

The Appraisal Mechanism

Spillover Effects of All-Cash Sales on Local Housing Markets

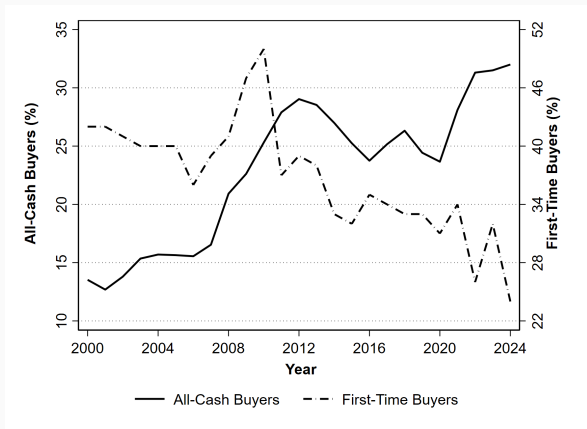
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Cash Buyers & The Mortgage Premium

The rise of cash buyers and declining first-timers (2000-2024):



Mortgage-financed buyers pay **an 11% premium** over cash buyers
(Reher and Valcanov, JF 2024; Han and Hong, RF 2024)

The Appraisal Mechanism

Consider a mortgage-financed home **surrounded by cash sales**

1. Discounted cash sales enter "**comparable sales (comps)**"
2. Appraisal value ↓ ⇒ **buyer's financing** ↓

Three competing hypotheses:

1. Buy puts more down ⇒ cash-bridged, successful deal
2. Buyer and seller renegotiate ⇒ price anchored to appraisal
3. Withdrawn buyer or failed negotiation ⇒ failure

Institutional details

Do cash sales in a mortgage-financed property's immediate vicinity impact its appraisal value, transaction price, and liquidity?

Three competing predictions:

1. Buy puts more down $\Rightarrow$ cash-bridged, successful deal
 - ▶ Appraisal (-), **price (unaffected)**, time-on-market (?)
2. Buyer and seller renegotiate $\Rightarrow$ price anchored to appraisal
 - ▶ Appraisal (-), **price (-)**, **time-on-market (+)**
3. Withdrawn buyer or failed negotiation $\Rightarrow$ failure
 - ▶ **Loan rejections (+)**

What this paper does

1. Adopt a ring-based identification strategy (Bayer et al., AER 2021)
2. Estimate impact on appraisal, price, and liquidity
3. Estimate impact on mortgage failure probability
4. A buyer-seller bargaining model mapping welfare

What this paper does

1. Adopt a ring-based identification strategy (Bayer et al., AER 2021)
 - ▶ Examine the effects of **very local cash buyer activity** (0.6 miles)
 - ▶ Control for comparable activity on **other nearby blocks** (1.2 miles)
2. Estimate impact on appraisal, price, and liquidity
3. Estimate impact on mortgage failure probability
4. A buyer-seller bargaining model mapping welfare

What this paper does

1. Adopt a ring-based identification strategy (Bayer et al., AER 2021)
2. Estimate impact on appraisal, price, and liquidity
 - ▶ Evidence supporting **successful renegotiation (H2)**
 - ★ One SD $\uparrow$ in nearby cash sales (25) $\implies$ ~ 1.4 pp $\downarrow$ in appraisal/price
 - ▶ Effects stronger for **disadvantaged** neighborhoods and buyers $\implies$ **information revelation**
3. Estimate impact on mortgage failure probability
4. A buyer-seller bargaining model mapping welfare

What this paper does

1. Adopt a ring-based identification strategy (Bayer et al., AER 2021)
2. Estimate impact on appraisal, price, and liquidity
3. Estimate impact on mortgage failure probability
 - ▶ Evidence supporting **the failure channel (H3)**
 - ★ One SD $\uparrow$ in nearby cash sales $\implies$ $\sim 23\text{pp}$ $\uparrow$ in mortgage rejection
4. A buyer-seller bargaining model mapping welfare

What this paper does

1. Adopt a ring-based identification strategy (Bayer et al., AER 2021)
2. Estimate impact on appraisal, price, and liquidity
3. Estimate impact on mortgage failure probability
4. A buyer-seller bargaining model mapping welfare
 - ▶ **Exclusion vs. lower cost of ownership**
 - ▶ **A net welfare loss** for neighborhoods with more **constrained buyers**

Sources: deeds, tax, and listings from CoreLogic merged with mortgage originations (and rejections) from HMDA **at the transaction level**

Primary Sample: 2018–2022

- Arms-length transactions; SF + townhomes
- No foreclosures, intra-family transfers, investor purchases; drop records with extremely low or high prices, building size, etc.
- Selection very close to Reher and Valcanov (2024)

Overview

- 6.2+ million records with transaction, listing, and loan information
- 2,074 counties and 76k tracts (90+% population)

