COVID-19 and Public Transit

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New Directions in Transportation Economics
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What do we know about COVID-19 and Public Transit?

How does travel impact COVID-19 spread?

▶ Mobility predicts disease spread (Wilson (2020); Glaeser, Gorback and Redding (2020))

▶ ↑ subway use correlated with ↑ cases (Glaeser, Gorback and Redding (2020))

▶ Spatial lockdowns in commuting networks (Fajgelbaum et al. (2020))

How does COVID-19 impact travel?

▶ Travel ↓ and avoids risky areas (Wilson (2020); Brinkman & Mangum (2020))

▶ Exposure to others when traveling declined (Couture et al. (2021))

▶ Telecommuting ↑ (Bartik et al. (2020); Dingel & Neiman (2020))

▶ Switch to telecommuting → disperse cities (Delventhal & Parkhomenko (2020))

These largely study lockdown periods, it's time for new data!

# National Public Transit Trips Down 58% since 2020m2
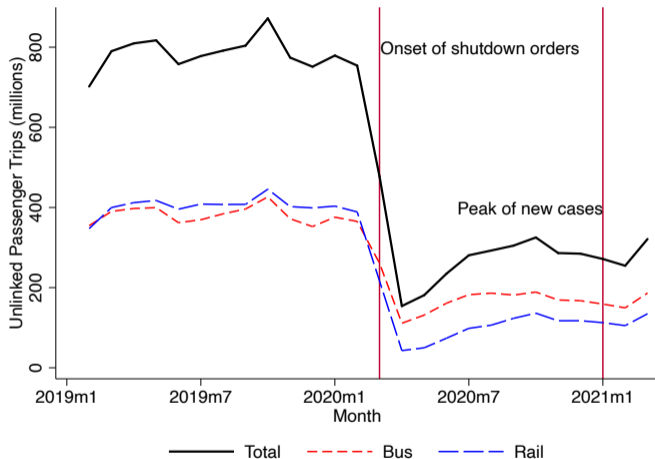
Source: National Transit Database Monthly Module as of March, 2021

The Recovery is Slow Everywhere as of March, 2020

▶ **Lockdown stringency matters:** FL down 33%, while CA down 58%

▶ **Transit-heavy cities recover slower:**
  ▶ Top 6 cities with highest commuting shares: ridership ↓ 65%
  ▶ Other large cities, prefer driving: ridership ↓ 49%

▶ Ridership down by $\approx$ 50% **no matter the agency, or city size**

Is this due to decreased demand, or reduced capacity?

- ▶ Agencies cut peak bus service by about 15%, and rail service by 5-7% (supply fell)
- ▶ Even at reduced capacity, vehicles carry fewer passengers (demand fell more)
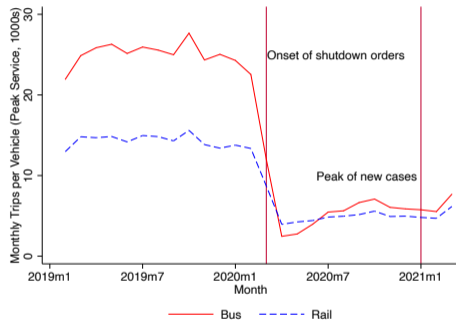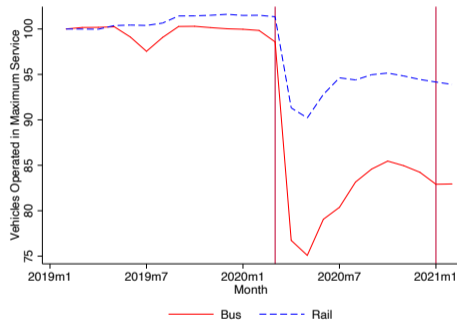
(a) Vehicles Operated in Maximum Service   (b) Monthly Passenger Trips per Vehicle

Likely to be another costly year for public transit authorities.

*Source*: National Transit Database, VOMS and ULP

NYC Case Study

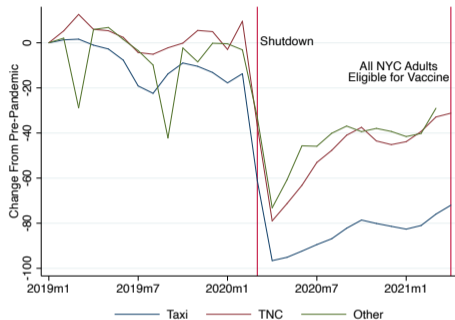NYC is a useful city to study:

- ► Some of the largest transit facilities (MTA, LIRR, Metro-North)

- ► Lots of publicly available data through June 5th, 2021

- ► Enables analysis of socioeconomic correlates

- ► NYC is most-transit reliant city in the U.S.

