Adapting an Existing Activity Based Modeling Structure for the New York Region

presented to
2018 TRB Innovations in Travel Modeling Conference Attendees

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Outline of Presentation

- Characteristics of New York Region
- Background on Activity-Based Modeling Structure
- Model Structure Adaptation
  » Overview
  » Sub-region approach
  » Mode choice changes
- Conclusion
New York Modeling Area

- 20 million residents
- Very dense urban core, lower density suburbs
- High public transit share
  » Much higher share within NYC

Source: NYMTC
Salient Characteristics of New York Region

- NYC residents make fundamentally different long-term choices than residents of surrounding areas with similar socio-demographics.

- Transportation system in NYC is vastly different from the rest of the region.

- Region has wide variety of highly utilized transit options:
  - Serve a diverse swath of demographics and sub-areas within the region.
NYMTC BPM 2012 Update

TransCAD
User Interface / Skimming / Non-ABM Travel / Assignment

PopGen
Synthesize Population

CEMSELTS
Long-Term Choice

CEMDAP
Daily / Tour / Trip Choice

TourCast Microsimulation Interface Platform

Loaded Networks
Aggregate Demand
PostGreSQL Database
Disaggregate Demand

Networks
Land Use
Travel Data

Scenario Definitions

Model Parameters

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Model Structure Adaptation

- Seamless integration with zonal structure and network/skim attributes

- Models were re-estimated with New York data
  - NY Regional Household Travel Survey, Establishment Survey, NHTS for NY region
  - Majority of models retained original SimAGENT structure

- Uniqueness of New York region led to:
  - Taking a sub-region approach to some models
  - Large changes to mode choice modeling
Sub-Regional Diversity

- Different sub-regions in New York region displayed very different choice behaviors (based on survey data)
  - Manhattan
  - Rest of New York City
  - Outside New York City

- Particularly for longer-term choices

- Difference apparent even after controlling for accessibility, built environment
Example – Models Segmented by Sub-Region

Household Tenure (own/rent)
» Income plays bigger role for those outside NYC
» Children & Education play bigger role for those living in NYC

Housing Type (apartment, Single-family)
» Baseline housing types very different in NYC
» Renters outside NYC impacted more by presence of children than owners outside NYC
School Locations

Manhattan children travel farther for school

Source: 2010/2011 NYMTC & NJTPA Regional Household Travel Survey
Mode Diversity in New York

- NY region required richer mode alternative specifications than earlier SimAGENT implementations
  - 3 auto modes
  - Taxi
  - Walk
  - Bike
  - 6 transit modes

- Competitiveness
  - Mode impedances

### Los Angeles Commutes
- Auto 95%
- Bike, Walk 3%
- Transit 2%

### New York Commutes
- Auto 69%
- Bike, Walk 5%
- Transit 25%
- Taxi 1%
NY sees a lot of mode switching within tours

Some ABMs consider mode switching loosely

Added mode switching behavior to SimAGENT
SimAGENT Mode Modifications

- For commuting, a trip mode choice model was easily added to the model stream (conditional on chosen tour mode)
  » This is similar to how other ABMs handle trip mode

- For other tours, SimAGENT model chain:

  For each tour…
  - Tour Mode
  - Number of Stops
  - Stay Duration before Tour @ Home

  For each stop on tour…
  - Activity Type
  - Activity Duration
  - Stop Location
SimAGENT Mode Modifications

- For commuting, a trip mode choice model was easily added to the model stream (conditional on chosen tour mode)
  - This is similar to how other ABMs handle trip mode

- Adjustment to model chain:

  For each tour…
  - Number of Stops
  - Stay Duration before Tour @ Home

  For each stop on tour…
  - Activity Type
  - Activity Duration
  - Stop Location
  - Trip Mode
**Mode Choice Estimation Findings**

- **Key variables**
  - Level of service & transit accessibility at destination
  - Previous modes used on tour
    - Particularly important since tour modes not modeled
  - NYC & Manhattan
    - Increased transit, taxi, non-motorized modes usage
    - City indicator variables over and above impacts of accessibility
  - Strong & clear nesting across estimated models
    - Auto, transit, non-motorized, taxi
Conclusions

- SimAGENT is a robust model system
  - Much of model structure was unchanged
  - Importance of analyzing region-specific data against modeling processes

- NYC is unique in U.S. & offers particular challenges for any model system
  - Diversity of socio-demographics
  - Diversity of travel options (particularly mode)

- New challenges may emerge as model is implemented & validated