Transport Policy 43 (2015) 55–60

Contents lists available at ScienceDirect

Transport Policy

journal homepage: www.elsevier.com/locate/tranpol

Hubs at risk: Exposure of Europe's largest hubs to competition on transfer city Pairs

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ARTICLE INFO

Available online 19 August 2015

Keywords:
Airline management
Hub competition
Connectivity
Network management
Topic areas:
Airline network development
Airline strategy
Airport strategy

ABSTRACT

Hubs are airports used by airlines as transfer points to get passengers to their destinations. Each of the five largest European hubs – Amsterdam, Charles de Gaulle, Frankfurt, Heathrow, and Madrid – is closely associated with one former national flag carrier. Some concerns exist in Europe that the expansion of the Gulf carriers with their hubs in Dubai, Abu Dhabi and Doha threatens the existence of European hubs regarding transfer city pairs that include at least one long-haul leg. Our paper examines the actual exposure to competition by combining airline schedules data with methodology to measure competitive transfer connections. We provide the percentage of the transfer city pairs of the five largest European hubs that is exposed to competition. Further, we identify the main competitors to each of these hubs. One important result of our paper is that despite the increasing market share of Gulf carriers, the main competition for transfer traffic is still among the five largest European hubs, with Munich and Istanbul being another two strong contenders. Hence, our paper puts into perspective the competitive risk posed by Gulf carriers and their hubs.

1. Introduction

Over the past decade, the three Gulf carriers Emirates, Etihad Airways, and Qatar Airways have built a passenger base by flying people from Europe to South East Asia, India, Africa, and Australasia via their hubs in Dubai, Abu Dhabi, and Doha. More recently, they have started to expand their networks by flying people from China and India beyond Europe to the Americas. As a result, European network carriers have lost shares in the market for transfer traffic on intercontinental routes. This leads to concerns shared by many in the European aviation industry that the rapid expansion of the Gulf carriers with their centrally located hubs in the Middle East threatens the existence of European hubs. In September 2012, the European Commission presented a document entitled "The EU's External Aviation Policy – Addressing Future Challenges", stating that the global competitive pattern has changed significantly with the rise of the Gulf carriers providing 6th freedom services while relations with the Gulf States have largely been a one-way process of opening EU markets to Gulf carriers (European Commission, 2012). This paper refers to this broad context, but examines only the impact which the Gulf hubs as competitors have on the five largest European hubs – Amsterdam, Charles de Gaulle, Frankfurt, Heathrow and Madrid – for transfer traffic with at least one long-haul leg. To examine the actual exposure to competition, we combine airline schedules data with a two-step connectivity analysis of first constructing all feasible transfer connections and then identifying all competitive transfer connections.

There is published work on the rise of the Gulf carriers during the last decade and the underlying business model (e.g. O'Connell, 2011). Other researchers have dealt with the Gulf carriers' network development (Hooper et al., 2011), reasons for comparative cost advantages of Gulf carriers (De Wit, 2014) and the impact of new services via the Middle East hubs on traffic flows between secondary airports in Germany and Asia (Grimme, 2011). Another stream of research relevant to our paper is the work done on measuring air transport connectivity and the performance of airline networks. Some initial assessment of the competitive position of airports and airlines is possible with size-variables such as the number of passengers. However, these traditional indicators do not provide all necessary information when airlines not only compete on direct routes (from A to B), but also indirectly with a transfer at a hub (from A to B via hub H). Burghouwt and Redondi (2013) provide an overview on air transport literature that accounts for both, direct and indirect connectivity, by introducing connectivity measures. These measures allow to examine a wide range of air transport network issues, such as the competitive position of hub airports concerning major traffic flows like the

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http://dx.doi.org/10.1016/j.tranpol.2015.05.012
0967-070X/

transatlantic market (Burghouwt and Veldhuis, 2006) or even worldwide (Redondi et al., 2011), the development of multihub airline networks (Li et al., 2012), de-hubbing of airports due to airline network reorganization (Redondi et al., 2012), and the connectivity of regional air transport markets (Suau-Sanchez and Burghouwt, 2012).

Research on airline networks and connectivity typically makes use of connection builders, i.e., algorithms that construct flight connections using a set of rules and parameters, that are calibrated with schedule and booking data (Seredynski et al., 2014). In our approach, a feasible transfer connection must not only meet conditions of minimum connecting time, maximum connecting time, and maximum detour factor. We also require a return connection to exist and interline connections between airlines to be supported by codeshare agreements, as these two conditions contribute to the attractiveness of a connection to passengers. In line with Burghouwt and Veldhuis (2006), we measure relative connectivity. The quality of a feasible transfer connection is compared with a reference connection using the concept of inconvenience time which is calculated by adding penalty times to the elapsed travel time of a connection. If the reference connection offers a shorter inconvenience time exceeding a threshold value, a feasible transfer connection is considered not to be competitive. Using this two-step methodology, we give the percentage of the transfer city pairs of the five largest European hubs that is exposed to competition. Further, we identify the main competitors to each of these hubs. An important result of our paper is that despite the increasing market shares of Gulf carriers, the main competition for transfer traffic is still among the five largest European hubs, with Munich and Istanbul being another two strong contenders. Hence, our paper puts into perspective the competitive risk posed by Gulf carriers and their hubs.

