Redevelopment and Gentrification in General Equilibrium

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  - can create a "trickle-down" effect at the city-level to improve affordability (Nathanson, 2025)
- Rising interests to restrict redevelopment: e.g. Chicago, SF, Seattle
- However, there is limited understanding of the distributional effects of redevelopment:
  - across heterogeneous households
  - at both the neighborhood and city level
  - in the short-run and long-run

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Question: What are the distributional effects of housing redevelopment?

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Structural Model: build a dynamic spatial GE model:

- Space: neighborhoods with indivisible, heterogeneous housing units, endogenous amenities
- Supply: forward-looking landlords $\Rightarrow$ endogenous redevelopment + quality depreciation
- Demand: heterogeneous households with different income $\Rightarrow$ assignment + filtering

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Counterfactual: simulate teardown tax policies with different nghds coverages and length

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- shift redevelopment towards untreated, especially low-income, neighborhoods
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Key takeaways:

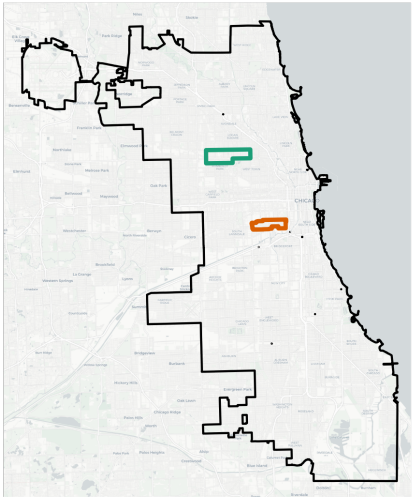
1. Housing quality is an important determinant of household sorting and neighborhood changes.
2. Housing policies targeted at specific locations can generate significant spatial spillovers.

Empirical Analysis: The Teardown Tax

Data

- **Assessment records and transaction deeds**: 2000–2023
  - assessment data record a detailed list of housing characteristics for buildings up to six units
  - transaction data record sales price, date, deed type and parcel identifier
- **Building permits**: 2006–2023
  - record application date, address, work type, estimated cost and work description
  - use ChatGPT to select permits that involve tearing down or erecting an entire building
- **RentHub data**: 2014–2024
  - web-scrapped rental listings, records monthly rent, address, unit identifier, and housing characteristics
- **Verisk address history data**: 2012–2024
  - panel data on individual address history based on private and public records

The Teardown Tax Policy in Chicago



- Policy: teardown tax to obtain a demolition permit:
  - tax = $\max(\$15,000, \$5,000 \times \text{demolished unit})$
  - emergency teardown and redevelopment into affordable housing are exempt
- Two policy neighborhoods: 606-Trail and Pilsen
  - each $\approx$ 5,000 units, account for 4% in Chicago
  - rising redevelopment and affordability issues detail
- Period: Mar 2021 – Dec 2024
- Goal: to preserve naturally occurring affordable housing (City Council of Chicago, 2021)

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- The regressions are specified as follows:

$$Y_{it} = \beta_0 + \sum_{k=-t_0}^{t_1} \beta_k \times 1_{t=k} \times Tr_{it} + \delta_{xt} X_{it} + F_{xt}(LON_i, LAT_i) + \mu_i + \epsilon_{it} \quad (1)$$

  - Y_{it}: demolition and construction permits, log housing rental and sales prices, and mobility
  - $Trt_{it} = 1$ if unit i is in the treated area and $t \geq 2021$
  - X_{it}: control variables; μ_i: unit fixed effect
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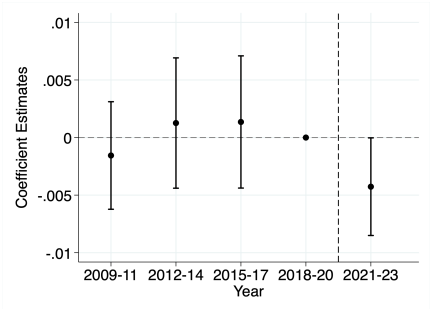
- **Identification assumption**: conditional on the set of control variables, housing demand conditions are comparable within the narrow buffers across the boundary absent of the policy.

Main Finding: The Teardown Tax Significantly Reduced Demolition



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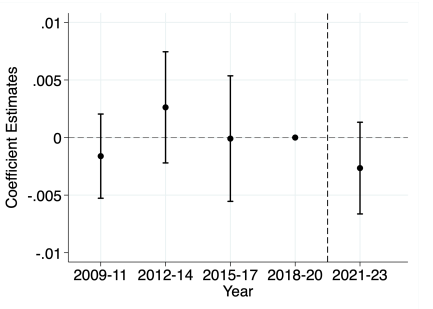

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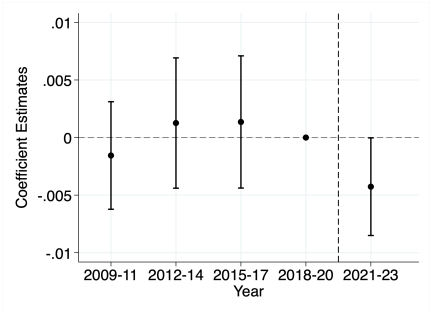

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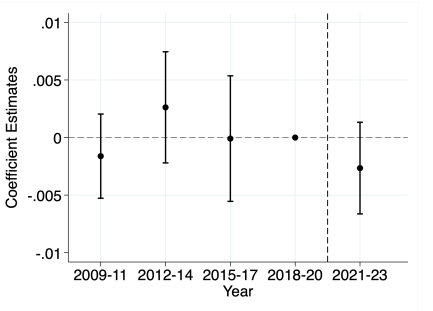

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  - parallel pre-trend indicates similar housing demand conditions across the border
  - spatial spillovers to the control area is likely minimal due to short policy duration avg rate

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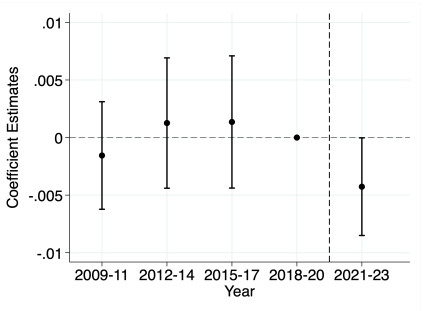

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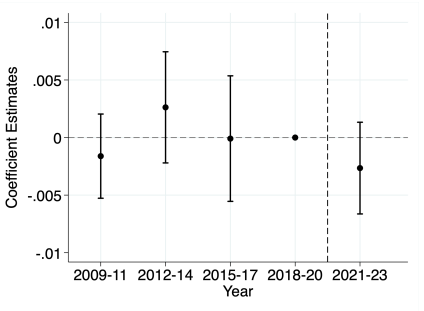

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- Negative yet insignificant effect on construction permits

Other Empirical Results and Robustness

- Other outcomes:
  - **housing rent and sales price**: negative, insignificant effects detail
  - **mobility**: negative, insignificant effect detail
  - **renovation permits**: insignificant effect detail
  - **estimated costs of construction permits**: insignificant effect detail
  - **permit processing time**: insignificant effect detail

- Robustness check:
  - alternative buffer widths (250m and 1000m) detail

- We also provide causal evidence on the effect of neighborhood-level redevelopment on income sorting detail

A Model of Redevelopment and Neighborhood Sorting

Environment

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- Discrete-time economy. Discount factor β.