Identifying Spillover from Nearby Cash Sales

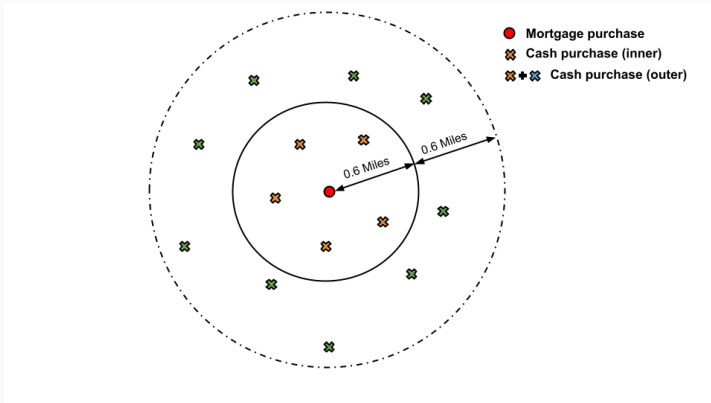
Goal: Identify causal effects of nearby cash sales on a focal mortgage-financed home's outcomes (appraisal, price, time-on-market)

Challenges:

1. Cash buyers are not randomly assigned to neighborhoods or transactions
2. Unobserved neighborhood-level factors simultaneously influence both cash buyer activity and housing outcomes

Strategy: a ring-based research design used extensively in identifying neighborhood effects and local spillovers

Ring-Based Research Design



Measure the effects of cash activity within the inner ring, while conditioning on activity in the wider band

Ring-Based Research Design

$$\log(Y_{i,t}) = \beta_1 C_{t-s:t}^{\text{inner}} + \beta_2 C_{t-s:t}^{\text{outer}} + \gamma X_i + \delta_{c(i),t} + \varepsilon_{i,t}$$

- $Y_{i,t}$: appraisal, price, or TOM of property i on date t
- $C_{t-s:t}^{\text{inner/outer}}$ = **cumulative count in cash sales** within 0.6/1.2 miles in a recent time period, $t - s : t$ ($s = 11$ months)
- $X_{i,t}$: property, buyer, and other transaction-level characteristics
- $\delta_{c(i),t}$: tract-by-year fixed effects

β_1 is the **net spillover effect** on a property of having cash sales in its immediate vicinity, beyond the **area-wide trends** captured by β_2

Identification Assumptions

A1: The sorting of nearby cash sales is quasi-random hyper-locally

A2: Neighborhood interactions are stronger at very local geographies

Identification Assumptions

A1: The sorting of nearby cash sales is quasi-random hyper-locally

- E.g., **limited ability to cherry-pick micro-locations** $\implies$ a property's immediate vicinity experiencing a cash sale is limited by timing and listing availability rather than a reflection of some unobserved “desirability” of that exact block
- **Testable:** The selection of cash sales into properties/blocks **does not vary significantly across the geographic scale**, following Bayer et al. (AER 2021)

A2: Neighborhood interactions are stronger at very local geographies

Identification Assumptions

A1: The sorting of nearby cash sales is quasi-random hyper-locally

A2: Neighborhood interactions are stronger at very local geographies

- Will find effects only if the response of focal property to cash activity is **stronger within the closer vicinity** than in the broader area (with implications for choosing the inner ring radius)
- Comps are predominantly **drawn from the immediate vicinity** so that appraisers have little reason to go outside the inner ring to find comparables

A1: Cash Sorting Does Not Vary by Geographic Scale

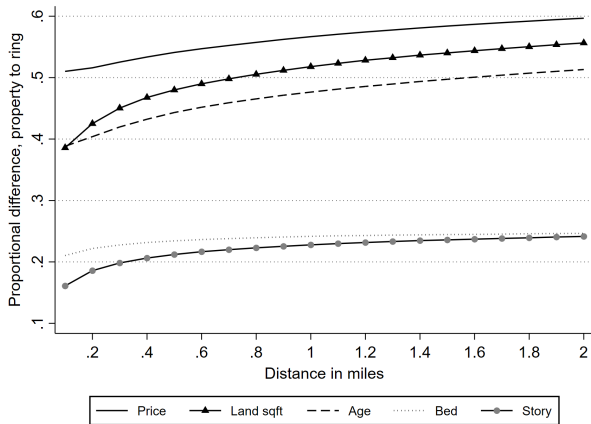
Step #1: Identify property-level selection of cash sales

- Cash buyers prefer **cheaper, younger homes with fewer bedrooms, larger living space, more land and parking** (conditional on tract-level characteristics) Property Selection

Step #2: Test to what degree cash sales sort by geographic proximity

- Compare a cash-purchased home's attribute x_i with the mean of those attributes within successive annuli of width d , $\bar{x}_{i,rd,(r+1)d}$ ($d = 0.1$ mile; $r = 1, 2, \dots, 20$)

