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Dynamic evolution of European airport systems in the context of Low-Cost Carriers growth

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ABSTRACT

Airport systems adapted to the influx of Low-Cost Carriers (LCC) as the segment grew in prominence in the European market during the last decades. The generalised perspective that LCCs are attached to remote secondary airports is being increasingly challenged by recent moves of the largest European LCC. The reality is that the impact of LCCs has spread to most commercial airports in Europe, primary and secondary alike. Yet, despite valuable insights on the evolution of airline networks, the existing literature lacks a clear understanding of why this has occurred. This paper explains the dynamics in the evolution of airports systems that resulted in significant growth for the low-cost segment in Europe. A multiple case study involving 42 European airports was used to identify the mechanisms that triggered the traffic patterns leading to the ascendency of LCCs in their respective airport systems. Understanding these mechanisms may prove valuable for supporting airport strategic planning.

1. Introduction

The liberalisation of the air transport market around the world has profoundly changed the evolution trends of the aviation industry. A liberalised market created a proper environment for Low-Cost Carriers (LCC) to emerge and favoured their rapid expansion. Yet after decades of liberalisation the academic literature is not conclusive on the long-term impact of this trend for airports (A. Graham, 2013). There is concern about the growing market power of LCCs and its implications for airports, and there is uncertainty about the future evolution of the business models, not only for LCCs but also for traditional airlines (European Parliament, 2007).

An important body of literature links the emergence of LCCs to the availability of 'secondary' airports where they could thrive avoiding direct competition with other airlines (Barbot, 2006; de Neufville, 2008; Dobruszkes, 2006, 2013; Francis et al., 2003; Francis et al., 2004; Franke, 2004; Zhang et al., 2008). This aspect has been studied as a trigger for competition between airports (Jimenez et al., 2013; Pels et al., 2009), a factor for airport efficiency (Martini et al., 2013), and as a potential asset to increase network connectivity (Malighetti et al., 2008). Yet recent developments in Europe show that primary airports are in the core of LCC expansion and that the implication of this trend for smaller secondary airports remains unclear (Dobruszkes et al., 2017).

In order to understand such implications, it is necessary to understand first how LCCs start, expand or abandon service at a given airport and how other airlines and airports react. And that needs to be assessed over time to gain a clearer picture of foreseeable trends. To the best of our knowledge, the existing literature (covered in the next section) describes extensively what has happened to the low-cost segment over time, but still lacks a clear understanding on how the current landscape formed. Gaining insights on such details may be valuable for airport planners and policy makers, and may help them discern possible outcomes of the current trends.

In that sense, this paper proposes a dynamic perspective to study the evolution of European airport systems regarding LCC influence. Given that 16 of the top 20 European airports with the largest amount of seats provided by LCCs in 2013 belonged to a Multi-Airport System (MAS), we examined the evolution at 42 airports (all the airports in each MAS plus the four remaining single-airport systems) between 2004 and 2013. Over this period LCCs became major players at both primary and secondary airports in Europe, contrary to the notion that LCCs are attached to remote secondary airports.

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We considered two types of dynamics in the evolution of the airport systems, those related to infrastructure and to the market. Their interaction results in particular traffic patterns with commonalities that are recognisable among diverse airport systems. By understanding such dynamics, airport managers may improve their planning processes, considering both infrastructure development and strategy formulation simultaneously.

The paper is structured in six sections. After this introduction, the second section reviews the relevant literature and defines the gaps that this research addresses. Section 3 describes the methodology used for the research. Section 4 summarises the most relevant findings from the traffic evolution at the airports selected for the study, and section 5, based on the multiple case studies, introduces the mechanisms that produce generic traffic patterns. Finally, section 6 presents the main findings and implications for policy making.

2. The impact of LCCs on airport systems

Airports are systems in the sense that they do not operate independently (de Neufville and Odoni, 2003, 2013); they are part of networks in which decisions made in one airport can affect others. This is more evident when different airports serve the same region, i.e., when they are part of Multi-Airport Systems (MAS). In an MAS airports compete with each other for traffic and services (Copenhagen Economics, 2012; de Neufville and Odoni, 2003, 2013; Jimenez et al., 2013; Pels et al., 2009) generating complex dynamics for planning and operations (de Neufville, 1995a, 1995b). Bonnefoy (2008) studied some of those dynamics to determine how a set of inter-related airports develop into an MAS over time.

