



Determinants of European PSO airline efficiency – Evidence from a semi-parametric approach



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In the last decade, the use of public service obligations (PSO; regulation and/or subsidies) in air transport to European remoter regions has substantially increased. However, there is significant heterogeneity between different regions in Europe with respect to the provision of PSO operations which makes benchmarking of European PSO airlines and learning from best practices a worthwhile activity. Particularly during the current times of government austerity it is interesting to understand, whether individual PSO operators are efficiently run. As most of these services are supposed to be vital for the social and economic development of the relevant regions, it is decisive to examine factors (other than cease operation) that could improve this efficiency. This paper applies a two-stage DEA approach to measure the efficiency of 18 European PSO airlines over two fiscal years. We then use truncated regressions to determine the impact of specific details of the airlines and their 206 PSO contracts on efficiency. Our results suggest that ownership has no impact on the airlines efficiency. By contrast, the number of remaining months (before a PSO is due for renewal) on these contracts has a very significant positive and the average stage length a negative impact on the efficiency of the associated airlines.

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1. Introduction

Many European countries are committed to subsidised Public Service Obligation (PSO) air services for their remote regions (typically to peripheral areas such as the Hebrides, Orkney and Shetland Islands in Scotland). Member States may impose PSOs on routes to these remoter regions, if they feel that air services are vital for the economic and/or social development of these regions and that without subsidies and/or regulatory measures to protect them no scheduled air service to these regions could be maintained. Although the member states must respect the conditions and requirements set out in Article 16 of the Air Services Regulation 1008/2008, the interpretation of the “air service adequacy” depends on the judgement of the Public Transport Authority imposing the PSO. As a consequence there is substantial heterogeneity and imbalance between different regions across Europe (EU) in terms of the provision of PSO operations (see for example, Williams and Pagliari, 2004). For example, on the thin routes serving the Shetland Islands in Scotland PSO operators use rather small aircraft to provide the vital air services to the remoter communities in these

regions. In contrast in France, many PSO routes are served by big aircraft such as A320 or even Boeing 777-300ER because these routes have high traffic in the summer months. Since these routes are often also competing with well-developed ground transport, previous research has extensively focused on whether some of these PSO routes are legitimate or rather a product of market protectionism and government/lobby group intervention (e.g., Bahuand, 2010). However, there is also literature on the benefits of PSO air transport. Gordijn and van de Coevering (2006) highlight, for example, the social and economic advantages of PSOs in Europe and identify a large number of European regional airports that would benefit from these publicly supported air services.

We believe that PSOs are often sensible and necessary (as are similar schemes in Australia, Canada, India and the U.S.), because otherwise individuals or businesses would become (at least during certain periods of the year) more or indeed totally isolated and some regions severely disadvantaged in terms of their economic development. These PSO air services should be, however, still efficiently run. It is hence interesting to see whether determinants such as the market access to the relevant routes, type of operator, contract characteristics and ownership have an impact on the efficiency of the PSO operators. If one considers, that on some European PSO routes such as Paris to Bastia, low cost carriers are very keen on operating competing services on a commercial basis on

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these routes it becomes interesting to examine how efficient the airlines that operate EU PSO routes are (other studies such as [Merkert and Cowie, 2012](#), have shown that EU airlines have generally improved their efficiency over the last decade, however no empirical evidence on PSO airlines exists). At this point it is worth mentioning that PSO operators in Europe usually undertake in addition to PSO operations also commercial services. This paper analyses the overall efficiency of these operators and therefore covers both, PSO and commercial services.

The structure of this paper is as follows. Section 2 provides a brief review of the previous literature on the efficiency of PSO operations in Europe. Section 3 describes the methodology and data of the two-stage technical efficiency Data Envelopment Analysis (DEA) that we apply to European PSO operators. Section 4 presents and discusses the results, whilst Section 5 summarises the findings of the paper and offers final conclusions as well as recommendations for further research.

2. Review of previous literature on the efficiency of PSO air transport operators

As a result of geographical differences across the European member states but also because of the room for interpretation regarding the air service adequacy, we find a substantial heterogeneity with respect to the provision of PSO air transport operations across the European community. Ten Member States (Finland, France, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden and the UK) and two European Economic Area (EEA) countries (Iceland and Norway) currently impose PSOs, with France accounting for the largest share in total PSO contracts. Despite the EEA framework being almost identical, in this paper we focus on the PSO operations in the ten member states of the EU, in order to ensure fair comparison of operators that are governed by similar transport contracts.