Selection Does Not Vary Significantly by Geographic Scale



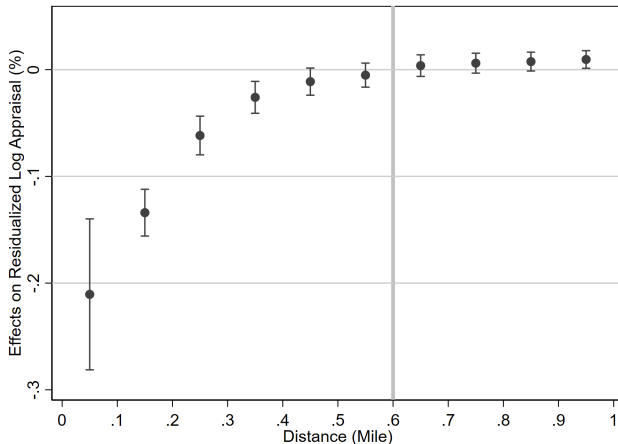
Cash-purchased properties are **only slightly less similar to their neighbors** 0.1-0.2 miles away relative to neighbors within 0.1 miles, and again slightly less to those 0.2-0.3 miles away, and so on

A2: Strong Hyper-Local Neighborhood Interactions

Test #1: Estimate the average treatment effect of nearby cash sales **in each concentric ring** (i.e., 0-0.1, 0.1-0.2, ..., 0.9-1 miles)

- See whether the effects **decay in distance**
- The point where the effects decay to zero suggests **the choice of the inner ring radius**

Decaying Average Treatment Effects



The effects decay dramatically along geographic scale and **fade around 0.6 mile** (i.e., a desirable cutoff to capture the full treatment effects)

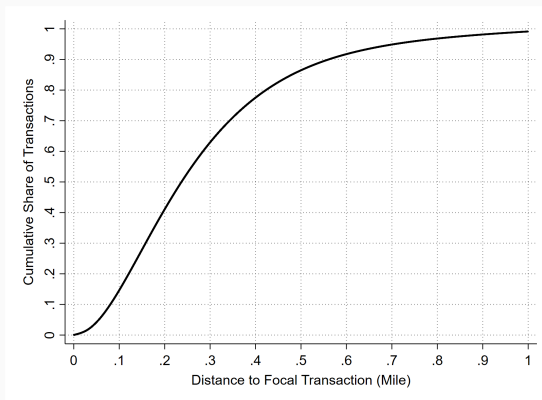
A2: Strong Hyper-Local Neighborhood Interactions

Test #2: Do appraisers draw comps from the immediate vicinity?

- Limitation: no available on comparable sales
- Following the industry standard, **manually construct comps** for each transaction
- Check the distribution of realistic comps across distance

Detailed Algorithm

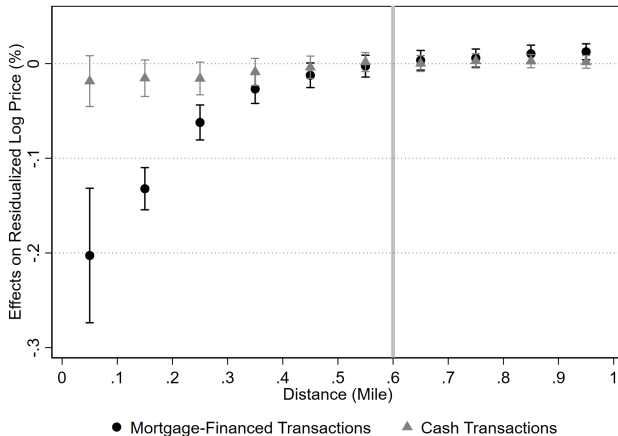
Most Imputed Comps Are Within 0.6 Mile



- **92.8%** realistic comps are within the 0.6-mile radius [PDF of Imputed Comps](#)
 - Most focal sales are matched with more than 10 nearby candidates with 1 mile → prioritizing closer and more recent candidates

Placebo Test Using Cash-Purchased Focal Properties

Use only **all-cash transactions** as the focal properties (where the appraisal friction should not operate) - the pseudo impact is negligible:



Summary: Evidence Supporting Internal Validity

1. Quasi-random exposure to cash sales

- ▶ Though cash buyers select at the property level, they don't significantly sort across the geographic scale

2. Average treatment effects decay in distance

- ▶ Effects decay to zero around 0.6, suggesting the choice of the inner ring radius

3. Most simulated comps are located within 0.6 mile

- ▶ Selected comps are indeed more similar in attributes, closer in distance and recency to the focal property