Household's Problem: Quality Choice

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- We use the assignment model for the quality choice (Landvoigt, Piazzesi and Schneider, 2015).
- In neighborhood x, the household with income z chooses (q, y) to maximize utility:

$$U_t(x,z) = \max_{q,y} q^{\alpha} y^{1-\alpha} \tag{2}$$

subject to

$$P_t(q,x) + y = z \tag{3}$$

  - where α is the preference weight on housing, y is the numeraire, final good
  - $P_t(q,x)$ is the rent-quality schedule in neighborhood x

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Proposition
For $z_2 > z_1$ and two neighborhoods x_1 and x_2, we have,

$$\forall q, \quad \frac{\partial \log P(q,x_2)}{\partial \log q} > \frac{\partial \log P(q,x_1)}{\partial \log q} \implies \frac{U(x_1,z_2)}{U(x_1,z_1)} > \frac{U(x_2,z_2)}{U(x_2,z_1)}.$$

Household's Problem: Neighborhood Choice

- Neighborhood choice of household with income z:

$$\max_x \; A_t(x,z)\; U_t(x,z)\; \xi_t(x) \tag{6}$$

  - $A_t(x,z)$: income-specific neighborhood amenity
  - $\xi_t(x)$: i.i.d. Type-II EVD nghd idiosyncratic preference with shape parameter σ_x

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- Housing sorting:

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- Neighborhood amenity includes an exogenous and an endogenous component:

$$A_t(x,z) = \bar{A}(x,z) \cdot \bar{z}_t(x)^{\eta} \tag{8}$$

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$$V_{it}(s_{it}, \hat{q}_{it}) = \max \Bigg\{ \overbrace{P_t(q_{it}, x) h_{it} + \beta \mathbb{E}_{\hat{q}_{it+1}} V_{i,t+1}\left[(1-\delta) q_{it}, h_{it}, \hat{q}_{i,t+1}\right]}^{\text{Value of the Existing Structure}}, \underbrace{\max_{h_{i,t+1}} \{ -C_{it}(\hat{q}, h_{i,t+1}) + \beta \mathbb{E}_{\hat{q}_{it+1}} V_{i,t+1}\left[\hat{q}_{it}, h_{i,t+1}, \hat{q}_{i,t+1}\right] \}}_{\text{Value of Redevelopment}} \Bigg\} \tag{9}$$

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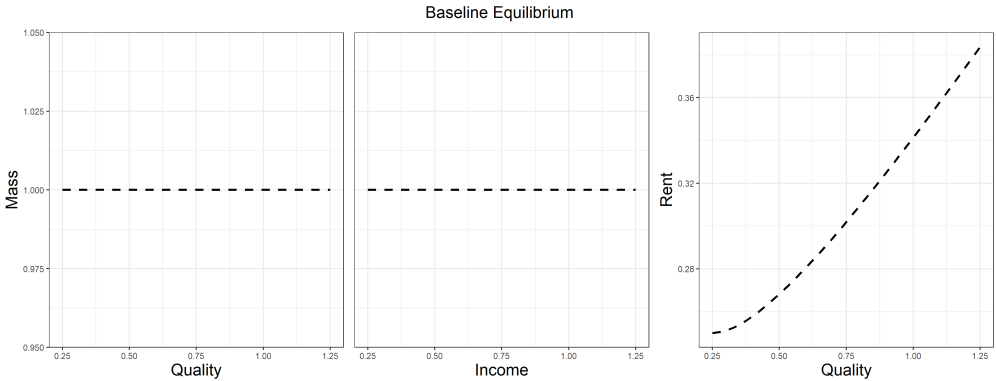
- Construction cost function:

$$C_{it}(\hat{q}, h) = \underbrace{\Omega_x \cdot \hat{q} \cdot h^{\gamma}}_{\text{Variable construction costs}} + \underbrace{F_{\hat{q}x}}_{\text{Fixed cost incl. teardown tax}} + \underbrace{\sigma_c^{-1} \xi_{it}^{R}}_{\text{i.i.d. Type-I EVD cost shock}} \tag{10}$$

Illustration of a Teardown Tax in the Model



- Start from a baseline eqm where a neighborhood has uniform quality and income dist

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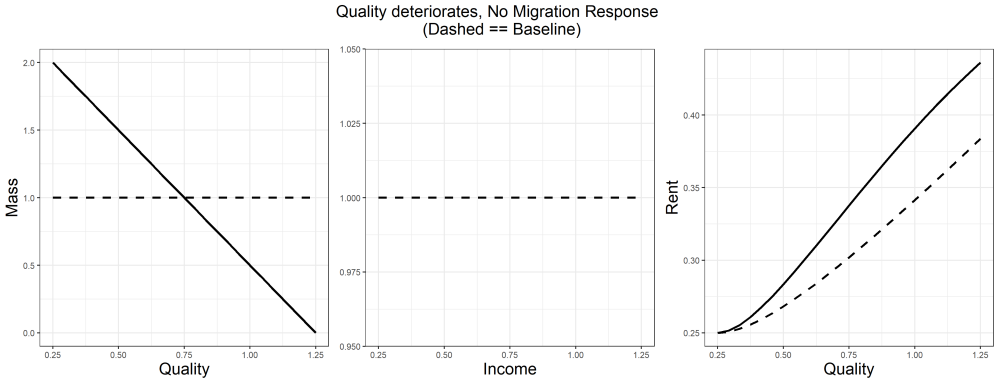

- Exogenously increase low-quality and decrease high-quality housing (teardown tax)
- Without migration, the rent function increases throughout the quality dist and steepens

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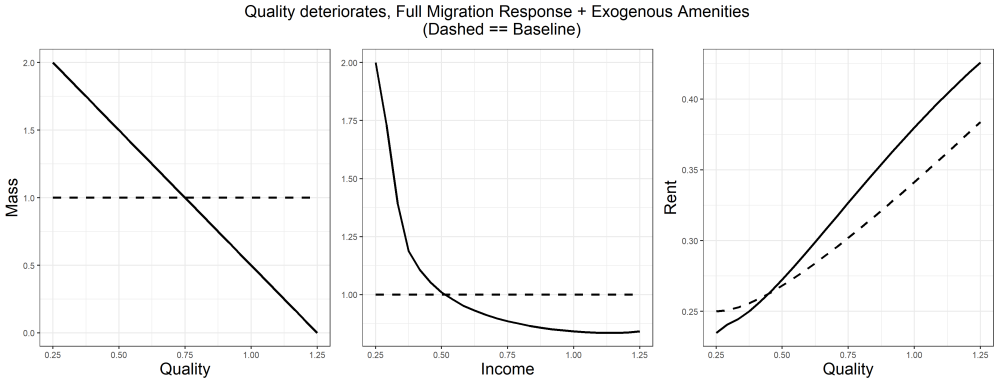

- With migration, high-income hhs move out and low-income hhs move in
- Change in income dist. shifts down the rent fun. $\Rightarrow$ low-quality housing becomes cheaper

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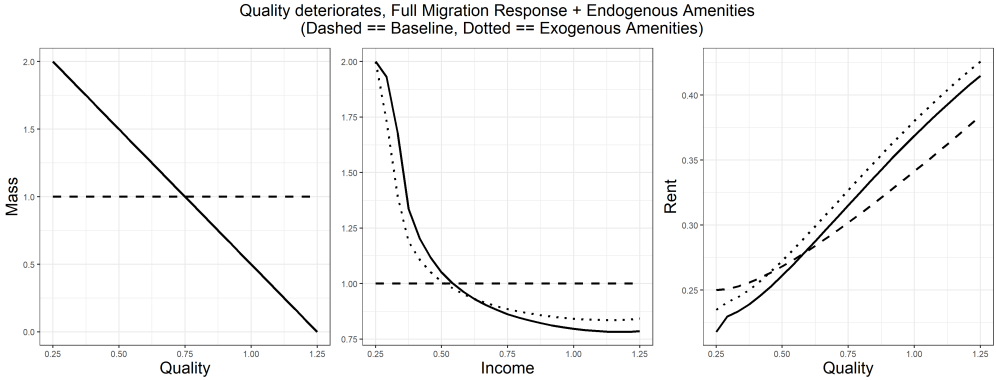


- With migration + endogenous amenity, amenity decreases in the nghd
- The rent function function further shifts down, amplifying the effect of the quality shift

