Is the Rent Too High?
Land Ownership and Monopoly Power

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AREUEA - JSP

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Overview

- Location is an inherently differentiated good controlled by a single landlord
  - Housing *could* be monopolistic Smith (1776); Ricardo (1817); Chamberlin (1933)
  - This possibility is generally ignored in most models with housing
- We ask: (1) What are the theoretical consequences of monopoly ownership of land and housing, and (2) Is monopoly power an empirically relevant force in housing?

Monopoly 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 monopoly power; markups are at least a fifth of prices of new structures

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This Paper

- We build a model of housing supply in the presence of monopoly power, where
  - Monopoly 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 monopoly power *across* buildings
  3. Concentration can increase rents *across* buildings
- Is monopoly power *empirically* relevant?
  1. Data: NYC Rental Buildings
  2. Pass Through of Idiosyncratic Cost Shocks
     → over 80% of cost shock passed onto rents, inconsistent w/ pure competition
  3. Rent-HHI regressions (non-causal)
     → Census tract ownership concentration associated w/ higher rents *across* buildings
  4. Quantification Exercise
     → Estimated demand model implies markups *at least a fifth* of building rent

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Implications

1. New *source of supply constraints:*
   - Existing papers consider policy to be a primary source of distortion (Glaeser Gyourko 2018, Jedwab et al 2021)
   - Other literatures discuss the costs of redevelopment (Siodla 2015, Brooks and Lutz 2016, Hornbeck and Keniston 2017)
   - Monopoly means lower quantities and higher prices
2. The existence of meaningful monopoly power has implications for *measurement:*
   - Housing supply function Combes, Duranton, Gobillon (2021)
   - Counterfactuals depend on supply elasticities Ahlfeldt, Redding, Sturm, & Wolf (2015); Severen (2021) Brinkman and Lin (2020)
3. *Policy:* Land use policies may have different effects in the presence of markups Mayo (1981); Gyourko & Voith (2000)

Theory: Set Up

- **City**: $j \in \mathcal{A}$ discrete buildings with location amenities a_j
- 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
    $\rightarrow$ subject to long-run constraints (e.g., zoning)
  - ***Supply-constrained* Landlords**: $f \in \mathrm{F}$ bid to buy parcels and the right to lease space to renters
    $\rightarrow$ subject to short-run capacity constraints (e.g., fixed cost of construction)
  - **Renters**: $i \in M$ mass of renters with utility defined over consumption and amenities
    $\rightarrow$ declining (residual) inverse demand for each parcel $r_a(q_a)$
- **Market Clearing**: Rents, Occupancy, and Redevelopment decisions such that renters do not want to change locations and developers and landlords cannot increase profit

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Theory: Supply Side

Developer problem:

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

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

Landlord problem:

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

- If $q_a^{\mathsf{f}*} < q_{a,0}$: $1^*_{redev} = 0$, $r_a^* > c_a^{\mathsf{f}}(q_{a,0})$, Landlords withhold units
- If $q_a^{\mathsf{f}*} = q_{a,0}$: $1^*_{redev} = 0$, Landlords price at $D_a(q_{a,0})$ (corner solution)
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Theory: Redevelopment

Third margin of reduced quantity: redevelopment failure

- Redevelopment occurs only if (ignoring C^f):
$$\underbrace{\left[r_a(q^*_{a,1}) \cdot q^*_{a,1} - C^d_a(q^*_{a,1})\right] - \left[r_a(q^*_{a,0}) \cdot q^*_{a,0} - C^d_a(q^*_{a,0})\right]}_{\Delta\text{Monopoly Profits}} > \underbrace{C^d_a(q^*_{a,0})}_{q_0 \text{ Reconstruction Cost}}$$
- *Social Surplus* = all three agent's combined surplus $\neq$ monopoly profits
- Δ Net Social Surplus *always greater than* Δ Monopoly Profit
if downward sloping demand

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

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Policy: Redevelopment Subsidies, Concentration, and Zoning

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.

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

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 2007-2015
  - 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

Data: Sample

NYC rental market is heavily *regulated*:

- $\approx 75\%$ of single-use buildings are zoning constrained
- $\approx 50\%$ of residential units are rent stabilized
- Landlords at corner solution $\rightarrow$ markup rule not relevant
- We use model to identify buildings where Lerner Rule applies

NYC neighborhoods are heavily *concentrated*:

- Avg Tract HHI 0.18 (steady across years)
- At least one-third of tracts have 'moderate concentration' (HHI$>$0.15)
- At least one-fifth of tracts have 'high concentration' (HHI$>$0.25)