4. Placebo test shows little effects

Baseline Results

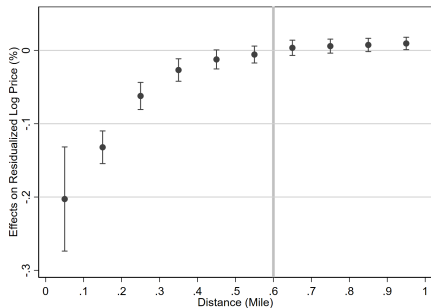
Baseline Results: Appraisal and Price

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Appraisal Values</i>			<i>Transaction Prices</i>		
# Cash sales						
within 0.6 miles	-0.0619*** (0.0054)	-0.0714*** (0.0056)	-0.0558*** (0.0047)	-0.0619*** (0.0054)	-0.0710*** (0.0057)	-0.0555*** (0.0048)
within 1.2 miles	0.0018*** (0.0002)	0.0018*** (0.0002)	0.0015*** (0.0002)	0.0018*** (0.0002)	0.0017*** (0.0002)	0.0012*** (0.0002)
# Mortgage sales						
within 0.6 miles		0.0077** (0.0015)	0.0076** (0.0013)		0.0075* (0.0015)	0.0074* (0.0014)
within 1.2 miles		-0.0014* (0.0007)	-0.0012* (0.0006)		-0.0004 (0.0006)	-0.0003 (0.0005)
List price			0.5917*** (0.0016)			0.5900*** (0.0016)
Observations	3,532,462	3,532,462	3,532,462	3,532,462	3,532,462	3,532,462
Tract-by-year FE	Y	Y	Y	Y	Y	Y
Property/Buyer/Loan Attributes	Y	Y	Y	Y	Y	Y

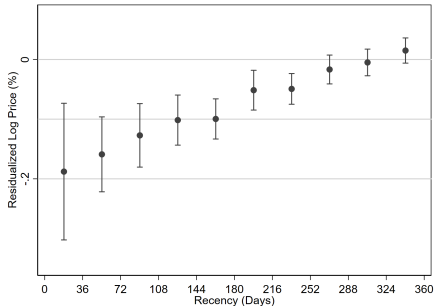
One SD $\uparrow$ in nearby cash sales (25) $\implies$ $\sim 1.4pp$ $\downarrow$ in appraisal/price [Full Table](#)

- Nearby mortgage sales don't have meaningful effects
- Listing price absorbs away $\sim 22\%$ of the magnitude on the inner-ring coeff

Decaying Effects in Distance and Recency



A: Distance



B: Recency

The effects from the immediate vicinity and those temporally closer

Baseline Results: Liquidity

	(1)	(2)	(3)	(4)
	<i>Days on Market</i>			
No. Cash Sales				
within 0.6 miles	5.56*** (0.25)	1.56*** (0.26)	1.50*** (0.26)	1.46*** (0.26)
within 1.2 miles	-0.03*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
List price	1.59*** (0.06)	21.54*** (0.24)	21.94*** (0.25)	21.87*** (0.25)
Tract-by-year FE		Y	Y	Y
Property characteristics			Y	Y
Buyer/Loan Controls				Y
R-squared	0.001	0.567	0.567	0.567
Observations	3,467,928	3,467,928	3,467,928	3,467,928

One SD $\uparrow$ in nearby cash sales (25) $\implies$ $\sim$ 38 days $\uparrow$ on market

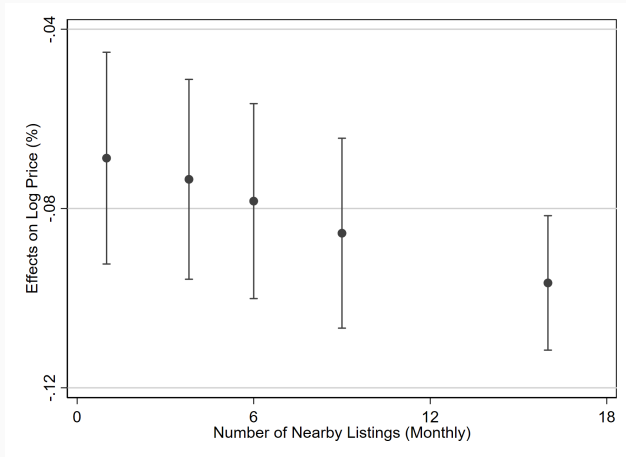
Motivation for Heterogeneity

- Evidence supports Hypothesis 2:
 - ▶ A successful renegotiation drives transaction price down to the depressed appraisal value
 - ▶ **A transfer from seller to buyer, or seller's WTP to avoid failure**
- The extent to which the price is negotiated depends on:
 - ▶ Buyer-seller bargaining power
 - ▶ Buyer's financial literacy
 - ▶ Asymmetric information (and how negotiations alleviate it)
 - ▶ ...

How do effects vary across market conditions, neighborhoods, and buyer attributes?

Heterogeneity

Bargaining Power: High vs. Low Inventory



Effects decay as nearby inventory rises - buyer having more outside options is bad for seller

Ex ante unclear: can negotiations help with **asymmetric information**?

1. Disadvantaged buyers would benefit from more information
2. Seller may negotiate more with less sophisticated, poorly informed, or more financially constrained buyers

Information Revelation

Ex ante unclear: can negotiations help with **asymmetric information**?

