

Commentary

Understanding the Impact of Ride-Hailing Services on Travel Behavior

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The arrival of transportation network companies (TNCs), including Uber, Didi Chuxing, Ola, Lyft and others, has the potential to critically alter key aspects of passenger auto travel behavior.



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Major transformations are taking place in the road transportation sector, particularly in passenger auto travel. The arrival of transportation network companies (TNCs), including Uber, Didi Chuxing, Ola, Lyft and others, has the potential to critically alter key aspects of passenger auto travel behavior such as vehicle ownership, miles traveled, the uptake of alternative fuel vehicles and the use of mass transit. These behavioral changes could have major impacts on the passenger light-duty vehicle sector, which is currently the biggest single oil consuming sector worldwide and represents about 25% of global oil demand. Understanding the needs and motivations of TNC users and drivers is key to gaining insights into this new form of mobility. A forthcoming KAPSARC paper reports findings from a unique sample of survey respondents in TNC-served areas in the United States (U.S.). The results form a case study, the insights of which can be applied to other personal auto travel dominated countries, including Saudi Arabia. This commentary provides an overview of the potential impacts of TNC use on travel behavior and highlights some of the major findings from the forthcoming KAPSARC discussion paper.

The rise of TNC services

TNC services have experienced tremendous growth over the past few years, with many new players entering the market. The number of trips offered by TNC firms such as Uber and Lyft has grown exponentially, as shown in Figure 1 (Smith 2018a, b). From Uber's inception in 2009 until 2017, the number of active drivers using its platform increased on average by over 200% annually, with an estimated 4 billion rides in 2017. Schaller (2018) highlighted that, in the U.S., TNCs provided 2.61 billion rides in 2017, a 37% increase from 2016. Uber has expanded to over 600 cities globally, reaching billions of people (Smith 2018b). The ease of access to TNC services through smartphone applications, and the higher availability of cars through these platforms compared with regulated, traditional taxi services explain their popularity. Moreover, the preferences of younger consumers toward pay-per-use mobility instead of owning a vehicle could also be contributing to this evolution. Pay-per-use mobility avoids high upfront costs, maintenance and operation costs, the need for parking, and so on.

