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AIRLINE ECONOMICS IN EUROPE

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CHAPTER 1

CURRENT ISSUES IN EUROPEAN AVIATION

Kevin Cullinane

The story of contemporary air travel in Europe really began in 1992, with the inauguration of the EU's concept for an internal market for aviation, whereby the disparate national rules of member states were usurped in favor of a unified approach across the whole of an expanding EU. The policies and legislation that supported and reinforced this concept deregulated the market and paved the way for greater competition between airlines operating within the EU (Graham, 1998). What has emerged since represents a revolution in air travel, whereby the public in Europe now benefit from significantly greater choice and lower fares than could possibly have been imagined back in 1992. There has been a mushrooming of new airline operators offering new routes and slashing prices (admittedly, not all successful), so much so that the air mode often competes with rail for inter-urban journeys, even over quite short distances; again, something that could not be conceived of prior to 1992. Debatably, this revolution in air travel has now come to be regarded, in some quarters, as one of the greatest successes of the EU. There can be no doubt that it has played a significant role in facilitating much greater connectivity within the region and, as a consequence of this, it is said that it has made a vital (and much-needed) contribution to cultural understanding across the nations that comprise the EU (Fox, 2017).

In pursuing its journey toward greater deregulation of the market, the EU has benefitted from being able to observe the pioneering experiences of the USA; for example, the compromising of safety has never really been an issue within the European context of airline deregulation. Today, in fact, the safety record of the airline industry in Europe is impressive (Eurostat, 2019), although both safety and security remain high on the agenda of challenges facing the sector, particularly as demand for air travel continues to grow within the region and congestion

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at airports and in the skies becomes increasingly prevalent. There are, of course, numerous other challenges and opportunities, only some of which are addressed within the confines of this work on the economics of air transport in Europe.

The volume begins with a scene-setting contribution that outlines the detail of the regulatory context within which the European airline sector operates. We then move on to look at some of the strategic responses to this evolving regulatory context. In this respect, the specifics of some relevant business models, the competitive context (particularly with respect to pricing and profitability), changes in the productivity of European airlines relative to the global industry and the issue of joint ventures in the transatlantic market are all dealt with in some detail. The focus then shifts to the analysis of more niche sectors within the European aviation sector, specifically the business aviation and air cargo markets. The volume finishes with more specific works which address key issues in today's European airline market, namely the adoption of new propulsion technology and the ever-present environmental impacts associated with aircraft noise.

The substantive content of the volume begins with a *tour de force* from Sveinn Vidar Gudmundsson, who provides a detailed overview of the regulatory context for the European air transport industry. The focus of his contribution rests very much with the pivotal role played by the EU as the overarching regulator of the sector (Bartlik, 2016; Forsyth, Gillen, Knorr, Mayer, & Starkie, 2017). Indeed, the implementation of the single market for air transport within the EU is identified as the first critical step taken in the development of the industry in the region. As the author suggests, policy and associated legislation have since been developed and evolved in the four pivotal areas of: liberalization, safety and security, greening and the external policy. In addressing each of these areas, Gudmundsson details the various steps in liberalizing the market, taking the reader through each of the freedoms that have been negotiated and agreed over time and describing the specific policies, legislation and supporting case law which have molded their development. A vision of the emergent competitive landscape is drawn, with a particular focus on the gradual withdrawal over time of the various exemptions from competition law the sector had previously enjoyed. Emphasis is also placed on the significant role now played in the market by low-cost carriers (LCCs). More recent attention, however, has understandably focused on safety and security issues, as well as on the environmental concerns surrounding air transport and the attempts to improve its green credentials (Daley, 2016; Hagmann, Semeijn, & Vellenga, 2015; Janic, 2017). In this latter respect, the author identifies the inclusion of air transport in the EU's Emissions Trading Scheme (ETS) as having a significant influence on the subsequent development of the industry in Europe. At the same time, the author points to the many and varied complications and challenges the industry faces as a result of its inclusion in the ETS (Cui, Li, & Wei, 2017; Scheelhaase, Maertens, Grimme, & Jung, 2018). The work concludes, however, that the critical issues of energy and congestion remain relatively unaddressed within political circles and that these may pose some of the biggest future challenges for the sector to overcome.

