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Does Online Shopping Create Urban Congestion?

Meeting of the minds webinar 18 April 2018

Alison Conway, The City College of New York
Michael Browne, University of Gothenburg

The City College
of New York

UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

URBAN FREIGHT PLATFORM

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Cities and e-commerce: an urban freight transport perspective

Some fundamental problems in urban deliveries:

- Space
- Time
- Organization

Impacts of the rise in e-commerce

Rise in e-commerce and online shopping

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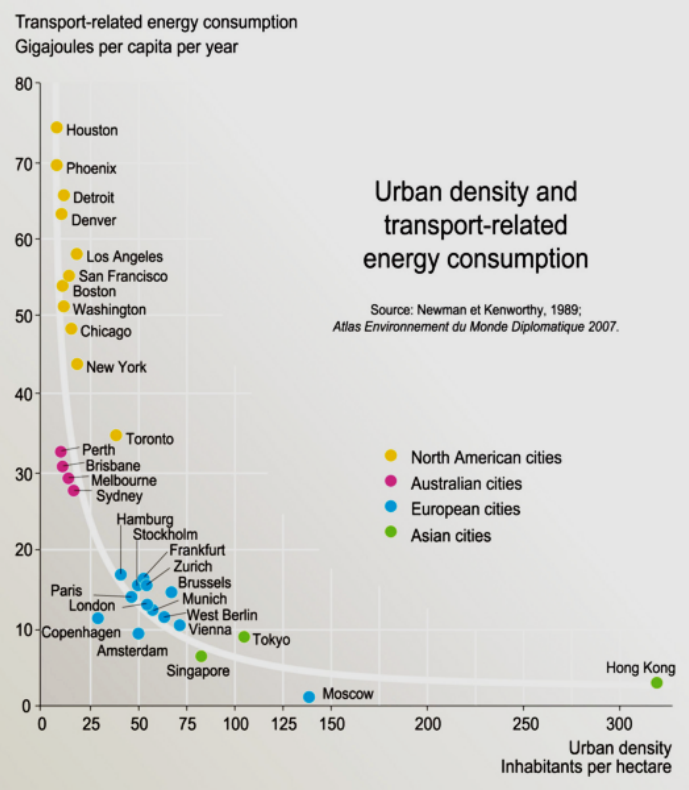
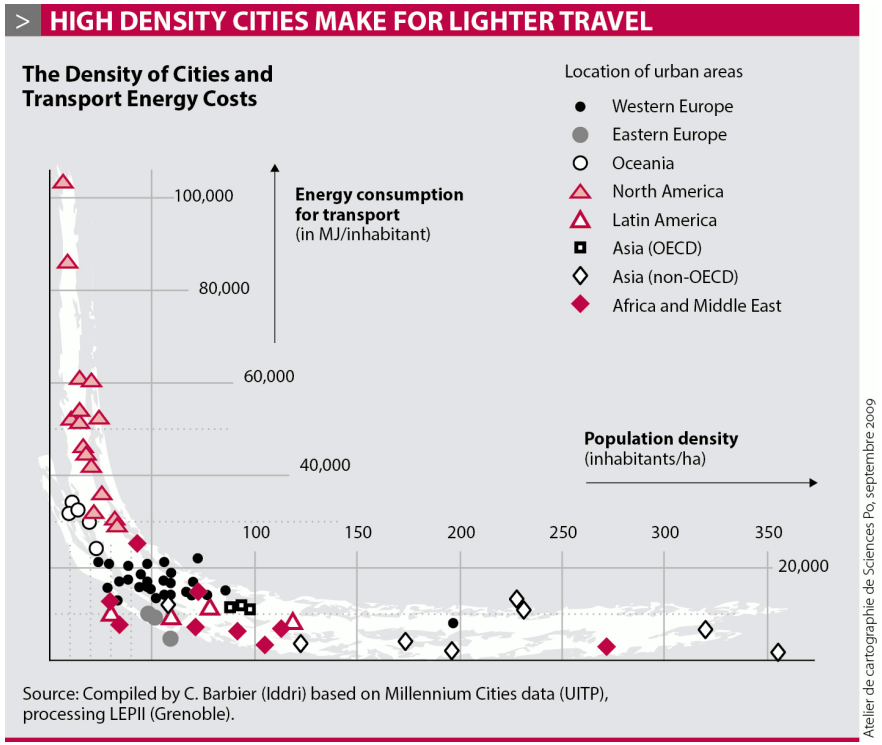
- Annual growth rate globally: 20% a year over past 10 years
- Total share of retail sales worldwide estimated at about 9%
- Big variations:
  - South Korea 18% India and Brazil 5%
- Expectations of continued significant growth by 2021: China 30% of sales, USA 18%, UK 20%
- Variation in products bought online – important for urban transport patterns