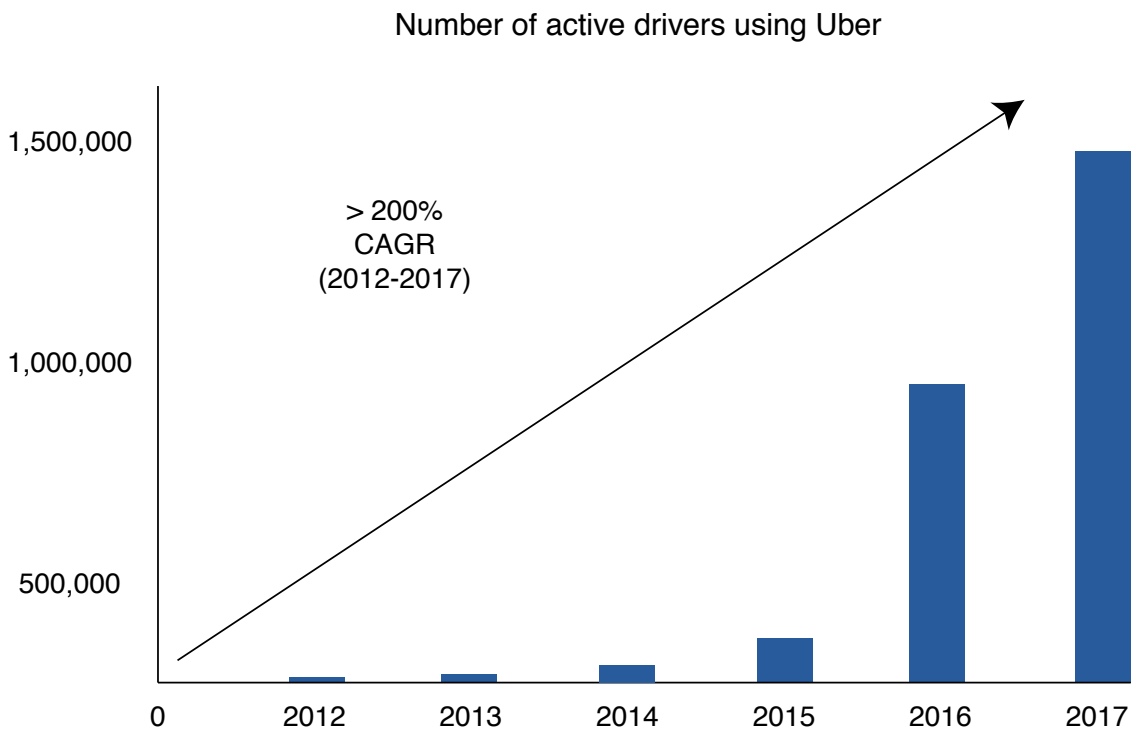
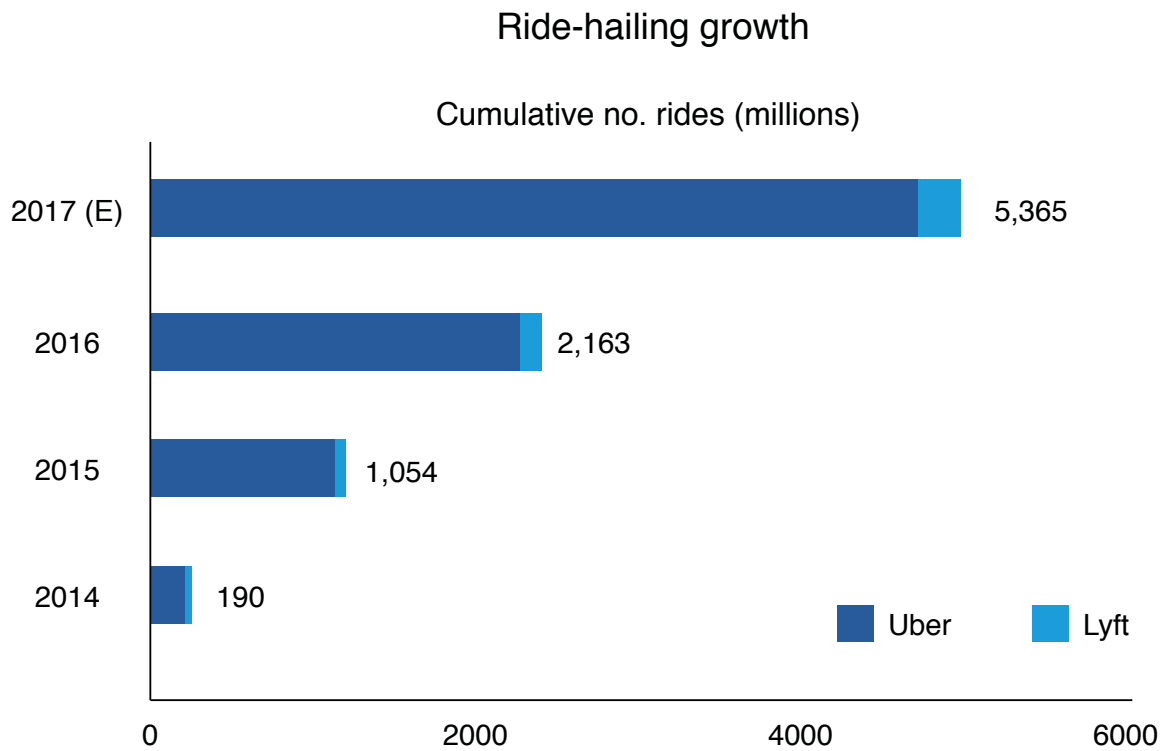
The impact of TNC services on travel behavior

TNCs have the potential to influence various aspects of travel behavior by impacting the availability, reliability and accessibility of personal transportation. By offering technology-enabled, easily accessible options, they have the potential to influence different aspects of travel behavior, as discussed below.

