Overview of Presentation

- Introduction
- Motivation
- Methodology
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  - MNL model
- Data sources
- Results
- Conclusions
Introduction

- TOD models deal with the time at which travel occurs throughout the day

Why it matters?

- vehicular emissions and air quality
- time-of-day specific congestion management programs
- travel demand management strategies on time-of-day travel
- transit level of service
Why long-distance trips?

- Long-distance trip accounted for about on-third of all person miles made in the country. (2001 NHTS)
- Improve the forecasts of rural and intercity travel demand.
- Supplement urban forecasts of vehicular emissions and traffic congestion.
- Important to air travel service providers.

Definition

- long-distance trips—longer than 50 miles and 60 minutes
- Departure Time alternatives
  - early morning (0:00-6:29 am)
  - am peak (6:30-8:59 am)
  - am off-peak (9:00-11:59 am)
  - pm off-peak (12:00-15:59 pm)
  - pm peak (16:00-18:29 pm)
  - evening (18:30-23:59 pm)
Hypothesis

\[ \Pr(TOD) = f(T, A, P, H) \]

where

- \( TOD \) = TOD period choice for the long trip,
- \( T \) = trip related factors,
- \( A \) = activity related factors,
- \( P \) = personal characteristics,
- \( H \) = household characteristics.

Data Development

- Preference Survey
  - 14 responses, 20 long trips

- 2001-2002 National Household Travel Survey
  - 3322 long trips
Preference Survey

- Personal information, and habitual information regarding long-distance trip making
- Trip information regarding the most recent one or two long-distance trips
- TOD preference and prioritization
- Major focuses—Scheduling constraints, mode captivity, differences from urban trips, others.

Preference Survey

- Scheduling constraints were the predominant factor
  - Trip purpose
  - Traveling accompanies
  - Peak hour congestion
  - Night driving
- Mode captivities:
  - generally mode was not related to TOD
  - when public transportation was used, the travelers were more constrained in terms of the return trip scheduling
Preference Survey

- **Differences from urban trips**
  - short trips in urban areas have more mode choices available
  - long-distance trips are more unreliable in terms of travel times
  - consideration of intermediate stops

- **Other issues**
  - weather conditions
  - traveling through congested urban area
  - geographical locations didn’t make a difference in TOD choice behavior

2001 NHTS

- 3322 long-distance trip records, 2135 (64%) were unique, 571 were duplicates
- More than half (54.8%) took place during the mid-day periods from 9:00 am to 16:00 pm
- Automobile was the dominant mode (93%), followed by airplane (3.19%) and transit (2.74%).
MNL Model Results

- Activity duration
- Trip duration
- Purpose
- Day type
- Age
- Gender
- Number of non-household members
- Education
- Lifecycle
- Number of household workers
- Whether a worker
- Mode

2001 NHTS MNL Model

<table>
<thead>
<tr>
<th></th>
<th>00:00--6:29</th>
<th>06:30--8:59</th>
<th>09:00--11:59</th>
<th>12:00--15:59</th>
<th>16:00--18:29</th>
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<tr>
<td>Work/School</td>
<td>3.841</td>
<td>2.796</td>
<td>1.411</td>
<td>1.043</td>
<td>0.550</td>
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<tr>
<td>Return</td>
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<td>0.168</td>
<td>0.657</td>
<td>1.773</td>
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<tr>
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<td>1.981</td>
<td>1.617</td>
<td>1.191</td>
<td>0.779</td>
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<tr>
<td>Social Rec.</td>
<td>0.498</td>
<td>0.998</td>
<td>1.382</td>
<td>1.295</td>
<td>0.782</td>
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</tbody>
</table>

TOD Choice
MNL Model Results

- Trip duration, activity duration, trip purpose, and whether the trip took place on weekend were the most powerful factors in determining the TOD choice for long-distance trips.

- Different types of long trips exhibited various preferences on the departure time.
MNL Model Results

- Travel mode in general was not statistically significant to the TOD choice.

- Generally, traveling with other accompanies, whether with household members or non-household members, would increase the probability of making long-distance trips in the evening.

MNL Model Results

- Age, gender, work status, education level all presented significant impacts on the TOD choice for long-distance trips, at different significant levels in the models.

- Household characteristics including household income, household size, number of workers, and number of vehicles revealed various impacts on the TOD choice for long trips.
Conclusions

- Discrete choice modeling is an effective approach for explaining decision-making behavior for short-term travel choices.

- The preference survey further helped in gaining insights about the underlying causality of the TOD choice behavior for long-distance trips.

Conclusions

- The findings from this study were consistent with the experience from urban trips, in that trip purpose and socio-demographic characteristics had significant impacts, while

- the travel day type, traveling with accompanies, and the preference of young children had stronger implications on the departure time choice for long trips than urban trips.
Conclusions

- TOD choice behavior for long-distance trip is more complicated than for urban short trips.

- Future work can be done by separating weekday trips and weekend trips.

- Better approach for multi-day travel data collection.