Ridehailing Services
MODE SUBSTITUTION PATTERNS AND SUSTAINABILITY IMPLICATIONS: A FOCUS ON TRANSIT

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Arizona State University

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Ridehailing services

**Beginning**

- 2011: Uber launches to help wealthy people hail a limo
- 2012: UberX, Lyft, Via, etc. began arriving in U.S cities

**Annual ridership**

<table>
<thead>
<tr>
<th>Year</th>
<th>Ridership</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1.9b</td>
</tr>
<tr>
<td>2016</td>
<td>2.6b</td>
</tr>
<tr>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>2018*</td>
<td>4.2b</td>
</tr>
</tbody>
</table>

*2018 is projected.

Source: Growth and Impacts of New Mobility Services. Bruce Schaller, TRB 2018 Annual Meeting, Washington DC.
Ridehailing services

Impacts on

- Mode choice
- Car ownership / residential location
- Activity engagement
- VMT
- Congestion

We are yet to fully understand the impacts of these services on the transportation system!
Research questions

- How do ridehailing services affect mode switching patterns?
- Among ridehailing users, who complements/substitutes public transit?
TOMNET/D-STOP Transformative Transportation Technologies (T4) Survey

- Phoenix, Atlanta, Austin, and Tampa metro areas
- Summer and Fall 2019 (pre-pandemic)
- Random address-based sample with online instrument

I. Attitudes & Preferences
II. Vehicle Ownership & Residential Location
III. Current Travel Patterns
IV. Mobility on Demand & Shared Mobility Services
V. Autonomous Vehicles
VI. Background Information

<table>
<thead>
<tr>
<th></th>
<th>PHX</th>
<th>ATL</th>
<th>AUSTIN</th>
<th>TAMPA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>1,027</td>
<td>944</td>
<td>1,127</td>
<td>260</td>
<td>3,358</td>
</tr>
</tbody>
</table>

Phoenix, Atlanta, Austin, and Tampa locations on a U.S. map.
## Changes in mode usage after using ridehailing services

*Sample is weighted.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Changed usage, but not because of ridehailing</th>
<th>Use it about the same</th>
<th>Use it less often</th>
<th>Use it more often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive private vehicle, alone [N=1804]</td>
<td>19.9</td>
<td>59.4</td>
<td>13.8</td>
<td>6.9</td>
</tr>
<tr>
<td>Drive private vehicle, with passengers [N=1790]</td>
<td>19.1</td>
<td>62.1</td>
<td>14.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Ride in private vehicle, with others [N=1779]</td>
<td>18.6</td>
<td>59.2</td>
<td>17.8</td>
<td>4.3</td>
</tr>
<tr>
<td>Public transit: bus [N=1747]</td>
<td>22.9</td>
<td>55.3</td>
<td>17.2</td>
<td>4.5</td>
</tr>
<tr>
<td>Public transit: light rail [N=1621]</td>
<td>26.8</td>
<td>56.4</td>
<td>14.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Taxi [N=1755]</td>
<td>28.7</td>
<td>44.7</td>
<td>25.6</td>
<td>1</td>
</tr>
<tr>
<td>Bicycle or e-scooter [N=1740]</td>
<td>31.6</td>
<td>54</td>
<td>11.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Walk [N=1740]</td>
<td>25.5</td>
<td>57.1</td>
<td>11.9</td>
<td>5.5</td>
</tr>
</tbody>
</table>
A focus on transit changers

**Changing behavior**

- Substitute transit: 79.6%
- Complement transit: 20.4%

(N=362)

**Location**

- **Phoenix, AZ** [N=45]
  - Substitute transit: 79.7%
  - Complement transit: 20.3%

- **Atlanta, GA** [N=97]
  - Substitute transit: 80%
  - Complement transit: 20%

- **Tampa, FL** [N=22]
  - Substitute transit: 91.8%
  - Complement transit: 8.2%

- **Austin, TX** [N=198]
  - Substitute transit: 78.1%
  - Complement transit: 21.9%

*Sample is weighted.*
Ridehailing familiarity and usage

**Private ridehailing**

- **Use weekly [N=54]**
  - Substitute transit: 49.4%
  - Complement transit: 50.6%

- **Use monthly [N=107]**
  - Substitute transit: 83.1%
  - Complement transit: 16.9%

- **Use less than once a month [N=201]**
  - Substitute transit: 83.1%
  - Complement transit: 16.9%

**Shared ridehailing**

- **Use weekly [N=26]**
  - Substitute transit: 27.8%
  - Complement transit: 72.2%

- **Use monthly [N=65]**
  - Substitute transit: 77.9%
  - Complement transit: 22.1%

- **Use less than once a month [N=107]**
  - Substitute transit: 86.9%
  - Complement transit: 13.1%

- **Familiar but never used [N=127]**
  - Substitute transit: 87%
  - Complement transit: 13%

- **Not familiar [N=37]**
  - Substitute transit: 61.6%
  - Complement transit: 38.4%