Personal vehicle ownership

The great promise of TNCs is that they offer many of the benefits of vehicle ownership, including flexibility, without the high up-front and operating costs. Moreover, TNCs allow passengers to focus on activities other than driving. In our forthcoming KAPSARC paper focused on TNC users and drivers in the U.S., around 10% of TNC users reported postponing new car purchases, while a further 5% decided not to buy an additional car after they started using TNC services. For these respondents, TNC services become an extension to, rather than a replacement for, primary vehicle ownership.

Figure 1. Growth of ride-hailing companies (Albrahim et al. 2019).



13% of TNC drivers indicated that they would be inclined to shift to BEVs, while a majority indicated a desire to shift to high fuel economy ICEVs, including hybrid and diesel engines.

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The adoption of alternative fuel vehicles (AFVs)

The high mileage of TNC vehicles favors the use of low operating cost, fuel efficient solutions such as battery electric vehicles (BEVs). However, the vehicles' high mileage and the need to charge the BEV batteries frequently might cause them to degrade quickly, necessitating frequent and expensive battery replacement. This expense might reduce the appeal of BEVs, especially as internal combustion engine vehicles (ICEVs) become more fuel efficient. Of the TNC drivers surveyed, 13% indicated that they would be inclined to shift to BEVs, while a majority indicated a desire to shift to high fuel economy ICEVs, including hybrid and diesel engines.

Vehicle miles traveled (VMT)

TNC services may increase ride-pooling, which could result in an overall reduction in vehicle miles traveled (VMT). However, if ride-pooling through TNCs displaces mass transit usage, this may lead to an increase in VMT. Moreover, empty miles and travel demand from those previously unable to drive (such as the infirm, elderly or children) or unable to afford a vehicle (such as those in developing economies) would add to VMT. There could also be a shift away from biking and walking to using vehicles, adding extra VMT. Around 29% of the surveyed drivers reported that they drive to busy parts of their cities to get more rides, thereby inducing empty VMT. Additionally, the average pick-up times during peak and off-peak hours are 9 and 10 minutes, respectively, which adds around 2-3 miles per trip to the induced VMT.

