Take the Q Train: Value Capture of Public Infrastructure Projects

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Motivation

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- ▶ As major urban centers continue to grow, so does demand for public infrastructure
- ▶ Costs of public transportation is very high
  - ▶ Light rail costs $10m-$300m per mile, compared to $3m-$5m per mile for urban roads
  - ▶ Subway more expensive: $200-$900m per mile
  - ▶ NYC: 7 line and 2nd Ave subway extension: **$2,600 million per mile**

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- ▶ But investment decision requires cost-benefit analysis

- ▶ This paper: connect commuting gains of transit expansion to the value capitalized into residential and commercial real estate assets, and fraction of this benefit accrued by government through property taxes
  - ▶ Difference-in-difference approach
  - ▶ Define a geographical area that is "treated" by the extension, and contrast with a control group that is untreated
  - ▶ Define a period before and a period after treatment (taking into account anticipation effects)

# We Document Large Benefits of Subway Expansion Incompletely Captured by Government

- ▶ Study Second Avenue subway extension in NYC
  - ▶ The most expensive subway ever built per mile!

1. Novel geolocation data show transportation benefits
   - ▶ 3–15 min commute gains

2. Assess complementary real estate gains in vicinity of transit stops
   - ▶ Real Estate prices increase 5–10%
   - ▶ $\sim$ 50% Increase in rents, $\sim$ 50% change in discount rate

3. Study public finance implications:
   - ▶ Government captures only 30% of value generated by subway
   - ▶ Increased use of *value capture* could be a feasible funding strategy to pay for major infrastructure projects

Data and Specification

- ▶ Commuting times: locational data from GPS signals from smartphones

- ▶ All residential real estate transactions on NYC's Upper East side from Jan 2003–March 2019
  - ▶ Deeds records from Department of Finance on condo units, coop units, multifamily buildings (tax code 2), other CRE properties (tax code 4)
  - ▶ Matched against web-scraped data of owner-occupied and rental unit characteristics (bedrooms, bathrooms, sqft, floor) from StreetEasy.

- ▶ Tax data from Notice of Property Value (DOF), rent data from city

- ▶ Key Specification follows difference-in-difference:

$$
\begin{aligned}
\ln(y_{it}) = {}& \alpha + \gamma_1 \cdot \text{Treatment}_{it} + \delta_1 \cdot \text{Post 2013}_{it} + \beta_1 \cdot \text{Treatment}_{it} \times \text{Post}_{it} + \textbf{X}'_{it} \cdot \theta \\
& + \delta_2 \cdot \text{Construction Period}_{it} + \beta_2 \cdot \text{Treatment} \times \text{Construction Period}_{it} + \varepsilon_{it}
\end{aligned}
$$

Timing
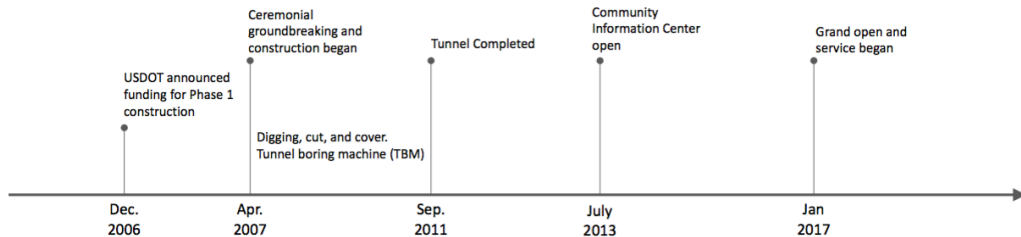
Timing — Initial Separation of Pre and Post Period
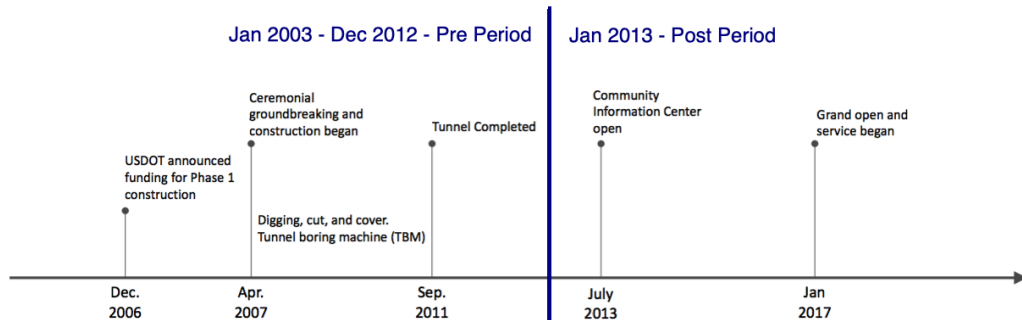
Timing — Additional Inclusion of Construction Period

Treatment Definitions Surrounding New Transit Stops

- ▶ Treatment 1: 2nd Ave Corridor between 1st and 3rd; 59th-100th St
- ▶ Treatment 2: < 0.3 miles based on walking distance
- ▶ Treatment 3: Properties with a reduction in distance to the nearest subway station
- ▶ Treatment 4: All of the Above

