The Price of Inclusion: Evidence from Housing Developer Behavior

Evan Soltas

July 2022
Inclusionary Housing 101

• Mandate or incentive (subsidy, zoning rights, etc.) for mixed-income housing

• Developers reserve share of units for low-income HHs at below-market rent
  - E.g.: 20% of units for 25-year exemption of building from property taxation

• Policy motive: social integration
  - Typical IH unit is in a higher-income neighborhood vs. other housing programs

• Core economic issue of voluntary IH: developer participation constraint
  - Developers only participate if profitable
  - But government wants most/best units at minimum fiscal cost
How cost-effective is voluntary inclusionary housing (421-a) in New York City?

3 contributions:

1. Develop and estimate microeconomic model of housing developer behavior
2. Use estimates to analyze the supply and marginal fiscal cost of inclusionary units
3. Explain cost differences versus LIHTC and Section 8, and estimate MVPF of 421-a
Summary of Results

1. 421-a is very costly on the margin
   - Citywide average marginal fiscal cost per inclusionary unit: $1.6 million
   - Average fiscal cost is 3x more than LIHTC & Section 8 units in NYC

2. High costs reflect fundamental policy trade-off between cost and quality
   - 421-a’s cost premium versus LIHTC & Section 8 mostly explained by neighborhood
   - High developer breakevens, not high incidence on developer profit

3. 421-a is an “opportunity bargain” in some areas but is not cost-effective in others
   - Neighborhood-specific MVPFs of 421-a range from zero to infinity
   - Variation in costs and benefits both important to MVPF variation
Prior Literature

- Housing supply responses to tax subsidies, especially LIHTC

- Existing policy evaluation literature of IZ: city-level diff-in-diffs
  Powell & Stringham (2004), Bento et al. (2009), Mukhija et al. (2010), Schuetz et al. (2011), Hamilton (2019)

- Much recent work in housing policies aimed at inclusion and desegregation

- Estimating regulatory compliance costs via revealed preference
Overview

1. Policy Background
2. Model
3. Data and Estimation
4. Results
5. Cost-Effectiveness Evaluation
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Policy Mechanics of 421-a

Property tax exemption primarily for buildings with onsite inclusionary units

- $1.6B in tax expenditure in FY 2019 (15% of relevant tax base)
- 4.6 percent of all eligible new residential units are income-restricted due to 421-a

A developer plans to build an apartment building. Do they participate in 421-a?

- *If accept:* Must reserve 20% of units, but get tax exemption
  - Below-market rent set by government
  - Regulated tenant selection: income-restricted, sometimes other conditions
  - Tenants in *unreserved* units: Business as usual

- *If decline:* Business as usual — free to choose rents and tenants for all units
Housing Supply At Center of IH Policy Debate

421-a forfeits billions of dollars in public money for minimal public benefit in return …a windfall for real estate developers, with little return for communities.

– Association for Neighborhood and Housing Development

Ultimately, however, MIH reflects a fundamental failure to recognize that inclusionary housing is always voluntary. No development occurs without the expectation of a threshold rate of return on investment.

– Eric Kober (former senior official, NYC Department of City Planning)
Measurement of 421-a Tax Incentive

421-a incentive is the present discounted value of tax savings as a share of building value:

\[
\Delta \tau_i = \frac{\text{PDV}_{i,0}}{V_{i,0}} = E_0 \left[ \sum_{s=0}^{\infty} \frac{\tau_{i,s}^0 - \tau_{i,s}^1}{(1 + \rho)^s} \right]
\]

\(\tau_{i,s}^1\) and \(\tau_{i,s}^0\) = building i’s tax rate in year s if it respectively accepts or rejects 421-a.