- $\implies$ **Recovery barriers in NYC can inform less-reliant cities**

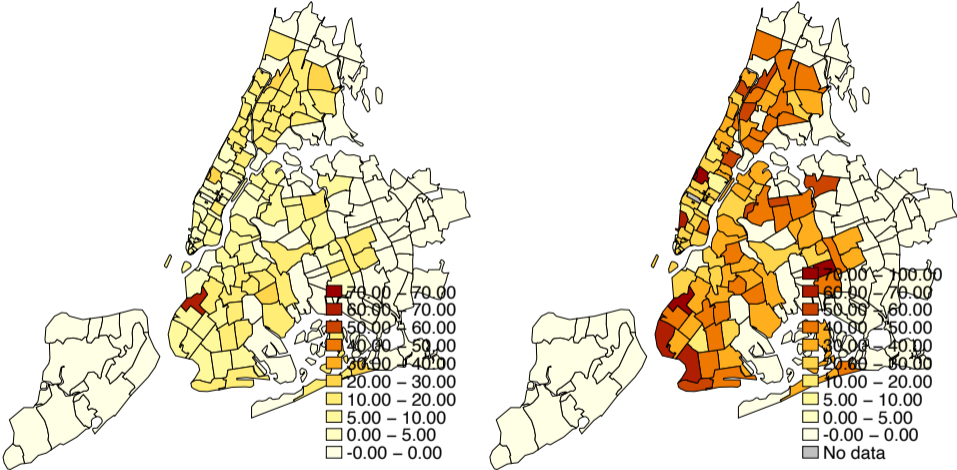# NYC Public Transit Dropped for All Modes
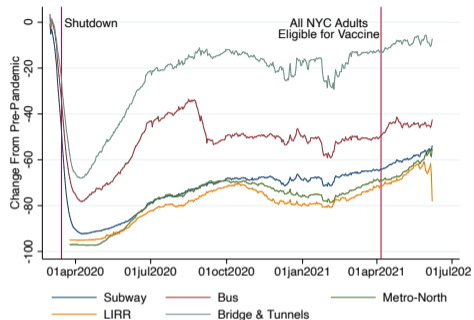
(a) Mass Transit

(b) For-Hire Vehicles

Low-density vehicles recover faster: rail ↓ 60%, bus ↓ 40%, TNC ↓ 25%

Source: NYC TLC monthly aggregates as of April; MTA Day-by-day ridership numbers as of June 7, 2021

Subway Use has recovered more in Outer Boroughs

(a) April 6-12, 2020

(b) May 31 - June 6, 2021

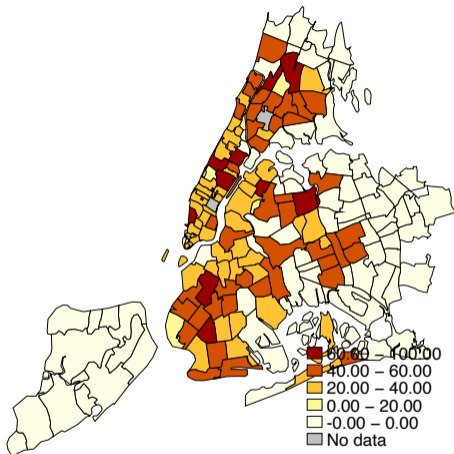*Source:* MTA Turnstile Developer Data, through June 5, 2021

Race mattered in 2020, Income matters now

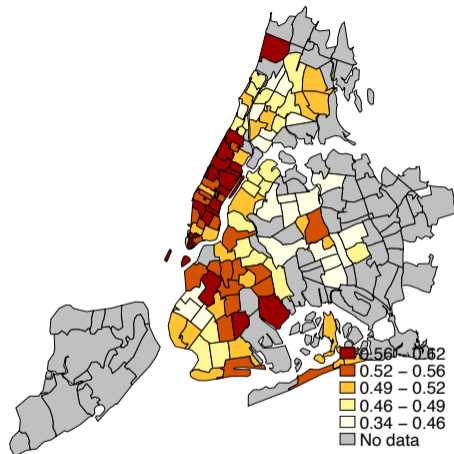|	Entries Index[1]	
	April 6-12, 2020	May 31 - June 6, 2021
Income ($1000s)	-0.02	-0.09***
Fraction Hispanic	10.05***	1.53
Fraction Afr. Amer.	8.17**	-3.31
Population (1000s)	-0.00	0.03

