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Title: The evolution, usage and trip chain patterns of taxis & ridesourcing services -- Evidence from 2001, 2009 & 2017 US NHTS Survey

Abstract: Ridesourcing services, provided by transportation network companies, such as Uber and Lyft, have significantly transformed people's daily travel behavior. Based on US National Household Travel Survey data in 2001, 2009 and 2017, this study explores 3 following perspectives.

First of all, the evolution of on-demand ride services (including taxi and ridesourcing) in the U.S. metropolitan areas since 2001 and the impact of ridesourcing services on people's daily trip chain pattern since its entry in 2009 were assessed. Results show that the home-based taxi/ridesourcing trips increase most dramatically since 2009. The origins and destinations of those trips are found to be asymmetric, indicating an unbalanced demand for different trip purposes during different time of the day. For instance, 15 percent of the total trips were served for people from optional activities to home during late night (10 pm - 4 am) and other 10 percent were served for people from home to mandatory activities in the morning (4 am -12pm), which were the two largest share among all. When linking individual trip and mode into trip chain, findings indicate a positive role of taxi/ridesourcing on creating multimodal transportation system. All trip chain types associated with taxi/ridesourcing increase explosively since 2009, especially for simple optional, simple flexible and simple mandatory trip chains.

Secondly, differences of VMT, mode share and daily trip chain pattern between ridesourcing users and non-users in 2017 were compared. It turned out that those frequent ridesourcing users had higher daily mile travelled by all modes, yet had lower daily vehicle mile traveled. Besides, frequent users had significantly lower mode share of auto, while significantly higher share of public transportation and active transportation. Surprisingly, frequent users had higher share of mandatory trip chains, but lower non-mandatory trip chains, indicating they treat ridesourcing as a reliable commuting mode more than occasional and non-users.

Finally, the impact ridesourcing usage, which is classified based on frequency of use in the past month (i.e. no usage, occasional usage and frequent usage), was explored with propensity matching method. The self-selection biases were eliminated by controlling for socio-demographic features and residential built environment variables. The result suggests a positive effect of ridesourcing services on increasing individual daily total VMT.