

Take the Q Train: Value Capture of Public Infrastructure Projects

Arpit Gupta (NYU Stern) **Stijn Van Nieuwerburgh** (Columbia GSB, NBER, CEPR)
Constantine Kontokosta (NYU CUSP, Marron)

March 1, 2020

E PLURIBUS UNUM

Motivation

- ▶ As major urban centers continue to grow, so does demand for public infrastructure

Motivation

- ▶ 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: \$2,600mi per mile

Motivation

- ▶ As major urban centers continue to grow, so does demand for public infrastructure
- ▶ Costs of public transportation is very high
- ▶ But investment decision requires cost-benefit analysis.
- ▶ Several benefits documented in the literature
 - ▶ Improved access to workplaces and amenities due to shorter commuting times (Baum-Snow and Kahn 2000, 2005, Severen 2018)
 - ▶ ⇒ Labor force participation ↑, esp. for women (Black et al. 2004)
 - ▶ Reduced traffic congestion on roads and other public transportation ⇒ pollution ↓ (Anderson 2014)
 - ▶ Less drunk driving (Jackson and Owens 2015)
 - ▶ Knock-on effects: improved retail (+), more noise and crime (-) around stations (Bowes and Ihlanfeldt 2001)
- ▶ Cost-benefit analysis difficult because benefits hard to quantify

Capitalization Approach to Measuring Benefits

- ▶ Real estate values in the vicinity of public transportation hubs **capitalize** the present value of all future benefits that accrue to households and businesses from transportation

Capitalization Approach to Measuring Benefits

- ▶ Real estate values in the vicinity of public transportation hubs **capitalize** the present value of all future benefits that accrue to households and businesses from transportation
- ▶ Measure how value of residential and commercial real estate assets changes after extension to public transportation
 - ▶ 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)
 - ▶ Difference-in-difference approach

Capitalization Approach to Measuring Benefits

- ▶ Real estate values in the vicinity of public transportation hubs **capitalize** the present value of all future benefits that accrue to households and businesses from transportation
- ▶ Measure how value of residential and commercial real estate assets changes after extension to public transportation
- ▶ Literature tends to find modest increases in value of residential real estate after completion of transportation (3-10%)
 - ▶ Direct effect around stations: Toronto (Deweese 1976), Chicago (McDonald and Osuji 1995), Taipei (Lin and Hwang 2003), Atlanta, Boston, Chicago, Portland, and Washington DC (Baum-Snow and Kahn 2004), Chicago (McMillen and McDonald 2004), Singapore (Diao, Leonard, Sing 2017)
 - ▶ Network effects: 1.5-2% increase in real estate prices around *pre-existing* subway lines in Singapore, compared to 2-3.2% direct effects (Fesselmeyer et al. 2018)

We Document Large Benefits of Subway Expansion Incompletely Captured by Government

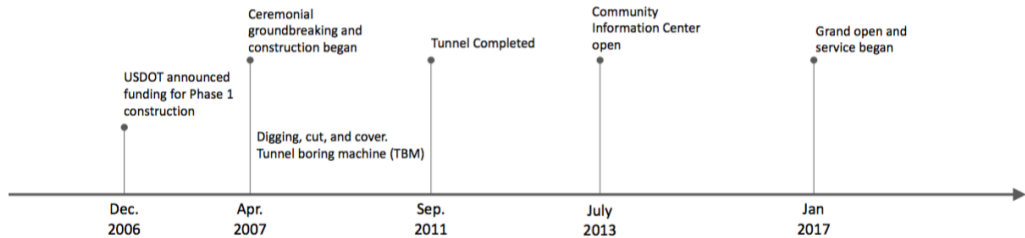
- ▶ Study Second Avenue subway extension in NYC
 - ▶ The most expensive subway ever built per mile!
- 1. Novel geolocation data show transportation benefits
 - ▶ 3–15 min commute gains
- 2. Assess complementary real estate gains in vicinity of transit stops
 - ▶ Real Estate prices increase 5–10%
 - ▶ ~ 50% Increase in rents, ~ 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 unit characteristics (bedrooms, bathrooms, sqft, floor) from StreetEasy.
- ▶ Tax data from Notice of Property Value (DOF), construction permits
- ▶ Key Specification follows difference-in-difference on sale price:

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

Timing



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

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

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

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

A black and white photograph of a crowded subway station. In the foreground, a person in a dark jacket is seen from behind, standing on an escalator. To the left, another person is walking on a different escalator. The background is filled with a dense crowd of people, some standing and some moving. The ceiling of the station is visible, with some structural elements and lighting fixtures. The overall atmosphere is busy and crowded.