1. Disadvantaged buyers would benefit from more information
2. Seller may negotiate more with less sophisticated, poorly informed, or more financially constrained buyers

Result 1: price compression is stronger in **low-income, more affordable, low-growth neighborhoods with a higher minority population share**

Neighborhood Heterogeneity

Result 2: at the transaction level, **disadvantaged buyers** (e.g., first-time, minority buyers with lower income and higher leverage) benefit the most

Buyer Heterogeneity

Confirming that information revelation channel dominates!

Testing Hypothesis 3

Testing Hypothesis 3: Failure

I matched 26,514 **mortgage rejections** ("application approved but not accepted") to the deed-tax-listing-merged sample; run the following logistic-style regression:

$$\log\left(\frac{\Pr(\text{Fail}_{i,t} = 1)}{1 - \Pr(\text{Fail}_{i,t} = 1)}\right) = \beta_0 + \beta_1 C_{t-s:t}^{\text{inner}} + \beta_2 C_{t-s:t}^{\text{outer}} + \gamma X_i + \delta_t + \varepsilon_{i,t}$$

- $\text{Fail}_{i,t}$: an indicator of whether mortgage i in date t is rejected
- $C_{t-s:t}^{\text{inner/outer}}$ = cumulative count in cash sales within 0.6/1.2 miles in a recent time period, $t - s : t$ ($s = 11$ months)
- $X_{i,t}$: property, buyer, and other transaction-level characteristics
- δ_t : year fixed effects

H3: More Rejections with Nearby Cash Activity

	(1)	(2)	(3)	(4)
	Mortgage Rejection			
Regression coefficients				
No. Cash Sales				
within 0.6 miles	0.013*** (0.003)	0.013*** (0.003)	0.012*** (0.003)	0.012*** (0.003)
within 1.2 miles	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Average treatment effects				
No. cash sales within 0.6 miles				
Increase by one SD	-24.86%	-25.27%	-22.07%	-23.37%
Year FE		Y		Y
Property characteristics			Y	Y
Buyer/Loan Controls			Y	Y
Pseudo R-squared	0.002	0.013	0.102	0.108
Observations	481,109	481,109	481,109	481,109

One SD $\uparrow$ in nearby cash sales (19) $\implies$ ~ 23 pp $\uparrow$ in mortgage failure rate

- Effects stronger in lower-demand, lower-growth neighborhoods (where appraisal constraints are more likely to bind)

Welfare Implications

Differential Welfare for Low- Vs. High-Growth Neighborhoods

	Low Growth / Low Demand	High Growth / High Demand
Net welfare	Lower: misallocation & excluded buyers	Higher: near-efficient matching
Exclusion risk	High: appraisal caps bind	Low: appraisals track market
Avg. surplus / buyer	Unequal: cash gains; constrained = 0 if excluded	Competitive: small per-winner surplus but full participation
Takeaway	Cash spillovers can trigger an <i>appraisal trap</i> $\Rightarrow$ welfare loss	Cash in hot markets <i>not</i> welfare-detrimental; can aid price discovery

Full Model

- **Policy lens:** In low-demand areas, reduce appraisal/down-payment frictions; in hot markets, maintain appraisal accuracy and access for first-time buyers

Conclusion

Nearby cash sales tighten a mortgage-financed buyer's financing through the appraisal mechanism

- For a successful sale: (1) compressed price & (2) prolonged time-on-market
- For a mortgage application: increased rejection probability
- Heterogeneity results support the **information revelation channel**

Neighborhood composition matters for welfare: lower cost of ownership vs. exclusion

- Neighborhoods with mostly unconstrained buyers: a positive gain
- Those with many constrained buyers see a much lower gain and can even lose welfare on net

Thank You!

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Appendix

Institutional Details on Home Appraisals

Stylized facts on home appraisals

1. In mortgage approval, lenders determine **loan amount** based on the appraisal report
2. Residential appraisals mainly rely on recent **comparable sales**
3. By regulations, the source or type of financing **must not** influence an appraisal's outcome

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Table 1: Primary Sample Summary Statistics (2018–2022)

Variable	Mean	SD	Min	P25	P50	P75	Max
Sale Amount (\$)	307,654	167,512	6,351	187,000	269,900	386,765	1,300,000
Appraisal Values (\$)	308,224	166,754	5,000	185,000	265,000	385,000	1,005,000
Age	33	26	0	14	31	47	122
No. Bed	3.28	1	1	3	3	3	6
No. Bath	2.30	0	1	2	2	2	5
No. Stories	1.45	0	1	1	1	2	3
Land (Sqft)	16,776	21,350	1,065	6,599	9,749	16,553	168,577
Building (Sqft)	2,377	812	825	1,877	2,377	2,592	5,773
Parking (Sqft)	481	120	193	440	481	491	1281
Basement (Sqft)	750	120	120	750	750	750	1926
Income (000s)	99	61	23	57	83	124	409
LTV (%)	85	12	37	80	92	97	102
No. Observations	6,216,851						