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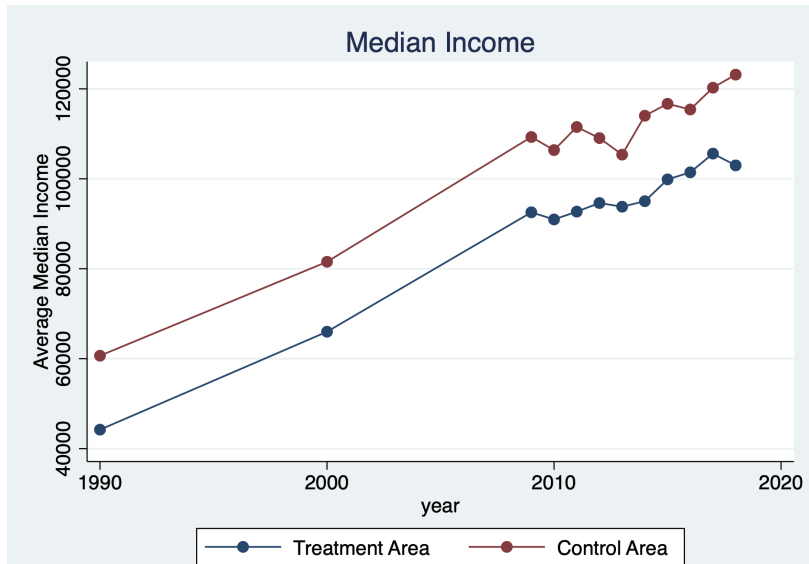
Lack of Evidence for Differential Income Trends

1. Commuting Time Impacts of Q-line Construction

Document Transportation Improvements from Extension

Subway Construction Reduces Commute Times

	Commute Time (sec)			
VARIABLES	On 2nd Ave	Walking Distance	Closer Subway	Intersection
After Jan 2017	-3	10	-2	8
	(35)	(36)	(37)	(33)
Treatment	359***	356***	383***	448***
	(48)	(48)	(47)	(50)
After Jan 2017 x Treatment	-193***	-199***	-160***	-251***
	(55)	(54)	(54)	(57)
Observations	27549	27549	27549	27549
R-squared	0.004	0.004	0.006	0.005
Treatment Def.	1	2	3	4

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2.7– 4.2 min commute reduction resulting from subway construction; relative to baseline commute of 43.6 min in treatment group

Subway Users Dominate Commute Time Reduction

	Commute Time (sec)			
VARIABLES	On 2nd Ave	Walking Distance	Closer Subway	Intersection
Post	144	149*	138	175**
	(91)	(86)	(91)	(86)
Treatment	-324*	153	99	-13
	(189)	(241)	(182)	(248)
Subway	-324***	-262***	-277***	-263***
	(88)	(85)	(90)	(83)
Post x Treatment	592***	631**	446**	563**
	(200)	(254)	(195)	(260)
Subway x Treatment	749***	248	330*	505**
	(195)	(246)	(189)	(254)
Subway x Post	-182*	-191**	-181*	-211**
	(99)	(94)	(100)	(93)
Subway x Post x Treatment	-850***	-854***	-653***	-864***
	(208)	(260)	(203)	(267)
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10.9–14.4 min commute reduction for subway users, in treatment area, after construction

Subway Construction Impact on Commuting Choice

Fraction of Commuters Using Mostly the Q Line

Subway Construction Impact on Commuting Choice
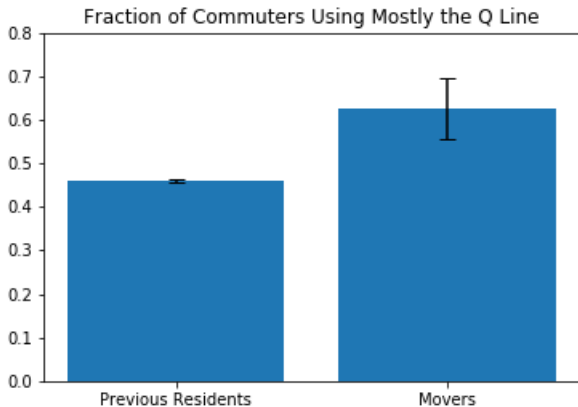
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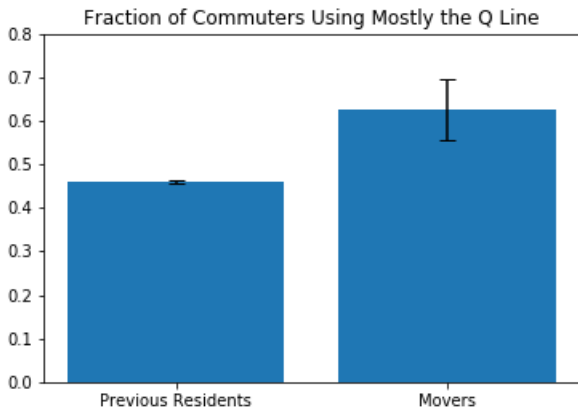
Marginal movers more likely to set real estate prices

2. Real Estate Capitalization of Transportation Benefits

Real Estate Prices Increase: 50% from higher rents, 50% higher valuation

Baseline Results (Full Variables)

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price
Post x On 2nd Ave	0.138***	0.0970***	0.0432***	0.138***	0.0597***
	(0.0154)	(0.00957)	(0.00866)	(0.0112)	(0.0103)
Constr. Period x On 2nd Ave				0.0845***	0.0317***
				(0.0115)	(0.0104)
Post	0.0903***	0.123***	0.111***	0.177***	0.159***
	(0.00982)	(0.00610)	(0.00550)	(0.00717)	(0.00652)
On 2nd Ave	-0.469***	-0.203***		-0.246***	
	(0.00927)	(0.00612)		(0.00849)	
Constr. Period				0.101***	0.0882***
				(0.00721)	(0.00652)
Observations	49,673	49,673	49,673	49,673	49,673
R-squared	0.068	0.643	0.739	0.648	0.741
Controls	NO	YES	YES	YES	YES
Building FE	NO	NO	YES	NO	YES

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4.8–10.8% price increase on 2nd Avenue corridor after 2013