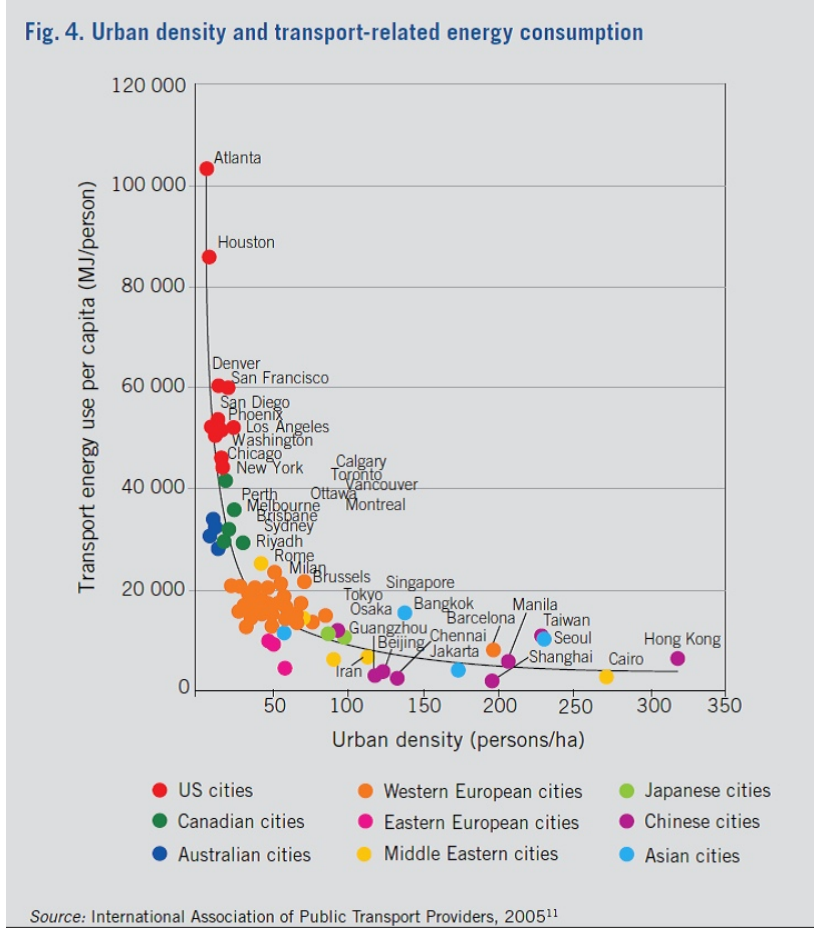
E-commerce and complexity

- Products: Food vs non-food
  - temperature control, basket size, order frequency, repeat orders, vehicle used for delivery, time of day of delivery, location
- Delivery location
  - Home (building type), Workplace (company policy), Collection points and lockers
- Variety in delivery systems
  - Time-definite, Same day, Instant

Urban density and transport energy







But reduced car ownership and use will mean changes in urban freight transport needs

http://old.grida.no/graphicslib/detail/urban-density-and-transport-related-energy-consumption_eda9#
http://regardssurlaterre.com/en/data-maps/high-density-cities-make-lighter-travel
http://www.who.int/sustainable-development/transport/strategies/land-environment/en/

Some issues to consider

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- Blurred line between B2B and B2C
  - Delivery to workplace: Some estimates from London show that over 50% of packages delivered are really B2C
- Buildings not designed for the volumes of packages now being delivered (residential and commercial property)
- Activities may be concentrated into peak traffic periods in the day
- Increasing variety of delivery options and vehicles used – issues of employment and work conditions, safety and regulation
- The importance of ‘free delivery’ and fragmentation in the last mile of the chain

Pressure on curbspace

Analysis of next-day parcel deliveries in central London

- Vehicle rounds studied in London's 'West End'
- Average drive time between stopping locations 4 minutes, with 8 minutes vehicle dwell time at each vehicle stop
- 95% of vehicle stops took place on-street at curbside
- Vehicles parked for 60% of total vehicle round time
- Average walking distance per vehicle round - 5 miles
- Major curbside space and time consumption

Source: FTC 2050 Project

Does Online Shopping Create Urban Congestion?

The Case of Residential Buildings in NYC

Alison Conway
Associate Professor of Civil Engineering
The City College of New York

Meeting of the Minds Webinar, April 18, 2018

How should space be organized in cities to accommodate flows while minimizing impacts?