*Sample is weighted.*
Socio-demographic attributes

Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Substitute transit</th>
<th>Complement transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30 years</td>
<td>68.4</td>
<td>31.6</td>
</tr>
<tr>
<td>31-40 years</td>
<td>77.9</td>
<td>22.1</td>
</tr>
<tr>
<td>41-50 years</td>
<td>88.1</td>
<td>11.9</td>
</tr>
<tr>
<td>51-60 years</td>
<td>89.6</td>
<td>10.4</td>
</tr>
<tr>
<td>61+ years</td>
<td>98.3</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Annual household income

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Substitute transit</th>
<th>Complement transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $50K</td>
<td>70.4</td>
<td>29.6</td>
</tr>
<tr>
<td>$50K to $99K</td>
<td>85.1</td>
<td>14.9</td>
</tr>
<tr>
<td>$100K to $149K</td>
<td>87.7</td>
<td>12.3</td>
</tr>
<tr>
<td>$150K or more</td>
<td>86.8</td>
<td>13.2</td>
</tr>
</tbody>
</table>

*Sample is weighted.
# Socio-demographic attributes

## Education

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Substitute Transit</th>
<th>Complement Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school or less [N=37]</td>
<td>87.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Some college or technical school [N=106]</td>
<td>71.4</td>
<td>28.6</td>
</tr>
<tr>
<td>Bachelor's degree(s) [N=132]</td>
<td>76</td>
<td>24</td>
</tr>
<tr>
<td>Graduate degree(s) [N=85]</td>
<td>83</td>
<td>17</td>
</tr>
</tbody>
</table>

## Employment

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Substitute Transit</th>
<th>Complement Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both worker and student [N=64]</td>
<td>60.5</td>
<td>39.5</td>
</tr>
<tr>
<td>Student (part-time/full-time) [N=76]</td>
<td>74.9</td>
<td>25.1</td>
</tr>
<tr>
<td>Worker (part-time/full-time) [N=185]</td>
<td>80.4</td>
<td>19.6</td>
</tr>
<tr>
<td>Neither worker nor student [N=37]</td>
<td>86.5</td>
<td>13.5</td>
</tr>
</tbody>
</table>

*Sample is weighted.
Mobility attributes

**Driver’s license**

<table>
<thead>
<tr>
<th></th>
<th>Substitute transit</th>
<th>Complement transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>No [N=40]</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>Yes [N=322]</td>
<td>82.2</td>
<td>17.8</td>
</tr>
</tbody>
</table>

**Household vehicles**

<table>
<thead>
<tr>
<th></th>
<th>Substitute transit</th>
<th>Complement transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 [N=30]</td>
<td>67.1</td>
<td>32.9</td>
</tr>
<tr>
<td>1 [N=108]</td>
<td>80.9</td>
<td>19.1</td>
</tr>
<tr>
<td>2+ [N=224]</td>
<td>81.7</td>
<td>18.3</td>
</tr>
</tbody>
</table>

**Commute mode**

<table>
<thead>
<tr>
<th></th>
<th>Substitute transit</th>
<th>Complement transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public transit [N=51]</td>
<td>29.1</td>
<td>70.9</td>
</tr>
<tr>
<td>Walk/Bike/e-Scooter [N=50]</td>
<td>75.9</td>
<td>24.1</td>
</tr>
<tr>
<td>Private vehicle [N=177]</td>
<td>89.6</td>
<td>10.4</td>
</tr>
</tbody>
</table>

*Sample is weighted.*
Attitudes towards technology and green modes

**Tech-savviness**

- **Agree [N=212]**
  - Substitute transit: 76.2%
  - Complement transit: 23.8%
- **Neutral [N=80]**
  - Substitute transit: 86.5%
  - Complement transit: 13.5%
- **Disagree [N=69]**
  - Substitute transit: 83.0%
  - Complement transit: 17.0%

**Green mode commitment**

- **Agree [N=187]**
  - Substitute transit: 63.0%
  - Complement transit: 37.0%
- **Neutral [N=87]**
  - Substitute transit: 92.4%
  - Complement transit: 7.6%
- **Disagree [N=87]**
  - Substitute transit: 97.2%
  - Complement transit: 2.8%

*Sample is weighted.*
Public transit is a reliable means of transportation for my daily travel needs.

“I prefer to live close to transit, even if it means I’ll have a smaller home and live in a more densely populated area.”

*Sample is weighted.*
Location choice based on ridehailing

“The time spent traveling to places provides a useful transition between activities.”

“Ridehailing service availability affects where I choose to live, work, and/or go to school.”

*Sample is weighted.*
Concluding remarks

- ~80 percent did NOT change their mode usage patterns due to ridehailing services.
- About one-fifth changed their transit use after adopting ridehailing services.
  - Of those, 20 percent used ridehailing to complement transit; they are:
    - Frequent ridehailing users, shared ridehailing users
    - Younger, low-income, students
    - Transit is main commute mode, no driver’s license, zero-vehicle households
    - Tech-savvy, committed to green modes, pro-transit, and perceive transit as reliable
- Programs should aim at influencing and shaping attitudes and perceptions towards sustainable modes of transportation.
- Policies should aim to incentivize use of ridehailing services as a complementary mode to transit.
Thank you!

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