Dynamic Differences-in-Differences Estimation

Price Effect of Being on Second Avenue (Relative to UES)
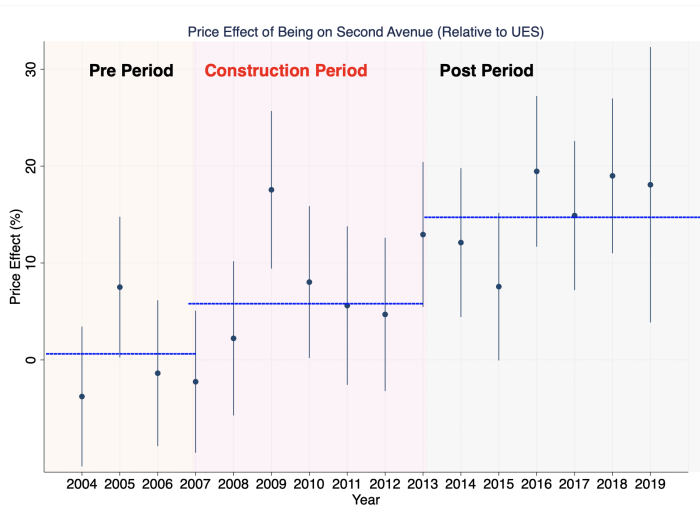
Connecting Commuting and Price Estimates

- ▶ 750k (house price in treatment area) $\times$ 5–10% price increase / 3 min one-way commute = $12,500–$25,000 increase in house price per minute

METRO-NORTH HARLEM LINE

HOME COST PER COMMUTING MINUTE

Station
Travel Time
Median Home Price

Grand Central

$34,643 — **Bronxville**
35 min.
$1,212,500

$17,297 — **Tuckahoe**
37 min.
$640,000

$11,250 — **Crestwood**
40 min.
$450,000

$36,826 — **Scarsdale**
40 min.
$1,583,500

$12,543 — **Hartsdale**
46 min.
$577,000

$12,800 — **White Plains**
(2 stops) 50 min
$640,000

$12,861 — **Valhalla**
44 min.
$565,900

$10,625 — **Hawthorne**
48 min.
$510,000

$13,654 — **Pleasantville**
52 min.
$710,000

$17,370 — **Chappaqua**
55 min.
$955,350

Decomposing Effects into Rental Increase and Valuation

	Property-level		Block-level indices					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Log R	Log R	Log R	Log P	Log P/R	Log R	Log P	Log P/R
Post x Treat	0.0177***	0.00685***	0.0203	0.0465**	0.0262	0.0274	0.0696***	0.0421
	(0.00255)	(0.00241)	(0.0149)	(0.0212)	(0.0219)	(0.0185)	(0.0264)	(0.0271)
Post	0.0322***	0.00849***	0.0172*	0.0841***	0.0670***	-0.00293	0.0812***	0.0842***
	(0.00186)	(0.00171)	(0.00919)	(0.0131)	(0.0135)	(0.0115)	(0.0164)	(0.0168)
Treat	-0.0601***	-0.0498***	-0.111***	-0.195***	-0.0838***	-0.106***	-0.186***	-0.0799***
	(0.00221)	(0.00147)	(0.0110)	(0.0156)	(0.0162)	(0.00852)	(0.0122)	(0.0125)
Observations	99,034	99,034	1,853	1,853	1,853	1,853	1,853	1,853
R-squared	0.808	0.806	0.404	0.422	0.105	0.400	0.414	0.108
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Building FE	NO	NO	NO	NO	NO	NO	NO	NO
Post Year	2013	2017	2013	2013	2013	2017	2017	2017
Treatment Def	1	1	1	1	1	1	1	1

▶ StreetEasy listings show significant rent increase based on individual apartment rents

Decomposing Effects into Rental Increase and Valuation

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▶ Shift to block-level, estimating rental and price indices for each block accounting for characteristics

Decomposing Effects into Rental Increase and Valuation

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Post Year	2013	2017	2013	2013	2013	2017	2017	2017
Treatment Def	1	1	1	1	1	1	1	1

- ▶ Half of the treatment effect on log price is increase in log price-rent ratio

- ▶ Project lowered discount rate on local residential real estate by 2-3% points

- ▶ Complementarity: infrastructure reduces risk of real estate investments

But What About...

1. Alternative Treatment Definitions Link
2. Breaking Out Effects by Avenues Link
3. New Development Link
4. Building Permits Link
5. Heterogeneous Treatment for New v. Old buildings Link
6. Effects by Number of Bedrooms Link
7. Repeat Sales Link
8. Within Distances Broken Down Link
9. Rent Control Link

3. Value Capture Implications
Property tax recoups little of value generated by subway

Estimating Value Capture

- NYC will increase property taxes if the building becomes more valuable through looking at NOI of comparable rental buildings
- It does so gradually
- We estimate this process, and find that city captures 30.6% of increase in property value through taxes (details in paper)

Subway Construction Achieves Limited Value Capture Details

Value Add Under:	Value in 2012 (in bn $)	(2) Standard Controls	(3) Building FE	(4) Constr. Period	(5) Constr. Period + Building FE
Treatment Effect:		0.097*** (0.01)	0.043*** (0.00866)	0.138*** (0.01123)	0.060*** (0.01026)
Percentage Change:		10.2	4.4	14.8	6.2
Owner-Occupied Residential ($b)	32	3.24	1.41	4.72	1.97
Renter-Occupied Buildings ($b)	26	2.67	1.16	3.88	1.62
Commercial Non-residential ($b)	12	1.23	.53	1.78	.75
Total ($b):	70	7.1	3.1	10.38	4.3
Property Tax Receipts ($b):		2.17	.95	3.18	1.32
Net Gain to Govt ($b):		(2.33)	(3.55)	(1.32)	(3.18)