- ▶ **April 2020:** ↑ 10pp of zipcode Hispanic (Afr. Amer.) share $\implies$ ↑ in turnstiles from 10.5% of normal to 11.53% (9.8%)
- ▶ **June 2020:** moving between the 25th and 75th income percentiles ↓ turnstile turns from 36% of normal to 30.5% of normal

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[1]Turnstile entries indexed to 100 on Feb 24-Mar 1, 2020. *Source:* MTA Turnstile Developer Data, through June 5, 2021, American Community Survey (2018)

Telecommuting may be Preventing Transit Recovery

(a) Weekday AM, May 31-June 6, 2021

Legend (a):
- 60.00 – 100.00
- 40.00 – 60.00
- 20.00 – 40.00
- 0.00 – 20.00
- -0.00 – 0.00
- No data

(b) Share Teleworkable

Legend (b):
- 0.56 – 0.62
- 0.52 – 0.56
- 0.49 – 0.52
- 0.46 – 0.49
- 0.34 – 0.46
- No data

Source: MTA Turnstile Developer Data; Dingel & Neiman teleworkable shares

Is fear of transit preventing labor market recovery?

Evidence of substitution from risky travel during height of pandemic:

- ▶ Survey participants estimated a 62% probability of catching COVID-19 when sharing transportation (Bundorf et al. (2021))
- ▶ People avoid contagious areas and prefer outdoor activities (Wilson (2020); Brinkman & Mangum (2020))
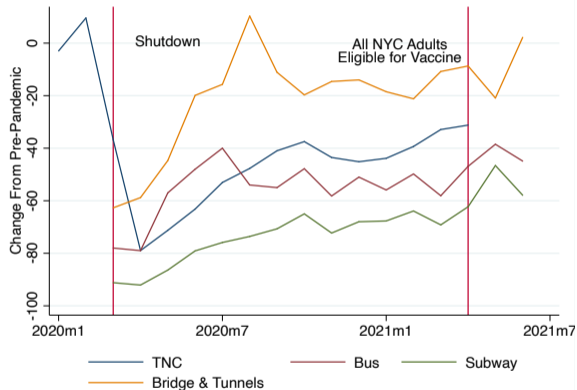- ▶ 36-40% of firms expect significant teleworking to continue post-pandemic (Bartik et al (2020))

Are these avoidant behaviors still going on?

- ▶ Shift to lower density travel (mode, time) (BEA, MTA)
- ▶ Shift to teleworking (BLS)

Room for optimism? (CDC, Google Mobility)

Evidence of Lower Density Trips: Mode
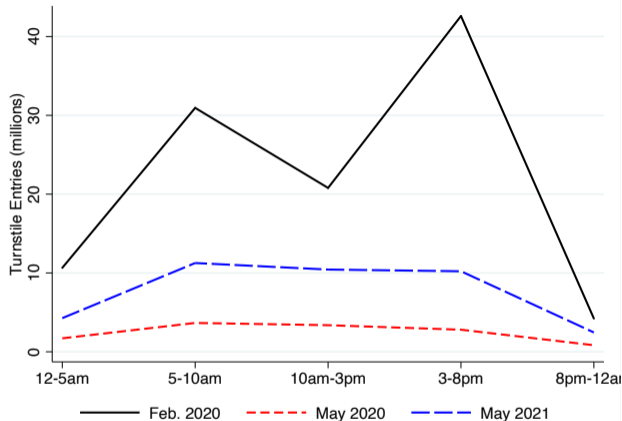
Less-dense modes recovered faster:

Source: U.S. Bureau of Economic Analysis, Total Vehicle Sales [TOTALSA]; NYC TLC monthly aggregates as of April; MTA Day-by-day ridership numbers as of June 7, 2021

Evidence of Lower Density Trips: Time of Day
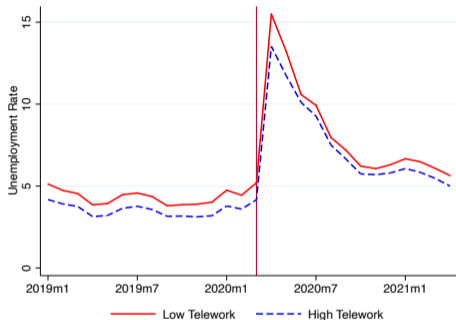
Rush hour determines
infrastructure and
transit capacity
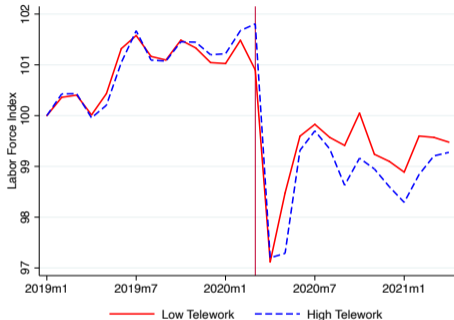
$\Longrightarrow$

what if rush hour
flattens?