As explicitly identified by Gudmundsson, one of the prevailing characteristics and drivers of the European aviation industry in recent times has been the

emergence and subsequent development of what have become known as low-cost carriers (LCCs). In Chapter 3, Richard Klophaus and Frank Fichert describe the traditional approach to the categorization of airline service providers on the basis of the network configuration of the services offered by an airline. Typically, this has led to a dichotomous classification of service provision as either 'point-to-point' or 'hub-and-spoke' (Burghouwt, 2016; Lawton, 2017). The authors go on to provide their analysis of how the typical LCC model of providing simple point-to-point services has now become defunct in Europe and how the more advanced LCCs have evolved (and are evolving) into a form of hybrid service provider that melds the conventional point-to-point network with a system which attempts to facilitate flight connections for passengers within their own network. In this way, the emergent model allows LCCs to develop networks without the need to invest significant funds, manpower and time into developing full-blown hub-and-spoke configurations. As such, the conventional dichotomous classification of carriers is becoming increasingly blurred. In contrast to those airlines which are typically classified as 'full service network carriers' that, invariably, operate hub-and-spoke network configurations (i.e. the so-called legacy carriers), Klophaus and Fichert refer to this new emergent airline classification model as 'Network Carriers without Legacy'. Such carriers are characterized as offering what the authors refer to as 'mesh networks' that lie somewhere between point-to-point and hub-and-spoke network topologies. As a pioneer of this emergent new model, a schedule analysis of Ryanair's direct and indirect services at its base at Porto airport provides a practical insight into the design and workings of this novel 'mesh network' configuration.

Whatever approach is adopted for network design and configuration, there is no escaping the fact that choosing the right pricing strategy is pivotal to maintaining competitiveness and achieving success in the operation of an airline (Zhang & Zhang, 2018). As pointed out by Rosário Macário, Hilde Meersman and Eddy Van de Voorde in Chapter 4, arriving at and implementing the appropriate pricing strategy is not an easy task. Simply the sheer range of potential alternative approaches is daunting, as indicated in the authors' overview of the state of the art in airline pricing strategies. The chapter then moves on to address the central question of how airline pricing strategies can be used to support strategic aims and what consequences might be experienced, particularly as a result of the relationship between airline pricing, yields and profits, as analyzed by the authors. In an effort to illuminate the theoretical background to airline pricing strategies, a case study of what happened at Brussels Airport over the period 2012–2017 is presented. This revolves around the attempted entry of two LCCs into the provision of flights to and from Brussels Airport and the vigorous response by the incumbent carrier, Brussels Airlines, who engaged in an extremely aggressive pricing war against the two new entrants. The success of Brussels Airlines' pricing campaign is attributed to its ability to combine low costs and low fares with high demand and high capacity utilization, as well as to the advantages it held in terms of network effects. This contribution concludes with a description of the emerging situation of Brussels Airlines at Brussels

Airport and a recommendation that further investigation is needed to determine the impact on consumer welfare and the implications for policy therefore.

Despite the problems encountered in the first few years following its implementation (Goetz & Dempsey, 1988; Golich, 1988), the US Airline Deregulation Act of 1978 initiated a worldwide trend toward the liberalization of airline markets, not only within nation-states but also multilaterally (Button, 2017; Williams, 2017). As with all such policies, there are a number of potential motivations for, and associated anticipated benefits of, deregulating any market (Brooks & Cullinane, 2006). One of the most common of these is the desire to instill greater productivity/efficiency into the operations of the players in the market, as achieved through the workings of the market mechanism. In Chapter 5, Gianmaria Martini, Davide Scotti and Nicola Volta provide a long-term assessment of the changes in efficiency experienced by 77 of the world's airlines over the period 1980 to 2013.

