Is the Rent Too High?
Land Ownership and Monopoly Power

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Views and opinions expressed here reflect those of the authors and do not necessarily reflect those of the FDIC or the United States.

Is Housing Supplied Monopolistically?

- Location is an inherently differentiated good controlled by a single landlord
  - Housing *could* be monopolistic Smith (1776); Ricardo (1817); Chamberlin (1933)
  - Final necessary feature is downward sloping location demand
- In urban economics, land is developed competitively: $P = MC$
  1. Wedges between P and MC assumed to be policy (zoning) Glaeser Gottlieb (2008)
     Pricing power is a supply constraint
  2. Estimates of housing supply function Combes, Duranton, Gobillon (2021)
  3. Counterfactuals in models with housing Ahlfeldt, Redding, Sturm, & Wolf (2015); Severen (2021); Brinkman and Lin (2020)
     Endogenous markups impact the supply response
  4. Policy interactions: Zoning, ownership concentration, redevelopment subsidies, and rent control Mayo (1981); Gyourko & Voith (2000)

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- We ask: (1) What are the theoretical consequences of monopoly ownership of land and housing, and (2) Is pricing power an empirically relevant force in housing?
- Pricing power:
  1. reduces building size, inhibits redevelopment, and increases vacancy
  2. provides a rationale for redevelopment subsidy, ownership constraints, and interacts with zoning constraints
  3. is *empirically relevant:* cost-rent pass-through & concentration patterns consistent with pricing power; markups are at least a tenth of prices of new structures

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- We build a model of housing supply in the presence of pricing power, where
  - Pricing power coexists w/ inelastic short-run supply + policy restrictions
  - Endog. supply distortions: (1) Units are withheld, (2) Buildings are smaller (3) Redevelopments are less frequent
- Assess new policy implications
  1. Development incentives w/ rent commitments can broadly improve welfare
  2. Zoning restrictions increase pricing power *across* buildings
  3. Concentration can increase rents *across* buildings
- Is pricing power *empirically* relevant?
  1. Data: NYC Rental Buildings
  2. Pass Through of Idiosyncratic Cost Shocks
     $\approx 110\%$ of cost shock passed onto rents, inconsistent w/ pure competition
  3. Rent-HHI regressions (non-causal)
     $\rightarrow$ Census tract ownership concentration associated w/ higher rents *across* buildings
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     $\rightarrow$ Estimated demand model implies markups *at least a tenth* of building rent

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Theory: Set Up

- **City**: $j \in \mathcal{A}$ discrete buildings with location amenities a_j
- Conceptualize pricing power in the presence of
  - *Short-run* supply constraints: housing is durable, rebuilding to fit demand is costly, landlords' supply may not fit demand
  - *Long-run* constraints: zoning restrictions may impede market clearing at optimal quantities as well
- Three agents:
  - ***Policy-constrained* Developers**: $d \in \mathrm{D}$ own parcels with buildings; can either redevelop (at a cost) or leave as-is and then sell to landlords
  - ***Supply-constrainted* Landlords**: $f \in \mathrm{F}$ bid to buy parcels and the right to lease space to renters
  - **Renters**: $i \in M$ mass of renters with utility defined over consumption and amenities $\rightarrow$ declining (residual) inverse demand for each parcel: $D_a(q_a)$

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Theory: Supply Side

Developer problem:

$$\pi_a^{\mathsf{d}} = \max_{\mathbb{1}_{redev}, q_{a,1}} \begin{cases} s_a(a, q_{a,0}) & \text{if } \mathbb{1}_{redev} = 0 \\ s_a(a, q_{a,1}) - C_a^{\mathsf{d}}(q_{a,1}) + \mathsf{S}_a & \text{if } \mathbb{1}_{redev} = 1 \end{cases}$$

$$\text{s.t. } q_{a,1} \leq q_{a,z},$$

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$$\pi_a^{\mathsf{f}} = r_a \cdot q_a^{\mathsf{f}} - C_a^{\mathsf{f}}(q_a^{\mathsf{f}}) - s_a \quad \text{s.t.} \quad q_a^{\mathsf{f}} \leq q_{a,\mathsf{d}},$$

- If $q_{a,f}^* < q_{a,0}$: $1_{redev}^* = 0$, Landlords withhold units, price at MU over $c_a^f(q_a, f)$
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Would Landlords Really Withhold Existing Units?

Technology

Rent Going Up? One Company's Algorithm Could Be Why.

by Heather Vogell, ProPublica, with data analysis by Haru Coryne, ProPublica, and Ryan Little

Oct. 15, 5 a.m. EDT

RealPage claims its software will increase revenue and decrease vacancies. But at times the company has appeared to urge apartment owners and managers to reduce supply while increasing price.

