Public Transit at a Time of Changing Lifestyles, Emerging Transportation Technologies and Shared Mobility

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Impact of Disruptive Technologies

Disruptive technologies such as *shared mobility*, *electrification* and *autonomous vehicles* are bringing big changes in:

- **Transportation supply**
- **Transportation demand**

Need to update travel demand forecasting to capture effects of new trends...

Importance to evaluate impacts on the environment and sustainability

Role of policy in affecting travelers’ response to innovations and the use of travel modes...
What is the Impact of Emerging Technologies?

- Smartphones (GPS, access to more info)
- Increasing opportunities to multitask
- Integrated ride-sharing / shared mobility
- Impact levels of car-ownership
- Extend range of public transportation
What Replaces What?

Need a ride? Get a Lyft.
Some Research Questions...

• How do customers respond to new mobility choices?
• What are the barriers to the adoption of new technological services?
• How are other travel options and choices affected?
• How does innovation impact mobility for various demographic markets?
• How can transit agencies efficiently integrate shared mobility options?
Impact of last Uber/Lyft trip on the use of other means of transportation (by age group)

<table>
<thead>
<tr>
<th>Impact</th>
<th>Generation X</th>
<th>Millennials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced the amount of driving I did</td>
<td>77.4%</td>
<td>70.9%</td>
</tr>
<tr>
<td>Reduced the amount of walking/biking I did</td>
<td>23.1%</td>
<td>42.0%</td>
</tr>
<tr>
<td>Reduced my use of public transportation</td>
<td>41.0%</td>
<td>48.6%</td>
</tr>
<tr>
<td>Increased the amount of walking/biking I did</td>
<td>6.2%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Increased my use of public transportation by providing a ride outside public transportation hours</td>
<td>11.3%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Increased my use of public transportation by providing a better way to access public transportation</td>
<td>11.3%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Other</td>
<td>2.1%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

N\text{Millennials} = 333, N\text{Gen X} = 195

*Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)*
Impact of Uber/Lyft Use (2)

How would you have traveled if Uber/Lyft was not available?

<table>
<thead>
<tr>
<th>Option</th>
<th>Generation X</th>
<th>Millennials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would have driven a car</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td>Would have gotten a ride from someone</td>
<td>16%</td>
<td>32%</td>
</tr>
<tr>
<td>Would have taken taxi</td>
<td>56%</td>
<td>45%</td>
</tr>
<tr>
<td>Would have walked or biked</td>
<td>10%</td>
<td>24%</td>
</tr>
<tr>
<td>Would have used public transportation</td>
<td>11%</td>
<td>28%</td>
</tr>
<tr>
<td>Would have used a van/shuttle service</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Would not have made that trip at all</td>
<td>7%</td>
<td>10%</td>
</tr>
</tbody>
</table>

N_{Millennials} = 333, N_{Gen X} = 195

Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)
Emerging Travel Patterns

- Millennials more often adopt shared mobility.
- Urban residents that live in zero-vehicle households more likely to use Uber/Lyft more frequently.
- Increased land use mix and regional auto accessibility increase the likelihood of using these services.
- Tech-savvy individuals with stronger pro-environmental and variety-seeking attitudes more likely to use shared mobility.
- Those with stronger preference to have their own car are less likely to use shared mobility services.
- Individuals with higher willingness to pay to reduce travel time are high-frequency users.

Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)
How does the adoption of *shared mobility* affect other components of *travel behavior* (e.g. use of transit)?

Various modeling approaches: *bivariate ordered Probit*, *recursive Probit*, or *latent-class structural equation models*...
Shared Mobility and Travel Behavior

How does the adoption of *shared mobility* affect other components of *travel behavior* and *vehicle ownership*?

Jointly model the adoption of shared mobility and *use of other modes* or *vehicle ownership*:

- **Mobility Style**
  - **Use of New Services**
  - **Car Ownership**

Data from longitudinal component of panel study (2015-2018) will help disentangle the relationship with *vehicle ownership*...
What Limits the Adoption of Shared Mobility?

**Concerns about drivers**

<table>
<thead>
<tr>
<th></th>
<th>Users</th>
<th>Non-users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly limits</td>
<td>14.4%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Somewhat limits</td>
<td>40.3%</td>
<td>40.9%</td>
</tr>
<tr>
<td>It does not limit</td>
<td>45.4%</td>
<td>36.6%</td>
</tr>
</tbody>
</table>

Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)
What Limits the Adoption of Shared Mobility?

**Concerns about comfort/safety**

**Users**
- It does not limit: 49.0%
- Somewhat limits: 36.9%
- Strongly limits: 14.2%

**Non-users**
- It does not limit: 40.8%
- Somewhat limits: 24.5%
- Strongly limits: 34.7%

*Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)*
What Limits the Adoption of Shared Mobility?

*Prefer to have/use my own car*

**Users**
- 38.4%
- 33.6%
- 28.0%

**Non-users**
- 55.6%
- 24.9%
- 19.6%

*Strongly limits*  *Somewhat limits*  *It does not limit*

*Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)*
Availability of the Service

Average waiting time to access on-demand ride-hailing services in Northern California
Average Waiting Time for UberX

[Box plot showing average waiting times for UberX in different cities: San Francisco, Los Angeles, San Diego, Sacramento. The box plots are color-coded to represent Rural, Suburban, and Urban areas.]
How can we coordinate use of shared mobility and public transit?

• Uber/Lyft can provide first-/last-mile access to transit:
  – What are the current experiences and pilot projects telling us?
• Competition vs. substitution with public transit:
  – What is the best allocation of funds? Use of curb space, right of way, etc.
• Urban form (e.g. low-density regions) not conducive to use transit:
  – Origins/destinations too far away to make service feasible/profitable (same for shared ride-hailing services)?
  – How do innovations influence mobility in urban, suburban and/or rural areas?
• How will the transportation landscape change with AVs?
  – Blending of public/private transportation? Opportunities for microtransit?

Important role of policies to align with societal benefits... and space for research partnerships to generate knowledge in this area...
Thank you for your attention!

For more information, please contact:

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