Courteous or Crude? Operational Tools to Shape User Behavior in Ridesharing

One of the most distinctive features that sets sharing economy platforms apart from traditional online marketplaces is that service providers and customers need to interact in person and complete transactions offline after being matched online. It is thus critically important for the platforms to ensure quality of service on the providers’ side and courteous and appropriate behavior on the customers’ side. To facilitate this, ridesharing platforms (e.g., Uber and Lyft) adopt bilateral rating systems that allow customers (riders) and service providers (drivers) to rate each other.

In this paper we focus on the impact of rider behavior and driver preferences on the performance of ridesharing platforms. We develop an evolutionary game-theory model to study how rider behavior and driver preferences evolve under a rating system and investigate how platform’s operational decisions such as pricing and supply-demand management impact the platform’s long-run performance. (Similar evolutionary models have also been utilized in the context of different (symmetric) matching platforms e.g., Kanoria and Saban, 2017.) An interesting aspect of our approach is that we allow for asymmetry in platform’s use of ratings. This is consistent with observed industry practice; for example, Uber warns drivers with ratings below 4.7/5 that their accounts may be deactivated if the ratings fail to improve, while low-rating riders’ accounts are rarely deactivated. As such, we model a ridesharing platform where all drivers offer quality services and focus on riders’ behavior and whether drivers react to their ratings. This approach which endogenizes customer responses to the rating and matching system complements the existing literature that exogenizes customer behavior (e.g., Jin et al., 2017).

We model two types of riders—courteous riders who make costly efforts to behave courteously during service, and crude riders who do not make the effort and impose negative externalities to drivers during service. We assume that rider ratings may be high or low which perfectly reflect
their true types, i.e., courteous riders receive high ratings and crude riders receive low ratings. Correspondingly, we model two types of drivers—*selective drivers* who actively check rider ratings at their own cost and only accept high-rating (i.e., courteous) matched riders, and *indifferent drivers* who do not actively check rider ratings and accept all matched riders.

Riders and drivers may adjust their behavior over time in response to their experiences with platform matched services. In our evolutionary model, these individual-level behavioral changes are captured in aggregate by changes of the type distributions of riders and drivers. Specifically, we utilize a dynamic system formulation under which the proportion of a type that experiences higher (lower) utilities relative to the population average gradually increases (decreases) over time. The direction and rate of the system’s evolution depend on the tradeoffs that riders and drivers face. Riders primarily face the tradeoff between the efforts to behave courteously versus risk of being rejected service, whereas drivers primarily face the tradeoff between the efforts of being selective versus avoiding crude riders. By analyzing the dynamic system of riders’ behavior and drivers’ preferences, we find that the system may end up in three distinctive states, based on the platform’s price and wage and the demand-supply relationship:

- **Cyclical State:** The system enters an unstable state in which the proportions of courteous riders and selective drivers oscillate forever. Such instability is undesirable for the platforms’ long-run performance.

- **Homogeneous State:** The system converges to a stable equilibrium where either all riders are crude and all drivers are indifferent (an undesirable state for the platform), or all drivers are selective and all remaining riders are courteous (but some riders choose to leave the platform).

- **Heterogeneous State:** The system converges to a stable equilibrium with a mixture of courteous and crude riders, and selective and indifferent drivers.
Based on the possible states, we further investigate operational tools to shape user behavior on a ridesharing platform. We find that either increasing the total number of riders (e.g., by lowering prices and advertising) or making drivers more selective (e.g., by decreasing wages) could potentially stabilize the system and incentivize riders to improve their ratings. On the other hand, when the platform has a large proportion of selective drivers, we find (somewhat surprisingly) that the platform could lower the price for riders to decrease the number of selective drivers without necessarily increasing the number of courteous riders.

We also investigate a matching scheme that prioritizes courteous riders when multiple riders compete for drivers. We establish that, when demand sufficiently exceeds supply, such a matching scheme may lead to a desirable stable equilibrium where all riders are courteous and no driver is selective. Finally, we numerically investigate the impact of drivers and riders’ behavior on the platform’s profit as well as the system’s welfare.

References