

# The Effect of Price and Time on Private and Shared Transportation Network Company Trips

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Office of Operations  
Federal Highway Administration  
1200 New Jersey Avenue SE  
Washington, DC 20590



U.S. Department of Transportation  
**Federal Highway Administration**



# Why Sharing?

- Vehicle occupancy impacts the number of vehicles on the road.
- By reducing vehicle miles traveled (VMT), sharing may:
  - Alleviate congestion
  - Improve travel time and travel time reliability for all road users
  - Reduce vehicle emissions
  - Support economic growth
- Purpose of study
  - Understand motivations behind the choice to use specific shared options versus private options



# Ridehailing vs. Ridesharing

## Private Rides

- UberX
- Standard Lyft
- Taxi

## Shared Rides

- UberPool
- Shared Lyft
- Via

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# TNC Methodology and Data

## Survey Questions to TNC Users:

- Trip purpose
- Personal characteristics
- Travel behavior

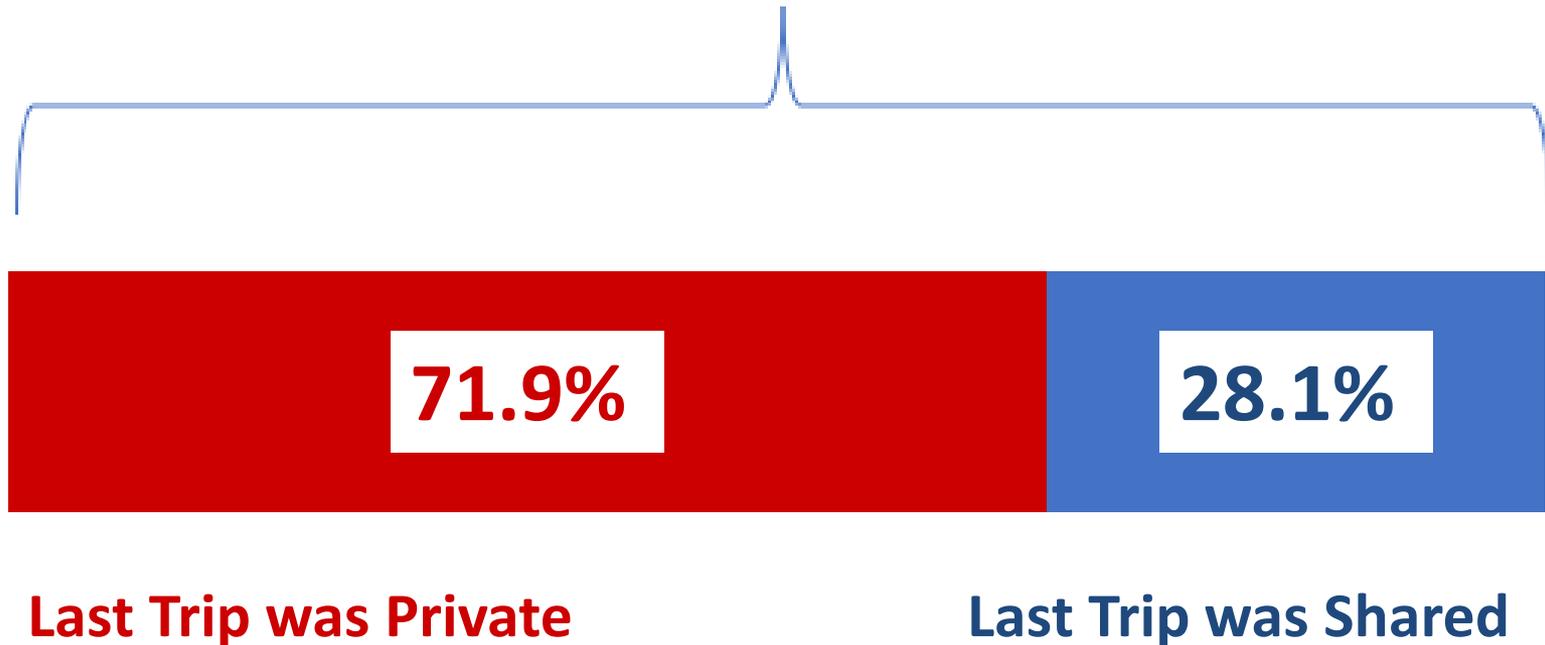
## Appended Data:

- Trip cost and travel time
- Built environment characteristics
- City-specific data



# National Survey Results Usage Summary

**4,365 TNC Users**



# TNC Methodology and Data: Sample Survey Question

Which one of these choices would you have taken for your recent trip by TNC?