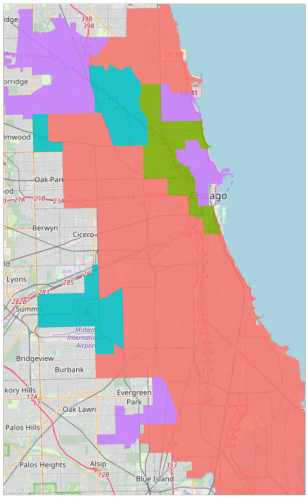
Taking the Model to Data

Taking the Model to Data

- **Housing quality and depreciation rate** δ: estimate a log-linear hedonic regression with nghd-specific parameters using merged RentHub and assessment data detail
- **Housing supply elasticities**:
  - redevelopment elasticity σ_c: match the DiD estimate of the policy effect on demolition detail
  - unit supply elasticity γ: exploit revealed choices of new buildings and housing demand IV detail
- **Calibrate remaining parameters** to match three sets of empirical moments: detail
  - nghd housing quality distributions (from the hedonic regression)
  - nghd population and income distributions (ACS block-group data)
  - expenditure shares on rent by income decile (ACS microdata)
- Add **moving costs** and **non-homothetic preference** to the model

Counterfactual Analysis

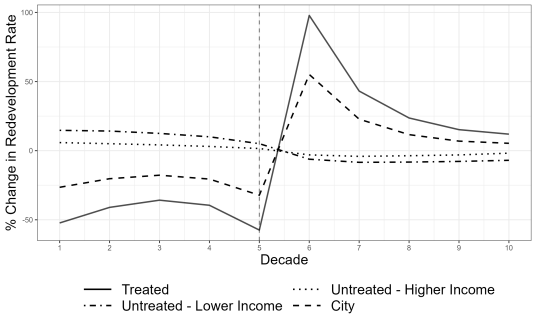
A Teardown Tax on Low-Income Neighborhoods



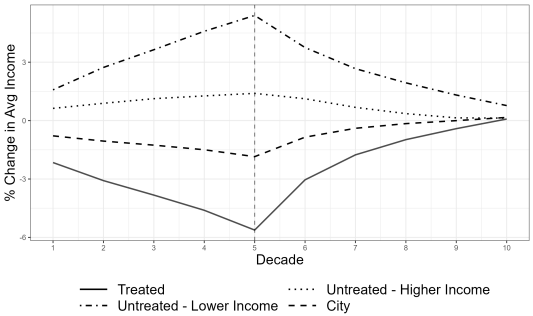
Treatment Status
Treated
Untreated - high income
Untreated - low income
Untreated - middle income

- Simulate a $60,000 teardown tax in all below-median-income neighborhoods for 50 years.
- Compare outcomes for the treated neighborhoods and untreated neighborhood by initial income.
- Solve for the whole transition path; set a period to be 10 years.

The Policy Effects on Redevelopment and Average Income



(a) Redevelopment Rate



(b) Average Income

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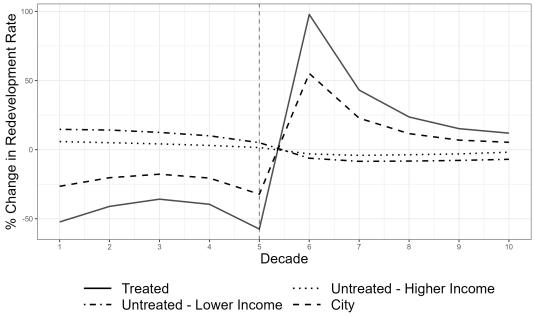

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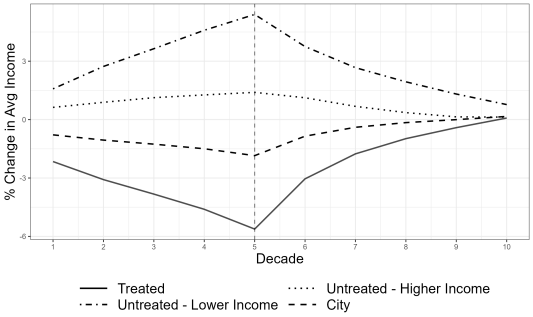
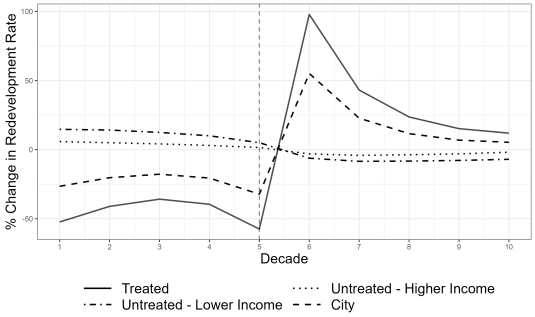


(b) Average Income

- Redevelopment rate:
  - **treated neighborhoods**: decrease by more than half during the policy, increases after the policy
  - **untreated neighborhoods**: increases during the policy, decreases after the policy
  - greater increase in the untreated, low-income neighborhoods

The Policy Effects on Redevelopment and Average Income



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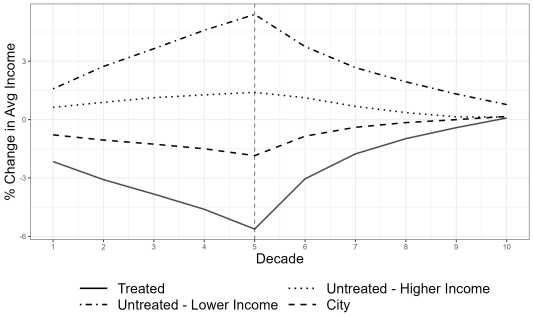
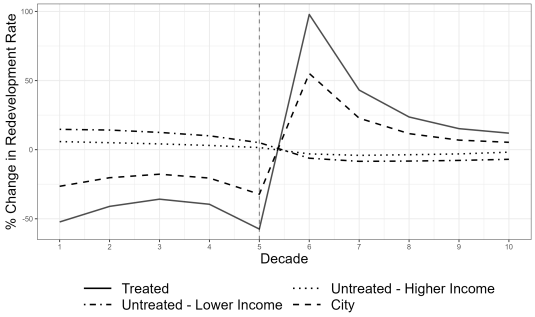


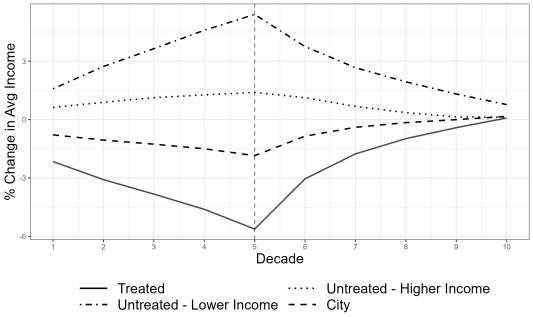
(b) Average Income

- Average neighborhood income: qualitatively similar pattern
  - **treated neighborhoods**: decrease during the policy, increases after the policy
  - **untreated neighborhoods**: increases during the policy, decreases after the policy
  - greater increase in the untreated, low-income neighborhoods

The Policy Effects on Redevelopment and Average Income



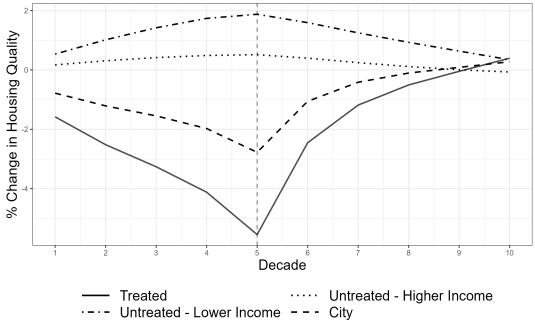
(a) Redevelopment Rate



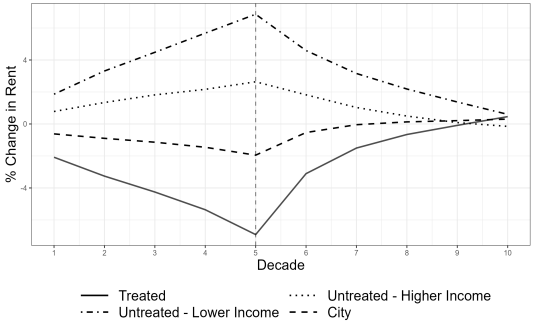
(b) Average Income

- A spatially-targeted teardown tax on low-income neighborhoods:
  - delay redevelopment in treated neighborhoods
  - shift redevelopment and gentrification to untreated neighborhoods
  - average income in the city decreases during the transition