- ▶ Estimate pre-subway valuation for every co-op and condo including for non-transacting units

- ▶ Correct NYC's assessment of market value for properties through a block-level adjustment factor comparing true market value / NYC market value

Aggregating Real Estate Values

- Estimated total value of real estate in the treatment group: $70b (baseline)
- Estimated $7 increase in market value (baseline), $3–10b (range)
- Cost to build: $4.5b
  - Value capture = 30.6% $\times$ $3–10b = $1–3b; $1–3b shortfall
- Value capture with micro targeting:
  - Using individual unit gains to assess surcharge

Conclusions

- ▶ Public infrastructure projects in urban areas are very expensive, esp. NYC subways
- ▶ Responsible policy requires careful cost-benefit analysis $\Rightarrow$ measurements of private benefits
- ▶ Our analysis reveals sizable benefits:
  - ▶ Commuting gains of 3–15 min in treated areas, especially among subway commuters
  - ▶ Real estate price gains of 5–10%, split 50-50 between rent and discount rate reducation
- ▶ However, most of the gain is realized by private landlords, not recouped by public government in the form of greater property taxes
- ▶ Better designed value capture programs may facilitate greater public investment in infrastructure

Thank You!

Lack of Evidence for Differential Income Trends

Income Effect of Being on Second Avenue (Relative to UES)
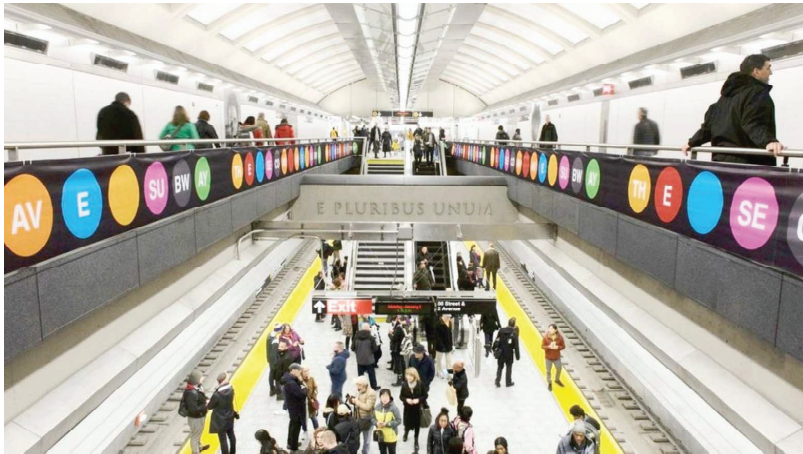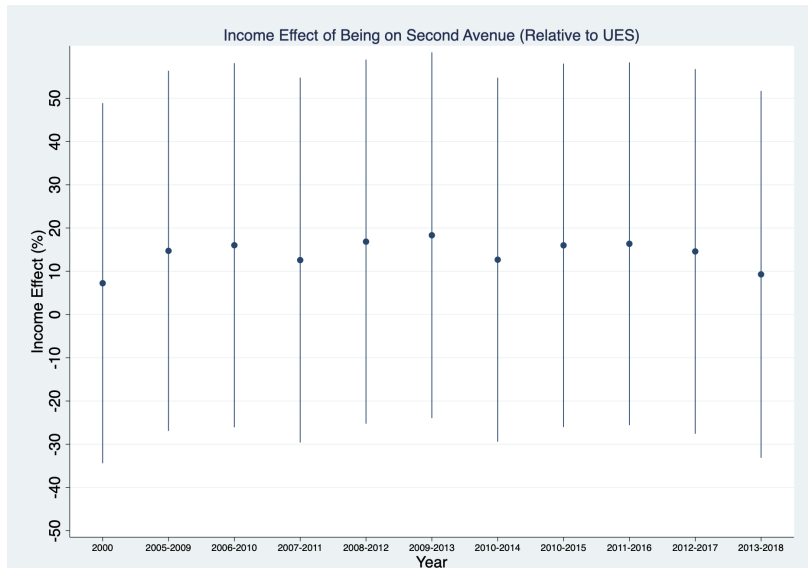
NYC Property Taxes

- ▶ Per lot (BBL), we have tax assessment record
- ▶ "Market" value
  - ▶ NYC imputes NOI per sqft based on comparable rental buildings
  - ▶ Multiply by cap rate; uniform 12.42% in Jan 2018
  - ▶ → NYC's "market value" is 18.8% of true market value (UES: $269 vs $1442 per sqft)
- ▶ Assessed value = 45% of "market value"
  - ▶ Increases in market value passed spread out over 5 years (> 11 units)
- ▶ Tax paid harder to observe
  - ▶ Tax paid = tax rate $\times$ (assessed value $-$ exemptions)
  - ▶ Tax rate is 12.9%; fairly stable over time period
  - ▶ We have tax paid data for 2015 to measure exemptions
- ▶ Apply the estimated effect to all properties in the treatment group to obtain aggregate benefit

Value Capture

- Take a typical condo building on UES
    - 90 units, 140,000 sqft
    - True market value is $200m or $1442 per sqft
    - NYC's market value is $37.65m or $269 per sqft
    - Assessed value is $16.9m
    - Assessed value after condo abatement (exemption) is $14.0m
    - Tax paid is $1.8m; 0.9% (4.8%) of true (NYC) market value
- Second Avenue subway increases value by 10.8% or $18.9m
    - NYC's "market value" increases by $4.1
    - Assessed value after exemptions ↑ by $1.8m, phased in over 5 years
    - Taxes paid ↑ by $194,609 in year 5 and beyond
    - Assume a 100-year horizon
    - Assume a government discount rate of 3.0% (municipal bond yield)
    - PV of tax increase is $5.78m
- Value capture is $5.78m / $18.9m = 30.6%