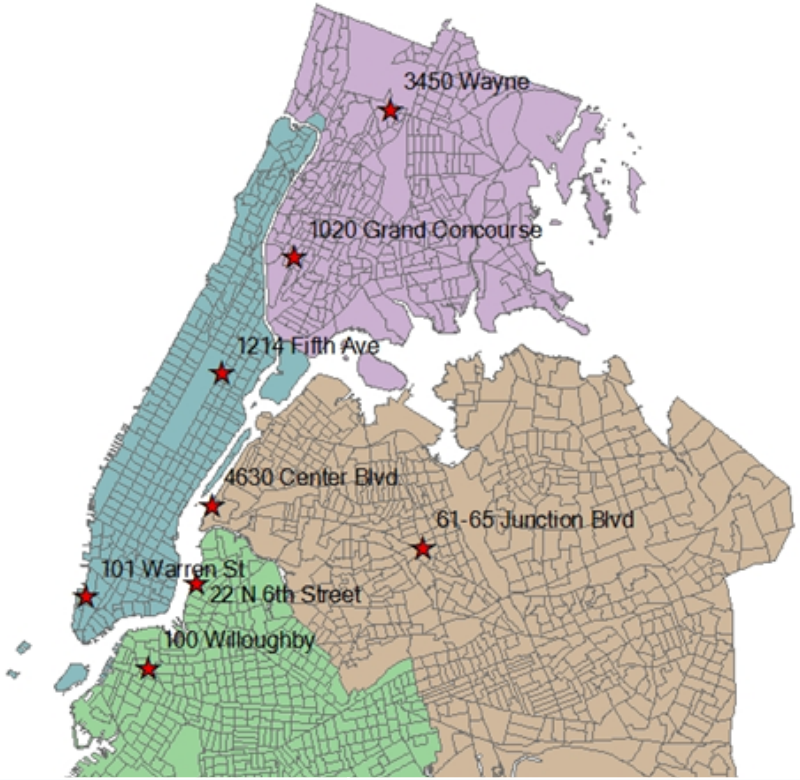
- Lane capacities
- Curb/loading space
- Parking regulations
- Zoning regulations

Data Collection is Difficult

Data Types	Benefits	Challenges
• Household surveys	• **Receiver demographics** • **Delivery types**	• Human error • Delivery time not always observed
• Building records	• **Temporal distributions** • **Delivery types**	• Parcel activity, not vehicle activity • No curbside info
• Carrier records	• **Detailed parcel, vehicle, and routing info**	• Segment of industry • Privacy concerns
• Field observation	• **Detailed parcel, vehicle, and curbside activity**	• Expensive • Limited coverage

CCNY/Metrofreight Project

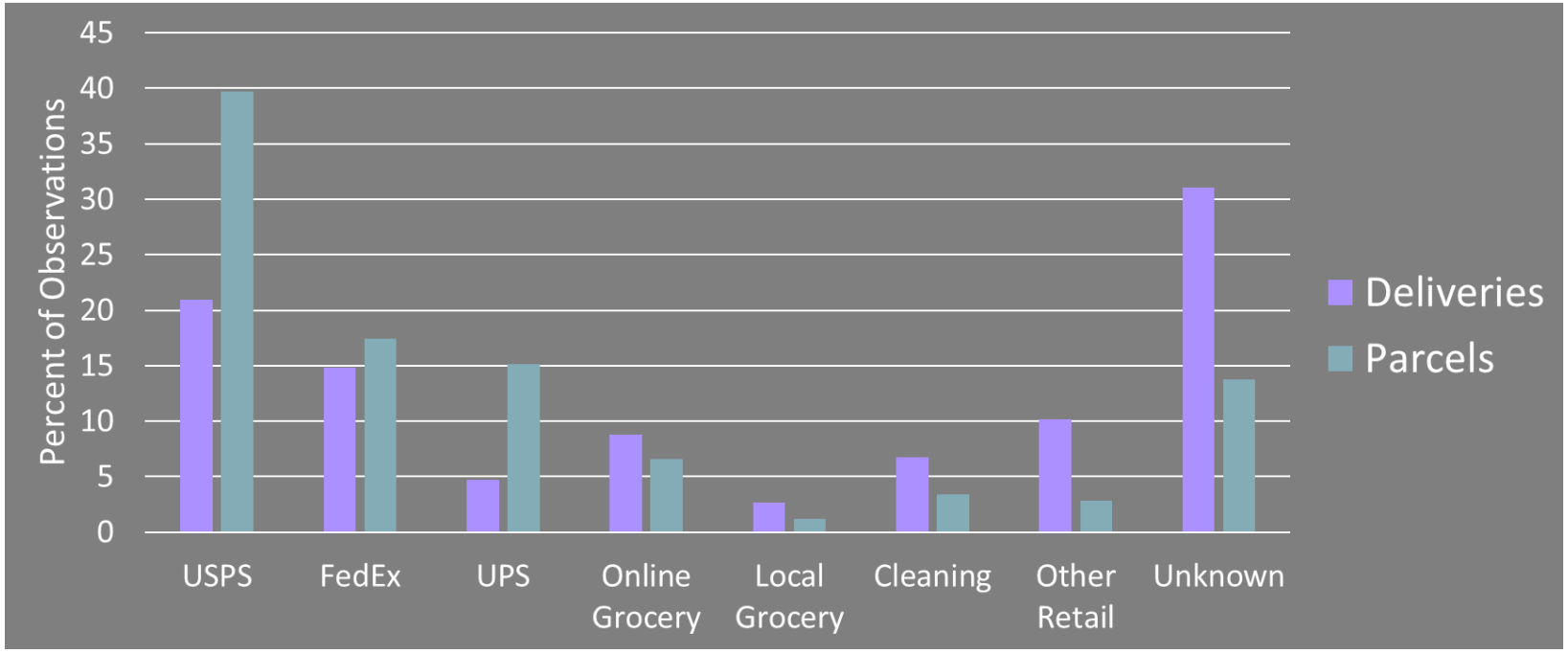
- Field observation at 8 residential buildings
  - November/December 2016
  - 9 am – 9 pm weekdays
- 295 total deliveries recorded
  - 148 “other” deliveries
  - 147 meal deliveries (204 bags)
- 1240 total packages recorded