Data from the European Commission (EC PSO inventory tables) shows that particularly Greek and French airlines operate a large number of PSO routes while some countries such as Austria or Poland do not have a single PSO route in their air space (often because of good/adequate surface transport in these countries). The data suggests further that apart from a small number of contracts with international traffic in France, Ireland and Finland, PSO routes are usually operated domestically, by local (national) carriers and often they connect islands with the mainland market. In terms of aircraft used, some carriers in France, Italy, Portugal and Spain use on average much bigger aircraft (e.g., A320) than carriers from other countries such as the UK (with sometimes less than 10 seats). This substantial heterogeneity across countries/operators is also reflected in the average distance flown. While French operators on PSO contracts fly an average distance of more than 480 miles, their British counterparts do on average not even fly 80 miles per trip.

This heterogeneity raises questions regarding the performance of the air transport carriers involved in the operation of the PSO contracts. In times of government austerity (e.g., the Irish Government cut EUR5.5m or some 30% in support for regional air services in 2011) such information would be most useful for transport departments as it could inform them on how to ensure their budgets stretch as far as possible. At the route level some routes such as Paris (Orly) to Bastia are relatively easy to spot because other airlines, particularly low cost carriers, are very keen on operating competing commercial services on these routes (and indeed already do so on parallel routes). It is, however, the other routes and actually entire networks that should be of interest. This paper therefore examines the efficiency of the PSO operators instead of individual routes.

More recent data shows that the number of PSO contracts in Europe has substantially increased over the last decade. While in 1997 there were 64 PSO contracts in operation, by September 2001 this number had expanded to 164 and in September 2012 more than 250 contracts were listed in the European Commission PSO inventory table. This increase of PSO traffic in addition to the difficult financial situation of many European transport departments resulted in an increase of importance of PSO operations to policy makers, regulators, transport authorities and people associated with the aviation and tourism industries. Hence, there is substantial research interest concerning best practices in procuring such air transport services.

A PSO is a form of service of general interest in which a state or public transport authority can subsidise an air connection for social or economical reasons. Particularly for the latter, it is interesting to evaluate how efficiently these services are operated. Economic theory suggests that for welfare maximisation subsidies should only be given to efficiently organised air transport operators to ensure the maximum return for the scarce public funding. However, until now there has been only limited systematic analysis on the relative performance of individual or groups of PSO operators and there is neither any evidence on factors that may determine their efficiency.

Most studies have looked at specific case studies or have discussed the impact of PSOs on the social and economic development of the relevant regions (e.g., [Bräthen and Halpern, 2012](#)). [Nolan et al. \(2005\)](#) examined, for instance, the social welfare implications of different schemes to guarantee the service in thin markets, namely direct subsidies, protected route packages and revenue guarantees. Along the same lines most other studies have looked into the efficient use of subsidies (e.g., [Williams, 2005](#)). Whenever previous studies have discussed the PSO market (e.g., [Reynolds-Feighan, 1995](#); [Dobruszkes, 2007](#)) and determinants of productivity and cost efficiency they did not apply econometrical methods. When quantitative methods were used, the focus was usually on particular countries/markets, most notably on the Spanish and U.S. markets. [Calzada and Fageday \(2009\)](#) investigated, for example, the Spanish air transport market from 2001 until 2009 and focused in particular on the impact of public service obligations on prices and frequencies. Their key finding is that routes which benefit from price discounts given to island residents exhibit higher prices but similar frequencies than the rest of routes. More recently also [Cabrera et al. \(2011\)](#) have analysed the impacts of subsidies paid to Spanish operators (which have substantially increased from a level of 10 per cent to 50 per cent as a share in the total air fare during the recent years), and their findings confirm that these subsidies result in market distortions (i.e. fare increases). [Mendes and de Neufville \(2010\)](#) looked at similar issues when analysing the U.S. regional aviation market (based on three case studies) and found overall gains in efficiency, mostly attributable to the U.S. policy of encouraging competition between air carriers seeking to provide service to small communities. In a rare cross-national study [Santana \(2009\)](#) has shown that for the period 1991–2002 PSOs have increased the cost of regional airlines in Europe, but not in the U.S. This, however, does not tell us anything about the efficiency of the analysed airlines. Overall, there is very limited empirical evidence on the efficiency of European PSO airlines. Hence, with this paper we aim to provide some first findings on the efficiency of these operators as well as on determinants of the measured efficiency.

3. Methodology and sample

This paper aims to benchmark the efficiency of European PSO air transport operators in order to be able to evaluate the effects of

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