Ride-Hailing, Ridesharing, and Transit Ridership: A National Study Using the 2017 National Household Travel Survey

Marlon G. Boarnet   University of Southern California, boarnet@usc.edu
Clemens Pilgram   University of Southern California, pilgram@usc.edu

Project Objective

This study uses person-level data from the 2017 National Household Travel Survey (NHTS) and from a SACOG travel model ("SACOG Replica") to evaluate the overlap between users of ridehailing (such as Uber and Lyft) and public transit riders, and whether the complementarity between modes varies across space.

Problem Statement

Launched with the promise of on-demand "car-sharing" reducing the need for private vehicle ownership, ridehail services such as Uber and Lyft have been seen as competing with transit agencies for riders ever since their emergence - prompting the question whether ridehail is a complement to or a substitute for transit.

Research Methodology

Our research relies on several different methods, each applied to the same data sources:

- **Descriptive statistics:** First, we review descriptive statistics of for each of four types of travelers: Persons who used ridehail but not transit, persons who used transit but not ridehail, persons who used both, and persons who used neither. We used data (primarily from the 2017 NHTS) to determine whether these groups differ from one another in observable ways in terms of demographics or home surroundings.
- **Complementarity Regressions**: We model transit usage at the person level as a function of the same demographic and land use information used in the "type of rider" classification models, as well as their ridehailing usage.
- **Intraday Distributions of Trips:** Finally, we evaluate when during the day riders of both modes use either mode to determine whether ridehailing and public transit are likely used for the same purposes, and we compare the time-of-day distribution for ridehail travel with the time-of-day distribution for transit use for persons who exclusively use either ridehail or transit, or who use both.

Results

The 2017 NHTS asked respondents about their travel in the previous 30 days, and we used that 30-day retrospective question to classify respondents into categories of persons who used ridehail and transit, ridehail only, transit only, or neither. We find that persons who reported using both ridehail and transit in the previous 30 days closely resemble ridehail users overall. Both groups, ridehail and ridehail plus transit users, skew younger and wealthier than persons who used transit but not ridehail in the previous 30 days.

We used regression analysis to examine the link between ridehail usage and transit usage, also using the 30-day retrospective questions from the NHTS. Controlling for the size of the metropolitan area in which

a respondent lives, whether or not their location is urban, their age, household income, race, education, gender, ethnicity, driver status, and access to vehicles within their household, we find evidence for complementarity between the two modes: Respondents who reported at least one ridehailing trip in the past 30 days are 24.2 percentage points more likely to also have reported using public transit on at least one of the past 30 days. Similarly, respondents who reported using transit in the past 30 days are 17.8 percentage points more likely to have also reported using ridehail services during the same period, all else held equal. While usage of both transit and ridehailing is greater within half a mile of frequent rail service in California, it is inconclusive whether the complementarity between modes varies with distance to rail transit.

However, we do find evidence that ridehail trips peak at different hours than transit trips even among users of both modes, suggesting that the two modes serve different types of trips rather than ridehailing solving the transit first/last-mile problem: For habitual users of both modes, ridehail trips tend to occur later in the day, and ridehailing trips do not have the same morning and evening peak patterns of usage across time that are visible in the distributions of public transit trips (**Figure 1**). By contrast, the ridehailing and transit usage patterns of habitual users of only transit or only ridehail are somewhat more like each other visually (**Figure 2**).