Alternative Treatment Definitions Back

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price	(6) Log Price
Post x Treat	0.0711***	0.0398***	0.0862***	0.0297***	0.0819***	0.0372***
	(0.00947)	(0.00851)	(0.00945)	(0.00849)	(0.0103)	(0.00937)
Post	0.129***	0.110***	0.115***	0.113***	0.137***	0.117***
	(0.00641)	(0.00578)	(0.00683)	(0.00614)	(0.00564)	(0.00506)
Treat	-0.137***		-0.151***		-0.165***	
	(0.00592)		(0.00769)		(0.00656)	
Observations	49,673	49,673	49,673	49,673	49,673	49,673
R-squared	0.639	0.739	0.638	0.739	0.640	0.739
Controls	YES	YES	YES	YES	YES	YES
Building FE	NO	YES	NO	YES	NO	YES
Treatment Def.	2	2	3	3	4	4

Unpacking Control Group

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
Post x On 2nd Ave	0.122***	0.0610***	0.170***	0.0726***
	(0.0138)	(0.0127)	(0.0161)	(0.0149)
Post x On Lexington Ave	0.0103	0.0157	0.0126	0.00270
	(0.0153)	(0.0140)	(0.0179)	(0.0164)
Post x On York Ave	0.0677***	0.0326**	0.0877***	0.0318*
	(0.0155)	(0.0140)	(0.0181)	(0.0165)
Constr. Period x On 2nd Ave			0.0969***	0.0210
			(0.0162)	(0.0147)
Constr. Period x On Lexington Ave			0.00391	-0.0254
			(0.0180)	(0.0163)
Constr. Period x On York Ave			0.0386**	-0.00406
			(0.0181)	(0.0164)
Post	0.0981***	0.0931***	0.144***	0.146***
	(0.0117)	(0.0107)	(0.0137)	(0.0125)
On 2nd Ave	-0.498***		-0.545***	
	(0.0133)		(0.0156)	
On Lexington Ave	-0.236***		-0.237***	
	(0.0106)		(0.0141)	
On York Ave	-0.443***		-0.460***	
	(0.0189)		(0.0209)	
Constr. Period			0.0859***	0.0989***
			(0.0136)	(0.0123)
Observations	49,673	49,673	49,673	49,673
R-squared	0.649	0.739	0.653	0.741
Controls	YES	YES	YES	YES
Building FE	NO	YES	NO	YES

Back

Summary Statistics: Treatment Group

	N	Mean	St.Dev	p1	p25	p50	p75	p99
saleprice	19941	1090000	1020000	189000	509000	761000	1280000	5520000
sqft	13355	1039.486	670.708	392	670	850	1250	3158
ppsf	13330	1062.336	442.979	332.336	779.935	979	1277.826	2444.582
bedrooms	19918	1.501	0.968	0	1	1	2	4
bathrooms	19384	1.495	0.825	1	1	1	2	5
condo	19941	0.375	0.484	0	0	0	1	1
coop	19941	0.625	0.484	0	0	1	1	1
studio	19941	0.092	0.289	0	0	0	0	1
building age	19941	45.791	24.388	1	28	44	57	105
NewConstr	19941	0.059	0.235	0	0	0	0	1
closest pre	19941	0.324	0.114	0.057	0.245	0.313	0.395	0.551
closest post	19941	0.183	0.084	0.007	0.111	0.186	0.247	0.364
dist change	19941	0.14	0.128	0	0.011	0.112	0.249	0.429
treat2	19941	0.803	0.398	0	1	1	1	1
treat3	19941	0.79	0.408	0	1	1	1	1
treat4	19941	0.728	0.445	0	0	1	1	1

Summary Statistics: Control Group

	N	Mean	St.Dev	p1	p25	p50	p75	p99
saleprice	29732	1840000	1790000	203000	646000	1180000	2330000	8730000
sqft	15527	1271.255	862.084	379	725	1050	1569	4034
ppsf	15449	1243.767	610.658	335.328	838.746	1101.92	1472.258	3381.886
bedrooms	29678	1.882	1.063	0	1	2	2.192	5
bathrooms	28875	1.83	1.03	1	1	1.5	2.5	5
condo	29732	0.304	0.46	0	0	0	1	1
coop	29732	0.696	0.46	0	0	1	1	1
studio	29732	0.053	0.223	0	0	0	0	1
building age	29732	59.009	27.97	1	42	56	83	109
NewConstr	29732	0.041	0.198	0	0	0	0	1
closest pre	29732	0.343	0.221	0.022	0.162	0.283	0.503	0.851
closest post	29732	0.265	0.14	0.022	0.158	0.247	0.357	0.603
dist change	29732	0.078	0.127	0	0	0	0.13	0.429
treat2	29732	0.219	0.414	0	0	0	0	1
treat3	29732	0.341	0.474	0	0	0	1	1
treat4	29732	0	0	0	0	0	0	0