Building	Address	Characteristics	
		Units	Rent ($/ft^2)
Bronx 1	1020 Grand Concourse	453	26
Bronx 2	3450 Wayne	399	20
Brooklyn 1	22 N 6th Street	360	62
Brooklyn 2	100 Willoughby	500	56
Manhattan 1	101 Warren St	227	83
Manhattan 2	1214 Fifth Ave	229	71
Queens 1	4630 Center Blvd.	184	62
Queens 2	61-65 Junction Blvd	314	43

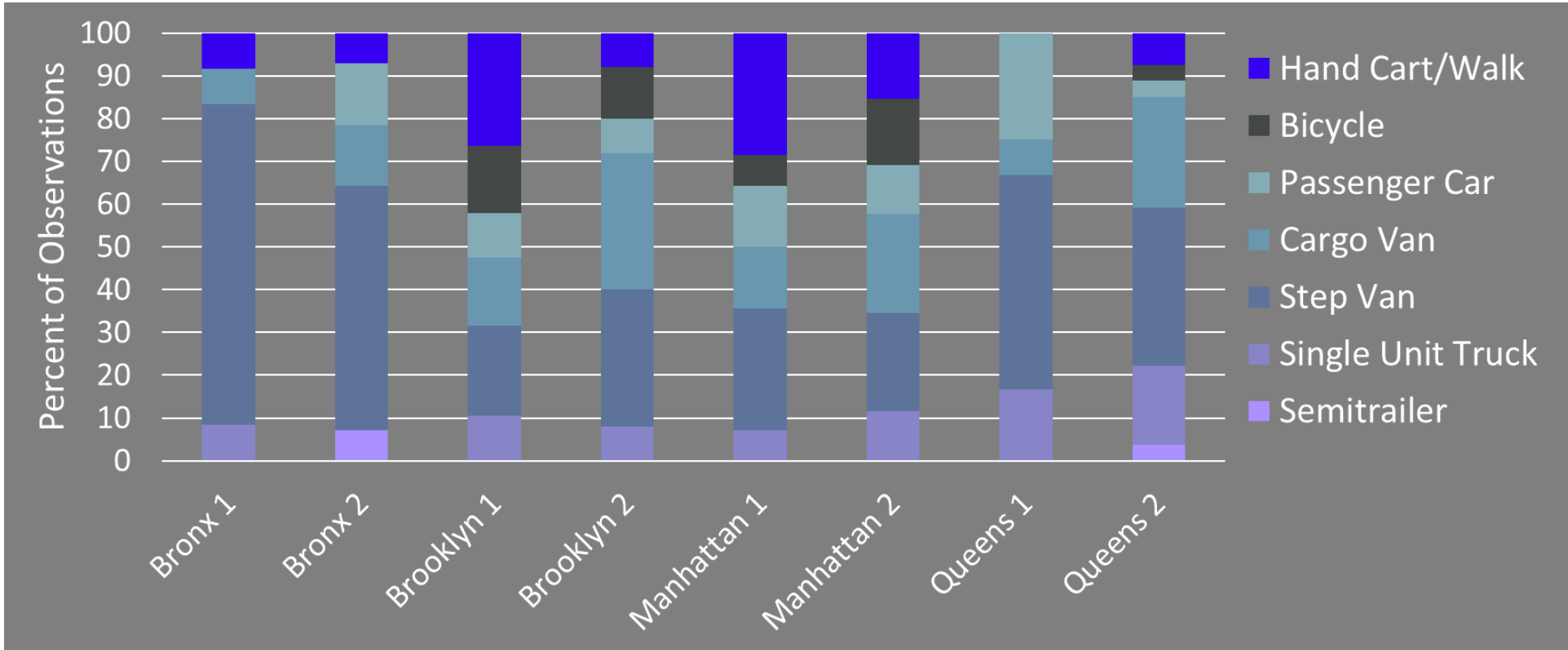
Frequencies

- Parcel deliveries per 12-hour day: 1 package per 1.3 u → 1 package per 6 u
- Vehicle trips per 12-hour day: 1 trip per 7 u -> 1 trip per 33 u