→ Obtain from newly-built microsimulation model of NYC property tax code

Ideal measure of incentive: \(\Delta\) profits between accepting and next best alternative

1. Restrict developers’ price expectations
2. Restrict their choice set: Only accept or reject 421-a, no other margins

→ Will later try to convince you that #2 is not an egregious oversimplification
Sources of Variation in 421-a Tax Incentive

Policy reforms:

- **GEA Expansion**: Region of NYC ("GEA") w/ different tax regime expands in 2007
- **"As-Of-Right" Curtailment**: In "NPP" regions of NYC until 2008, buildings 421-a eligible even w/o inclusionary units → tax subsidy eliminated or capped

Idiosyncratic variation in assessment:

- **Assessment Growth Caps**: assessed-value growth cannot exceed caps, which vary by building type, binding for some buildings but not others
- **Condo Underassessment**: DOF uses biased estimates of condo market values, as required under law to benchmark condos against rentals
Supply Responses to Two Changes in 421-a Incentives
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Model Preliminaries

- The developer of a building $i$ maximizes profit $\pi_i$. Two considerations:
  - PDV of tax savings
  - PDV of foregone rental income

- Sole decision is over 421-a participation: No intensive margin or rent-setting power
  - Binding zoning rules mean construction is essentially predetermined
  - In appendix: Model w/ monopolistic competition & intensive margin
Developer’s Problem

Developer $i$ takes up 421-a if it is profitable to do so:

$$D_i = 1[\Delta \pi_i \geq 0]$$

**Take-up condition:** Value of tax savings must exceed foregone rental income

$$\Delta \tau_i \geq \lambda \mu_i + (1 - \lambda) \delta_i$$

- **$\Delta \tau_i$:** 421-a tax incentive, expressed in p.p. of building’s market value
- **$\lambda \in [0, 1]$:** Inclusionary share of units
- **$\mu_i$:** Log diff in rent, market-rate units versus inclusionary units
- **$\delta_i$:** Log diff in rent on market-rate units, due to presence of inclusionary units
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Observe all 421-a eligible multifamily residential construction, 2003–2015, in NYC:

- **Property Tax Assessments** (DOF)
  - Scraped and digitized raw PDF tax assessments of all new construction → administrative codes that record inclusionary housing provision

- **Land-Use Records** (DCP)
  - Detailed information on zoning, lot characteristics, land value

- **Building Permits** (DOB)
  - Key filing date for 421-a eligibility as well as identity of developer

- **Neighborhood Characteristics** (2010 Census / 2013–2017 ACS)
  - Census block & block-group data on poverty rate, HH income, composition by race/ethnicity/education/age, commuting mode shares, vacancy rate, etc.
**ASSESSMENT ROLL 2016-2017**  
City of New York  
Taxable Status Date: January 5, 2016

**Parcel Information**

- **Owner Name**: 110 CORONA LLC  
- **Property Address and Zip Code**: 11017 CORONA AVENUE 11368  
- **Real Estate Billing Name and Address**: 110 CORONA LLC 110-17 CORONA AVENUE FLUSHING NY 11368  
- **Borough**: Queens  
- **Block**: 2011  
- **Lot**: 36  
- **Tax Class**: 2  
- **Building Class**: D1

**Land Information**

<table>
<thead>
<tr>
<th>Lot Size</th>
<th>Irregular</th>
<th>Corner</th>
</tr>
</thead>
<tbody>
<tr>
<td>72.37 FT x 112.44 FT</td>
<td>IRREG</td>
<td></td>
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</table>

**Building Information**

<table>
<thead>
<tr>
<th>Number of Buildings</th>
<th>Building Size</th>
<th>Extension</th>
<th>Stories</th>
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<tr>
<td>1</td>
<td>44.00 FT x 50.00 FT</td>
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**Assessment Information**

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<th>Description</th>
<th>Land</th>
<th>Total</th>
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<tr>
<td>ESTIMATED MARKET VALUE</td>
<td>1,708,000</td>
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<tr>
<td>ACTUAL AV</td>
<td>224,550</td>
<td>768,600</td>
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<tr>
<td>ACTUAL EX AV</td>
<td>206,171</td>
<td>753,221</td>
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<tr>
<td>TRANS AV</td>
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<td>580,050</td>
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<td>TRANS EX AV</td>
<td>206,171</td>
<td>564,671</td>
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**Taxable/Billable Assessed Value**

- SUBJECT TO ADJUSTMENTS, YOUR 2016/17 TAXES WILL BE BASED ON 15,379

**Exemption Information**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Exempt Value</th>
</tr>
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<tbody>
<tr>
<td>* 5114-01 (48800)</td>
<td>421A (25 YR NOT CAP)</td>
<td>753,221</td>
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</tbody>
</table>
ASSESSMENT ROLL 2016-2017
City of New York
Taxable Status Date: January 5, 2016