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price
Post x On 2nd Ave	0.138***	0.0970***	0.0432***	0.138***	0.0597***
	(0.0154)	(0.00957)	(0.00866)	(0.0112)	(0.0103)
Constr. Period x On 2nd Ave				0.0845***	0.0317***
				(0.0115)	(0.0104)
Post	0.0903***	0.123***	0.111***	0.177***	0.159***
	(0.00982)	(0.00610)	(0.00550)	(0.00717)	(0.00652)
On 2nd Ave	-0.469***	-0.203***		-0.246***	
	(0.00927)	(0.00612)		(0.00849)	
Constr. Period				0.101***	0.0882***
				(0.00721)	(0.00652)
Condo		0.141***	0.298	0.141***	
		(0.00625)	(0.580)	(0.00621)	
1BR		0.400***	0.333***	0.410***	0.343***
		(0.00904)	(0.00843)	(0.00900)	(0.00841)
2BR		0.806***	0.664***	0.815***	0.674***
		(0.00984)	(0.00941)	(0.00978)	(0.00939)
3BR		1.108***	0.895***	1.117***	0.905***
		(0.0122)	(0.0116)	(0.0121)	(0.0114)
4BR+		1.180***	0.947***	1.194***	0.961***
		(0.0155)	(0.0150)	(0.0154)	(0.0149)
Pre War		0.129***	-0.0418	0.131***	-0.0233
		(0.00642)	(0.157)	(0.00638)	(0.156)
Built Within 10 Years		0.359***	0.0722***	0.346***	0.0917***
		(0.0105)	(0.0197)	(0.0104)	(0.0197)
Bathrooms		0.190***	0.144***	0.186***	0.141***
		(0.00355)	(0.00338)	(0.00353)	(0.00337)
Missing Bath		0.248***	0.176***	0.263***	0.183***
		(0.0149)	(0.0139)	(0.0148)	(0.0138)
Missing Bed		0.781***	2.287*	0.808***	
		(0.0604)	(1.232)	(0.0600)	
Floor		0.00945***	0.0114***	0.00945***	0.0114***
		(0.000315)	(0.000334)	(0.000313)	(0.000332)
Missing Floor		0.820***	0.778	0.824***	
		(0.152)	(1.353)	(0.151)	
GrandCentralWalkingDist		-0.135***	3.750*	-0.132***	4.059**
		(0.00478)	(2.015)	(0.00475)	(2.007)
CentralParkWalkingDist		-0.481***	-1.887	-0.484***	-2.290
		(0.0107)	(1.882)	(0.0106)	(1.875)
FT Doorman		0.0373***	-0.577**	0.0383***	-0.566*
		(0.00968)	(0.291)	(0.00962)	(0.290)
Bike Room		-0.0499***	0.0247	-0.0454***	0.0135
		(0.00571)	(0.132)	(0.00568)	(0.131)
Doorman		0.206***	0.448**	0.202***	0.455**
		(0.0121)	(0.200)	(0.0120)	(0.199)
Gym		0.151***	0.102	0.149***	0.0506
		(0.00580)	(0.258)	(0.00576)	(0.257)
Elevator		0.231***	-0.0104	0.235***	-0.000227
		(0.0119)	(0.0311)	(0.0118)	(0.0310)
Laundry		-0.0908***	-0.0847	-0.0882***	-0.0806
		(0.00528)	(0.0940)	(0.00525)	(0.0936)
Concierge		0.0288***	1.438	0.0312***	-0.0136
		(0.00634)	(0.905)	(0.00631)	(0.251)
Live in Super		-0.109***	0.0860	-0.113**	0.0793
		(0.00653)	(0.0571)	(0.00650)	(0.0569)
Pool		-0.0810***	1.600	-0.0733***	
		(0.00847)	(1.103)	(0.00843)	
Storage		0.0426***	-0.412**	0.0409***	
		(0.00568)	(0.0962)	(0.00564)	
Roofdeck		0.0199***	0.119	0.0197***	0.0581
		(0.00595)	(0.236)	(0.00592)	(0.235)
Playroom		-0.0389***	0.0482	-0.0320***	0.0346
		(0.00753)	(0.146)	(0.00749)	(0.145)
Parking		-0.0242***	-1.479	-0.0249***	
		(0.00602)	(1.017)	(0.00598)	
Observations	49,673	49,673	49,673	49,673	49,673
R-squared	0.068	0.643	0.739	0.648	0.741
Controls	NO	NO	YES	NO	YES
Building FE	NO	NO	YES	YES	YES

Within Distance Broken Down Back

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
Post x Within 0 - .1 mi	0.0333*	0.0231	0.0293	0.0260
	(0.0179)	(0.0158)	(0.0210)	(0.0187)
Post x Within .1 -.2 mi	0.0655***	0.0317**	0.0828***	0.0508***
	(0.0141)	(0.0127)	(0.0167)	(0.0150)
Post x Within .2 -.3 mi	0.0871***	0.0507***	0.140***	0.0715***
	(0.0117)	(0.0105)	(0.0137)	(0.0125)
Constr. Period x Within 0 - .1 mi			-0.00767	0.00644
			(0.0215)	(0.0191)
Constr. Period x Within .1 -.2 mi			0.0334*	0.0358**
			(0.0170)	(0.0154)
Constr. Period x Within .2 -.3 mi			0.101***	0.0346***
			(0.0139)	(0.0126)
Post	0.129***	0.110***	0.186***	0.157***
	(0.00641)	(0.00578)	(0.00751)	(0.00683)
Constr. Period			0.109***	0.0875***
			(0.00762)	(0.00683)
Within 0 - .1 mi	-0.148***		-0.144***	
	(0.0111)		(0.0156)	
Within .1 -.2 mi	-0.126***		-0.147***	
	(0.00883)		(0.0127)	
Within .2 -.3 mi	-0.140***		-0.195***	
	(0.00723)		(0.0102)	
Observations	49,673	49,673	49,673	49,673
R-squared	0.639	0.739	0.644	0.741
Controls	YES	YES	YES	YES
Building FE	NO	YES	NO	YES