During an earnings call in 2017, Winn said one large property company, which managed more than 40,000 units, learned it could make more profit by operating at a lower occupancy level that "would have made management uncomfortable before," he said.

Theory: Redevelopment

New monopoly margin of reduced quantity: redevelopment failure

- Redevelopment occurs only if :

$$\underbrace{\left[r_a(q^*_{a,1}) \cdot q^*_{a,1} - C^{\mathrm{d}}_a(q^*_{a,1})\right] - \left[r_a(q^*_{a,0}) \cdot q^*_{a,0} - C^{\mathrm{d}}_a(q^*_{a,0})\right]}_{\Delta\text{Monopoly Profits from Redevelopment}} > \underbrace{C^{\mathrm{d}}_a(q^*_{a,0})}_{q_0 \text{ Reconstruction Cost}}$$

- Note that *Social Surplus* = Surplus of Developer+Landlord+Renter
  $\neq$ monopoly profits

- If demand is downward sloping, then
  Δ Net Social Surplus *always greater than* Δ Monopoly Profit

  $\Longrightarrow$ $\exists$ buildings where city planner wants redevelopment but developer / landlord does not: ΔNet Social Surplus $> 0 >$ ΔMonopoly Profit

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Policy: Redevelopment Subsidies

Prop.1 A subsidy equal to the reconstruction cost paired with an avg. rent ceiling equal to initial rent minus initial average cost is (i) implementable, (ii) reduces local redevelopment failure, and (iii) is locally social welfare improving.

- Local redevelopment subsidies are extremely common
  - Paired with requirements for below-market rate housing
  - Generally considered equity-based
  - Redevelopment failure introduces an efficiency argument for such programs

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Policy: Redevelopment Subsidies, Concentration, and Zoning

Prop.2 Greater zoning constraints on a given building increases monopoly markups at unzoned building

Prop.3 Greater ownership concentration of a given landlord increases monopoly markups of rival landlords

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But how important are monopoly forces?

Data: Data Sources

- We collect public data on all NYC buildings from 2007-2019
  - Subset data to rental buildings with 4+ units, single-use residential
  - Observe: location, ownership, zoning, number of units, lot, renovation year, rent regulations, assessments, building income ($= r_a$), age, structure type, avg. unit size
  - Do not observe occupancy; impute at block-group level using ACS

- Building data sources and dataset names:
  - Dept of Planning: Primary Land Use Tax Lot Output (PLUTO), Dept of Finance: Final Assessment Roll (FAR), Dept of Housing Preservation & Development: Multiple Dwellings Registration and Contacts (MDRC), Web-scraped dataset: Notice of Property Value (NPV)

Map

1. Pass Through as Market Power Test

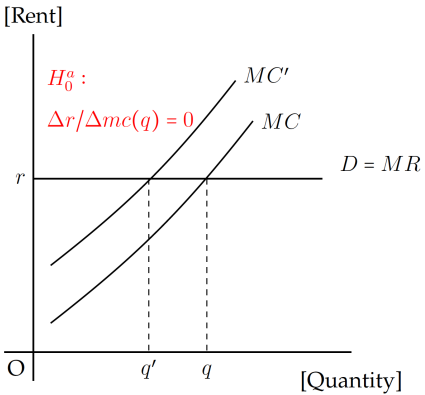


Figure: Perfectly Elastic Demand

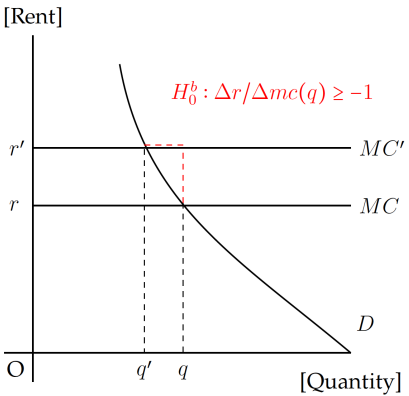


Figure: Finitely Elastic Demand

1. Pass Through as Market Power Test

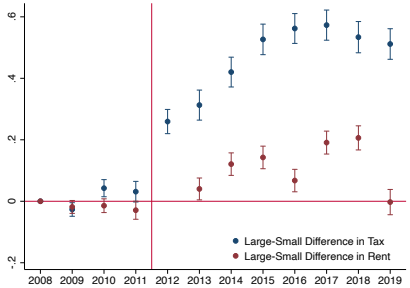
- $H_0^a : \Delta r / \Delta mc(q) = 0$
  $\rightarrow$ idiosyncratic shocks *cannot* be passed onto rents
  $\rightarrow$ can test this directly with Reduced Form regression of shock on rent