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Taxable/Billable Assessment

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### Panel A: Building-Level Characteristics

<table>
<thead>
<tr>
<th>% Social Units in Building</th>
<th>421-a</th>
<th>LIHTC</th>
<th>Tenant-Based Section 8</th>
<th>Project-Based Section 8</th>
<th>Public Housing</th>
<th>All Rental Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19.3</td>
<td>89.3</td>
<td>n.a.</td>
<td>94.0</td>
<td>100.0</td>
<td>n.a.</td>
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### Panel B: Block-Level Characteristics

<table>
<thead>
<tr>
<th></th>
<th>421-a</th>
<th>LIHTC</th>
<th>Tenant-Based Section 8</th>
<th>Project-Based Section 8</th>
<th>Public Housing</th>
<th>All Rental Units</th>
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</thead>
<tbody>
<tr>
<td>Med. HH. Income</td>
<td>$100,043</td>
<td>$42,223</td>
<td>$41,187</td>
<td>$36,899</td>
<td>$23,420</td>
<td>$63,093</td>
</tr>
<tr>
<td>Med. Monthly Rent</td>
<td>$2,163</td>
<td>$1,128</td>
<td>$1,189</td>
<td>$964</td>
<td>$553</td>
<td>$1,452</td>
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<tr>
<td>% Poor</td>
<td>17.0</td>
<td>31.4</td>
<td>26.4</td>
<td>33.0</td>
<td>43.7</td>
<td>21.2</td>
</tr>
<tr>
<td>% Less than HS</td>
<td>10.8</td>
<td>25.7</td>
<td>26.3</td>
<td>27.6</td>
<td>34.2</td>
<td>19.8</td>
</tr>
<tr>
<td>% HS Graduate</td>
<td>13.8</td>
<td>24.9</td>
<td>27.3</td>
<td>25.1</td>
<td>30.9</td>
<td>23.0</td>
</tr>
<tr>
<td>% Some College</td>
<td>14.4</td>
<td>23.0</td>
<td>22.2</td>
<td>20.4</td>
<td>22.0</td>
<td>19.5</td>
</tr>
<tr>
<td>% College Graduate</td>
<td>33.5</td>
<td>16.7</td>
<td>15.3</td>
<td>17.3</td>
<td>9.4</td>
<td>22.1</td>
</tr>
<tr>
<td>% More than College</td>
<td>27.6</td>
<td>9.7</td>
<td>8.9</td>
<td>9.7</td>
<td>3.4</td>
<td>15.7</td>
</tr>
<tr>
<td>% Non-Hispanic White</td>
<td>44.8</td>
<td>13.0</td>
<td>19.4</td>
<td>17.7</td>
<td>4.9</td>
<td>32.9</td>
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<tr>
<td>% Non-Hispanic Black</td>
<td>16.9</td>
<td>40.5</td>
<td>30.9</td>
<td>32.0</td>
<td>42.8</td>
<td>23.0</td>
</tr>
<tr>
<td>% Hispanic</td>
<td>37.6</td>
<td>40.9</td>
<td>41.6</td>
<td>43.8</td>
<td>47.7</td>
<td>30.6</td>
</tr>
<tr>
<td>% Asian</td>
<td>14.6</td>
<td>5.1</td>
<td>5.8</td>
<td>5.9</td>
<td>4.4</td>
<td>11.6</td>
</tr>
<tr>
<td>Median Age</td>
<td>33.9</td>
<td>33.0</td>
<td>32.8</td>
<td>39.0</td>
<td>33.8</td>
<td>35.8</td>
</tr>
<tr>
<td>% Renters</td>
<td>83.8</td>
<td>90.8</td>
<td>83.3</td>
<td>91.1</td>
<td>97.7</td>
<td>78.6</td>
</tr>
<tr>
<td>Does the Building Provide Onsite Inclusionary Housing?</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>-----</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Market Value ($ Millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
<td>84.12</td>
<td>274.80</td>
<td>16.48</td>
<td>117.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>9.82</td>
<td>39.41</td>
<td>2.05</td>
<td>20.05</td>
<td></td>
<td></td>
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<tr>
<td>Building</td>
<td>74.30</td>
<td>241.91</td>
<td>14.43</td>
<td>101.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Per Unit</td>
<td>0.536</td>
<td>1.524</td>
<td>0.557</td>
<td>1.498</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Rate (p.p.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>0.31</td>
<td>0.32</td>
<td>0.47</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of 421-a Incentive</td>
<td>32.95</td>
<td>28.23</td>
<td>4.74</td>
<td>13.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Value of Tax Savings ($)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16,107,285</td>
<td>40,975,046</td>
<td>1,238,956</td>
<td>8,486,184</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per Inclusionary Unit</td>
<td>443,782</td>
<td>549,262</td>
<td>126,610</td>
<td>523,299</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Units</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>105.89</td>
<td>178.21</td>
<td>19.95</td>
<td>85.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>102.23</td>
<td>175.66</td>
<td>17.48</td>
<td>69.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Buildings</td>
<td>581</td>
<td></td>
<td>11,565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Units</td>
<td>59,393</td>
<td></td>
<td>202,179</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Estimation

