RIDING TOGETHER: ELICITING TRAVELERS' PREFERENCES FOR LONG-DISTANCE CARPOOLING

Xavier Lambin, Essec Business School, Phone: +33 4 76 70 65 62,
E-mail:xavier.lambin@essec.edu
Nicolas Astier, Paris School of Economics
Pierre-Francois Bouquet, BlaBlaCar

Overview

Most seats in private cars are empty when drivers hit the road. With a global fleet of personal vehicles exceeding a billion units, carpooling could represent a low-cost strategy to reduce carbon emissions in the transportation sector. However, by contrast to ride-hailing applications, carpooling takes place in the private sphere. Matching potential drivers and passengers is thus a big challenge. In particular, carpoooling entails significant transaction costs, especially for one-time long-distance trips: both parties have to trust each other, agree on pick-up and drop-off locations, pick a departure time, agree on a price, etc.

Digital platforms have now considerably lowered these search and transaction costs, enabling the development of long-distance carpooling on a large scale. However, in the eyes of many travellers, engaging in carpooling still represents a major behavioral change relative to solo driving. To reach its full potential, carpooling thus needs to offer a service that matches passengers' preferences to the best extent possible. In particular, it is critical to understand which trip characteristics matter most to travellers, and which changes in platform design and/or public policies would be most effective at fostering carpooling.

This paper addresses this question empirically, based on very detailed revealed preference data. We study the actual choices and behaviors of the users of BlaBlaCar, the largest carpooling platform for medium and long-distance trips in the world. The platform collects trip postings from drivers who have spare seats in their vehicle. Drivers provide their departure time, origin and destination locations, requested price per seat as well as several other characteristics. Passengers can then book a seat on their preferred ride. Observing the choices made by passengers, along with all relevant information collected by the platform, we are able to estimate passengers' preferences regarding the characteristics of carpooling trips.

This work contributes to two main strands of literature. First, we complement the recent literature leveraging data collected by mobility platforms, which has almost exclusively focused on ride-hailing (Castillo et al., 2017; Cook et al., 2018; e.g. Chen et al., 2019; Buchholz et al. (2020); Goldszmidt et al. (2020); Christensen and Osman (2021)). Second, we expand the smaller literature on carpooling, which has so far only leveraged stated preference or scraped data (Lambin and Palikot, 2019; Farajallah et al., 2019; Monchambert, 2020; Yeung and Zhu, 2021).

Methods

Our main analysis uses data on 10,000+ bookings from users of the platform BlaBlaCar. This data is provided by the platform itself under a non-disclosure agreement. The corresponding trips took place in October 2020, along 15 distinct routes in France.

We gather a collection of ``choice situations'' when a prospective passenger is faced with a set of rides to choose from. We have access to very detailed information for each choice situation (essentially any information observed by the platform). First, we observe the search request made by the passenger: date of departure, GPS coordinates of desired origin and destination. Second, we observe passengers choice set, which is the list of rides that the platform returned in response to the search request. These rides have themselves a number of specific characteristics (e.g. price, duration, etc.). The platform also operates a coach service (via the same website/application) on each of the road corridors we study which we use as our outside option.

We estimate several conditional logit models in which passengers are assumed to maximize an underlying utility function consisting of a linear combination of the various characteristics of a trip. The main explanatory variables are: the price of a seat, the duration of the trip, the convenience of the pick-up and drop-off locations (measured by

the distance between the desired origin/destination and the actual pick-up/drop-off locations), the rating of the driver, whether booking is automatically confirmed or contingent on driver's manual approval, whether the driver starts or ends her trip in a different city than that of the passenger, and dummies capturing whether the stated preferences of the driver and the passenger (about listening to some music, having casual conversations and smoking) match. We explore heterogeneity by allowing the coefficients for price and duration to be randomly drawn from a normal distribution.

Given the importance of the value of travel time as an input to many critical decisions (e.g. public infrastructure cost-benefit analyses), we instrument for both price and duration using credibly exogenous variations coming from a couple of operational features of the platform. Importantly, these particularities are generated automatically by algorithms developed by the platform (routing, creation of rides) and are invisible to end users.

Finally, we use our estimates to assess the impact that a number of public policies may have on the attractiveness of carpooling.

Results

We find that passengers are very sensitive to price, with a price elasticity of about 6 (in absolute terms). Consistently, they seem to have a low dis-utility from time spent in the car, with an estimated value of travel time of about 3\euro/hour. This value is three to four times lower than the reference values used in cost-benefit analysis for public infrastructure in France, even when the reference value is tailored to leisure trips by car and expressed on a per-traveler basis.

Policies that decrease price or improve the quality of the spatial match between passengers and drivers are found to be the most effective at promoting carpooling.

Conclusions

Our results speak to a considerable volume of long-distance car trips in France, as BlaBlaCar gathers about hundred million users (about 20 million in France) and facilitates about a hundred million trips a year worldwide. As a result, our finding of a low value of time could have important policy implications. Counterfactual scenarios evaluate several policies affecting trip duration. Our results also shed light on the optimal roll-out of charging stations for electric vehicles on highway corridors. They suggest that there may be a sizable demand for slower but much cheaper charging options than DC fast charging. Finally, carpoolers are found to pay strong attention to the pick-up/drop-off locations. Convenience, as measured by the distance between desired origin/destination and actual pick-up/drop-off points, is found to be one the characteristic that passengers value the most.