A **17 to 20-minute**  
shared trip that cost  
**\$8**

A **15 to 17-minute**  
shared trip that cost  
**\$7**

An **11-minute** private  
trip that cost  
**\$11**



# Results: Descriptive Price Analysis

- Survey asked how TNC users *would* respond to hypothetical options generalized from their observed trip, if they were made available.
- Holding travel time constant, higher discounts for shared rides correspond to greater portions of the population willing to use sharing, indicating some amount of price sensitivity.
- This relationship presents a roughly linear pattern.



# Results: Descriptive Price Analysis

## Share of Private TNC Users Switching to Shared (Holding Travel Time Constant)



# Results: Descriptive Analysis of Time (Combined with Price)

- Lower travel time penalties for shared rides correspond to greater portions of the population willing to use sharing, holding price constant.
- As noted earlier, the willingness to share increases along with discount, due to price sensitivity.
- Over 30% of users rejected a shared trip with no time penalty at the maximum discount (75% less expensive than the observed private trip).
- At the lowest tested amount of travel time penalty (a 15-30% increase), 50% of respondents were unwilling to share at a 75% discount.



# Results: Descriptive Analysis of Time (Combined with Price)

*Portion of private TNC users that switched from private to shared travel at each level of travel time difference and price difference offered (n = 3,142).*



# Results: Variables that Predict Sharing

- A discrete choice model analyzed the effect of several predictor variables on the choice to share a TNC ride.
- Exponentiated coefficients (next slide) greater than 1 indicate that a unit change in that variable would increase the probability of sharing; the opposite is the case for coefficients below 1.
- Dividing data into market segments, it is possible to examine the effect of an increase in the price differential between shared and private TNC travel on an individual's probability of selecting shared travel.



# Results: Variables that Predict Sharing

<b>Variable</b>	<b>Coefficient</b>	<b>Variable</b>	<b>Coefficient</b>
<b>Shared Cost Savings (\$/mile)</b>	1.086	<b>Transit Use: 1 or more days/week</b>	1.316
<b>Shared Time Penalty (min/mile)</b>	0.666	<b>Household owns car</b>	1.031
<b>Income: Under \$50,000</b>	1.497	<b>Gender: Male</b>	0.924
<b>Income: Over \$100,000</b>	0.667	<b>Visitor</b>	1.138
<b>Dense Office District (Begin Only)</b>	1.111	<b>Size of Traveling Party: 1</b>	1.208
<b>Dense Office District (End Only)</b>	0.953	<b>Trip Start Time: Morning</b>	0.812
<b>Competitive Transit (Begin Only)</b>	0.859	<b>Trip Start Time: Evening</b>	0.934
<b>Competitive Transit (End Only)</b>	<i>Not Significant</i>	<b>Trip Distance (miles)</b>	1.009
<b>To/From Airport</b>	0.949	<b>Home-based Commute Trip</b>	1.211
<b>Employer Paid for Trip</b>	0.464	<b>Home-based Social Trip</b>	1.071



