

Planes, Trains, and Co-Opetition: Evidence from China

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What we do:

This paper analyzes the impact of the high-speed train (HST) roll-out on air carriers' route network decisions.

Methodology:

Using a unique hand-collected data set on airline networks and the timing of the HST roll-out in China, from 2006 to 2016, we estimate a structural dynamic oligopoly model of air-route entry and exit over time that accounts for both the competition between airlines and the spillovers from the HST network. We use a variant of a novel framework proposed by Arcidiacono, Bayer, Blevins and Ellickson in 2016 for estimating and solving dynamic discrete choice models in continuous time (as opposed to the most commonly used discrete-time framework) that can be applied to dynamic games.

Contribution:

This paper empirically quantifies the impact of HST in the airline industry in China. Such quantification has implications not only for China but also at a wider level. For example, in the United States, local airline carriers have often opposed the idea of HST introduction. Quantifying the negative and potential positive spillovers from HST to air travel (and their net effect) allows us to understand whether the resistance of the airline industry regarding the introduction of HST in some regions is warranted.

More broadly, this research contributes to the literature on entry and spatial competition by studying competition among firms in a network setting with both positive and negative spillovers across markets and industries.

Dynamics play a key role in our model building, because, for air carriers, there is a sunk cost associated with modifying their existing route network. Not accounting for the dynamics of airlines' decisions would result in an underestimation of the magnitude of the spillovers from HST to the airline industry.

Results:

We find strong evidence of heterogeneous spillover effects from the HST on airlines which depend on the routes' characteristics and their interaction (connecting vs. overlapping) with the HST network.

In a counterfactual policy simulation, we assess the impact of the HST on airlines' route decisions by banning the entry of the HST. We find that, overall, the introduction of the HST reduced the air carriers' route presence by around 15% (in terms of number of air routes).

Further, we also simulate a change in the extent of the spillover effects between the two modes of transportation to explore the possible benefits from services that facilitate the complementarity between air and rail travel. We find that the number of customers using intermodal travel needs to increase by at least 40% in order to shield the airline industry from the negative impact from the HST.

References:

Arcidiacono, Peter, Patrick Bayer, Jason R. Blevins, and Paul B. Ellickson (2016), Estimation of Dynamic Discrete Choice Models in Continuous Time with an Application to Retail Competition, *Review of Economic Studies*, vol. 83(3), pages 889-931