1. Pass Through as Market Power Test

- Under *pure competition* landlords lack market power
  $\rightarrow$ idiosyncratic shocks *cannot* be passed onto rents
- *Market* level shocks can pass through
  $\rightarrow$ use Building & Tract-Year FEs
- Reduced Form Test - regress log rent directly on the measures:
  $\ln[r_{jgt}] = \pi_0 + \pi_1 Z_{jgt} + \pi_2 X_{jgt} + \pi_3 D_j + \pi_4 D_{gt} + \nu_{jgt}$
- 2SLS Test - instrument log average total cost using Z:
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1. Pass Through IVs

- 'Tax' - Changes to property tax based on assessment procedure changes
  - Construction: Effective tax rate for each year using contemporaneous assessment procedures for but fixed building characteristics and income
  - Variation: mechanical effect of tax rate increase $\rightarrow$ higher cost to landlord

- 'Expenses' - Changes to building expenses based on building age groups
  - Construction: Calculate age-group & year specific leave-one-out averages of expenses per unit
  - Variation: cold winter $\rightarrow$ particularly high cost year for all pre-wars

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	ln[Average $r_{j,g,t}$]			
	(1)	(2)	(3)	(4)
	Full Sample		Unconstrained Sample	
	Panel (A): Reduced Form			
ln[predicted tax]	0.098		0.096	
	(0.006)		(0.017)	
ln[predicted expenses]		0.090		0.112
		(0.013)		(0.034)
Time-varying controls	Y	Y	Y	Y
Tract-year FEs	Y	Y	Y	Y
Building FEs	Y	Y	Y	Y
Observations	217,915	238,650	12,359	15,868
	Panel (B): Instrumental Variable			
ln[total expenses]	0.810	0.883	0.8913	1.292
	(0.119)	(0.252)	(0.574)	(1.41)
Instrumental variable:	Tax	Expenses	Tax	Expenses
F-stat	29.55	6.43	1.00	0.47
Time-varying controls	Y	Y	Y	Y
Tract-year FEs	Y	Y	Y	Y
Building FEs	Y	Y	Y	Y
Observations	64.543	68,338	2,059	2,380

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
- Controls: Building FEs and Tract-Year FEs, plus time-varying features

We find that a 10% increase in rival-HHI leads to 1% 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:

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

- 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)

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, years since renovation, distance to subway, tax abatement indicators, tract-year FEs, age group 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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- Standard issue is unobserved amenities: $\text{Cov}(r_{jbt}, \delta_{jbt}) \neq 0$

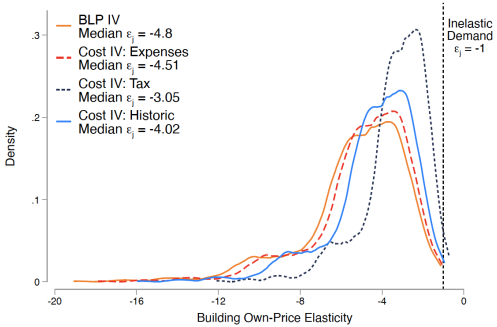
3. Quantification Exercise: Demand Estimation

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

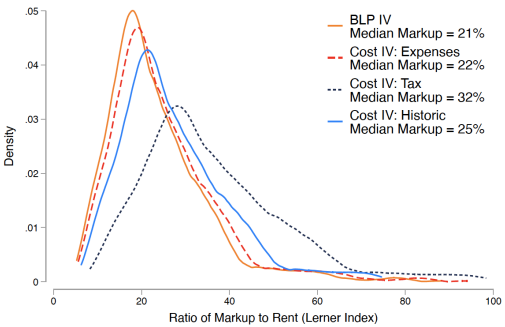
  1. Costs: Age based leave-out-average of building expenses
  2. Costs: Synthetic tax instrument using assessment procedure changes
  3. Costs: Historic borrowing costs (long run building costs) ▸ Details
  4. Competition: 'BLP instruments' based on rival buildings ▸ Details

Quantification Results: OPEs & Markups

(a) Own-Price Elasticity



(b) Markup as a Percent of Rent



▸ Table

Conclusion

- We model monopoly power in the urban context
- Monopoly 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 monopoly 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 fifth of rent in NYC

Appendix

Table A3: Example Mapping of Market Value to Income

y	GIM_{Low}	GIM_{High}	m	Y_j
$[y_1, y_2]$	$\frac{m_1}{y_1}$	$\frac{m_2}{y_2}$	$[m_1, m_2]$	$= MV_j \cdot \frac{y_2}{m_2}$
$[y_2, y_3]$	-	$\frac{m_3}{y_3}$	$[m_2, m_3]$	$= MV_j \cdot \frac{y_3}{m_3}$
$[y_3, y_4]$	-	$\frac{m_4}{y_4}$	$[m_3, m_4]$	$= MV_j \cdot \frac{y_4}{m_4}$

Note: This table provides a simplified example of the Gross Income Multiplier (GIM) method used by the NY DOF that we utilize to infer building income from observed building market value. For 80% of our multi-year sample, we observe both market value and income, which we use to estimate the GIM for the remaining properties, as described in the main text.