1. Commuting Time Impacts of Q-line Construction

Document Transportation Improvements from Extension

Subway Construction Reduces Commute Times

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

Subway Construction Reduces Commute Times

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

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

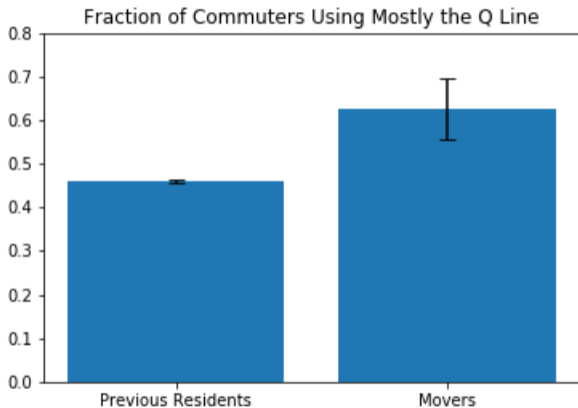
VARIABLES	Commute Time (sec)			
	On 2nd Ave	Walking Distance	Closer Subway	Intersection
Post	144 (91)	149* (86)	138 (91)	175** (86)
Treatment	-324* (189)	153 (241)	99 (182)	-13 (248)
Subway	-324*** (88)	-262*** (85)	-277*** (90)	-263*** (83)
Post x Treatment	592*** (200)	631** (254)	446** (195)	563** (260)
Subway x Treatment	749*** (195)	248 (246)	330* (189)	505** (254)
Subway x Post	-182* (99)	-191** (94)	-181* (100)	-211** (93)
Subway x Post x Treatment	-850*** (208)	-854*** (260)	-653*** (203)	-864*** (267)
Observations	27549	27549	27549	27549
R-squared	0.013	0.016	0.016	0.015
Treatment Def.	1	2	3	4

Subway Users Dominate Commute Time Reduction

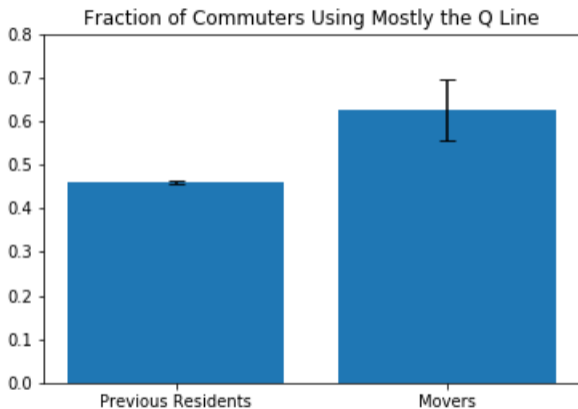
VARIABLES	Commute Time (sec)			
	On 2nd Ave	Walking Distance	Closer Subway	Intersection
Post	144 (91)	149* (86)	138 (91)	175** (86)
Treatment	-324* (189)	153 (241)	99 (182)	-13 (248)
Subway	-324*** (88)	-262*** (85)	-277*** (90)	-263*** (83)
Post x Treatment	592*** (200)	631** (254)	446** (195)	563** (260)
Subway x Treatment	749*** (195)	248 (246)	330* (189)	505** (254)
Subway x Post	-182* (99)	-191** (94)	-181* (100)	-211** (93)
Subway x Post x Treatment	-850*** (208)	-854*** (260)	-653*** (203)	-864*** (267)
Observations	27549	27549	27549	27549
R-squared	0.013	0.016	0.016	0.015
Treatment Def.	1	2	3	4

10.9–14.4 min commute reduction for subway users, in the treatment area, after subway construction


Subway Construction Impact on Commuting Choice



Subway Construction Impact on Commuting Choice



Marginal movers more likely to set real estate prices

An aerial photograph of a dense urban skyline, likely New York City, during sunset. The sky is filled with soft, colorful clouds in shades of orange, pink, and blue. The city buildings are illuminated by the low sun, creating a warm glow. A large white rectangular text box is superimposed over the upper portion of the image, containing the title and a key finding.