The use of mass transit

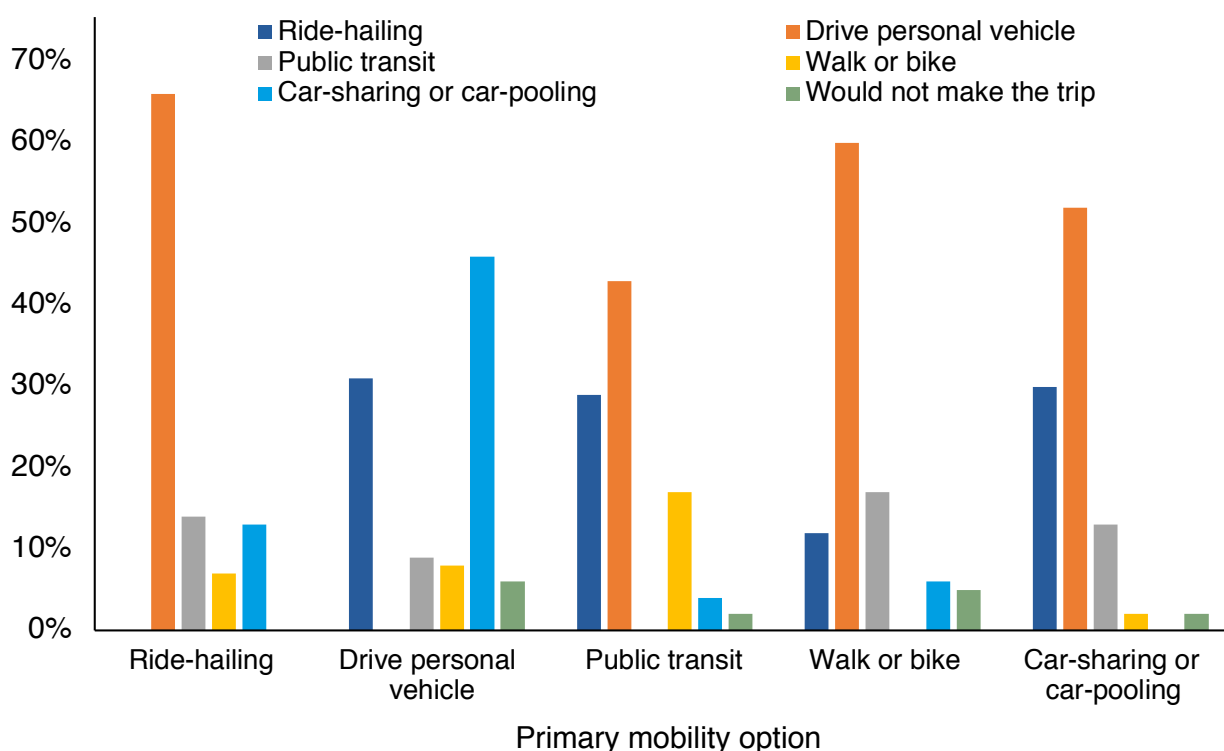
Mass transit – one of the earliest forms of mobility as a service – represents an inexpensive but often inconvenient option because of its availability, timing and the 'last-mile' problem (getting to and from the transit station to the final destination). The indirect, slow and infrequent nature of public transit, especially compared with private transportation, could lead to a defection of transit users to TNCs. Administrators of cities with widely dispersed populations see TNC services as an opportunity to fill mobility gaps such as the 'last mile' problem and to provide mobility when mass transit is either unavailable or unreliable.

Using the TNC user survey data to analyze transportation mode substitution, we found that TNC and car-sharing services are mainly capturing personal driving demand, without substantially affecting the demand for transit, with significant heterogeneity expected across locations. Without these services, around 66% of those who mostly use ride-hailing services would likely switch to driving personal vehicles, and 14% would likely switch to transit, respectively (Figure 2). Among those who indicated their primary mode of transportation was self-driven personal vehicles, 31% would shift to ride-hailing and 46% would switch to car-pooling or car-sharing, if personal vehicles were unavailable. For frequent public transit users, these figures would be 29% and 4%, respectively, if public transit was unavailable. Thus, TNC users would revert to either driving alone or car-sharing if TNCs were unavailable. These patterns imply that TNCs are replacing more automobile trips than mass transit rides.

This finding has implications for other countries, including Saudi Arabia, that have similar travel patterns to the U.S., i.e., those with high usage of personal vehicles as a share of all modes of transport. Based on this early evidence, recent investments in transit infrastructure (Riyadh Development Authority 2019; Nanji 2018) are unlikely to be affected by the growth of TNC services.

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Figure 2. Mobility options used if primary options were unavailable.



Source: KAPSARC analysis.

Ride-sharing

Shared TNC use in the form of ride-pooling, such as UberPOOL and Lyft Line in place of personal vehicle use, could reduce the number of vehicles on the road and the externalities of congestion, accidents, pollution, and greenhouse gas emissions. However, if TNC use replaces other shared-use modes such as mass transit, these externalities could increase. Of the TNC users in the survey data, 13% had used ride-pooling services. Further analysis of these ride-pooling users indicated that 34% of their ride-hailing trips were pooled. Around 50% of the TNC users who did not use ride-pooling services said they had not heard of these services. Around 22% of the ride-hailing users in the survey gave a preference for ‘private rides’ as their reason for using these services. The inconvenience of a slightly longer shared ride with a stranger nudges users toward solo trips. However, younger, smartphone-savvy consumers are more open to the idea of ride-sharing. Thus, ride-sharing might eventually become more common.

The inconvenience of a slightly longer shared ride with a stranger nudges users toward solo trips.

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