Delivery Times and Vehicle Types

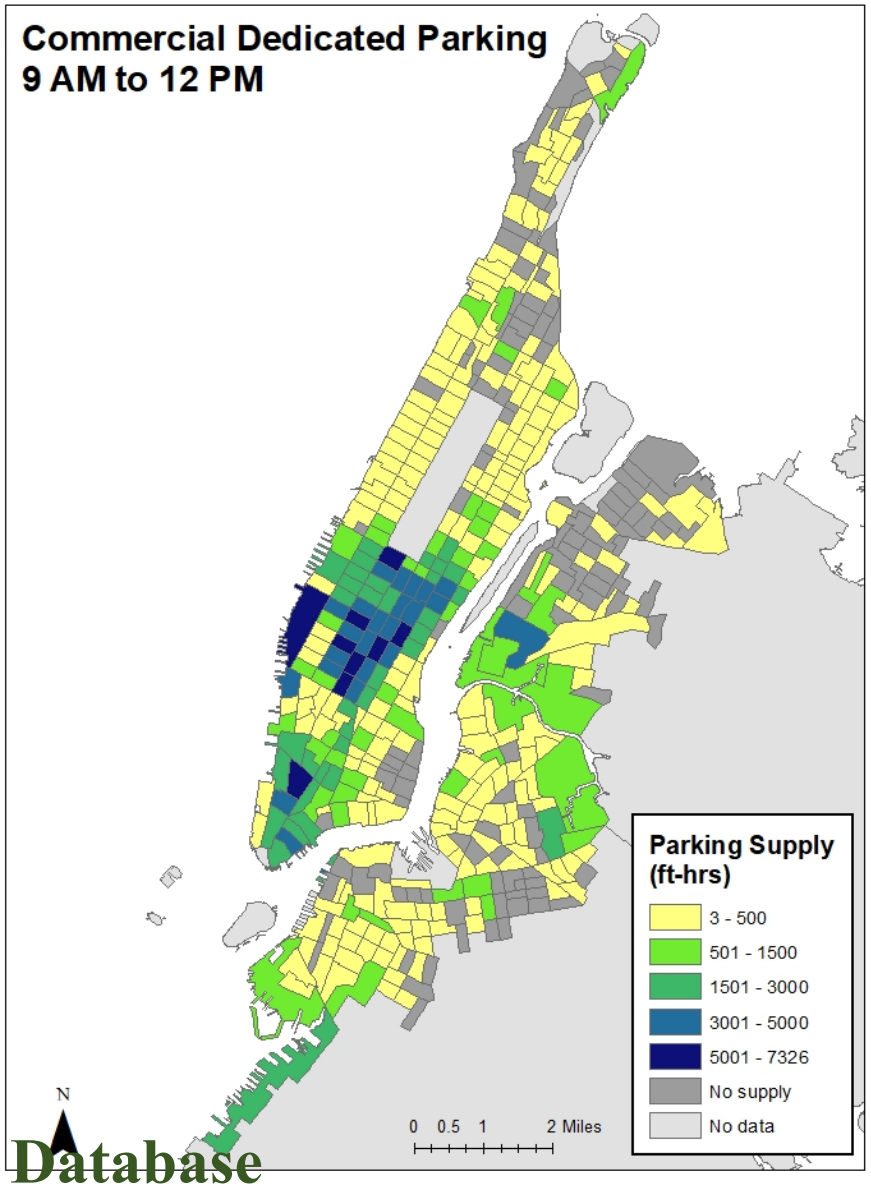
- Deliveries occur throughout the day
- Peak delivery times vary considerably across buildings
- Vehicle types heavily variable by location