2. Method

2.1. Scope

The paper analyses hub competition on transfer city pairs that include two legs. At least one of the two legs is required to be a long-haul leg. Intra-EU transfer traffic is excluded from our analysis, since this would dilute results on the extent of existing competition. The connections could represent either 6th freedom traffic between two foreign countries that involve stopping in the carrier's home country, or 3rd and 4th freedom traffic, i.e., flights from the carrier's home country to a foreign country and vise versa.

We examine the exposure of Europe's five largest airports – Amsterdam (AMS), Charles de Gaulle (CDG), Frankfurt (FRA), Heathrow (LHR), and Madrid (MAD) – to competition for transfer traffic as defined above, especially competition among these five hubs and with the Gulf hubs Dubai (DXB), Abu Dhabi (AUH), and Doha (DOH). Data comes from Innovata's worldwide airline schedules database. According to Innovata (2013), this data base contains 99% of all flight schedules worldwide, with approximately 900 participating airlines. Other connectivity studies use OAG instead of Innovata as provider of airline schedules data which offers the same kind of data with comparable coverage. The data used here relates to the month of November 2012. In addition, we look at data from November 2009 to detect changes in hub competition over time.

Our analysis includes only city pairs where the origin airport, the destination airport, or both are located outside the EU. The considered traffic flows are shown in Fig. 1 with “EU” standing for the European Union with its 28 member states and “NON-EU” for all other countries.

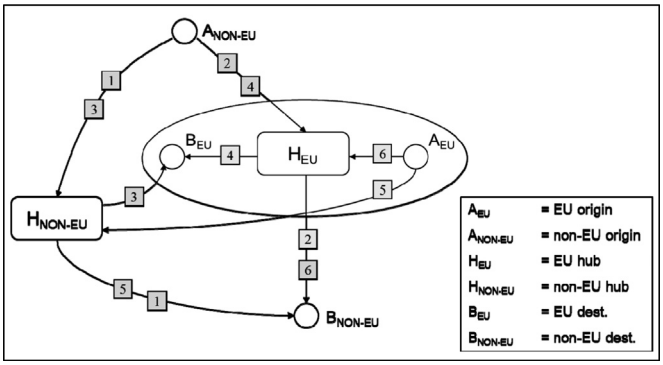

Fig. 1. Types of traffic flows considered.

Fig. 1 distinguishes six types of transfer traffic based on the location of origin airport, hub airport and destination airport.

- Traffic 1 from a non-EU origin (A_{NON-EU}) to a non-EU destination (B_{NON-EU}) via a hub outside the EU (H_{NON-EU}).
- Traffic 2 from a non-EU origin (A_{NON-EU}) to a non-EU destination (B_{NON-EU}) via a hub inside the EU (H_{EU}).
- Traffic 3 from a non-EU origin (A_{NON-EU}) to an EU destination (B_{EU}) via a hub outside the EU (H_{NON-EU}).
- Traffic 4 from a non-EU origin (A_{NON-EU}) to an EU destination (B_{EU}) via hub inside the EU (H_{EU}).
- Traffic 5 from an EU origin (A_{EU}) to a non-EU destination (B_{NON-EU}) via a hub outside the EU (H_{NON-EU}).
- Traffic 6 from an EU origin (A_{EU}) to a non-EU destination (B_{EU}) via a hub inside the EU (H_{EU}).

Intra-EU city pairs are not considered since Gulf hubs are not competitive on these city pairs due to their geographical location. By excluding intra-EU city pairs, we focus on competition between EU hubs and Gulf hubs on transfer connections that include at least one long-haul leg with a minimum great-circle distance of 3500 km, i.e., mainly intercontinental traffic.

2.2. Transfer connection building

Our estimates of the degree of competition between hubs on transfer city pairs rely on a methodology developed by airconomy aviation intelligence, a consultancy specialized on air travel data intelligence.

Accordingly, we measure the transfer network of each of the five major European hubs by the number of competitive transfer connections offered. In the following section, the computation of the set of competitive transfer connections is presented. It uses rules and parameters that are derived from a manual calibration process aiming to reflect real traffic flows and the underlying flight connections. Real traffic flow information is provided by booking data (Marketing Information Data Tapes – MIDT) from the major Global Distributions Systems (GDS) Amadeus, Galileo, Sabre, and Worldspan. The objective of the calibration process is to identify the set of competitive connections maximizing the coverage of passenger bookings while minimizing the number of competitive connections not booked by passengers according to the given data. For example, for the month of November 2012, the set of competitive connections covers approximately 86% of all passenger bookings. The remaining 14% of all passenger bookings not covered by our connection building procedure can partly be explained by incorrect or missing data and by passengers willing to accept very inconvenient connections (long travel times, many intermediate stopovers etc.), probably because of low fares. Unfortunately, because of the confidential nature of the data,