The Policy Effects on Average Housing Rent Quality



(a) Average Quality

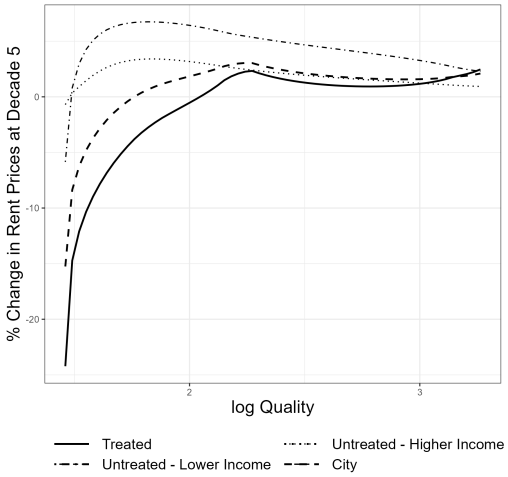


(b) Average Rent

- Avg housing quality and rent declines in the treated nghds and increase in untreated nghds.

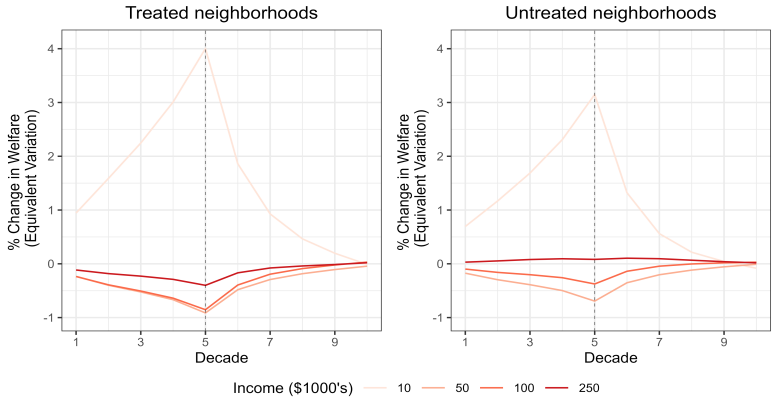
◂ land value ◂ 20 year

The Policy Effect on the Rent Function



- In addition to average rent, examine the changes in the rent function across neighborhoods
- Hump-shaped changes in rent along quality dist. in non-treated nghds:
  - lack of high-quality supply induces high-income to downgrade, generating a "trickle down" effect
  - more middle-income hhs move into untreated nghd, increasing middle-quality demand
  - these forces push up middle-quality rent

Welfare Effects across Households by Income and Initial Location



- Significant heterogeneous welfare effects across household income and initial location:
  - **low-income hhs** benefit the most, especially those initially in the treated nghds
  - **middle-income hhs** lose the most, due to increases in middle-quality rent
  - **high-income hhs** lose only slightly: small changes in high-quality rent and smaller exp. shares

Conclusion

Conclusion

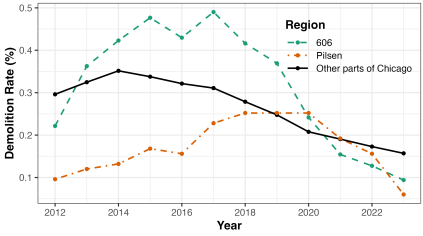
- We empirically and structurally assess a spatially-targeted teardown tax policy.
- While effective at reducing redevelopment locally, the policy has significant and heterogeneous welfare implications. more
  - benefits low-renters at the cost of middle- to high-income renters, especially the middle-income
  - decreases land value in treated areas and increases land value in untreated areas
- The model is useful for studying the long-run effects of housing policies that change quality distribution:
  - assignment within neighborhoods + quantitative spatial model + dynamics
  - e.g., low-income housing tax credit (LIHTC) and public housing demolition

Thank you very much!

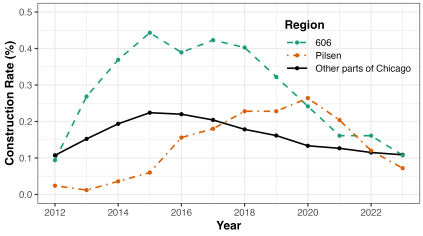
Appendix

Redevelopment and Gentrification in the Policy Areas

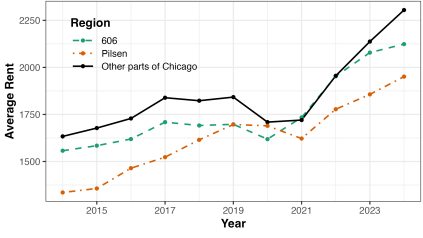
back



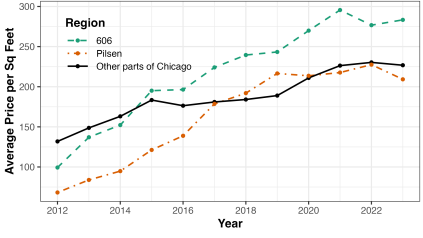
(c) Demolition Rate



(d) Construction Rate



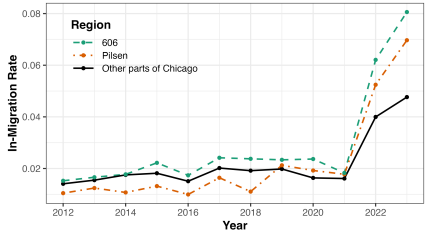
(e) Housing Rent



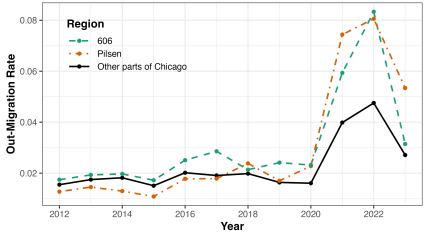
(f) Housing Price

Redevelopment and Gentrification in the Policy Areas

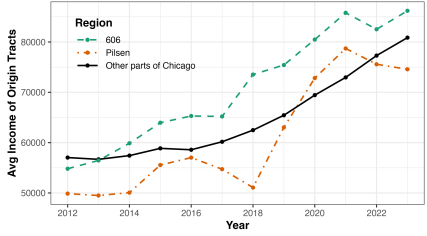
back



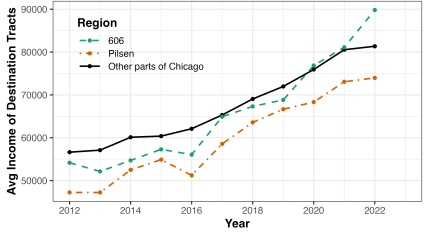
(g) In-migration Rate



(h) Out-migration Rate



(i) Orig. Tract Income for In-migrants



(j) Dest. Tract Income for Out-migrants

Balance Test (Buffer)