As recognized by the authors themselves and others (e.g., Duygun, Prior, Shaban, & Tortosa-Ausina, 2016), the estimation of efficiency in the airline industry has been the subject of extensive analysis over the years, typically involving the application of different versions of parametric (e.g., Data Envelopment Analysis (DEA), Malmquist Index) or non-parametric (e.g., Stochastic Frontier Analysis (SFA)) methods of analysis (Coli, Nissi, & Rapposelli, 2011; Merkert & Hensher, 2011). In this case, the authors have chosen to apply a parametric approach by estimating a stochastic frontier and then decomposing the total factor productivity growth into changes in both technical and scale efficiency over time. The work is relatively unique, not only in terms of the number of airlines in the sample and their geographical diversity, but also with respect to the long-time period covered by the dataset and the application of a parametric approach in tandem with a focus on the dynamic evolution of efficiency over time. This latter characteristic greatly complicates the analysis of this sort of panel data because of the influence of significant ad hoc exogenous factors which may have global, regional or local effects on the variables for which data has been collected. These factors might include, for example, the influence of the 9/11 terrorist attacks in 2001, the outbreak of SARS in 2004 and the global financial crisis of 2008. In addition, there are potential sector-specific endogenous influences and complications, such as the bankruptcy or take-over and restructuring of sample airlines. At an aggregate level, the chapter concludes that airlines have generally increased their productivity over time by, on average, approximately 0.3% per annum, but that this conceals an aggregate reduction in scale efficiency. The conclusions identify the influence of major world events on changes in airline productivity and go on to provide some interesting comparisons in evolving levels of productivity across geographical areas, business models, networks and alliances.

Another behavioral response to the deregulation of the airline industry, particularly in recent years, has been the emergence of various forms of cooperative agreements. Because they are globally relevant, most of the air-transportation literature has focused on the impact of the major airline alliances – Oneworld, Star Alliance and SkyTeam (see, e.g., Bilotkach & Hüschelrath, 2012; Hu,

Caldentey, & Vulcano, 2013; Kleymann & Seristö, 2017; Wang, 2014). However, in Chapter 6, the focus rests with joint ventures. More specifically, the effects of joint ventures on traffic on the transatlantic air market are investigated both theoretically and empirically by Xavier Fageda, Ricardo Flores-Fillol and Bernd Theilen. In so doing, they differentiate the potential forms of cooperative arrangements and point out that while alliances are revenue-sharing agreements, joint ventures are characterized by also involving some form of commitment to cost-sharing. A joint venture, therefore, represents a deeper form of cooperation whereby joint membership of an alliance is a necessary pre-condition for a joint venture. Utilizing a unique dataset for both non-stop and connecting passengers on transatlantic routings that possesses a rich variation in the degree of airline cooperation, the authors analyze the effect of joint ventures on traffic in interline (one-stopover) and interhub (non-stop) markets (Brueckner & Picard, 2013). The results from both the theoretical and empirical analyses point to the relevance of economies of traffic density in deriving results, but reveal a positive effect of joint ventures on traffic, both in interhub and interline markets. The authors conclude their work by identifying the policy implications of their results for the regulation of anti-competitive behavior in airline markets.

In Chapter 7, Sven Maertens, Alexandra Leipold and Hermann Keimel from the German Aerospace Center join forces with Nicholas Nahas, Dhruv Shah, Michael Abramovich and Christoph Wollersheim from Booz Allen Hamilton to undertake an analysis of the market for Business Aviation. This niche area represents an important segment of non-scheduled air transport that fulfills the demand for personalized, on-demand business trips by air, either on a charter or an own-account basis (Budd & Hubbard, 2010). The authors begin by providing an outline of the size and structure of the market, before moving on to define the various players within it. These include: operators; aircraft owners; maintenance, repair and overhaul providers; ground handlers and fixed-base operators; airports and airfields; air charter brokers, consultants and market intelligence providers; and manufacturers of business aircraft and parts. Having precisely defined the sector, the authors are then in a position to undertake an economic evaluation of it. By applying a methodology revolving around Input-Output Analysis (Miller & Blair, 2019) and using data from the World Input-Output Database and Eurostat, it is determined that 374,000 jobs in Europe are either directly or indirectly dependent on the sector and that it accounts for €32 billion in gross value added, approximately 0.2% of the total for the EU28. By comparing a sample of business flights against their fastest scheduled alternatives, average travel time savings of 127 minutes per flight were identified, as well as annual savings of about €15 million in overnight hotel costs and an average 150% increase in productive work time for the travelers. Finally, the study finds that the sector has a significant impact on connectivity, by increasing the number of directly served destinations from airports, particularly in remote regions and in Eastern Europe.