Source: MTA Turnstile Developer Data;
Motivated by: Emily Badger, New York Times: "A Little More Remote Work Could Change
Rush Hour a Lot", June 11, 2021.

Teleworking Differences aren't Driving Unemployment
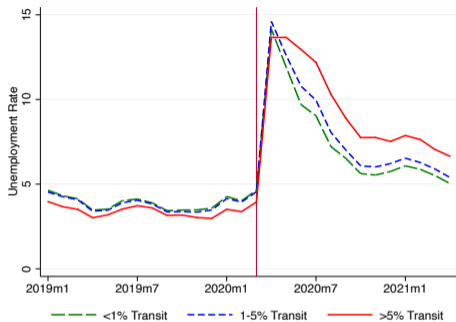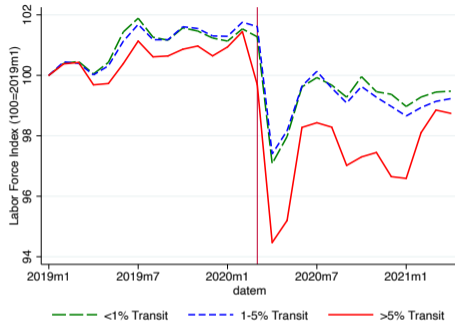

(a) Unemployment Rate

(b) Labor Force

However, most high-transit locations are also high-teleworkable...
Source: Bureau of Labor Statistics, Local Area Unemployment Statistics through April, 2020

# High-transit counties have worse employment recoveries

(a) Unemployment Rate

(b) Labor Force

Causality unclear: coincident with large cities taking bigger labor market hits, could be fear of going to work, waiting for higher wages in costly cities, or fear of traveling on transit

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics through April, 2020
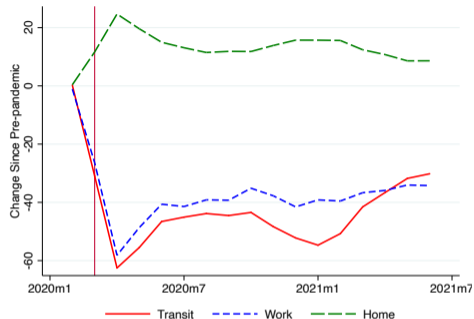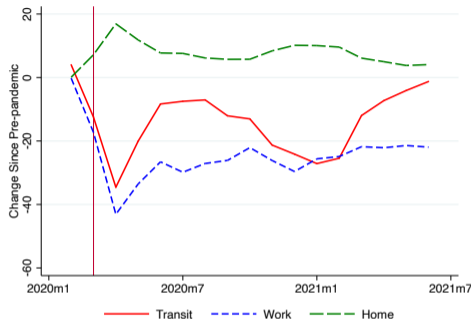
There's room for optimism!
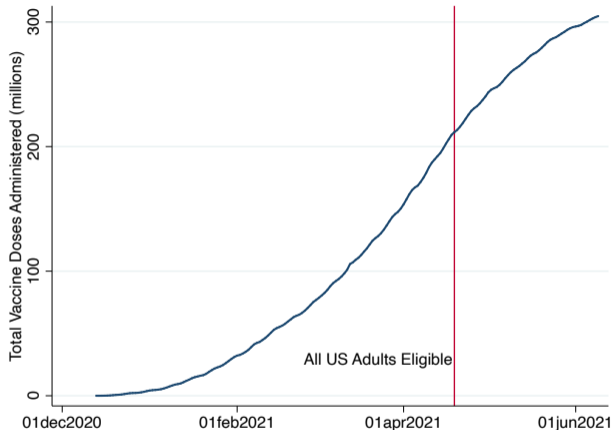
Most of the data publicly available ended before universal eligibility

Source: CDC COVID-19 Vaccinations in the United States, NCIRD

Transit isn't just for commuting

(a) High Transit Commuting

(b) Low Transit Commuting

Staying at home and at work has remained stable, but visits to transit stations are up!

Source: Google Community Mobility Reports

Conclusion: A lot is still up in the air

COVID-19 dealt public transit a huge blow

- ▶ Public transit trips down 58% nationally
- ▶ People favor lower-density travel (mode, time)
- ▶ Labor market recovery differs by transit use, but not driven by teleworking
- ▶ Evidence of increased transit use, even without increased commutes

Workplace, school expectations and travel evolving quickly

- ▶ EEOC (5/28/2021) permits employers to ask vaccine status
- ▶ Universal vaccine elligibility for ages 12+