◂ Back

	Treated Area		Control Area		Difference	
Variable	Mean	SD	Mean	SD	Estimate	SE
Panel A: Assessment data (2020)						
Bedrooms	4.57	(2.35)	4.38	(2.19)	0.20	(0.24)
Unit Sq. ft.	2423.36	(1433.72)	2337.09	(1369.41)	86.28	(207.49)
Land Sq. ft.	3201.29	(899.91)	3198.47	(1104.07)	2.81	(233.91)
Building Units	2.14	(1.20)	1.97	(1.16)	0.16	(0.23)
Build Year	1909.87	(39.14)	1916.59	(38.35)	-6.72	(8.35)
Panel B: Transaction data (2015–2020)						
Bedrooms	4.09	(2.17)	3.71	(2.09)	0.38	(0.25)
Unit Sq. ft.	2218.20	(1285.94)	2025.18	(1128.98)	193.01	(170.74)
Land Sq. ft.	3665.93	(2681.31)	3825.20	(2193.57)	-159.27	(289.06)
Building Units	2.72	(2.83)	3.51	(3.77)	-0.79***	(0.10)
Build Year	1929.76	(52.28)	1940.91	(51.00)	-11.15	(11.33)
log(Sale Price)	12.81	(0.62)	12.85	(0.66)	-0.04	(0.03)
Panel C: Rental data (2015–2020)						
Bedrooms	2.24	(0.86)	2.18	(0.76)	0.06	(0.06)
Unit Sq. ft.	1130.35	(416.91)	1160.16	(385.79)	-29.81	(49.49)
Build Year	1898.49	(26.73)	1909.75	(32.40)	-11.26	(8.01)
log(Rent)	7.37	(0.33)	7.49	(0.33)	-0.12**	(0.06)

Balance Test (Entire City)

◂ Back

	Treated Area		The Rest of Chicago		Difference	
Variable	Mean	SD	Mean	SD	Estimate	SE
Panel A: Assessment data (2020)						
Bedrooms	4.55	(2.33)	3.75	(1.89)	0.80***	(0.00)
Unit Sq. ft.	2393.72	(1413.87)	1875.43	(1235.09)	518.29***	(0.00)
Land Sq. ft.	3217.97	(896.78)	3991.24	(1830.01)	-773.27***	(0.00)
Building Units	2.12	(1.19)	1.46	(0.93)	0.65***	(0.00)
Build Year	1909.76	(38.57)	1932.63	(31.00)	-22.87***	(0.00)
Panel B: Transaction data (2015–2020)						
Bedrooms	4.05	(1.95)	3.37	(1.30)	0.68***	(0.00)
Unit Sq. ft.	2103.75	(942.36)	1670.15	(780.42)	433.60***	(0.00)
Land Sq. ft.	3495.19	(1234.90)	5214.29	(2128.79)	-1719.10***	(0.00)
Building Units	2.60	(2.61)	1.75	(2.27)	0.84***	(0.00)
Build Year	1926.70	(51.02)	1948.95	(32.54)	-22.24***	(0.00)
log(Sale Price)	12.78	(0.62)	12.30	(0.81)	0.48***	(0.00)
Panel C: Rental data (2015–2020)						
Bedrooms	2.12	(0.94)	1.79	(1.06)	0.33***	(0.00)
Unit Sq. ft.	1115.04	(514.36)	1052.04	(517.10)	62.99***	(0.00)
Build Year	1899.03	(27.20)	1916.11	(33.29)	-17.08***	(0.00)
log(Rent)	7.41	(0.36)	7.47	(0.47)	-0.07***	(0.00)

Robustness on the Buffer Width: Permits

◂ Back

	Demolition			Construction		
Buffer	0.25km	0.5km	1km	0.25km	0.5km	1km
	(1)	(2)	(3)	(4)	(5)	(6)
Treat ×						
2009–2011	-0.000	-0.002	-0.002	0.000	-0.002	-0.003*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
2012–2014	0.002	0.001	-0.002	0.004	0.003	0.000
	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
2015–2017	0.005	0.001	0.001	0.003	-0.000	0.000
	(0.004)	(0.003)	(0.002)	(0.004)	(0.003)	(0.002)
2018–2020	-	-	-	-	-	-
2021–2023	0.002	-0.004**	-0.004**	0.001	-0.003	-0.004**
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Building FE	Yes	Yes	Yes	Yes	Yes	Yes
Period × Neighborhood FE	Yes	Yes	Yes	Yes	Yes	Yes
F_{xt}(Lon, Lat)	Yes	Yes	Yes	Yes	Yes	Yes
Num. obs.	30,985	58,055	95,025	30,985	58,055	95,025

Robustness on the Buffer Width: Displacement

◂ Back

	Neighborhood-level			Address-level		
Buffer Width	0.25km	0.5km	1km	0.25km	0.5km	1km
	(1)	(2)	(3)	(4)	(5)	(6)
Treat ×						
2018	0.005	-0.023	-0.020	-0.007	-0.024	-0.027
	(0.028)	(0.022)	(0.018)	(0.030)	(0.025)	(0.020)
2019	0.039	-0.003	-0.006	0.034	-0.007	-0.009
	(0.029)	(0.023)	(0.017)	(0.029)	(0.024)	(0.018)
2020	-	-	-	-	-	-
2021	0.053	0.028	0.007	0.055	0.030	0.008
	(0.032)	(0.028)	(0.022)	(0.034)	(0.030)	(0.024)
2022	0.044	-0.015	-0.002	0.055	-0.009	-0.002
	(0.035)	(0.029)	(0.021)	(0.035)	(0.031)	(0.022)
2023	0.011	-0.029	-0.039*	0.021	-0.031	-0.041*
	(0.035)	(0.026)	(0.020)	(0.035)	(0.029)	(0.022)
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Period × Neighborhood FE	Yes	Yes	Yes	Yes	Yes	Yes
F_{xt}(Lon, Lat)	Yes	Yes	Yes	Yes	Yes	Yes
Num. obs.	4,194	7,775	13,809	4,194	7,775	13,809

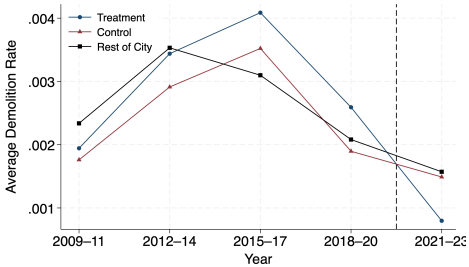
Robustness on the Buffer Width: Rental and Sales Prices

◂ Back

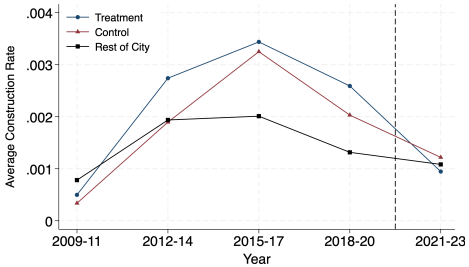
	Log Rent			Log Sale		
Buffer	0.25km	0.5km	1km	0.25km	0.5km	1km
	(1)	(2)	(3)	(4)	(5)	(6)
Treat ×						
2018	0.016	0.009	0.037	0.015	0.024	0.072*
	(0.015)	(0.041)	(0.021)	(0.059)	(0.040)	(0.040)
2019	-0.003	-0.004	-0.002	0.015	0.008	0.027
	(0.015)	(0.010)	(0.009)	(0.059)	(0.038)	(0.035)
2020	-	-	-	-	-	-
2021	-0.013	-0.019	-0.007	-0.043	-0.011	0.003
	(0.015)	(0.010)	(0.008)	(0.043)	(0.029)	(0.024)
2022	-0.020	-0.011	-0.004	-0.008	-0.053	-0.048
	(0.015)	(0.011)	(0.010)	(0.065)	(0.040)	(0.029)
2023	-0.018	-0.018	-0.010	0.039	-0.004	-0.004
	(0.016)	(0.011)	(0.010)	(0.073)	(0.040)	(0.031)
Housing Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Unit FE	Yes	Yes	Yes	No	No	No
Period × Neighborhood FE	Yes	Yes	Yes	Yes	Yes	Yes
F_{xt}(Lon, Lat)	Yes	Yes	Yes	No	No	No
Num. obs.	8,505	13,997	21,889	2,463	4,507	7,671