- Institutional details:
  - Prior to 2011, NYC assessed all buildings using gross income
  - 2011 (for 2012) NYC taxed 11+ unit buildings based on building-specific "capitalization rates"
  - Cap rates are calculated from a formula whose parameters change annually
  - Parameters target median building's tax increase
- Strategies:
  1. 3-Dif exploiting 2011 change
  2. IV using predicted tax + annual formula changes

1. Pass Through: Triple Difference

- In 2011 (for 2012), taxes for large (11+ unit) buildings became based on a capitalization rate formula
- This shifted the tax burden onto larger buildings
- Strategy: compare changes in rents for large and small buildings before and after change

Figure: Tax Burden Pass-through



1. Pass Through: IV

We create a synthetic tax instrument based on initial property value and assessment procedure changes:

- Construction: we use initial building income & characteristics, and then apply these arguments to changing assessment procedures for counterfactual property taxes: $Z_{jgt}^{\text{Tax}} = T_{gt}(X_{jg0})$
- Variation: mechanical effect of tax rate increase $\rightarrow$ higher cost to landlord

Table 2: The Pass-through of Costs Rent

	$\ln[\text{Average } r_{j,g,t}]$			
	Reduced Form		2SLS	
	(1)	(2)	(3)	(4)
Log Cf Tax	0.03	0.03		
	(0.00)	(0.00)		
Log Total Cost			1.25	1.25
			(0.11)	(0.11)
Robust F Stat			48.46	53.47
Robust AR Stat			96.56	107.81
One-Side Test			0.01	0.01
Time-varying controls	N	Y	N	Y
Tract-year FEs	Y	Y	Y	Y
Building FEs	Y	Y	Y	Y
Observations	195,194	195,192	113,024	113,023

2. Rent-HHI Correlations

Measures association between *rival* ownership concentration and own rents

- Prop.3 predicts that coefficient is positive
- Leave-Out HHI in Census tract $\approx$ concentration *around* building
- Compare 10-year change in concentration: 2009 vs 2019
- Controls: Tract / Building FEs, plus time-varying features

We find that a 10% increase in rival-HHI leads to 0.5% increase in Avg.Rent

▸ Table

3. Quantification Exercise: Demand Estimation

- Prior literature estimates housing demand elasticity
- Profit max implies building own-price elasticity key to price setting
- Markup set by Lerner / inverse elasticity rule:

$$\frac{r_j - c_j}{r_j} = \frac{-1}{\varepsilon_j} > 0 \tag{1}$$

- This is true only for redeveloped buildings not at a zoning constraint
- Use methods from discrete choice literature to estimate building level demand
  Berry (1994); BLP (1995); Bayer, Ferreira, & McMillan (2007); Ghandi & Houde (2018); Davis et al. (2021)
- Calculate OPEs for all buildings then use unconstrained, newly redeveloped sample to calculate markups

3. Quantification Exercise: Demand Estimation

- Estimation equation from logit demand.

$$\ln[\mathbf{s}_{jbt}] - \ln[\mathbf{s}_{0bt}] = \beta_0 + \beta_1 \cdot X_{jbt} + \alpha_{bt} \cdot \mathbf{r}_{jbt} + \delta_{jbt},$$

  X_{jbt}: average square feet, building age, years since renovation, distance to subway, tract-year FEs, % rent stabilized

- Parameter of interest is α_{bt}: utility parameter on rent $\rightarrow$ OPE
  $\rightarrow$ (for a subset of buildings) Markup over $c_a^{\mathsf{d}} + c_a^{\mathsf{f}}$
- Standard issue is unobserved amenities: $\text{Cov}(r_{jbt}, \delta_{jbt}) \neq 0$

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3. Quantification Exercise: Demand Estimation

- IV: Two sources of rent variation: Rent = Marginal Cost + Markup

  1. Competition: 'BLP instruments' based on rival buildings ▸ Details
  2. Costs: Synthetic tax instrument using assessment procedure changes
  3. Costs: Historic building costs (Barr, 2016)) ▸ Details