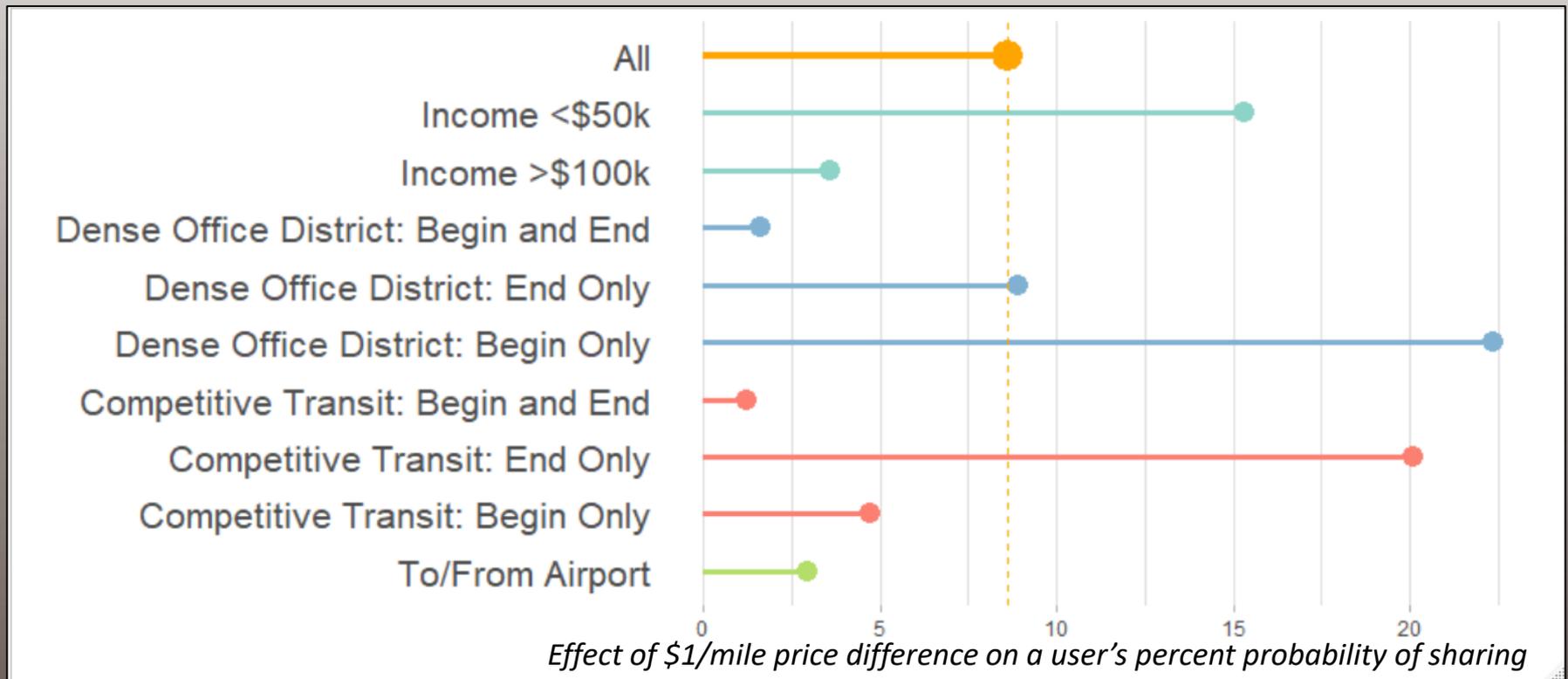
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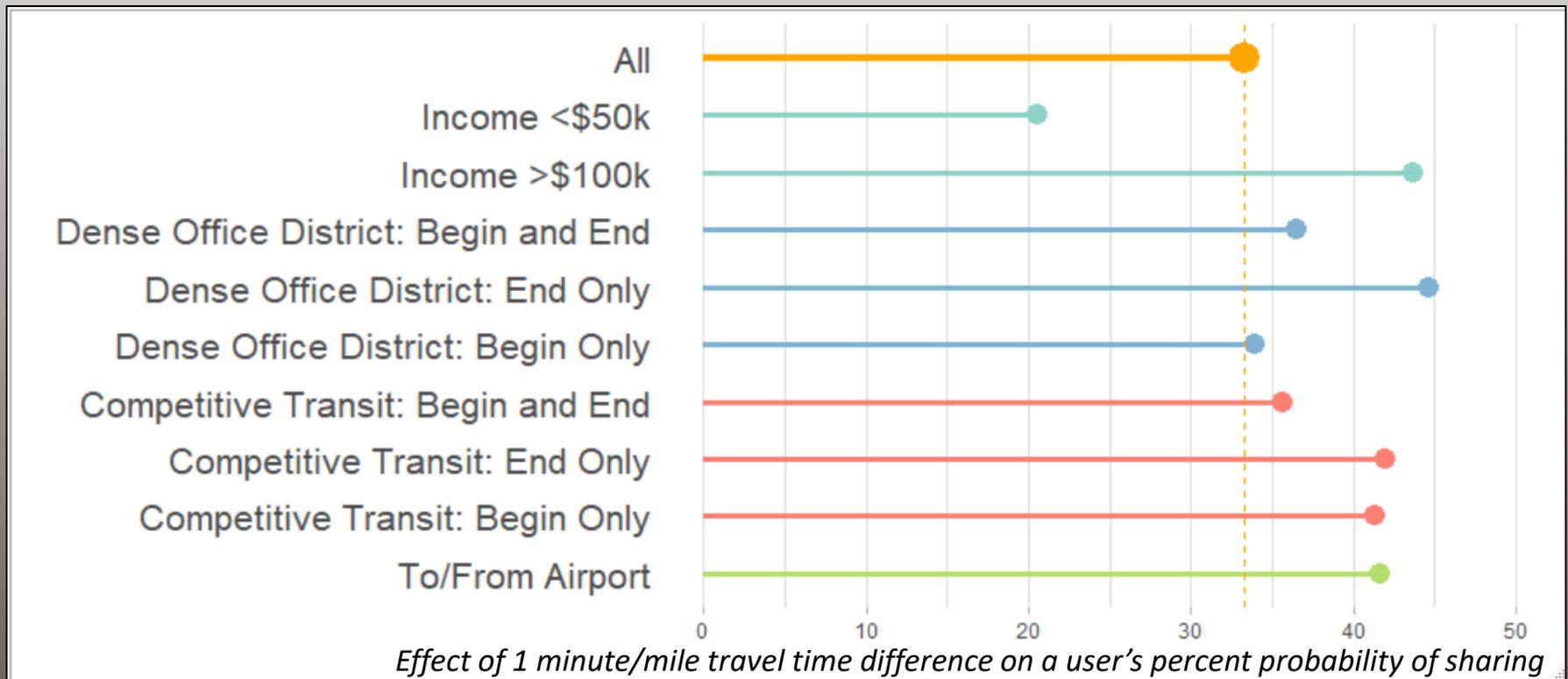
# Results: Effect of Price on Sharing

