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A Critical Assessment of The Public Service Obligations (PSO) in European Air Routes

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Abstract

The deregulation of air transport created the need to safeguard an acceptable level of air connectivity between urban centres and remote European regions. To this end, several protection schemes have been developed around the world, including the imposition of Public Service Obligations (PSOs) in a few European air routes. Thirty years after the establishment of PSOs in Europe, the debate over their efficiency and effectiveness is still active. This paper offers an overview of the European PSO program along with a review of the academic literature exploring the main issues that accompany the PSO scheme. The main findings that call for consideration from both scholars and policymakers are the need to strengthen the competition in these non-commercially attracting routes, the necessity for central network design and coordination and the requirement for transparency and open dissemination of information regarding the PSO routes.

1. Introduction

Since 1944 when Chicago Convention set the operational and legal frame of civil aviation, international air transportation was strictly regulated via bilateral Air Service Agreements (ASAs). The liberalization of air transportation started in the U.S. with the Airline Deregulation Act in 1978. Europe followed in 1987 with three liberalization packages evolving into a single aviation market formally established within the EU in 1997. The deregulation of the aviation market was accompanied by intensified airline competition, improved efficiency, enhanced service quality and market growth (Calzada & Fageda, 2014). On the other hand, the removal of protectionist restrictions exposed national flag carriers to competition forcing them to adjust their operation to the new, commercial terms. Liberalization led airlines to shrink their service network and focus only on profitable routes, leaving regional services underdeveloped (Di Francesco & Pagliari, 2012). To mitigate regional traffic loses, Essential Air Services (EAS) program was launched in the USA in 1978 and similar schemes were applied in Australia, Canada and India (Merkert & Williams, 2013), while EU introduced Public Service Obligations (PSO) in air routes in 1992. Thirty years later the debate over the effectiveness of the PSO scheme is still active, with researchers questioning the ever-growing numbers of PSO routes and trying to benchmark their efficiency across countries and/or airlines, using mainly operational and financial criteria (Costa et al. 2021).

This paper firstly offers an overview of the policies engaged by governments around the world to enhance air connectivity in remote regions[1] and then focuses on the European PSO scheme, by analyzing the available data about all PSO routes operating in Europe and discussing the recent debate over the selected policies. The aim of this paper is to critically evaluate the effectiveness of the PSO scheme after three decades of operation and to make suggestions about its improvement in face of the ominous future of the European aviation due to challenges posed by the covid-19 pandemic and the rising fuel prices that forebode one more crisis.

[1] There are similar but not identical definitions of "remote" regions in the literature. Dijkstra & Poelman (2008) suggest that a region is considered remote if less than half its population can drive to the centre of a city of at least 50,000 inhabitants within 45 minutes. According to OECD (2011), a region is considered to be remote if at least 50% of its population needs to drive 60 minutes or more to reach a populated centre with more than 50,000 inhabitants. European Commission advices that remoteness and isolation of a region should be assessed with regard to the territory of the Member State, its administrative, business, education and medical centres, but also with regard to the territory and such centres of other Member States with which it shares a border (C 194/01, 2017).

2. Air Connectivity Policies Across The World

To avoid the apparent isolation of remote areas that are not commercially appealing, a heterogeneous set of policies have been implemented around the world, which can be grouped into the following four categories (Fageda et al, 2018): 1) route-based policies, 2) passenger-based policies 3) airline-based policies and 4) airport-based policies.

In the first case (route-based policies), which is the most widely used, states have the right to impose Public Service Obligations on specific airlines, when the air transport services offered are not sufficient in terms of frequency, seats offered and pricing if designed only on free market terms and profitability criteria (Williams & Pagliari, 2004; Williams, 2010).

In such cases, states can hold open tenders for the assignment of the specific PSO routes to the lowest bidders by placing in the tenders' binding conditions regarding the frequency and timetable of the routes, the capacity and types of aircraft, as well as the amount of fares. In the event that no carrier expresses interest, additional restrictions may be imposed make specific routes more attractive, such as an exclusive right of operation for a period of 4-5 years and financial compensation of the carrier that will take over the route (Fageda et al, 2018).