Avg Demolition and Construction Rates

◂ Return



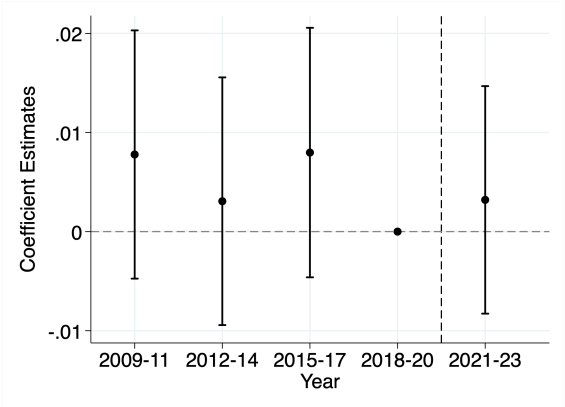
(a) Demolition Rate



(b) Construction Rate

Renovation Permits

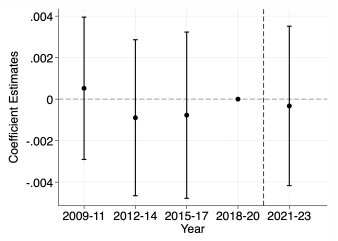
◂ Back



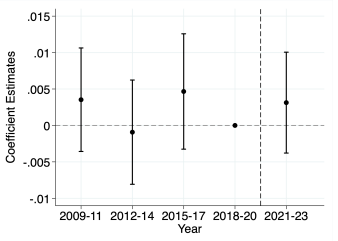
(a) All Renovation Permits

Renovation Permits by Type

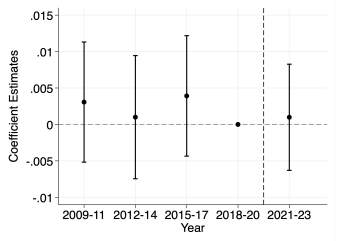
◂ Back



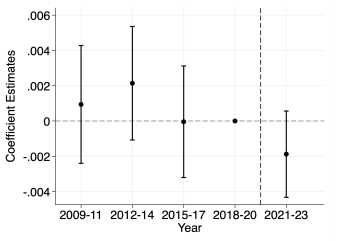
(b) Addition Permits



(c) Remodeling Permits



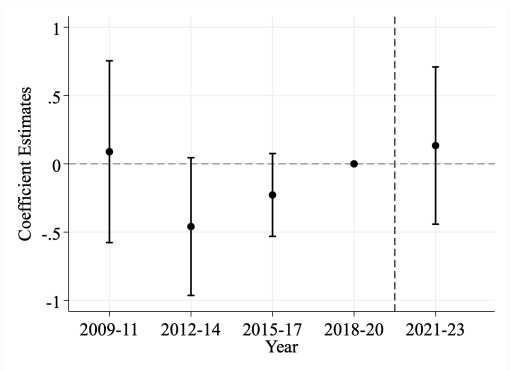
(d) Repairing Permits



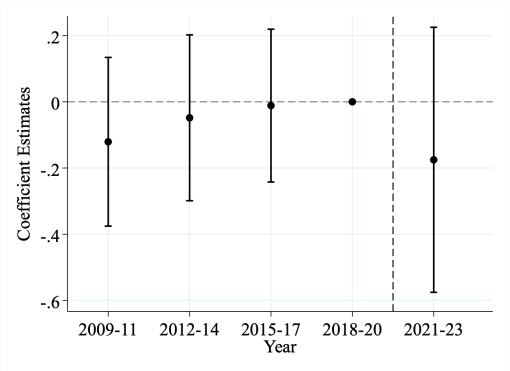
(e) Deconversion Permits

Processing Time

Back



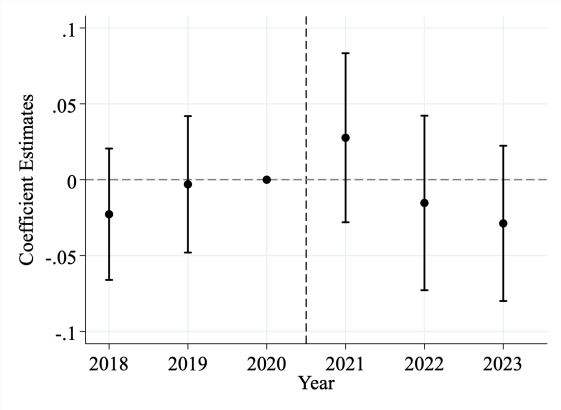
(a) Demolition Permits



(b) All Permits

Finding II: Displacement

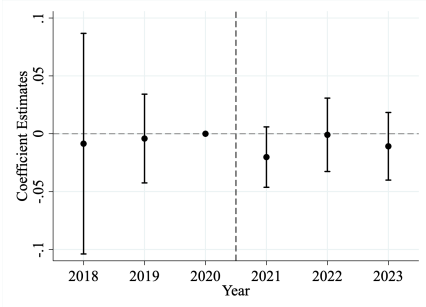
Back



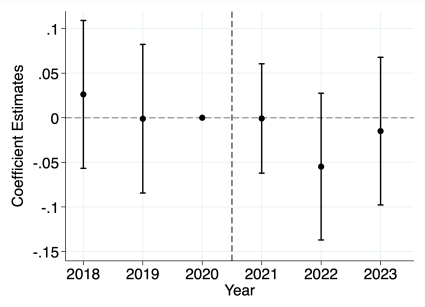
- Keep a panel of individuals who have stayed in the treater/control area for from 2014–2018
- Define displacement as leaving the 500-meter buffer area address
- Negative yet non-significant result on displacement

Finding III: Housing Rent and Price

Back



(a) Rental Price

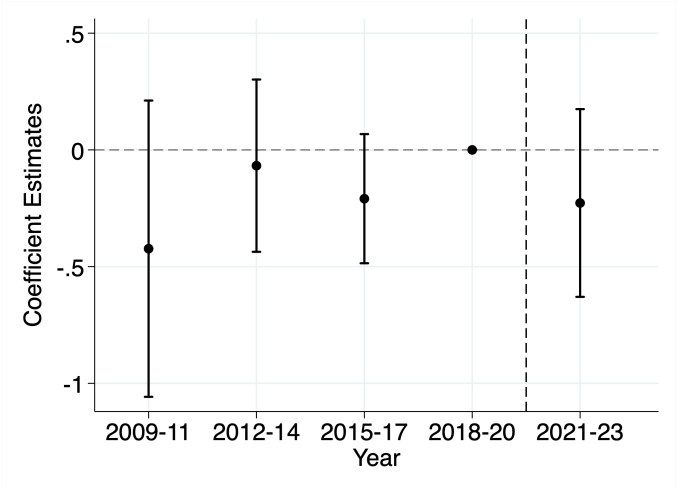


(b) Sales Price

- Negative yet insignificant effects on housing rent and sales prices.
  - The policy is too short to change the housing stock significantly.
- The parallel pre-trends and null policy effects also indicate that there was lack of anticipatory responses before the policy and no expectations of its extension.