Over the last decades LCCs have disrupted airport systems, particularly in North America and Europe (de Neufville, 2008). The impact that LCCs have on airports has been ample matter of research, yet “the academic literature is far less clear and conclusive about the overall impacts of LCC operations at airports and the extent to which airports benefit from LCCs, particularly in the long-term, and this suggests that more studies are needed” (A. Graham, 2013). Indeed, many studies have focused on specific airports within a limited time frame, or on the airlines (Barrett, 2004; European Parliament, 2007; Francis et al., 2003, 2004; Gillen and Lall, 2004; Graham and Shaw, 2008; Malighetti et al., 2009; Malighetti et al., 2007; Martini et al., 2013).

Consequently, it is commonly agreed that LCCs have preferred 'secondary' airports (Barbot, 2006; de Neufville, 2008; Dobruszkes, 2006, 2013; Zhang et al., 2008). However Abda et al. (2012) found that, in the USA, the market shares of LCCs were then bigger at the largest primary airports, “contrary to the common perception that LCCs avoid primary airports and direct competition with the Full Service Carriers” (A. Graham, 2013). This indicates that LCCs are becoming increasingly dominant in some markets (in particular the intra-USA and intra-European markets) and, as they keep growing, they move to the primary airports. In fact, the recent evolution of the networks of LCCs in Europe (Dobruszkes, 2006, 2009, 2013; Dobruszkes et al., 2017) suggests similar developments, as the business models of the airlines evolve.

The expansion of LCCs at larger primary airports poses interesting questions for practitioners and researchers. How do these airports respond to this evolution if their infrastructure has been normally developed for the use of traditional airlines? What factors favour or hinder LCC growth at primary and secondary airports? Are LCCs abandoning secondary airports altogether? What are the implications of these issues for policy making?

As a contribution for filling such gaps, this paper proposes a dynamic perspective to study how LCCs have affected the evolution of European airport systems. The main factors that guided particular paths of evolution in the airport systems may suggest insights for future developments as LCCs keep growing and legacy airlines compete more strongly. Understanding the dynamics of such evolution is paramount to cope with the inherent volatility and uncertainty in airport systems, certainly amplified by trends associated to LCCs.

3. Methodology

In order to study the evolution of airport systems with special consideration for the low-cost segment, we selected the 20 European airports with the largest offer of low-cost seats in 2013, as per Innovata data (IATA, n.d.). As most of them (16) belong to Multi-Airport Systems (MAS), we also included all the other airports in every relevant MAS to analyse their evolution and mutual influences. Hence, we performed a multiple-case study comprising an extensive document review coupled with an analysis of traffic trends for each of the 42 resulting airports (Table 1) between 2004 and 2013.

The analysis of traffic trends is primarily based on airline capacity (available seats) data, from the Innovata database (IATA, n.d.) aggregated for the years 2004, 2008, 2012 and 2013. In the case of Spanish airports we have also used data provided by AENA Aeropuertos, the airport operator, in terms of passengers per airline for every year 2005–2013 (AENA, 2014). In the case of British airports, we complemented capacity information with passenger traffic data, aggregated at the airport level (i.e. not by carrier) between 1998 and 2013 (CAA, 2014).

The document review included public documents in different languages, mainly the periodic reports of airport operators and civil aviation authorities, as well as their websites, aviation industry news and analyses, and mainstream and local journals. Traffic trends were assessed using non-hierarchical cluster analysis to group airports according to the relevance of low-cost traffic at the start (2004) and end (2013) of the analysis period. A non-hierarchical approach using k-means clustering (Forgy, 1965; Lloyd, 1982) based on Euclidean quadratic distances was selected due to the relatively small sample (the 42 airports were grouped in their respective 17 airport systems) and the insights gained from the case studies that preliminarily hinted at the possible number of clusters. Results of the cluster analysis were evaluated using Dunn (Dunn, 1974; Rousseeuw, 1987) and silhouette indexes. To select the appropriate number of clusters Dunn and silhouette indexes should be high.

In the document review we collected information regarding two types of dynamics in the evolution of every airport: those related to infrastructure and the market. Infrastructure-related dynamics mostly focus on capacity expansion in the passenger buildings and in the airside facilities (runway system and aprons); as well as in the redevelopment of existing airports or in the construction of new greenfield airports. Market-related dynamics refer to external events affecting the aviation industry globally or locally (such as the 2008 economic recession, or the opening of the Madrid–Barcelona High-Speed Rail line for airports in or near Madrid and Barcelona); management strategies (Malighetti et al., 2007) from the airports or airlines that affect their competitive position or their operations (such as mergers or acquisitions, change of strategic focus, creation of spin-off or start-up companies, opening or closing of bases or hubs); and vicissitudes that affect airline or airport operations (such as bankruptcies and legal disputes).

The 42 airports were studied by MAS, in order to allow for an analysis of the impacts that events in one airport might have on the other airports of the MAS. Given the extent of the exercise, Annex A summarises the most relevant findings of the multiple-case study according to the type of dynamics examined for every airport

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