Difference in profits between providing on-site inclusionary units and not:

\[ \Delta \log \pi_i = \Delta \tau_i + x_i \beta + \Delta e_i \]

- \( \Delta \tau_i \): Building-specific estimate of 421-a tax incentive
- \( x_i \beta \): Lot/neighborhood observables to explain variation in rent foregone
- \( \Delta e_i \): Unobservable shocks to rent foregone / 421-a participation costs

Assume \( e_i \) is distributed Type I Extreme Value with dispersion parameter \( \sigma \):

\[
Pr(D_i = 1 | x_i) = \frac{\exp[(\Delta \tau_i + x_i \beta) / \sigma]}{1 + \exp[(\Delta \tau_i + x_i \beta) / \sigma]}
\]

Next: Define and estimate objects of interest from \( \hat{\sigma} \) and \( \hat{\beta} \)
Overview

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### Do Developers Respond to the 421-a Incentive?

<table>
<thead>
<tr>
<th>Fixed Effects:</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls:</td>
<td>None</td>
<td>None</td>
<td>Lot</td>
<td>Lot &amp; Block</td>
<td>None</td>
<td>Lot</td>
<td>Lot &amp; Block</td>
</tr>
<tr>
<td>421-a Incentive</td>
<td>4.92*** (0.30)</td>
<td>5.18*** (0.54)</td>
<td>5.58*** (0.64)</td>
<td>5.99*** (0.69)</td>
<td>5.20*** (0.65)</td>
<td>5.87*** (0.76)</td>
<td>6.02*** (0.74)</td>
</tr>
<tr>
<td>N</td>
<td>11,669</td>
<td>11,669</td>
<td>11,647</td>
<td>11,640</td>
<td>7,465</td>
<td>7,450</td>
<td>7,445</td>
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<tr>
<td>Clusters</td>
<td>179</td>
<td>179</td>
<td>179</td>
<td>179</td>
<td>82</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Marginal Effect</td>
<td>0.18*** (0.02)</td>
<td>0.18*** (0.03)</td>
<td>0.19*** (0.04)</td>
<td>0.19*** (0.04)</td>
<td>0.26*** (0.03)</td>
<td>0.26*** (0.03)</td>
<td>0.26*** (0.03)</td>
</tr>
<tr>
<td>Std. Dev. of ∆εᵢ</td>
<td>0.368*** (0.023)</td>
<td>0.350*** (0.036)</td>
<td>0.325*** (0.038)</td>
<td>0.303*** (0.035)</td>
<td>0.349*** (0.044)</td>
<td>0.309*** (0.040)</td>
<td>0.301*** (0.037)</td>
</tr>
</tbody>
</table>

→ Not meaningful as elasticity. Instead, implies little unexplained dispersion in $\Delta \log \pi_i$. 
Endogenous Construction

**Problem:** Developers may respond to 421-a on margins beyond accept vs. reject

→ Will tend to inflate $\Delta \tau_i$ among participants versus nonparticipants

**Solution:** Simulated instruments approach (Currie & Gruber 1996)

1. Identify similar lots to lot $i$ on predetermined dimensions
2. On those lots, record buildings’ characteristics and tax exemptions
3. Simulate tax consequences of each such building if it were instead on $i$’s lot
4. Take average of counterfactual buildings’ 421-a savings
Computing and Using the Simulated Instrument