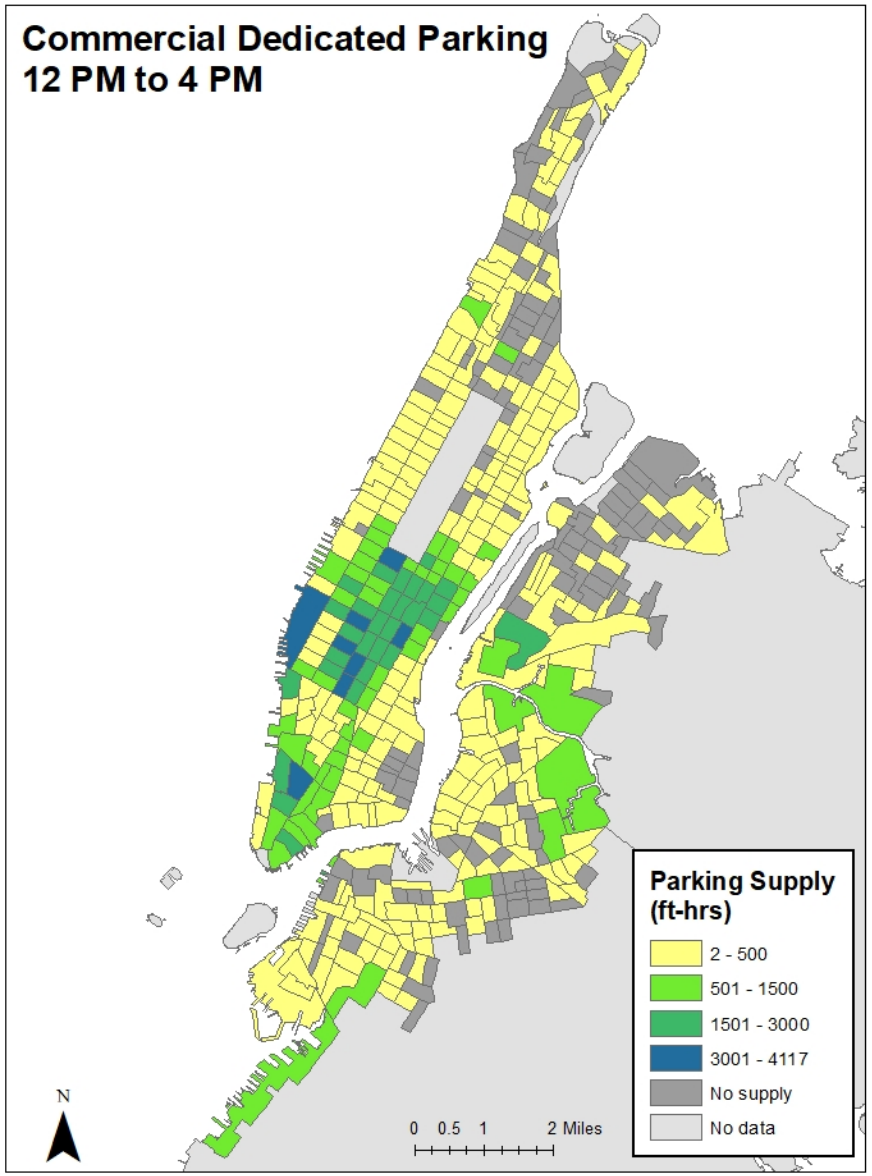


Time-Space Consumed for Package Delivery

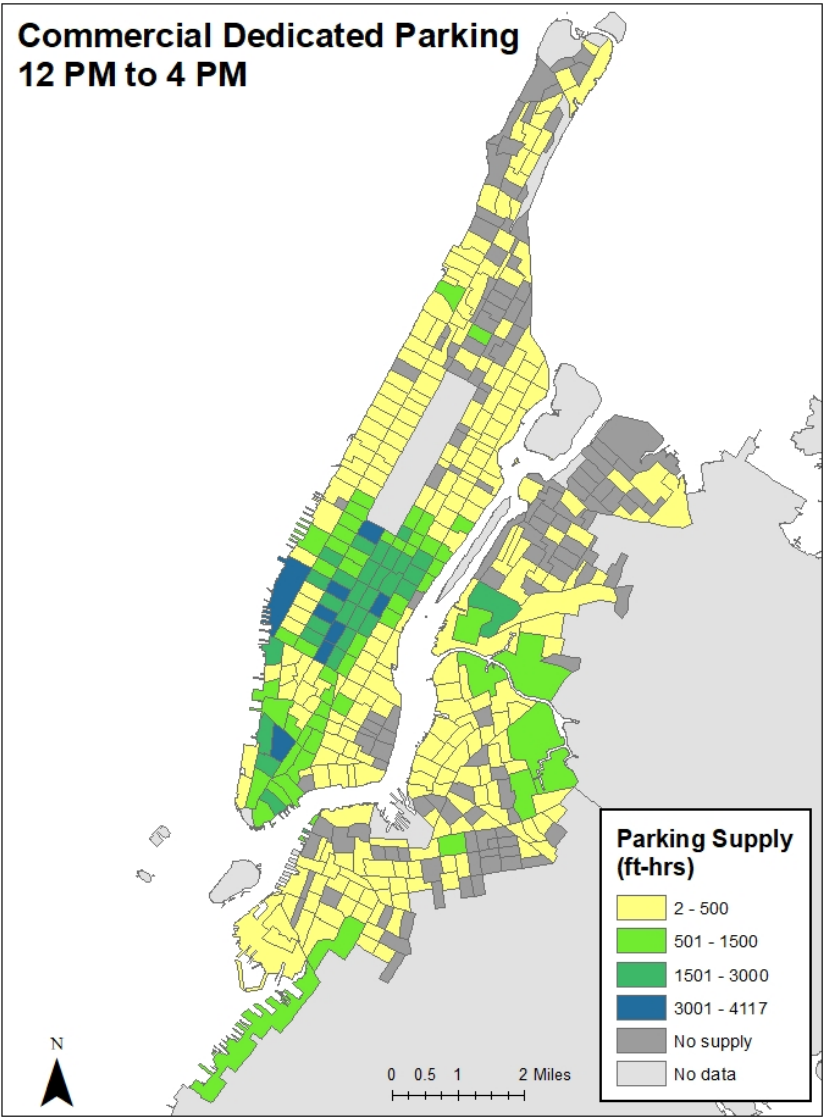
Vehicle Type	Count	Parcels	Total Parking Duration (min)	Est. Vehicle Length (ft)	Total Time-Space Consumption (ft*hour)	Time-Space Consumption per parcel (ft*hour/parcel)
PC	10	27	51	19.00	16.15	0.60
CV	24	54	115	18.68	35.80	0.66
SV	48	627	791	22.60	297.94	0.48
SU	12	151	265	30.00	132.50	0.88
ST	2	5	44	45.50	33.37	6.67
Sum	96	864	1266			