Table A1: Match Rate Across Boroughs

	BK	BX	MN	QN
2008	0.79	0.82	0.81	0.80
2009	0.80	0.83	0.83	0.81
2010	0.83	0.86	0.86	0.84
2011	0.83	0.87	0.87	0.84
2012	0.84	0.89	0.87	0.85
2013	0.85	0.88	0.87	0.85
2014	0.84	0.89	0.87	0.84
2015	0.84	0.88	0.87	0.84

Note: 2008-2015 NYC residential buildings with 4+ units. Data from DOF, PLUTO, MDRC files. Match rate between reported owner from PLUTO & FAR and MDRC owner name.

Table: The Relationship Between Ownership Concentration and Rent, Unconstrained buildings

	ln[Average $r_{j,g,t}$]					
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln[HHI_{f(j),g,t}]$	0.034	0.123	0.097	0.034	0.124	0.092
	(0.014)	(0.057)	(0.037)	(0.017)	(0.056)	(0.037)
$\ln[s_{g,t}^{f(j)}]$				0.018	0.002	-0.020
				(0.013)	(0.011)	(0.013)
Borough FEs	Y	N	N	Y	N	N
Tract FEs	N	Y	N	N	Y	N
Building FEs	N	N	Y	N	N	Y
Year FEs	Y	Y	Y	Y	Y	Y
Observations	13,639	13,563	12,734	13,639	13,563	12,734

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Table A6: Additional Demand Estimation Results

	OLS	IV: Cost Expenses	IV: Cost Land Value
	(1)	(2)	(3)
		First Stage Equation	
β^{FS}	–	0.02	0.03
	–	(0.00)	(0.00)
Wald F Stat	–	76.9	477.7
First Stage Eff.F Stat	–	23.1	51.1
AR Stat for Log Rent	–	64.4	27.1
		Structural Equation	
ε	-0.04	-2.37	-2.23
	(0.01)	(0.53)	(0.54)

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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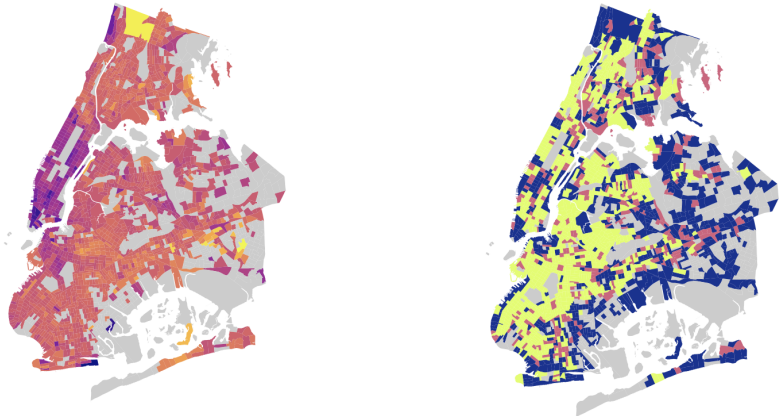
Figure 1: Distribution of New York City Rents & Concentration



3. Quantification Exercise Results

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	OLS	IV:BLP	IV: Cost Expenses	IV: Cost Synthetic Tax	IV: Cost Historic
	(1)	(2)	(3)	(4)	(5)
α	-0.41	-18.01	-16.90	-11.43	-15.08
	(0.06)	(3.91)	(4.84)	(0.50)	(6.91)
WIVR Conf. Set	–	$(-29.2, -12.2)$	$(-35.5, -10.7)$	$(-9.2, -8.0)$	$(-\infty, -41.7)$
First Stage Eff.F Stat	–	30.12	13.72	1835.62	7.70
AR Stat for Rent	–	93.20	75.26	758.99	34.92
Med(ε_{jbt})	-0.08	-3.65	-3.42	-2.32	-3.06
	(0.01)	(0.99)	(1.11)	(0.12)	(1.50)
Med(ε_{jbt} | Unconst., New)	-0.11	-4.80	-4.51	-3.05	-4.02
	(0.02)	(1.30)	(1.46)	(0.16)	(1.98)
Pct Elastic, Unconst., New	0%	100%	100%	99%	100%
Med(L_{jbt} | Unconst., New)	–	21%	22%	33%	25%
Avg(ε_{bt}^{Agg})	-0.02	-0.95	-0.90	-0.60	-0.80