Simulated instrument:

\[
\widetilde{\Delta \tau}_i = \frac{1}{|F_i|} \sum_{j \in F_i} \Delta \tau(b_j, x_i)
\]

- \(F_i\): Set of similar lots to \(i\) (same borough, same zoning class, \(\pm 20\%\) of \(i\)’s lot area)
- \(\Delta \tau(b_j, x_i)\): 421-a savings if \(j\)’s building were instead on lot \(i\)

Moment conditions:

\[
E \left\{ D_i - \Lambda \left( \frac{\Delta \tau_i + x_i \beta}{\sigma} \right) \right\} z_i = 0
\]

- \(z_i = (x_i, \widetilde{\Delta \tau}_i)\): Treat all other lot/neighborhood characteristics as exogenous
- \(\Lambda(\cdot)\): Logit function
‘Zeroth’ and First Stages of Simulated Instrument

Regressions
Estimating Developer Breakevens

What is the minimum amount a developer would accept for an inclusionary unit?

First, find the incentive \( \Delta \tau_i^*(x_i) \) at which developer \( i \) is just indifferent in expectation:

\[
E[\Delta \log \pi_i \mid x_i] = \Delta \tau_i + x_i \hat{\beta} = 0
\]

\[
\Rightarrow \Delta \tau_i^*(x_i) = -x_i \hat{\beta}
\]

Then, to obtain breakeven per inclusionary unit, rescale:

\[
FC_i = -\left(\frac{v_i}{\lambda}\right) \cdot x_i \hat{\beta}
\]

To government, \( FC_i \) is the minimum fiscal cost per unit in building \( i \).
Histogram of Estimated Developer Breakevens, by Take-Up Decision

- X-axis: Breakeven Cost Per Inclusionary Unit (Millions of Dollars)
- Y-axis: Number of Buildings

Data points:
- Has Inclusionary Units
- No Inclusionary Units

Legend:
- Black: Has Inclusionary Units
- Gray: No Inclusionary Units
Estimated Breakevens Are Strongly Related to Neighborhood Rents
Estimating Supply Responses

How many inclusionary units would be added if the 421-a incentive were increased?

\[ \int \frac{\partial \Pr(D_i = 1|x_i)}{\partial (\Delta \tau_i)} dF_n(x_i) = \frac{1}{\sigma} \int \Pr(D_i = 1|x_i) [1 - \Pr(D_i = 1|x_i)] dF_n(x_i) \]

- \( \sigma \): Dispersion of T1EV unobservable shocks
- \( F_n(x_i) \): Distribution of unit characteristics \( x_i \) in neighborhood \( n \)
- \( \Pr(D_i = 1|x_i) \): Conditional probability of 421-a participation

→ Supply response depends upon both observable and unobservable heterogeneity
Supply Response by Neighborhood Tabulation Area

Citywide Estimates
Estimating Average Marginal Fiscal Costs

How much does it cost NYC to get another inclusionary unit in neighborhood $n$?

$$MFC_n = \frac{1}{\lambda} \frac{\int \frac{\partial [v_i \Delta \tau_i \Pr(D_i = 1|x_i)]}{\partial (\Delta \tau_i)} dF_n(x_i)}{\int \frac{\partial \Pr(D_i = 1|x_i)}{\partial (\Delta \tau_i)} dF_n(x_i)}$$

- $v_i \Delta \tau_i \Pr(D_i = 1|x_i)$: Expected 421-a tax expenditure on building $i$
Overview

1 Policy Background
2 Model
3 Data and Estimation
4 Results
5 Cost-Effectiveness Evaluation
Evaluating the Comparative Cost-Effectiveness of 421-a

Average fiscal cost per unit of 421-a, versus Section 8 and LIHTC:

• 421-a: $652K (std. err. $76K)
• Section 8: $246K
• LIHTC: $220K

Why is 421-a so costly? Decomposing into “between” and “within” factors:

• Between: 421-a units are in costlier neighborhoods → higher developer breakevens
• Within: Differences in admin cost, building amenities, developer incidence

→ Implement decomposition following DiNardo Fortin Lemieux (1996)
Do Differences in Neighborhoods Explain 421-a’s Cost Premium?

