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The spatial scope of airline competition

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ABSTRACT

We investigate whether alternative city- or airport pairs are viable substitutes and the extent to which they impact airline competition between the United Kingdom and continental Europe. To this end, we employ and measure airlines' best responses in equilibrium. Using monthly airline-route seat capacity levels and two stage least-squares dummy-variables regression models, we estimate airlines' strategic reaction to the competitors' capacity levels, including competitors on other routes. We show that airlines' relevant market extends beyond the airport-pair level. Strategic reactions depend on airline type, but all airline types have a similar strategic reaction towards high speed rail.

1. Introduction

To what extent does a flight between Paris and London compete with a flight between Brussels and Manchester? How fierce is competition between full service airlines, low cost carriers and high speed rail? We use best responses of airlines to assess the competitiveness of airline markets taking into account the presence of imperfect substitutes. Earlier studies in aviation, particularly Brander and Zhang (1990), Oum et al. (1993) and Fischer and Kamerschen (2003), apply the conduct parameter method and find that airline conduct resembles Cournot behavior in duopoly routes in the US. Fageda (2006) finds that competition in Spanish aviation is less competitive, as he also takes monopoly routes into account.

Our analysis provides three main extensions to the existing body of airline competition literature. First, we relax the assumption of airlines competing in predefined geographical markets — usually airport- or city pairs — by determining the relevant market empirically and allowing the extent of competition to include alternative city pairs.[1] City pairs provide

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[1] In addition, our work relates to the branch of literature examining multimarket contact and intensity of competition, such as Evans and Kessides (1994), Prince and Simon (2009), Bilotkach (2011) and Zou et al. (2011). The common approach in these studies is to define the market as an airport pair and model multimarket contact as a count variable. Our approach, however, explores multimarket contact by taking into account the impact of the competitors' output on both the same and alternative city pairs.

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a rather crude boundary for airline markets, as airports within the same city can be further apart than airports in adjacent cities.[2] The distance between London Luton airport and London Gatwick, for example, is 114 km by road, whereas the distance between the airports of Liverpool and Manchester by road amounts to 50 km.

Second, we allow airlines' strategic responses towards rival airlines to differ depending on airline type of the competitors. Exploring patterns of strategic interaction between different types of airlines is important in determining the relevant market and subsequently for regulators when assessing market power, e.g. in the case of a proposed merger. Earlier airline conduct studies by Perloff et al. (2007, p. 235-246) and Brueckner and Luo (2014) allow for the possibility that airlines provide differentiated services. Brueckner and Luo (2014) explicitly model the strategic interaction among airlines in product-quality choices and find evidence for strategic interaction within carrier types, but not across types. Both studies, however, focus on duopoly markets and two types of airlines. In the current study, we aim to offer a more complete analysis by considering oligopolistic markets and distinguishing between full service carriers, low cost carriers, regional carriers, and a residual group.

Third, our study adds to a growing body of literature exploring competition between aviation and high speed rail by explicitly take into account the geographical extent to which high speed rail is considered to be a competitor by different types of airlines. The high speed rail connection between Paris/Brussels and London is a viable substitute for travelling by air (Behrens et al., 2012). To the best of our knowledge, there are no empirical studies examining the competitive effects of high speed rail beyond the same city pair (see, e.g., Gonzalez-Savignat, 2004; Park and Ha, 2006; Dobruszkes et al., 2014).

A major advantage of our approach is that the empirical analysis of firms' behavior neither requires price data nor estimating a demand function. Airlines commonly set their schedules prior to fares. Once the schedule is set, airlines may adapt to unforeseen demand fluctuations through advanced pricing mechanisms.[3] Hence, we presume that competition in capacities adequately reflects airlines' strategic responses to the behavior of other airlines.[4]

Our approach follows the intuition embedded in game theoretical oligopoly models, without having to specify the actors and their behavior in much detail. Firms' best responses to each other's capacity reflect the extent to which they compete as well as the intensity of competition. All capacities in a Nash equilibrium are best responses to all other capacities in the same market. These capacities may change due to an external shock that is unobserved by the researcher. Even though the shock is unobserved, the changes in capacities have to be consistent with firms' best responses and can hence be estimated empirically. Firms that do not respond to each other, can be considered as not being in each other's relevant market.

To empirically determine these best responses, we use monthly airline-route capacity levels in seats of routes between the United Kingdom and continental Europe for the period 2004–2010 and apply two stage least-squares dummy-variables regression models. We explicitly account for competition from alternative city pairs and differences between types of airlines. To generate a consistent estimate of the strategic interaction parameters, we control for airline, year, airport pair and continental airport-period specific effects via dummies, and use lagged capacities as an instrument. In this way, we control for potential unobserved demand shocks and the simultaneity bias arising from strategic interaction.[5]

Short haul airline markets in Europe provide several challenges that put our approach to a serious test. Unlike in the US, publicly available data is very limited for European airline markets. The European airline market exhibits both observed and unobserved product differentiation — considering the airports airlines fly from and the level of service airlines offer — and faces viable substitutes such as high speed rail. Moreover, cost differences are likely to be present and the behavior of some of the airlines is likely to be affected by their network structure.

We find that airlines respond to capacity changes of their competitors in adjacent airport pairs and that strategic reactions differ between airline types. Furthermore, we show that the impact of a change in capacity on the high speed rail link between London and continental Europe is substantial and has a wider geographical scope in continental Europe.

The remainder of this paper is organized as follows. We develop the theoretical and empirical framework in Section 2. The study area and data are outlined in Section 3. We present and discuss our empirical results in Section 4. In Section 5, we apply the estimation results to compute market level responses. Section 6 concludes.

2. Theoretical and empirical framework

2.1. Theory

Here we derive a measure that reflects strategic interaction between firms, using only a small number of widely accepted assumptions. The measure is quite similar to the conduct parameter, see Bresnahan (1989) for an overview. We avoid, however, the empirical problems brought forward by Corts (1999), by focusing on best responses rather than attempting to esti-

[2] Examples of studies analyzing strategic interaction in the airline industry using a trip between two airports or cities as the predefined market are Borenstein (1989), Ciliberto and Williams (2014), Bilotkach et al. (2014) and Zhang et al. (2014). In addition, please note that a commonly used market definition, the so-called catchment area, does not take into account how far or close alternative airports are.

[3] Although these pricing mechanisms are strategies themselves, the resulting observed prices will be strongly determined by short run demand fluctuations. The (changes in) observed prices, therefore, are less suitable as an indicator for mid- or long term airline strategies.

[4] The seminal contribution by Kreps and Scheinkman (1983) shows that such capacity-then-price strategies imply Cournot outcomes. In addition, the studies by Brander and Zhang (1990), Oum et al. (1993), and Fischer and Kamerschen (2003) find evidence for Cournot outcomes in the aviation industry.

[5] See, for example, Brueckner and Luo (2014) for an in-depth discussion about the simultaneity bias.