2. Real Estate Capitalization of Transportation Benefits

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

Baseline Results

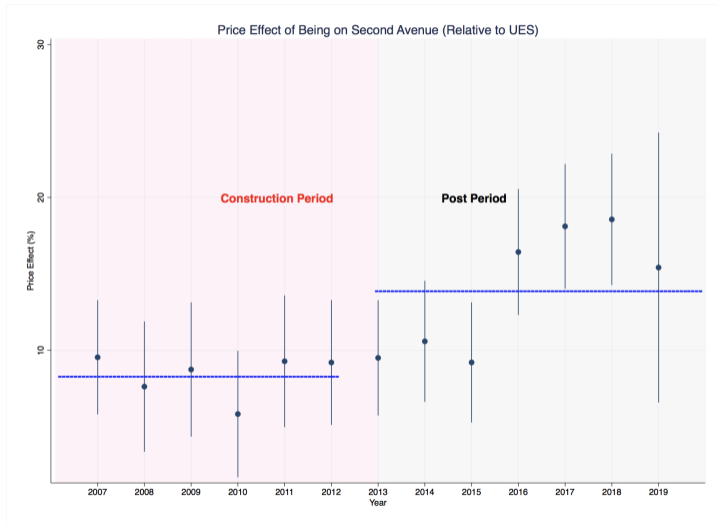
VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price
Post x On 2nd Ave	0.138*** (0.0154)	0.0970*** (0.00957)	0.0432*** (0.00866)	0.138*** (0.0112)	0.0597*** (0.0103)
Constr. Period x On 2nd Ave				0.0845*** (0.0115)	0.0317*** (0.0104)
Post	0.0903*** (0.00982)	0.123*** (0.00610)	0.111*** (0.00550)	0.177*** (0.00717)	0.159*** (0.00652)
On 2nd Ave	-0.469*** (0.00927)	-0.203*** (0.00612)		-0.246*** (0.00849)	
Constr. Period				0.101*** (0.00721)	0.0882*** (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

Baseline Results

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price
Post x On 2nd Ave	0.138*** (0.0154)	0.0970*** (0.00957)	0.0432*** (0.00866)	0.138*** (0.0112)	0.0597*** (0.0103)
Constr. Period x On 2nd Ave				0.0845*** (0.0115)	0.0317*** (0.0104)
Post	0.0903*** (0.00982)	0.123*** (0.00610)	0.111*** (0.00550)	0.177*** (0.00717)	0.159*** (0.00652)
On 2nd Ave	-0.469*** (0.00927)	-0.203*** (0.00612)		-0.246*** (0.00849)	
Constr. Period				0.101*** (0.00721)	0.0882*** (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

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

Dynamic Differences-in-Differences Estimation



Unpacking Control Group

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
Post x On 2nd Ave	0.122*** (0.0138)	0.0610*** (0.0127)	0.170*** (0.0161)	0.0726*** (0.0149)
Post x On Lexington Ave	0.0103 (0.0153)	0.0157 (0.0140)	0.0126 (0.0179)	0.00270 (0.0164)
Post x On York Ave	0.0677*** (0.0155)	0.0326** (0.0140)	0.0877*** (0.0181)	0.0318* (0.0165)
Constr. Period x On 2nd Ave			0.0969*** (0.0162)	0.0210 (0.0147)
Constr. Period x On Lexington Ave			0.00391 (0.0180)	-0.0254 (0.0163)
Constr. Period x On York Ave			0.0386** (0.0181)	-0.00406 (0.0164)
Post	0.0981*** (0.0117)	0.0931*** (0.0107)	0.144*** (0.0137)	0.146*** (0.0125)
On 2nd Ave	-0.498*** (0.0133)		-0.545*** (0.0156)	
On Lexington Ave	-0.236*** (0.0106)		-0.237*** (0.0141)	
On York Ave	-0.443*** (0.0189)		-0.460*** (0.0209)	
Constr. Period			0.0859*** (0.0136)	0.0989*** (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