Over the years, the carriage of freight cargo has risen in importance for the aviation industry and the carriers which specialize in this niche market have evolved in tandem with the growth of the market. It might be tempting to

assume, however, that the market can be rather simply delineated on the basis of the freight carried in the holds of passenger aircraft and the cargo that is carried in dedicated freighters (Chao, Lirn, & Shang, 2013). Chapter 8 of this book, by Wouter Dewulf, Hilde Meersman and Eddy Van de Voorde, dispels this simplistic view by providing an in-depth analysis of the different strategies adopted by the various players operating in the market. Despite the historical expansion of the market and the positivity surrounding its prospects for the future, the authors argue that the fact that it relies upon a derived demand for moving relatively expensive and time-sensitive products around the world does mean that, amidst a range of other competitive pressures, the industry does face fluctuations in its financial fortunes. It is vitally important, therefore, that the businesses involved in this market do have strategies in place to cope with its exigencies and to ensure long-term survival and prosperity. The authors implement a cluster analysis (Everitt, Landau, Leese, & Stahl, 2011) in order to identify and characterize the different forms of strategy which have been deployed in the market. Seven representative clusters (or strategy models) are identified for companies worldwide that are actively engaged in the air cargo market, with each characterized, and differentiated from each other, in terms of their product components and the approach taken to the market and network development. The authors conclude that 'winning strategies' do exist, but that they differ in accordance with the size of the airline considered.

In Chapter 9, Chikage Miyoshi and Patricia Prieto Torrell deal with the perennial issue of investing in a new technology which will certainly involve a significant outflow of funds, but which may also have some risks attached to the decision. More specifically in this case, they undertake an economic evaluation of introducing aircraft with geared turbofan (GTF) engines (Hughes, 2010) onto the London Heathrow (LHR)–Frankfurt (FRA) route. This technology not only has the advantage of greater fuel efficiency and, therefore, less emissions, but also has the additional benefit of lower noise levels (Van Zante & Suder, 2015). Based on a range of underlying assumptions, the authors undertake a cost-benefit analysis with a 10-year time horizon to determine whether it would be better for an airline operating the LHR-FRA route to: (1) keep the current A320–200 aircraft; (2) replace them with leased A320neo aircraft that use GTF technology or (3) replace them with leased 737–800 aircraft using GTF technology. The methodology applied encompasses a range of sensitivity and scenario analyses to investigate how outcomes might change under different assumptions. The results of the analysis suggest that, under nearly all assumptions, leasing A320neo aircraft with GTF engines is the preferred option from the perspectives of both the airline and society. Given the significant investment cost required, however, the authors argue that the results support the case for new policies or economic incentives to promote the adoption of GTF engine technology. They also highlight the potential role of the EU's ETS in providing some form of incentive.

In contrast to the USA, many airports in Europe apply rigid regulatory requirements on airlines in order to protect local residents from aircraft noise. These controls come in the form of either curfews or time-differentiated noise surcharges which are aimed at prompting airlines to refrain from using the most

noise-sensitive airport operating hours (Lu, 2014; Rodríguez-Díaz, Adenso-Díaz, & González-Torre, 2017). Such regulations have the distinct potential to contradict and undermine the objectives of regional and national policymakers that seek to maximize airport connectivity and promote the regional and national economies. In the final chapter of this book on the European aviation sector, Andreas Wittmer and Claudio Noto address this potential clash of policy objectives. In so doing, they point to the difficulty of both meeting the required information requirements and defining a practical system boundary where a complex network of interdependencies exists between individual airline sectors. The complexity of the problem faced is evidenced in the authors' identification and description of three distinct airline planning perspectives, three different potential steering goals and three steering effects that are relevant to this context. To resolve the complex issues faced in this context, the authors go on to advocate a practical approach to the (re-)design of pricing schemes that is grounded in theory but which, subject to the influence of restrictions on schedule changes and some flexibility in adhering to the user pays principle, is also feasible in practice. To this end, the authors present a generic framework for deciding on time-differentiated surcharges for airport noise which supports both the policy goals of achieving noise reduction while retaining a focus on economic development.

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