Adoption of Ride-hailing in California and Impacts on the Use of Other Travel Modes

STEPS Symposium, December 7, 2017

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Research activities of the 3 Revolutions Future Mobility Program include:

• **Data collection and analysis** of behavioral and attitudinal data on shared mobility, adoption of electric vehicles and of connected/automated vehicles;

• **Forecasting and simulation models** of the impacts on activity participation, travel patterns, vehicle ownership, and vehicle miles traveled;

• **Behavioral experiments** to understand the impacts of the adoption of new transportation technologies;

• **Policy analysis** and simulation of future transportation scenarios; and

• **Analysis of environmental, economic and equity impacts** of emerging transportation trends and evolving lifestyles.
Panel Study of Emerging Transportation Trends

• Statewide study of emerging transportation trends in California

• Design of a detailed survey to collect information on several groups of variables

• First survey administered with an online opinion panel among Millennials (18-34) and Generation X (35-50) in fall 2015

• Quota sampling by geographic region and neighborhood type

• Part of a longitudinal study (with rotating panel)
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- Susan Handy
- Pat Mokhtarian
- Lew Fulton
- Farzad Alemi
- Rosaria Berliner
- Kate Tiedeman
- Yongsung Lee
- Ali Etezady
- Grant Matson
All cases were geocoded based on residential location.

We integrated data from other sources, e.g. US Census, US EPA Smart Location Data, AllTransit, Walkscore.com, etc.

We classified the NH type as **urban**, **suburban** or **rural**, based on land use features at the census tract.
MILLENIALS DRIVE LESS BUT DIFFERENCES IN VMT LARGELY EXPLAINED BY STAGE IN LIFE

VMT

-15%

MILLENIALS WITH CHILDREN USE PUBLIC TRANSIT MORE THAN OLDER ADULTS WITH CHILDREN. SMARTPHONE USE CORRELATED WITH TRANSIT USE

INDEPENDENT MILLENNIALS CHOOSE MORE CENTRAL, ACCESSIBLE LOCATIONS AND ARE MORE MULTIMODAL

LATENT-CLASS ANALYSIS IDENTIFIES FIVE WELL-DEFINED GROUPS OF TRAVELERS

HABITUAL DRIVERS: 84.7%

HIGHER ADOPTION OF RIDEHAILING AMONG WELL-EDUCATED URBAN MILLENNIALS

MOST PEOPLE COMMUTE BY CAR IN CALIFORNIA. STILL, MILLENNIALS SLIGHTLY MORE LIKELY TO ADOPT OTHER MODES

MANY UBER TRIPS MADE BY MILLENNIALS REDUCE THE AMOUNT OF WALKING AND CYCLING

HIGHER LEVEL OF SATISFACTION WITH TRAVEL AMONG NON-URBAN MILLENNIALS, THOSE THAT RIDE A BIKE AND HAVE ACCESS TO A CAR
Research Question

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

Interest in modeling the adoption of shared mobility and the use of other travel modes, controlling for personal attitudes, adoption of technology, household, individual and built environment characteristics.
Results: Adoption of Lyft/Uber

- **Age and income/education** have the largest effects among sociodemographics.
- **Car accessibility** and **land-use mix** positively affect the use of ridehailing.
- Familiarity with **ICT** and use of **other emerging transportation** services are associated with higher adoption.
- Individuals with stronger **variety-seeking, technology-embracing, and pro-environment** attitudes are more likely to use Uber/Lyft.

What Limits the Adoption of Shared Mobility?

**Concerns about drivers**

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<th>Users</th>
<th>Non-users</th>
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<td>14.4%</td>
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<tr>
<td>Somewhat limits</td>
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<td>30.6%</td>
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<tr>
<td>It does not limit</td>
<td>40.9%</td>
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</table>

Source: Panel Study of Millennials’ Behavior and Emerging Transportation Trends in California (UC Davis)
Attributes of Latent Classes

- Class Size: 37%
- Highest Adoption Rate (47%)
- Independent Millennials
- Not Married
- No Kids
- Work and Study
- City Dwellers

- Class Size: 33%
- Adoption rate: 27%
- Most Affluent
- Dependent Millennials and Older Gen Xers
- Work or Study
- Live with Kid(s)

- Class Size: 30%
- Lowest Adoption Rate (%5)
- Lowest Education
- Least Affluent
- Younger Gen Xers
- Not Work nor Study
- Rural Dwellers
Research Question

What Replaces What?