Property Selection of Cash Buyers

- Column (1): mortgage-cash premium $\approx 11.3\%$
- Column (2): property attributes predictive of cash purchases
 - ▶ Cheaper, younger homes with fewer bedrooms, larger living space, more land and parking (conditional on tract-level characteristics)

	(1) Cash Indicator	(2) Log(Price)
Cash Indicator		-0.113*** (0.001)
Log(Price) Std	-0.124*** (0.001)	
Age Std	-0.006*** (0.000)	-0.091*** (0.001)
Bed Std	-0.005*** (0.000)	0.017*** (0.000)
Building Sqft Std	0.038*** (0.000)	0.188*** (0.001)
Land Sqft Std	0.009*** (0.000)	0.032*** (0.000)
Stories Std	-0.015*** (0.000)	-0.001 (0.000)
Parking Sqft Std	0.008*** (0.000)	0.030*** (0.000)
Basemen Sqft Std	-0.003*** (0.000)	-0.002*** (0.000)
Observations	8,303,958	8,303,958
Tract-by-Year FE	Y	Y
Other Hedonic Controls	Y	Y
R-squared	0.161	0.795

Summary Statistics for Each Ring

Table 2: Exposure to Nearby Cash Sales

Distance (miles)	Panel A: Number of Cash Sales		Panel B: Number of Housing Transactions	
	Mean	SD	Mean	SD
0.1	2	4	6	7
0.2	4	7	15	21
0.3	7	11	26	34
0.4	10	15	39	46
0.5	14	20	54	60
0.6	17	25	73	77
0.7	22	31	93	96
0.8	26	38	115	118
0.9	31	44	139	139
1.0	37	52	164	162
1.1	43	60	192	191
1.2	49	69	221	218
No. Observations			6,216,851	

Simulated Comps vs. Other Nearby Properties

Panel A: Summary Counts

No. Unique Pairwise Combinations	609,622,168
No. Unique Focal Transactions	3,816,516

Panel B: No. Nearby Transactions Matched Per Focal Transaction

	Mean	Std. Dev.	Min.	Max.	N
Imputed Comps	3.61	0.73	1	6	3,816,516
Other Nearby	156.11	123.57	1	2,373	3,816,516

Panel C: The Difference from Focal Transaction

	Mean	Std. Dev.	Min.	Max.	N
Group 1: Imputed Comps					
Similarity Score	0.38	0.35	0.01	3.72	13,683,225
Distance (Mile)	0.27	0.19	0	1	13,683,225
Recency (Day)	178.17	107.09	1	365	13,683,225
Building Age	5.21	9.99	0	125	13,683,225
Land Sq. ft.	4,011	19,186	0	145,547	13,683,225
Building Sq. ft.	348	396	0	2,390	13,683,225
No. Bed	0.19	1.26	0	5	13,683,225
No. Bath	0.18	0.50	0	4	13,683,225
Group 2: Other Nearby Transactions					
Similarity Score	1.19	0.50	0.01	3.72	595,938,943
Distance (Mile)	0.73	0.24	0	1	595,938,943
Recency (Day)	183.05	106.16	1	365	595,938,943
Building Age	15.24	19.09	0	125	595,938,943
Land Sq. ft.	7,583	29,128	0	189,150	595,938,943
Building Sq. ft.	831	827	0	4,727	595,938,943
No. Bed	0.72	1.90	0	5	595,938,943
No. Bath	0.73	0.94	0	4	595,938,943

An Algorithm for Simulated Comparable Sales

The industry standard (e.g., Zillow) of choosing comps is based on **distance, recency, and property attributes**

- Select ≥ 3 transactions within 0.25–0.5 mile (up to 1 mile) in the past 3–6 months (up to 1 year) with similar characteristics

An algorithm to manually construct comps:

1. Narrow down to potential comps traded within 1 mile & 1 year
2. Compute (dis-)similarity scores based on property attributes



$$S(i, j) = \sum_{k=1}^K w_k \cdot \frac{|x_{k,i} - x_{k,j}|}{\Delta_k}$$

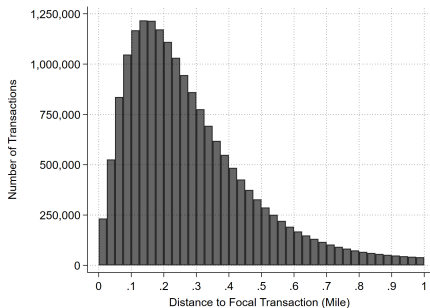
- ▶ $S(i, j)$: how dissimilar property j is to the subject property i

3. Selecting 3-4 final comps with top rankings

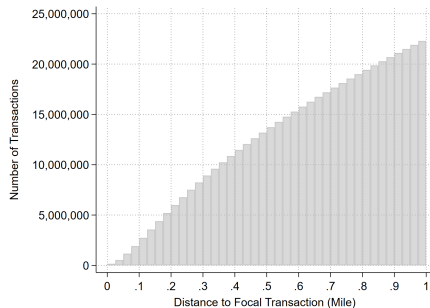
Comps vs. Non-Comps

- ▶ Prioritize closer, more recent candidates in the event of very close scores and similar key attributes (e.g., # bed, # stories must match)