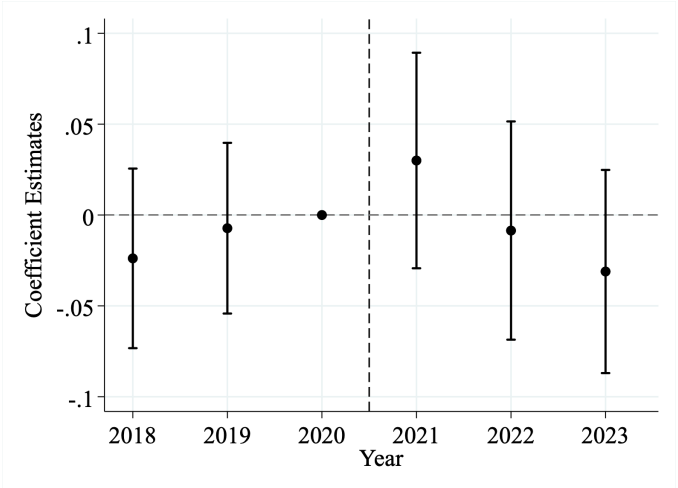
Construction Cost

Back



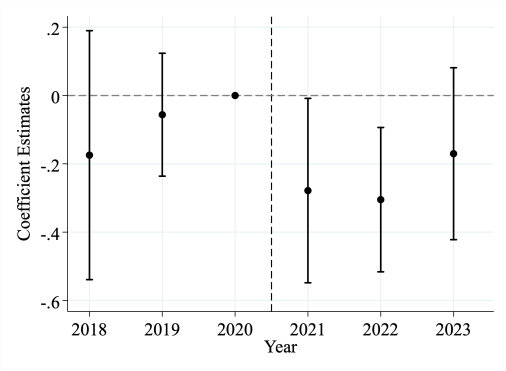
Address-Level Displacement

Back

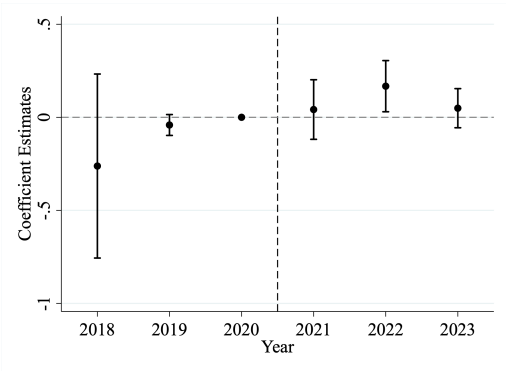


Composition of Transacted and Rental Properties

Back



(a) Build Age (Sales)



(b) Build Age (Rent)

Quality Estimation

◂ Back

Dependent var:	Log Rental Price		
Building age	-0.0020	-0.0019	-0.0021
Bedrooms	0.1477	0.1571	0.1572
Bedrooms^2	-0.0116	-0.0200	-0.0129
Bathrooms	0.1789	0.1715	0.1637
Bathrooms^2	-0.0201	-0.0201	-0.0199
Unit area (sq. ft.)	0.2825	0.2837	0.2880
Lot area (sq. ft.)	-0.0071	0.0061	-0.0120
Lot × unit area	0.0105	-0.0068	-0.0061
Rank of past sale price			0.0020
Rank of past sale price^2			-0.0000
Heating and Porch Type	Yes	Yes	Yes
Exterior Wall and construction quality	Yes	Yes	Yes
Number of Floors	Yes	Yes	Yes
Type of Structure	Yes	Yes	Yes
Neighborhood FE	Yes	Yes	Yes
Num Obs	17,212	11,333	11,333
R^2	0.87	0.87	0.87

The Effect of Redevelopment on Income Sorting

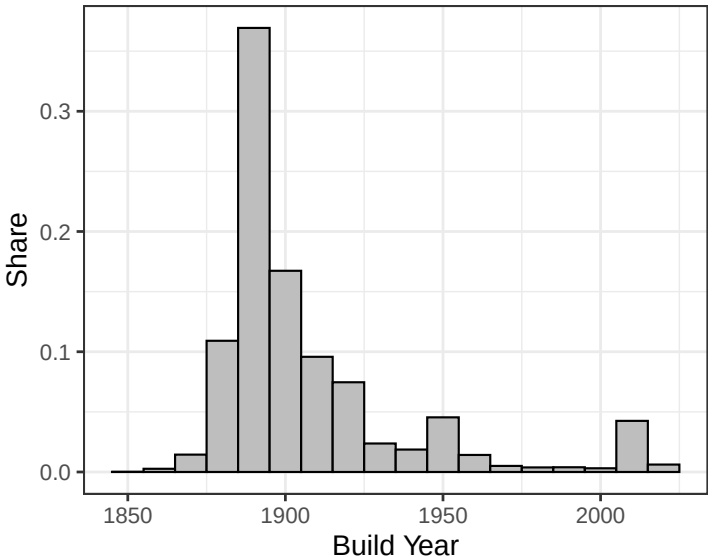
◂ Back

- To estimate the effect of housing redevelopment on income sorting, we run the following block-group-level regression:

$$\Delta \log \text{Median Income}_g = \beta_0 + \beta_1 \Delta \text{Median Building Age}_g + \beta_2 X_g + \varepsilon_g$$

  where
  - g represents a block group, Δ represents 2009-2019 changes
  - X is a set of control variables
- We are interested in β_1: $\beta_1 < 0$ means high-income hhs sort into nghds with newer housing
- Instrumental variable: Bartik-style IV $\times$ the share of housing units built before 1910.
  - Intuition: among nghds that had positive labor demand shocks, those with a greater share of old houses will redevelop more
  - similar to the instrumental variable idea in Diamond (2016)

Distribution of Build Year of Redeveloped Buildings



Evidence on the Effect of Redevelopment on Income Sorting

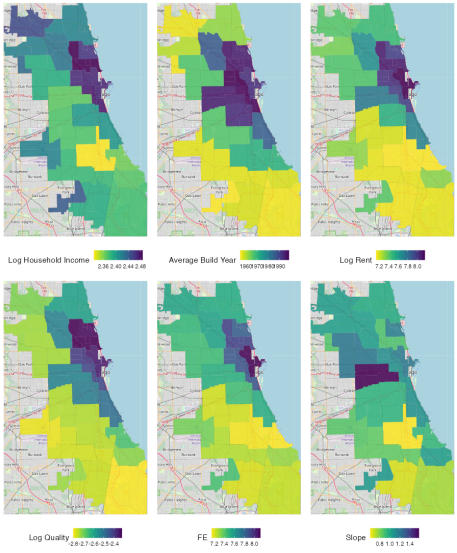
Back

Table 1: Change in Building Age and Income

	(1) Δ log Income	(2) Δ log Income	(3) Δ log Income	(4) Δ log Income
Δ Median Building Age	-0.068***	-0.086***	-0.107***	-0.105**
	(0.012)	(0.015)	(0.036)	(0.046)
Δ log Employment	-0.009	-0.052	-0.008	-0.053
	(0.037)	(0.036)	(0.038)	(0.036)
Initial Median Building Age	-0.001	-0.003***	-0.001	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Initial log Income		-0.269***		-0.276***
		(0.028)		(0.030)
Observations	2,268	2,268	2,268	2,268
R^2	0.038	0.143	0.025	0.140
Specification	OLS	OLS	IV	IV
KP F-Stat	.	.	29.7	38.2

Neighborhood-level Characteristics and Rent Function Estimates

Back



Estimating the Rent Function back

- Assume a uni-dimensional quality index as a function of housing characteristics:

$$q_{it} = -\delta \times \text{Age}_{it} + X_{it}\beta + \epsilon_{it}^{q}$$

  - δ is the depreciation rate, X_{it} is other observed housing char., ϵ_{it}^{q} is unobserved quality
  - control for past sales price to account for unobserved quality (Diamond and Diamond, 2024)

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- Specify a log-linear empirical rent function using merged RentHub and assessment data:

$$\log P_{it} = \log \nu_{1x} + \nu_{2x}\Big[-\delta \times \text{Age}_{it} + X_{it}\beta\Big] + \nu_{2x} \log \epsilon_{it}^{q} \tag{11}$$

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- Estimate equation (11) using NLS: result
  - $\delta = 0.21\%$ (0.35% by Rosenthal (2014)), recover q_{it} with $\hat{\delta}$ and $\hat{\beta}$

Redevelopment Elasticity σ back

- We set the housing supply elasticity σ to match the DiD estimate of the teardown tax:

$$\underbrace{\Delta \log \frac{p}{1-p}}_{\text{Treatment effect on Demolition: } -0.90} = \sigma \times \underbrace{\Delta[V^R - V^N]}_{\text{Teardown tax: } \$15,000}$$