- \( y_i \): Neighborhood characteristic of unit \( i \) (e.g., % college grad, med. HH income)
- \( f(y), g(y) \): densities of 421-a and (pooled) Section 8 & LIHTC units

Estimate densities using adaptive kernel, then compute ratio of densities:

\[
\psi(y) = \frac{\hat{f}(y)}{\hat{g}(y)}.
\]

Use DFL factor \( \psi(y) \) to reweight average fiscal cost:

\[
\widehat{\text{AFC}} = \frac{1}{\lambda} \int \frac{\psi(y_i) v_i \Delta \tau_i \Pr(D_i = 1 | x_i)}{\partial (\Delta \tau_i)} dF(x_i) \bigg/ \int \frac{\psi(y_i) \Pr(D_i = 1 | x_i)}{\partial (\Delta \tau_i)} dF(x_i)
\]

\( \rightarrow \) Cost of 421-a in counterfactual w/ neighborhood allocation of Section 8 & LIHTC
Neighborhoods Explain Most of 421-a Cost Premium

![Graph showing the average fiscal cost per unit for different programs: 421-a, Reweighted 421-a, Section 8, and LIHTC. The graph indicates that neighborhoods explain most of the 421-a cost premium.](image-url)
Incidence on Developers

What share of the fiscal cost of 421-a ends up as developer profits?

Use the Small and Rosen (1981) log-sum-exp formula for consumer surplus:

\[
\frac{E[\Delta \log \pi_i \mid D_i = 1]}{E[\Delta \tau_i \mid D_i = 1]} = \frac{\sigma \int \log \left[ 1 + \exp \left( \frac{\Delta \tau_i + x_i \beta}{\sigma} \right) \right] dF_n(x_i \mid D_i = 1)}{\int \Delta \tau_i dF_n(x_i \mid D_i = 1)}
\]

Result: Developers capture 46% of 421-a exemption

- Similar to incidence of Section 8 (Collinson and Ganong 2018)
- Compare to incidence-minimizing policy with same participation: 36% to developers
Is the “Price of Inclusion” Worth Paying?

Weigh costs of 421-a against benefits: external estimates of neighborhood effects

\[ \text{MVPF}_n = \frac{\text{PDV}(\text{Breakeven}_n) + \text{PDV}(\text{After-Tax Income}_n)}{\text{PDV}(\text{Marginal Fiscal Cost}_n) - \text{PDV}(\text{Fiscal Externality}_n)} \]

- WTP and program cost: Estimated breakevens and marginal fiscal costs
- Extrapolate impacts of 421-a from Opportunity Atlas, as in Bergman et al. (2020)
- Build MVPF calculator of 421-a from Hendren & Sprung-Keyser (2020) code base
- Predict “sender” NTAs by distance and pop. of renter HHs earning $30K–$60K
Is the “Price of Inclusion” Worth Paying?

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Is the “Price of Inclusion” Worth Paying?

Evaluate 421-a by its marginal value of public funds (Hendren & Sprung-Keyser 2020):

\[
MVPF_n = \frac{PDV(\text{Breakeven}_n) + PDV(\text{After-Tax Income}_n)}{PDV(\text{Marginal Fiscal Cost}_n) - PDV(\text{Fiscal Externality}_n)}
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MVPF of 421-a by Neighborhood Tabulation Area (Lower WTP)
Conclusion

Hallmark of U.S. housing policy since 1970s: implementation via private sector

- Landlord acceptance of Section 8 vouchers, developer take-up of LIHTC, …
- First paper to study supply-side facing any housing policy using microdata

I apply my microeconometric framework to study NYC’s 421-a program

- Inclusionary housing: urban policy of rising importance, yet almost no evidence
- Develop methods to estimate supply and marginal fiscal cost of inclusionary units
- Account for cost premium: DFL decomposition, incidence analysis, MVPF calculation
Thank you for attending!

esoltas@mit.edu
Additional Slides
Annual Value of 421-a Exemption ($ billions)