CDF of Imputed Comparables Sales



A: Histogram of Imputed Comps



B: Histogram of Other Nearby Transactions

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Baseline Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Appraisal Values				Transaction Prices			
Regression coefficients (%)								
No. Cash sales								
within 0.6 miles	-0.1356*** (0.0085)	-0.0619*** (0.0054)	-0.0714*** (0.0056)	-0.0558*** (0.0047)	-0.1355*** (0.0086)	-0.0619*** (0.0054)	-0.0710*** (0.0057)	-0.0555*** (0.0048)
within 1.2 miles	0.0027*** (0.0003)	0.0018*** (0.0002)	0.0018*** (0.0002)	0.0015*** (0.0002)	0.0028*** (0.0003)	0.0018*** (0.0002)	0.0017*** (0.0002)	0.0012*** (0.0002)
No. Mortgage sales								
within 0.6 miles			0.0077** (0.0015)	0.0076** (0.0013)			0.0075* (0.0015)	0.0074* (0.0014)
within 1.2 miles			-0.0014* (0.0007)	-0.0012* (0.0006)			-0.0004 (0.0006)	-0.0003 (0.0005)
List price				0.5917*** (0.0016)				0.5900*** (0.0016)
Constant	12.5793*** (0.0008)	11.9753*** (0.0042)	11.9741*** (0.0042)	4.6383*** (0.0200)	12.5786*** (0.0008)	11.9856*** (0.0042)	11.9836*** (0.0043)	4.6689*** (0.0204)
Average treatment effects								
No. cash sales within 0.6 miles								
Increase by one SD	-3.38%	-1.55%	-1.93%	-1.39%	-3.37%	-1.55%	-1.91%	-1.38%
Increase from Q1 to Q3	-2.71%	-1.24%	-1.54%	-1.12%	-2.70%	-1.24%	-1.52%	-1.11%
Property characteristics		Y	Y	Y		Y	Y	Y
Buyer age	Y	Y	Y	Y	Y	Y	Y	Y
Buyer race	Y	Y	Y	Y	Y	Y	Y	Y
Loan type	Y	Y	Y	Y	Y	Y	Y	Y
Tract-by-year FE	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.714	0.818	0.818	0.845	0.705	0.808	0.808	0.834
Observations	3,532,462	3,532,462	3,532,462	3,532,462	3,532,462	3,532,462	3,532,462	3,532,462

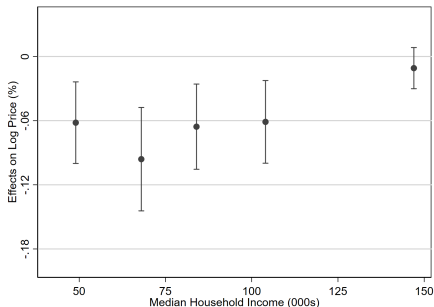
Summary Statistics of HPI Growth (2018-2022)

Table 3:

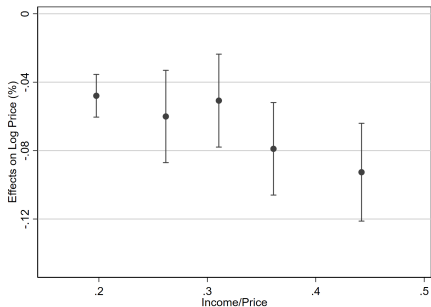
Year	Mean	SD	P10	P25	P50	P75	P90	N
2018	0.064	0.211	-0.120	-0.009	0.061	0.135	0.248	66,466
2019	0.051	0.208	-0.126	-0.021	0.048	0.122	0.238	66,466
2020	0.087	0.203	-0.084	0.016	0.083	0.156	0.268	66,466
2021	0.158	0.195	-0.021	0.079	0.154	0.232	0.341	66,466
2022	0.128	0.192	-0.059	0.049	0.128	0.210	0.314	66,466
Average	0.092	0.069	0.042	0.065	0.089	0.116	0.147	66,466

This table summarizes the house price indices (HPIs) estimated from hedonic regressions and aggregated to the annual level. The last row shows the summary statistics of the five-year average price growth across all 66,466 tracts.