Within Distance Broken Down Back

| VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price
Post x Within 0 - .1 mi	0.0229	0.0664***	0.0420**	0.0833***	0.0502**
	(0.0319)	(0.0199)	(0.0176)	(0.0233)	(0.0208)
Post x Within .1 -.2 mi	0.0500*	0.0986***	0.0505***	0.138***	0.0749***
	(0.0264)	(0.0165)	(0.0149)	(0.0195)	(0.0176)
Post x Within .2 -.3 mi	0.0750***	0.122***	0.0695***	0.196***	0.0954***
	(0.0232)	(0.0145)	(0.0131)	(0.0170)	(0.0155)
Post x Within .3 -.4 mi	0.00575	0.0731***	0.0315**	0.118***	0.0456***
	(0.0238)	(0.0149)	(0.0134)	(0.0174)	(0.0158)
Post x Within .4 -.5 mi	-0.0175	0.0212	0.0257*	0.0341*	0.0249
	(0.0264)	(0.0164)	(0.0148)	(0.0193)	(0.0174)
Constr. Period x Within 0 - .1 mi				0.0351	0.0164
				(0.0238)	(0.0212)
Constr. Period x Within .1 -.2 mi				0.0778***	0.0457**
				(0.0198)	(0.0178)
Constr. Period x Within .2 -.3 mi				0.145***	0.0444***
				(0.0171)	(0.0155)
Constr. Period x Within .3 -.4 mi				0.0909***	0.0245
				(0.0175)	(0.0158)
Constr. Period x Within .4 -.5 mi				0.0289	0.00110
				(0.0197)	(0.0176)
Within 0 - .1 mi	-0.625***	-0.197***	-0.254	-0.214***	-0.317
	(0.0192)	(0.0123)	(1.150)	(0.0174)	(1.145)
Within .1 -.2 mi	-0.596***	-0.177***	6.536**	-0.219***	6.531**
	(0.0159)	(0.0104)	(2.614)	(0.0148)	(2.604)
Within .2 -.3 mi	-0.535***	-0.193***	-0.699	-0.270***	-0.544
	(0.0138)	(0.00917)	(0.538)	(0.0128)	(0.536)
Within .3 -.4 mi	-0.358***	-0.113***	-0.718	-0.159***	-0.579
	(0.0141)	(0.00923)	(0.504)	(0.0129)	(0.502)
Within .4 -.5 mi	-0.279***	-0.0185*	-0.401**	-0.0313***	-0.310
	(0.0159)	(0.0102)	(0.195)	(0.0144)	(0.195)
Post	0.116***	0.0958***	0.0909***	0.132***	0.133***
	(0.0172)	(0.0107)	(0.00965)	(0.0126)	(0.0114)
Constr. Period				0.0660***	0.0776***
				(0.0126)	(0.0113)
Built Within 10 Years		0.359***	0.0726***	0.345***	0.0914***
		(0.0106)	(0.0198)	(0.0106)	(0.0197)
Observations	49,673	49,673	49,673	49,673	49,673
R-squared	0.068	0.641	0.739	0.645	0.741
Controls	NO	YES	YES	YES	YES
Building FE	NO	NO	YES	NO	YES

Adjusting for Rent Control: Buildings Built after 1974

Back

VARIABLES	(1) Log R	(2) Log R	(3) Log R	(4) Log P	(5) Log P/R	(6) Log R	(7) Log P	(8) Log P/R
Post x Treat	0.00778	0.00701	0.0242	0.0490	0.0248	0.0514	0.0445	-0.00691
	(0.00499)	(0.00511)	(0.350)	(0.0375)	(0.359)	(0.426)	(0.0462)	(0.437)
Post	0.0515***	0.0315***	-0.000665	0.100***	0.101	-0.0991	0.107***	0.206
	(0.00361)	(0.00366)	(0.225)	(0.0241)	(0.231)	(0.274)	(0.0297)	(0.280)
Treat	0.0195***	0.0228***	0.243	-0.158***	-0.401	0.245	-0.143***	-0.388*
	(0.00431)	(0.00325)	(0.257)	(0.0275)	(0.263)	(0.199)	(0.0216)	(0.204)
Observations	19,021	19,021	453	453	453	453	453	453
R-squared	0.849	0.847	0.044	0.275	0.059	0.045	0.255	0.060
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Building FE	NO	NO	NO	NO	NO	NO	NO	NO
Post Year	2013	2017	2013	2013	2013	2017	2017	2017
Treatment Def	1	1	1	1	1	1	1	1

New Development
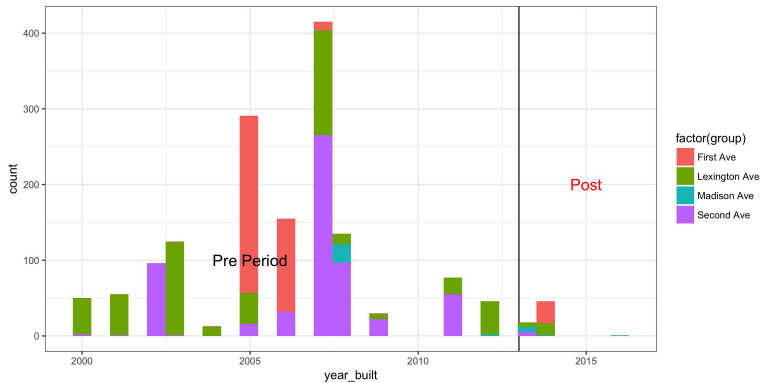
Permits

VARIABLES	(1) Log Estim. Cost	(2) Log Num. Permits	(3) Log Num. New Constr. Jobs	(4) Log Num. New Res. Build.
Post x On Second Avenue	0.0648	0.0369	0.0390	0.312
	(0.0598)	(0.185)	(0.209)	(0.446)
Post	0.288***	0.107	-0.0497	-0.0762
	(0.0254)	(0.131)	(0.148)	(0.311)
On Second Avenue	-0.447***	-0.964***	-0.826***	-0.314
	(0.0389)	(0.119)	(0.134)	(0.284)
Observations	19,175	34	34	32
R-squared	0.019	0.786	0.674	0.047