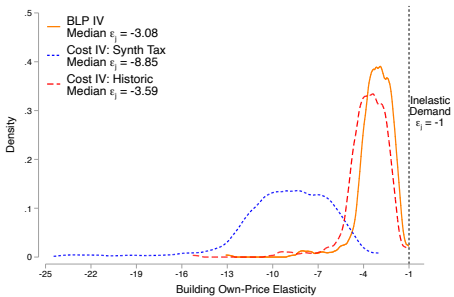
3. Quantification Exercise Results

	OLS (1)	BLP (2)	Tax (3)	Historic Costs (4)
α	1.01	-12.72	-36.61	-14.85
	(0.11)	(2.54)	(2.68)	(2.19)
Robust F Stat	-	57.54	233.15	33.50
Robust AR Stat for Rent	-	56.81	1468.04	101.59
Observations	354,435	354,435	183,210	336,139
Med(ε_{jbt})	0.18	-2.22	-6.40	-2.60
Med(ε_{jbt} | Unconst., New)	0.24	-3.08	-8.85	-3.59
Pct Elastic	0.00%	1.00%	1.00%	1.00%
Med(L_{jbt} | Unconst., New)	0.00	0.33	0.11	0.28
Avg(ε_{bt}^{Agg})	0.05	-0.59	-1.70	-0.69

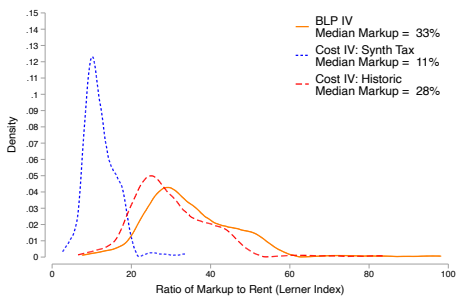
3. Quantification Results: OPEs & Markups

Figure: Distribution of Results

(a) Own-Price Elasticity



(b) Markup as a Percent of Rent



Conclusion

- We model pricing power in the urban context
- Pricing power interacts with urban policies: (existing) Redevelopment Subsidies, Zoning, and (new) Concentration
  - Redevelopment Incentives and rental ceiling can increase welfare (Prop 1)
  - Monopoly-induced zoning spillovers raise pricing power (Prop 2)
  - Rents positively correlated with local concentration (Prop 3)
- Evidence of market power using pass through of cost shocks onto rents, increasing concentration is correlated with increasing rent, and estimates of OPEs imply markups are at least a tenth of rent in NYC

Appendix

Table 3: The Relationship Between Ownership Concentration and Rent

	$\ln[\text{Average } r_{j,g,t}]$					
	(1)	(2)	(3)	(4)	(5)	(6)
Log Leave-Out Tract HHI	-0.02	0.04	0.05	-0.00	0.03	0.05
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Log Owner Share in Tract				-0.04	-0.01	0.01
				(0.00)	(0.00)	(0.01)
Time-varying controls	Y	Y	Y	Y	Y	Y
Borough FEs	Y	N	N	Y	N	N
Tract FEs	N	Y	N	N	Y	N
Building FEs	N	N	Y	N	N	Y
Observations	71,505	71,448	48,748	71,505	71,448	48,748

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Table A5: Additional Demand Estimation Results

	OLS (1)	IV: BLP (2)	IV: TAX (3)	IV: Historic (4)
ε	0.33	-4.2	-9.6	-2.4
	(0.03)	(0.53)	(0.87)	(0.75)
Wald F Stat	–	15.0	149.0	15.9
AR Stat for Log Rent	–	22.0	1,654.7	130.1

Note: The table displays parameter estimates from log-log demand models. We estimate the (1) OLS regression and three 2SLS regressions using predicted expenses (2) BLP IVs, (3) the counterfactual tax IV, and (4) historic building costs. All models include Census tract-year fixed effects, along with controls for log distance to nearest subway station, log age, log years since renovation, log average unit square-feet, and an indicator for having an elevator. Standard errors are clustered by Census tract and the first stage F statistics and the Anderson-Rubin F statistic for the estimated coefficients are cluster robust as well.

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3. Quantification Exercise: BLP IVs

IV Strategy 1: 'BLP' Instruments Back

- Gandhi and Houde (2018) Differences between competitor buildings' amenity value and own (controlling for own):

$$\sum(X_{j'bt} - X_{jbt})^2$$

- Using: years since renovation, average square feet
- Drop buildings j' within 1km of j
- Calculate optimal instrument: use all instruments to predict r_{jbt}

3. Quantification Exercise: Historic IVs

IV Strategy 2: Historic Instruments Back

- Long term interest rates in year of construction
- Housing rent yields in year of construction
- Both from Jordà-Schularick-Taylor Macrohistory Database
- We aim to augment these with historic construction cost indices and real estate tax rates

Data: Rent and HHI

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Figure 1: Distribution of New York City Rents & Concentration