Information Revelation (Neighborhood-Level)



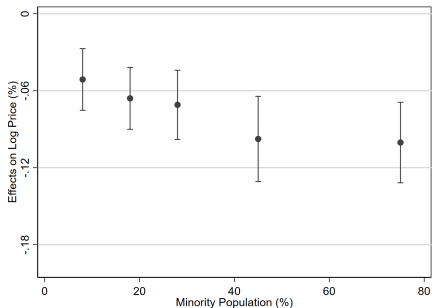
(a) Income



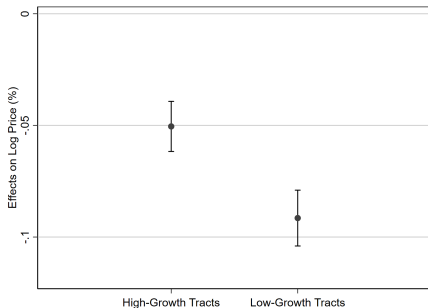
(b) Affordability

Affordable neighborhoods with lower median household income benefit the most from a successful negotiation

Information Revelation (Neighborhood-Level)



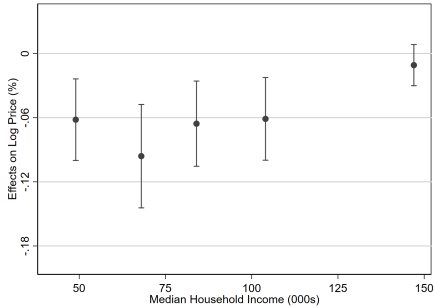
(a) Income



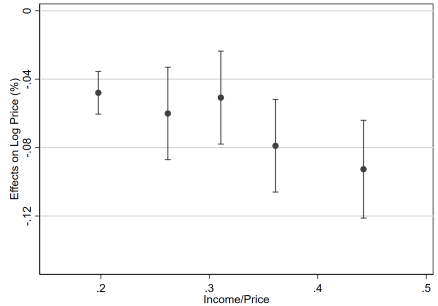
(b) Affordability

Lower-growth, lower demand neighborhoods with more minority population benefit the most from a successful negotiation

Information Revelation (Buyer-Level)



(a) Income

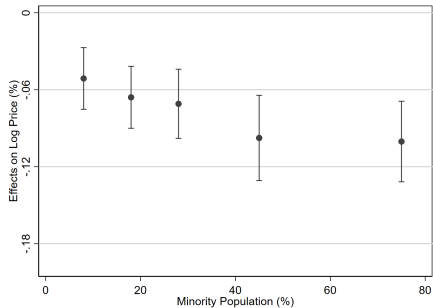


(b) Affordability

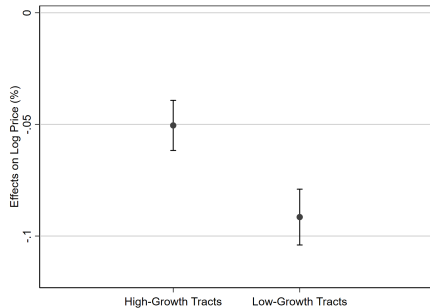
Lower-income, first-time home buyers benefit the most from a successful negotiation

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Information Revelation (Buyer-Level)



(a) Income



(b) Affordability

Minority home buyers and buyers using a higher loan-to-value ratio benefit the most from a successful negotiation

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Model Setup: Neighborhood Welfare Tradeoff

- **Environment:** Neighborhood with N houses and two buyer types:
 - ▶ **Unconstrained (cash):** No financing frictions, can pay in full
 - ▶ **Constrained (mortgage):** Face **appraisal cap** $P_i \leq W_i + \lambda A_t$
- **Cash spillover effect:** Nearby cash transactions at discounted prices $\downarrow$ appraised values A_t
- **Welfare channels:**
 - ▶ **Benefit:** Cash buyers gain surplus from lower purchase price
 - ▶ **Cost:** Constrained buyers excluded or forced to bring extra equity
- **Tradeoff:** Net welfare depends on buyer composition:
 - ▶ More cash buyers $\Rightarrow$ larger price discounts, fewer excluded
 - ▶ More constrained buyers $\Rightarrow$ more exclusion, lower aggregate welfare

Low Growth / Low Demand Neighborhood

- **Market conditions:** Weak demand, sparse sales $\Rightarrow$ discounted cash transactions push down appraisals A_t
- **Financing binds:** Low $A_t \Rightarrow$ tight mortgage cap
 $P_i \leq W_i + \lambda A_t \ll v_i$
- **Tradeoff: Cheaper prices** benefit cash buyers (buy at $P < v_i$); **exclusion/misallocation** for constrained high- v buyers (cannot bridge appraisal gap).
- **Dynamic:** Appraisal constraint – discounted $P_t \downarrow \Rightarrow A_{t+1} \downarrow \Rightarrow$ future P_{t+1} capped
- **Welfare:** Lost surplus from excluded buyers + misallocation (home not going to highest- v) $\Rightarrow$ **lower neighborhood buyer welfare**

High Growth / High Demand Neighborhood

- **Market conditions:** Strong demand, rapid turnover; frequent high- P comps keep A_t in line with fundamentals
- **Frictions minimal:** $P_i \leq W_i + \lambda A_t \approx v_i$; buyers can bid near true v (cash or with appraisal-gap coverage)
- **Outcome:** Bidding competes prices to v ; allocation close to efficient; little exclusion at the micro level
- **Welfare:** Nearly all buyer surplus realized via efficient matching; cash presence does **not** depress A_t and can speed price discovery