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- Obtain $\hat{\sigma} = \frac{-0.90}{-15} = 0.06$ per thousand dollars

Unit Supply Elasticity γ back

- Landlord's housing supply decision conditional on redevelopment:

$$\max_{h} -\Omega_x \hat{q} h^{\gamma} - F_{\hat{q}x} + \frac{1}{\sigma_c}\xi_{it}^{R} + \beta \underbrace{\mathbb{E}_{\hat{q}_{t+1}} V_{i,t+1}\left(\hat{q}_t, h, \hat{q}_{t+1}\right)}_{\text{Exp. building value at completion}}$$

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- Obtain the estimating equation from the FOC

$$\log h_{it+1} = \Gamma + \frac{1}{(\gamma-1)}\left(\log \underbrace{\frac{\partial \tilde{V}_{i,t+1}(q_{it+1}, h)}{\partial h}}_{\text{Observed Unit Value}} - \log q_{it+1}\right) - \frac{1}{(\gamma-1)}\left(\log \Omega_x - \epsilon_{it+1}^\gamma\right) \tag{12}$$

  - Proxy marginal expected value with **observed value per housing unit**
  - Use employment RMA Bartik shock as instrument for unit values

Table 2: Estimation of the housing supply elasticity

Dependent Variable:	Log(Housing Units)			
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Log(Price Per Unit)	−0.114***	0.068*		
	(0.018)	(0.040)		
Log(Adj. Price Per Unit)			−0.037*	0.091*
			(0.022)	(0.052)
Num. obs.	3304	3304	3304	3304
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First Stage F-stat		13.1		9.5

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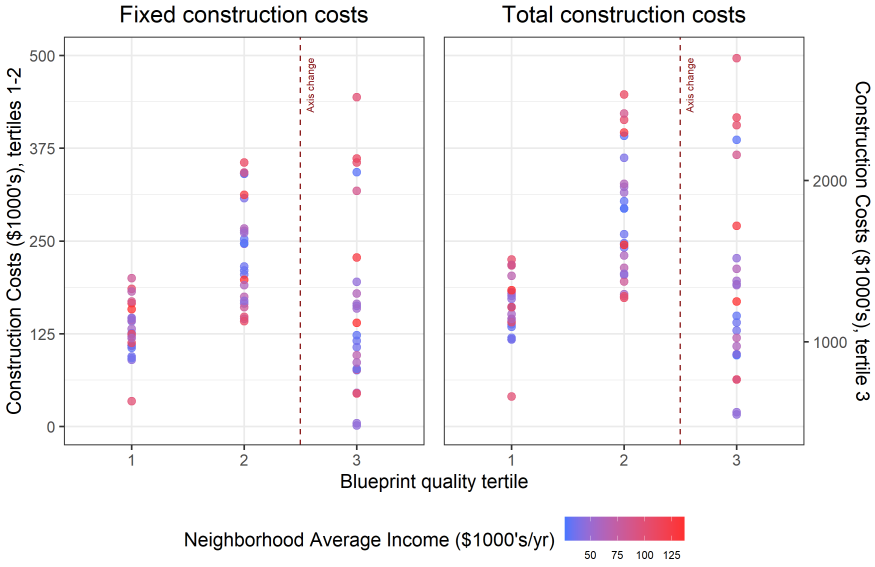
- similar to the unit supply elasticity 0.03 (0.03) estimated in Baum-Snow and Han (2024)

Estimated Construction Cost Parameters

◂ Back



Calibration of Other Parameters

back

- Calibrate remaining parameters to target three sets of empirical moments in the steady state:
  1. nghd rent functions and quality distribution (from the hedonic regression)
  2. nghd population and income distributions (ACS data)
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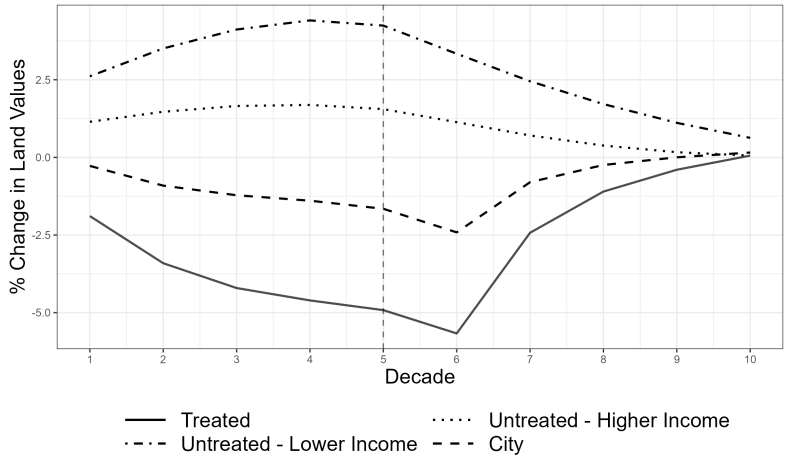
- **Demand-side parameters:**
  - Choose α and $\bar{q}$ to target expenditure shares at estimated rent functions
  - Exogenous amenities $\bar{A}(x,z)$ rationalize neighborhood population and income distributions
  - Choose $\sigma_x = 8.5$ (Baum-Snow and Han, 2024), $\eta = 0.24$ (Macek, 2024), $\tau = 0.75$, $\beta = 0.97$

- **Supply-side parameters:**
  - Choose fixed costs at each blueprint level $F_{\hat{q}x}$ to target estimated quality distribution $H(q,x)$
  - Variable cost Ω_x to target average housing units per parcel Construction Costs
  - Use redevelopment observed in the data to estimate unit supply elasticity γ

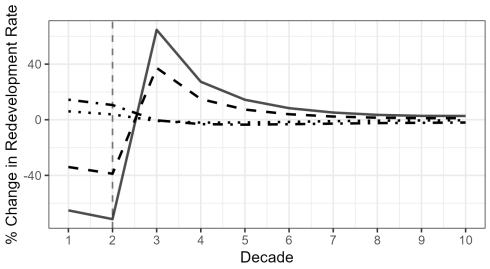
Land Value

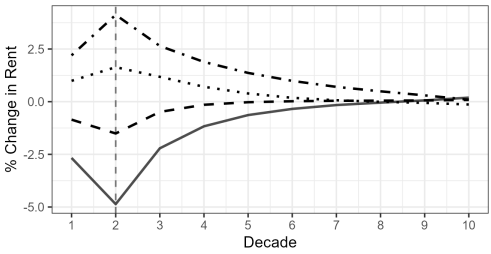
back

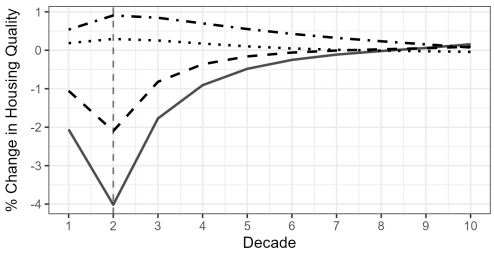


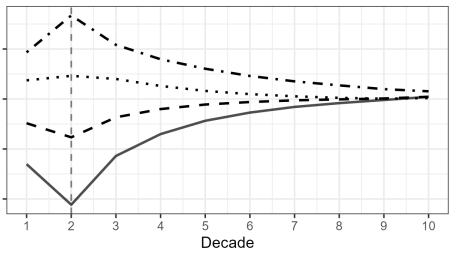
Effects of a 20-year Teardown Tax Policy

back









Policy Implications

back

- **Source of inefficiency:** arises from endogenous amenities, i.e., households do not internalize how their location choices affect neighborhood quality.
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  - politically infeasible: would raise segregation and have adverse social consequences.
- **Policy implications for housing:**
  - encourage redevelopment in high-income rather than restrict it in low-income neighborhoods.
  - taxing redevelopment is undesirable: high-quality housing eventually filters down.
  - prefer redistribution without distorting supply (e.g., housing vouchers to displaced households).