NYC Dedicated Commercial Parking Supply, Spring 2017

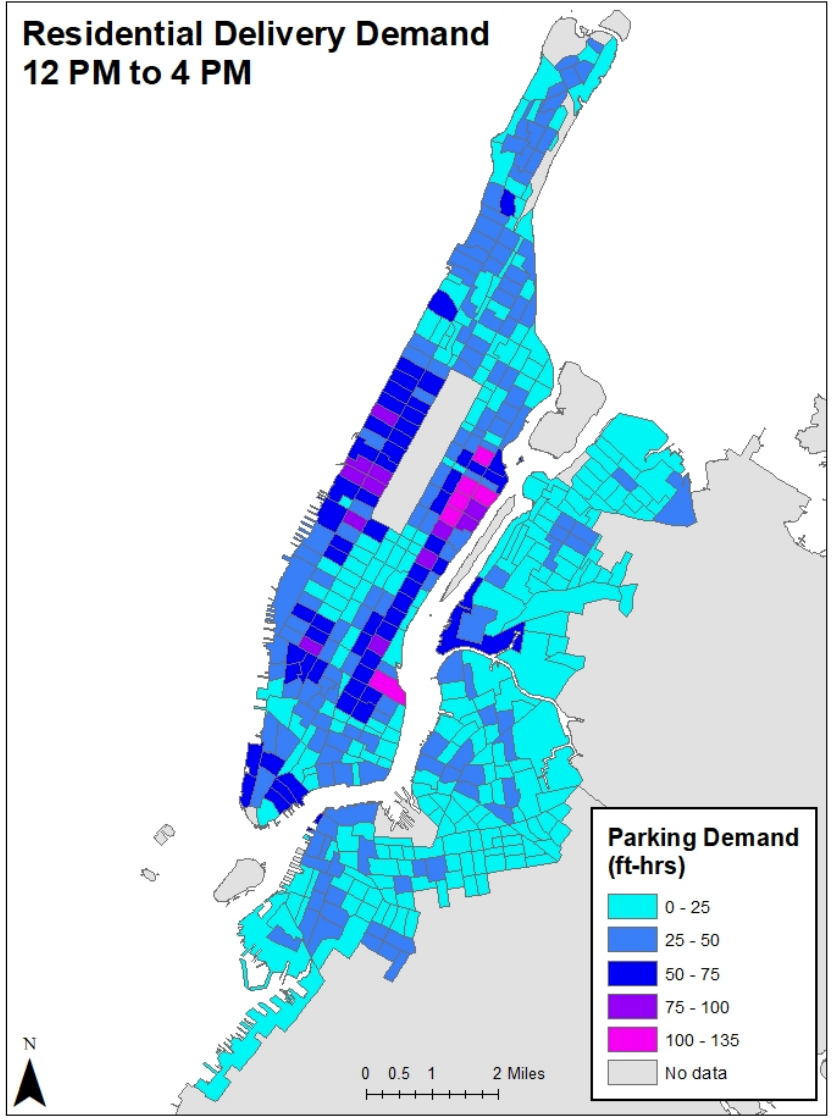


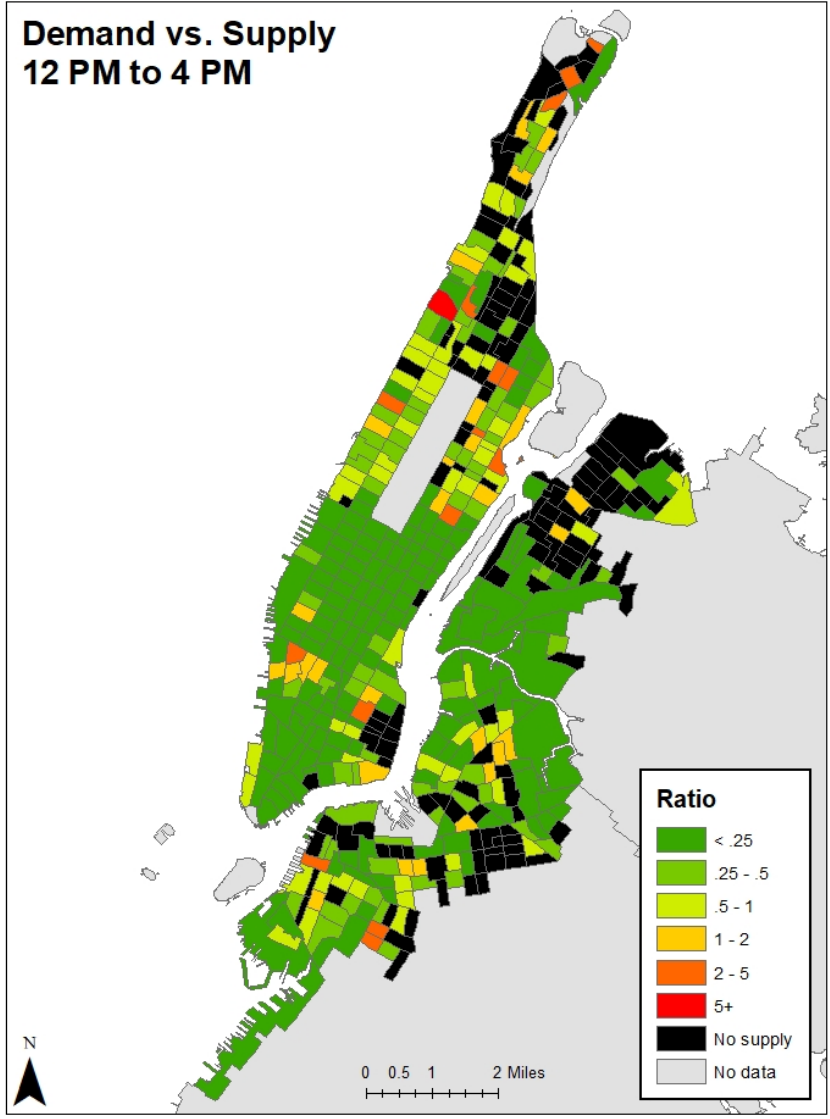


NYC DOT STATUS Database



2017 NYC DOT STATUS Database





2016 USPS Household Survey, US Census Bureau ACS 5-year Household Incomes, Field observations

NYC DCP MapPluto

Online shopping **does** contribute to urban congestion …

What can be done?

Some Initiatives to Reduce Impacts

Regulators

- Space for loading and distribution
- Time-appropriate parking regulations
- Updated zoning regulations
  - Off-street loading requirements
  - Freight elevators

Receiver

- Relaxing timed deliveries
- Shared/common procurement
- Concierge services in large buildings
- Delivery retiming
- Increased on-site storage at receivers
- Best location for personal deliveries

Carriers

- **Technology aids to improve driver efficiency**
- **Optimized routing for driving and walking**
- **Coopetition/Joint distribution**

Multi-tenanted Offices – Joint Procurement/ Consolidation and In-house Logistics

- 2 x 7-floor office buildings
- One has:
  - far greater procurement consolidation
  - In-house logistics service
  - Block with procurement consolidation receives 50% fewer vehicle deliveries
  - Each vehicle delivery 20% faster in block with in-house logistics despite larger delivery size
  - Opportunity for concierge service and/or locker facility

Information and Technology to Assist the Inexperienced Driver

Experienced v inexperienced driver

- 29% less driving time
- 39% less parking time

Operational issues include:

- Parcel loading strategy at depot
- Vehicle routing and scheduling
- Best place/s to park vehicle
- Finding parcels each time vehicle stops
- Walking routeing and scheduling
- Finding actual point of delivery

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https://www.chalmers.se/en/centres/lead/urbanfreightplatform/

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