Alternative Treatment Definitions

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price	(6) Log Price
Post x Treat	0.0711*** (0.00947)	0.0398*** (0.00851)	0.0862*** (0.00945)	0.0297*** (0.00849)	0.0819*** (0.0103)	0.0372*** (0.00937)
Post	0.129*** (0.00641)	0.110*** (0.00578)	0.115*** (0.00683)	0.113*** (0.00614)	0.137*** (0.00564)	0.117*** (0.00506)
Treat	-0.137*** (0.00592)		-0.151*** (0.00769)		-0.165*** (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

Decomposing Effects into Rental Increase and Valuation

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	0.0177*** (0.00255)	0.00685*** (0.00241)	0.0203 (0.0149)	0.0465** (0.0212)	0.0262 (0.0219)	0.0274 (0.0185)	0.0696*** (0.0264)	0.0421 (0.0271)
Post	0.0322*** (0.00186)	0.00849*** (0.00171)	0.0172* (0.00919)	0.0841*** (0.0131)	0.0670*** (0.0135)	-0.00293 (0.0115)	0.0812*** (0.0164)	0.0842*** (0.0168)
Treat	-0.0601*** (0.00221)	-0.0498*** (0.00147)	-0.111*** (0.0110)	-0.195*** (0.0156)	-0.0838*** (0.0162)	-0.106*** (0.00852)	-0.186*** (0.0122)	-0.0799*** (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

Decomposing Effects into Rental Increase and Valuation

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	0.0177*** (0.00255)	0.00685*** (0.00241)	0.0203 (0.0149)	0.0465** (0.0212)	0.0262 (0.0219)	0.0274 (0.0185)	0.0696*** (0.0264)	0.0421 (0.0271)
Post	0.0322*** (0.00186)	0.00849*** (0.00171)	0.0172* (0.00919)	0.0841*** (0.0131)	0.0670*** (0.0135)	-0.00293 (0.0115)	0.0812*** (0.0164)	0.0842*** (0.0168)
Treat	-0.0601*** (0.00221)	-0.0498*** (0.00147)	-0.111*** (0.0110)	-0.195*** (0.0156)	-0.0838*** (0.0162)	-0.106*** (0.00852)	-0.186*** (0.0122)	-0.0799*** (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

Half of the treatment effect on log price is accounted for by an increase in the log price-rent ratio. Second Ave reduced the discount rate on nearby residential real estate by about 2-3% points.

Additional Tests

1. New Development [Link](#)
2. Heterogeneous Treatment for New v. Old buildings [Link](#)
3. Repeat Sales [Link](#)

An aerial, black and white photograph of the U.S. Capitol building in Washington, D.C. The building's iconic dome is the central focus, topped with the Statue of Freedom. The surrounding area includes various other government buildings, streets with early 20th-century cars, and green spaces with trees. The sky is filled with soft, wispy clouds.

3. Value Capture Implications

Property tax recoups little of value generated by subway

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 $\$5.78\text{m} / \$18.9\text{m} = 30.6\%$

Subway Construction Achieves Limited Value Capture

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)