Need a ride? Get a Lyft.
Impacts on the Use of Other Travel Modes

Impact of last Lyft/Uber trip on the use of other means of transportation (by age group)

- Reduced the amount of driving I did
  - Generation X: 77.4%
  - Millennials: 70.9%

- Reduced the amount of walking/biking I did
  - Generation X: 23.1%
  - Millennials: 42.0%

- Reduced my use of public transportation
  - Generation X: 41.0%
  - Millennials: 48.6%

- Increased the amount of walking/biking I did
  - Generation X: 6.2%
  - Millennials: 4.5%

- Increased my use of public transportation by providing a ride outside public transportation hours
  - Generation X: 11.3%
  - Millennials: 7.8%

- Increased my use of public transportation by providing a better way to access public transportation
  - Generation X: 11.3%
  - Millennials: 9.0%

- Other
  - Generation X: 2.1%
  - Millennials: 2.1%

N_{Millennials} = 333, N_{Gen X} = 195
Impacts on the Use of Other Travel Modes (2)

Latent Class Analysis

Identification of different classes of behavioral changes

Class 1 (size=53%)
- Urban dwellers
- Walkable neighborhoods with good transit access
- Cost and time sensitive
- Least affluent
- Younger/independent Millennials
- Frequent commuters
- Multimodal travelers
- Most frequent users of Uber/Lyft

Class 2 (size=37%)
- Suburban Dwellers
- Car-oriented neighborhoods with poor transit access
- High number of vehicles per household drivers
- Frequent commuters
- Monomodal with high VMT
- Pro-suburban
- Materialistic/must own car
- Frequent air travelers
- Medium Uber/Lyft frequency

Class 3 (size=10%)
- Suburban Dwellers
- Low transit and walk accessibility
- Not cost and time sensitive
- Older Gen Xers
- Want to come back to urban area
- Non-frequent commuters
- Multimodal when possible
- Like biking
- Pro-environment
- Low frequency users
Impacts on the Use of Other Travel Modes (2)

Latent Class Analysis

Identification of different classes of behavioral changes

Class 1 (size=53%)
- Less Drive: 55.6%
- Less Walk/Bike: 68.6%
- More Walk/Bike: 2.3%
- More Transit: 99.2%

Class 2 (size=37%)
- Less Drive: 59.5%
- Less Walk/Bike: 0.6%
- More Walk/Bike: 1.7%
- More Transit: 48.8%

Class 3 (size=10%)
- Less Drive: 0.0%
- Less Walk/Bike: 0.0%
- More Walk/Bike: 21.0%
- More Transit: 93.6%
Research Question

Car Ownership vs. Shared Mobility?
Longitudinal Analysis of Vehicle Ownership Trends

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

Data from longitudinal component of panel study (2015-2018) will help disentangle the relationship with vehicle ownership…
Policy Implications and Research Needs

- Cost and personal-vehicle preference are limiting factors to the use of ridehailing → Pooling is the answer!
  - Pooling is the primary strategy to reduce prices and negative externalities.
  - It is a case where the public interest aligns with business interests.
  - Policymakers need better understanding of who might use pooling services and what incentives and policies could encourage them to do so.
  - More research is needed to determine price elasticity among different travelers.

- Single-passenger ridehailing tends to (a) substitute for driving, (b) replace the use of transit or active modes (especially among some groups), and (c) increases the attractiveness of living without a car:
  - Opportunities for demand-responsive services and microtransit.
  - Shared mobility can be integrated with public transit to provide better overall service, with lower economic and environmental costs.
  - More research is required to better understand the true nature and the causality links between the use of Uber/Lyft and the use of other modes.
Scientific Papers and Presentations


Papers presented at international conferences:

- Transportation Research Board 2017: 4 papers
- International Choice Modeling Conference 2017: 2 papers
- Association of Collegiate Schools of Planning 2017: 2 papers
- Transportation Research Board 2018: 6 papers
What Influences Travelers to Use On-Demand Ride Services in California?

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Exploring the Latent Constructs of On-Demand Ride Services in California

Investigating the Factors Limiting and/or Encouraging Their Use and Impacts on Other Travel Modes among Millennials and Gen Xers in California

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Adoption of Uber and Lyft, Factors Limiting and/or Encouraging Their Use and Impacts on Other Travel Modes among Millennials and Gen Xers in California

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THE ADOPTION OF SHARED MOBILITY IN CALIFORNIA AND ITS RELATIONSHIP WITH OTHER COMPONENTS OF TRAVEL BEHAVIOR

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A Research Report from the National Center for Sustainable Transportation – FINAL DRAFT

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