*For each additional \$/mile price difference between private and shared rides, there is an 8.6 percentage point increase in the probability of sharing*



# Results: Effect of Time on Sharing

*For each reduction of 1 minute/mile between a shared and private ride, there is a 33.3 percentage point increase in the probability of sharing.*



*Effect of 1 minute/mile travel time difference on a user's percent probability of sharing*



# Results: Effect of Price *and* Time

Reason I chose a private ride over a shared ride	% (n=3,142)
There was a chance that it was going to take a lot longer and that uncertainty is too risky	49.5%
The shared option was too much slower than the private option	29.2%
The discount was not big enough	24.6%
I prefer not to share my trip with a stranger	21.7%
I didn't see the shared option in the app	6.5%
I don't understand what the shared option is	0.0%

- Riders appear to place a very high value on their travel time showing the same travel response when offered to save either \$3.86 or 1 minute (for \$231 or 1 hour).
- Over 30% of riders whose last trip was private never selected a hypothetical shared option.



# Results: Effect of Price and Time (*Among Only Shared Options*)

- Looking at preferences *among* shared options, the ratio of savings a user accepted to the delay that they also accepted represents a ceiling on the user's willingness to pay to avoid additional travel time in a shared ride.
- For users whose last trip was private:
  - A small share of respondents have values of time below a ceiling of \$14.24 (18.9%) and most have ceilings below \$139.19 (70.1%).
- For users whose last trip was shared:
  - More than half of respondents (55.7%) have an implied value of time under \$10.62 and nearly all (91.8%) implying a value of time under \$57.82.
- These findings are consistent with the notion that a higher value of time is expected for customers whose last TNC trip was private.



# Conclusions

- Research used a novel **stated preference study** anchored off real TNC trips to simulate real decisions between taking private and shared TNC trips.
- Users may be influenced by **time-based ridesharing** incentives or **price-based incentives**, but some users appear unmoved by price.



# Conclusions (Continued)

- Users taking certain types of trips are more inclined than other users to select a shared option if ***relatively small changes*** in cost and time are made in the direction that favors sharing.
- Exploration of this data could **help guide service offerings** and **encourage more customers to make a shared ride choice** (e.g., offering service-standard guarantees for shared ride products).



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