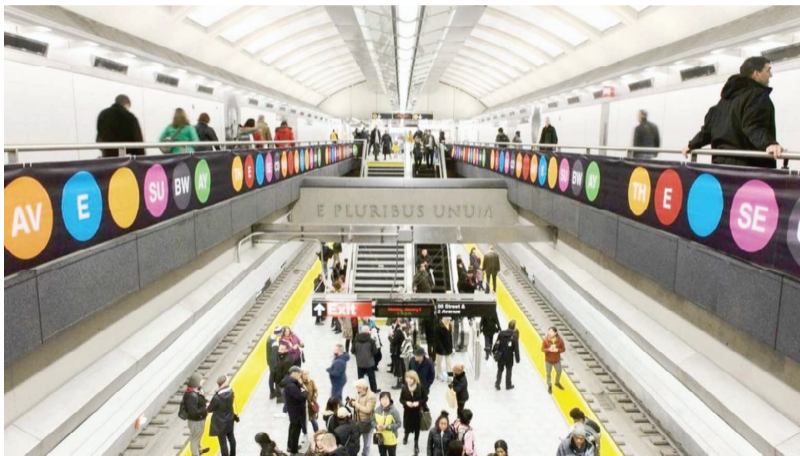
Aggregating Real Estate Values

- ▶ 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 = $30.6\% \times \$3\text{--}10\text{b} = \$1\text{--}3\text{b}$; **\$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 reduction
- ▶ 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!



Summary Statistics: Treatment Group

Back

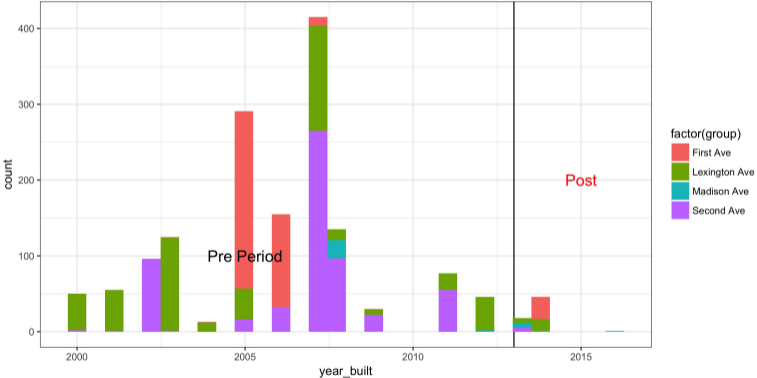
	N	Mean	St.Dev	p1	p25	p50	p75	p99
saleprice	19941	1090000	1020000	189000	509000	761000	1280000	5520000
sqft	13355	1039.486	670.708	392	670	850	1250	3158
ppsf	13330	1062.336	442.979	332.336	779.935	979	1277.826	2444.582
bedrooms	19918	1.501	0.968	0	1	1	2	4
bathrooms	19384	1.495	0.825	1	1	1	2	5
condo	19941	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

New Development

Back



Heterogeneous Treatment for New v. Old buildings Back

VARIABLES	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
Post x Treat	0.0914*** (0.00977)	0.0694*** (0.00969)	0.0704*** (0.00967)	0.0729*** (0.0106)
Post x Treat x NewConstr	0.0962*** (0.0342)	0.128*** (0.0343)	0.295*** (0.0358)	0.162*** (0.0347)
Post x NewConstr	-0.128*** (0.0290)	-0.154*** (0.0286)	-0.282*** (0.0316)	-0.154*** (0.0266)
Post	0.115*** (0.00621)	0.120*** (0.00654)	0.113*** (0.00694)	0.130*** (0.00574)
Treat	-0.213*** (0.00613)	-0.149*** (0.00593)	-0.168*** (0.00771)	-0.176*** (0.00657)
Newconstr	0.403*** (0.0143)	0.391*** (0.0144)	0.390*** (0.0144)	0.397*** (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

Back

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** (0.0119)	0.0191** (0.00900)	0.0432*** (0.0119)	0.0276*** (0.00894)	0.0544*** (0.0120)	0.0211** (0.00897)	0.0265** (0.0128)	0.0164* (0.00961)
Post	0.109*** (0.00794)	0.0537*** (0.00600)	0.100*** (0.00840)	0.0478*** (0.00633)	0.0913*** (0.00903)	0.0485*** (0.00676)	0.113*** (0.00729)	0.0555*** (0.00549)
Treat	-0.158*** (0.00881)	-0.181*** (0.00664)	-0.131*** (0.00865)	-0.144*** (0.00650)	-0.112*** (0.0105)	-0.126*** (0.00785)	-0.126*** (0.00951)	-0.149*** (0.00713)
Lagged Log P Resid		0.589*** (0.00520)		0.592*** (0.00519)		0.597*** (0.00517)		0.593*** (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