1990 2000 2010 2020

0.5 1 1.5

1990 2000 2010 2020
421-a as a Share of Class 2 Taxable Assessed Value

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>0.15</td>
</tr>
<tr>
<td>2000</td>
<td>0.05</td>
</tr>
<tr>
<td>2010</td>
<td>0.10</td>
</tr>
<tr>
<td>2020</td>
<td>0.15</td>
</tr>
</tbody>
</table>
NEW YORK CITY
421-A GEOGRAPHIC EXCLUSION AREAS (GEA)

421-A GEA
- Original Manhattan GEA
- Green Point Williamsburg Waterfront (Special Provisions Apply)
- Hudson Yards
- West Chelsea
- Atlantic Yards Arena Project (Special Provisions Apply)
- Expanded GEA (NYS & NYC Local Law)

Disclaimer: The map of the 421-a GEA is for information purposes only. It is important to rely on the actual text of the applicable law and rules regarding the 421-a GEA and to consult with an attorney as to the actual metes and bounds of the 421-a GEA.
Smaller Policy Details For Which I Account

- **Mixed-Use Buildings**: Rescale $\tau_i$ by $\min\{1.12 - s_i, 1\}$ to account for penalty for use of 421-a to subsidize commercial development beyond threshold.

- **Liberty Zone**: additional incentives for inclusionary development as part of 9/11 recovery package for downtown Manhattan, 2002–2007.

- **Inclusionary Housing Program (R10 and Designated Areas)**: additional incentives for inclusionary development in R10 zoning districts and DAs, which are mostly up-zoned neighborhoods (applies only after rezoning).
Lot Controls from Land-Use Data

- Assessed value of land
- Lot area, dimensions (frontage x depth), area, and type (e.g., corner lot)
- Zoning district (e.g., R8) and historic district indicator
## Model Estimates from Simulated Instrument GMM Approach

<table>
<thead>
<tr>
<th></th>
<th>(1) None No Controls</th>
<th>(2) Borough Fixed Effects No Controls</th>
<th>(3) Borough Fixed Effects Lot Controls</th>
<th>(4) Borough Fixed Effects Lot &amp; Block Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>421-a Incentive</td>
<td>5.419*** (0.384)</td>
<td>6.506*** (0.986)</td>
<td>5.525*** (1.009)</td>
<td>6.588*** (1.060)</td>
</tr>
<tr>
<td>N</td>
<td>11,460</td>
<td>11,460</td>
<td>11,448</td>
<td>11,445</td>
</tr>
<tr>
<td>Clusters</td>
<td>178</td>
<td>178</td>
<td>178</td>
<td>178</td>
</tr>
<tr>
<td>Std. Dev. of $e_i$</td>
<td>0.335*** (0.024)</td>
<td>0.279*** (0.042)</td>
<td>0.328*** (0.060)</td>
<td>0.296*** (0.053)</td>
</tr>
<tr>
<td></td>
<td>Exogenous Construction</td>
<td>Endogenous Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------</td>
<td>------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Response</td>
<td>0.59*** (0.07)</td>
<td>0.60*** (0.10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal Fiscal Cost</td>
<td>$1,593,037*** (326,216)</td>
<td>$1,568,194*** (423,196)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Fiscal Cost</td>
<td>$651,974*** (75,525)</td>
<td>$650,714*** (76,108)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data Sources by Housing Program

- LIHTC: National LIHTC Database, May 2019 release (HUD)
- Tenant-Based Section 8: Picture of Subsidized Households database (HUD)
- Project-Based Section 8: Database of active multifamily housing contracts as of March 2020 (Office of Multifamily Housing Programs, FHA, HUD)
- Public Housing: 2020 NYCHA Development Data Book
Developer Profit Share of Incidence
MVPF Calculation Details

My MVPF code build directly upon the Hendren & Sprung-Keyser (2020) modules for:

- MTO: Chetty et al. (2016)
- Chicago housing vouchers: Jacob et al. (2015)

I adapt these modules in several ways to my context:

- Use NYC-specific intergen. income rank–rank function: Friedman et al. (2018)
- Use NYC-specific earnings lifecycle: 2015 ACS microdata
- Use NYC-specific MTR on labor income: NBER TAXSIM and NYC local PIT rate
- Match characteristics of 421-a or NYC Section 8 households
- Predict mobility effects using Opportunity Atlas (Bergman et al., 2020)
WTP for housing assumptions:

- High WTP: Value every $1 in breakeven as $1 transfer to household
- Low WTP: Value $1 in breakeven as $1 for inframarginal spending, $0 above counterfactual spending, using NYC housing expenditure distribution among HHs w/ incomes from $30K to $60K (2015 ACS)

Migration model:

- Restrict population to low-income renter households
- Calibrate move distance coefficient to match mean distance in Bergman et al. (2020)

Fiscal externalities:

- Effects on earnings / college subsidies (from Hendren & Spung-Keyser, 2020)
- Add NTA-specific displacement from Section 8 & LIHTC
MVPF of 421-a by Neighborhood Tabulation Area (Higher WTP)
Tracing the Citywide Supply Curve

How would the 421-a take-up rate change under a nonmarginal change in incentives?

\[ S(\Delta \tau) = \int \Pr(D_i = 1 \mid x_i, \Delta \tau) \, dF(x_i). \]

Implementation details:

- Make \( \Delta \tau \) common across buildings, vary together
- Simultaneous (sup-\( t \)) bootstrap confidence bands as in Chernozhukov et al. (2013)
The graph illustrates the relationship between the 421-a Incentive (as a Fraction of Building Value) and the Citywide 421-a Participation Rate. The black line represents the Bootstrap Mean, and the light blue shaded area indicates the 95% Confidence Band. The x-axis represents the 421-a Incentive, ranging from 0 to 1.5, while the y-axis shows the Citywide Participation Rate, ranging from 0 to 1.
‘Laffer Curve’ for Inclusionary Units

How does the number of inclusionary units respond to a rise in the required share $\lambda$?

- Get more units from inframarginal buildings
- But buildings on the margin exit 421-a

→ Ambiguous b/c of opposite-signed mechanical and behavioral effects

Number of inclusionary units:

$$I_n(\lambda; \{\Delta \tau_i\}) = \lambda \int \Pr(D_i = 1 \mid x_i, \lambda, \Delta \tau) dF_n(x_i).$$

Problem: No $\lambda$ variation in data, need functional form assumption

$$\delta_i = \min \left\{ \frac{\lambda}{1 - \lambda} \delta_0(x_i), \mu(x_i) \right\} \implies \frac{\Delta \tau}{\lambda} \geq (\mu + \delta_0)(x_i)$$
## Duration of 421-a Tax Incentive, in Years

<table>
<thead>
<tr>
<th>Years</th>
<th>Location</th>
<th>Inclusionary Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>1985–2006</td>
<td>Manhattan GEA</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Manhattan non-GEA, South of 110th Street</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Preservation Program Areas</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>All Other Areas</td>
<td>15</td>
</tr>
<tr>
<td>2006–2008</td>
<td>Manhattan GEA</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Manhattan non-GEA, South of 110th Street</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Greenpoint–Williamsburg GEA</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Neighborhood Preservation Program Areas</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>All Other Areas</td>
<td>15</td>
</tr>
<tr>
<td>2008–2016</td>
<td>Expanded GEA</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>All Other Areas</td>
<td>15</td>
</tr>
</tbody>
</table>
# Measurement of 421-a Tax Incentive

How NYC (and I) calculate a building’s tax liability, in five easy steps:

<table>
<thead>
<tr>
<th>Concept</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. True Market Value</td>
<td></td>
</tr>
<tr>
<td>1. Estimated Market Value</td>
<td>Estimate (0)</td>
</tr>
<tr>
<td>2. Actual Assessed Value</td>
<td>Apply assessment ratio to (1)</td>
</tr>
<tr>
<td>3. Transitional Assessed Value</td>
<td>Apply growth caps to (2)</td>
</tr>
<tr>
<td>4. Taxable Value</td>
<td>Apply tax exemptions to (3)</td>
</tr>
<tr>
<td>5. Tax Liability</td>
<td>Apply tax rate, then abatements, to (4)</td>
</tr>
</tbody>
</table>

→ Convert liability sequences \( \{ T_{is}^0 \}, \{ T_{is}^1 \} \) to rates \( \{ \tau_{is}^0 \}, \{ \tau_{is}^1 \} \), compute diff in PDVs