Heterogeneous Treatment for Number of Bedrooms Back

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
Post x Treat	-0.0153	-0.0284	0.00558	-0.0137
	(0.0234)	(0.0234)	(0.0214)	(0.0272)
Post x Treat x 1BR	0.0737***	0.0703***	0.0421*	0.0571*
	(0.0249)	(0.0247)	(0.0224)	(0.0293)
Post x Treat x 2BR	0.158***	0.119***	0.110***	0.131***
	(0.0264)	(0.0259)	(0.0237)	(0.0314)
Post x Treat x 3BR	0.223***	0.180***	0.155***	0.215***
	(0.0331)	(0.0310)	(0.0290)	(0.0400)
Post x Treat x 4BR+	0.386***	0.348***	0.310***	0.408***
	(0.0461)	(0.0434)	(0.0393)	(0.0540)
Treat x 1BR	-0.00984	-0.0629***	-0.131***	-0.0480**
	(0.0206)	(0.0207)	(0.0211)	(0.0220)
Treat x 2BR	-0.0971***	-0.123***	-0.253***	-0.149***
	(0.0215)	(0.0213)	(0.0217)	(0.0232)
Treat x 3BR	-0.227***	-0.232***	-0.336***	-0.300***
	(0.0257)	(0.0245)	(0.0246)	(0.0284)
Treat x 4BR+	-0.238***	-0.272***	-0.328***	-0.350***
	(0.0345)	(0.0323)	(0.0317)	(0.0373)
Post	0.124***	0.129***	0.117***	0.138***
	(0.00609)	(0.00641)	(0.00681)	(0.00562)
Treat	-0.140***	-0.0325*	0.0320	-0.0597***
	(0.0192)	(0.0193)	(0.0200)	(0.0204)
1BR	0.390***	0.423***	0.483***	0.415***
	(0.0131)	(0.0133)	(0.0157)	(0.0116)
2BR	0.823***	0.861***	0.955***	0.852***
	(0.0137)	(0.0140)	(0.0162)	(0.0122)
3BR	1.154***	1.198***	1.284***	1.178***
	(0.0157)	(0.0161)	(0.0181)	(0.0143)
4BR+	1.209***	1.255***	1.325***	1.250***
	(0.0190)	(0.0195)	(0.0214)	(0.0178)
Observations	49,673	49,673	49,673	49,673
R-squared	0.645	0.640	0.640	0.642
Controls	YES	YES	YES	YES
Building FE	NO	NO	NO	NO
Treatment Def.	1	2	3	4

Heterogeneous Treatment for New v. Old buildings

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
Post x Treat	0.0914***	0.0694***	0.0704***	0.0729***
	(0.00977)	(0.00969)	(0.00967)	(0.0106)
Post x Treat x NewConstr	0.0962***	0.128***	0.295***	0.162***
	(0.0342)	(0.0343)	(0.0358)	(0.0347)
Post x NewConstr	-0.128***	-0.154***	-0.282***	-0.154***
	(0.0290)	(0.0286)	(0.0316)	(0.0266)
Post	0.115***	0.120***	0.113***	0.130***
	(0.00621)	(0.00654)	(0.00694)	(0.00574)
Treat	-0.213***	-0.149***	-0.168***	-0.176***
	(0.00613)	(0.00593)	(0.00771)	(0.00657)
Newconstr	0.403***	0.391***	0.390***	0.397***
	(0.0143)	(0.0144)	(0.0144)	(0.0144)
Observations	49,673	49,673	49,673	49,673
R-squared	0.641	0.637	0.636	0.638
Controls	YES	YES	YES	YES
Building FE	NO	NO	NO	NO
Treatment Def.	1	2	3	4

Repeat Sales

VARIABLES	(1) Log P	(2) Log P	(3) Log P	(4) Log P	(5) Log P	(6) Log P	(7) Log P	(8) Log P
Post x Treat	0.0299**	0.0191**	0.0432***	0.0276***	0.0544***	0.0211**	0.0265**	0.0164*
	(0.0119)	(0.00900)	(0.0119)	(0.00894)	(0.0120)	(0.00897)	(0.0128)	(0.00961)
Post	0.109***	0.0537***	0.100***	0.0478***	0.0913***	0.0485***	0.113***	0.0555***
	(0.00794)	(0.00600)	(0.00840)	(0.00633)	(0.00903)	(0.00676)	(0.00729)	(0.00549)
Treat	-0.158***	-0.181***	-0.131***	-0.144***	-0.112***	-0.126***	-0.126***	-0.149***
	(0.00881)	(0.00664)	(0.00865)	(0.00650)	(0.0105)	(0.00785)	(0.00951)	(0.00713)
Lagged Log P Resid		0.589***		0.592***		0.597***		0.593***
		(0.00520)		(0.00519)		(0.00517)		(0.00518)
Observations	16,883	16,883	16,883	16,883	16,883	16,883	16,883	16,883
R-squared	0.742	0.853	0.739	0.853	0.736	0.852	0.738	0.853
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Building FE	NO	NO	NO	NO	NO	NO	NO	NO
Treatment Def.	1	1	2	2	3	3	4	4