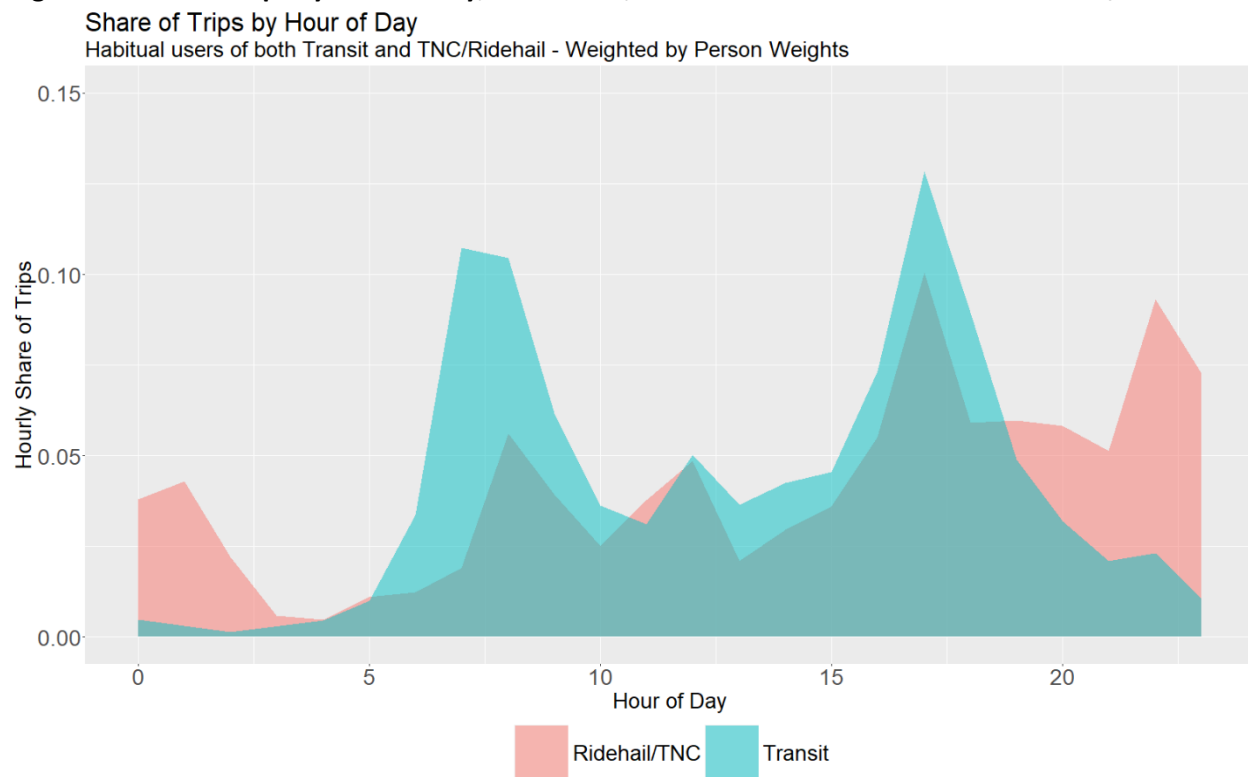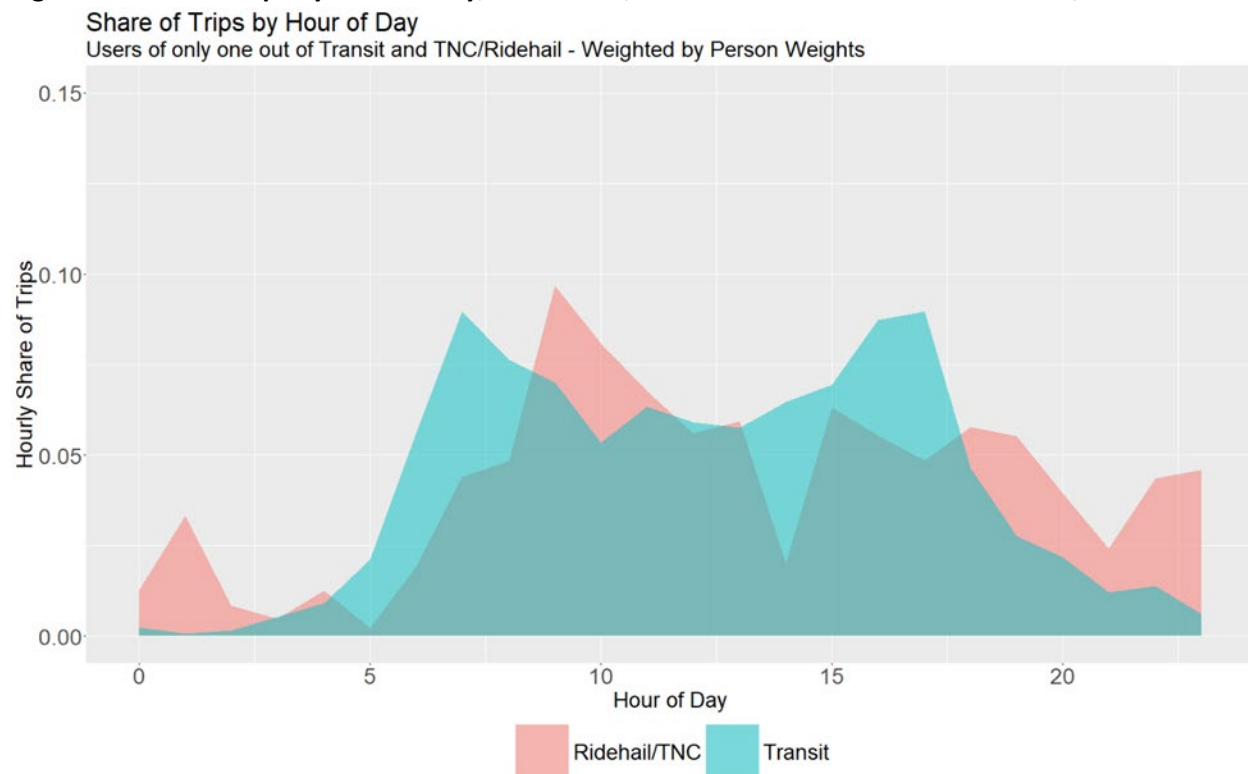**Figure 1. Share of Trips by Hour of Day, 2017 NHTS, Habitual users of both Transit and TNC/Ridehail**

Share of Trips by Hour of Day
Habitual users of both Transit and TNC/Ridehail - Weighted by Person Weights

Figure 2. Share of Trips by Hour of Day, 2017 NHTS, Habitual users either Transit or TNC/Ridehail

This finding suggests that for habitual users of both modes, ridehailing may serve a set of mobility needs unmet by public transit. A substantial share of all ridehail trips occur in the evening or late at night – times of day at which transit schedules may be less frequent or pose safety concerns.