Typical examples of protected PSO routes are those connecting large urban centers in a country to small islands or the latter to each other. In such cases sea transport is the only available connection, but it is accompanied by long journey times, low frequencies and very often, high ticket prices. At the same time, demand from the local market is very low and unable to attract a commercial airline, even though air connectivity is vital for access to health and education facilities, tourism development, commercial activity, economic development and connectivity to a regional or national urban center (Merkert & O'Fee, 2013).

In the second case (passenger-based policies), discounts are granted to residents of remote areas or a single price for air fares. For example, Spain has instituted a 50% discount on airline ticket prices for all permanent residents of the Canary and Balearic Islands. Similarly, residents of the Scottish Highlands and Islands enjoy a 40% discount (Calzada & Fageda, 2014). Portugal has a single reduced ticket price for residents of the Azores traveling by air to Madeira (Fageda et al, 2018). Recently (2019), the Greek state implemented the Transport Equivalent measure for air transport as well, returning a part of the ticket cost to the permanent residents of the island regions (GTP, 2019). It must be noted that route-based policies may be combined with passenger-based policies and air connectivity may be achieved not only by airplanes but with other types of aircraft, too. For example, Spanish PSOs coexist with a scheme of passenger-based policies and the remote region of Ceuta is connected with the Spanish mainland via helicopter flights from the local heliport (Poulaki et al., 2020).

In the third case (airline-based policies), air service to remote areas is provided by state-owned airlines. Such cases are observed in Algeria (Air Algerie), Argentina (Aerolineas Argentinas), Egypt (EgyptAir), Ethiopia (Ethiopian Airlines), Indonesia (Garuda Indonesia), Pakistan (PIA), and Russia (Aeroflot). The main problem with this model is that no efficiency incentives are provided. Competition is distorted and governments usually have weak control over the efficient implementation of the state aid granted (Fageda et al, 2018).

The fourth case (airport-based policies) is divided into two separate schemes: a) incentives for air carriers to launch new routes to remote destinations and b) financial incentives for airports in remote areas to continue their operation (Fageda et al, 2018). Incentives to airlines can take the form of discounts on airport charges, subsidies, guarantees for commercial development of the specific routes and promotional actions to increase demand (Fageda et al, 2018). In the second case, remote area airports, which are usually small in size and state-owned, are financially supported by the central or local government. The Government of Canada for example subsidizes 13 remote airports through the Airports Capital Assistance Program (ACAP) (Fageda et al, 2018).

The policies described above can be applied in combination by each country to enhance the connectivity of remote areas.

The USA started to implement the program Essential Air Services (EAS) in 1978 and similar schemes were later implemented by Australia (the program Remote Air Services Subsidy-RASS) (Merkert & Williams, 2013). Subsequently, the European Commission implemented a series of measures to strengthen economic and social cohesion and balance uneven distribution of mobility opportunities between European regions. These measures include travel subsidies for permanent residents and/or the establishment of PSO routes in regional or developing areas, so as to ensure the viability of non-commercial airlines deemed essential to the economic and social development of the specific areas, at the lowest possible cost for taxpayers (ICAO, 2003).

India operates a slightly modified air rights allocation model, whereby more commercial airlines "subsidize" less commercial ones. According to this program called Route Dispersal Guidelines (RDGs), airlines are classified into three categories: Category I includes air connections between one of the cities of Bombay, Calcutta and Delhi, each other or to another major city. Category II includes connections involving airports of North East India, cities of Jammu, Kashmir, Andaman Lakshadweep and Nicobar Islands. Category III includes all other destinations. Under the RDG programme, any airline operating between Category I airports is obliged to also serve Category II and III airlines.

3. Public Service Obligations in Europe

European Commission put into force a set of measures to ensure economic and social cohesion and to prevent mobility discrepancies among diverse European regions. These measures include subsidies to residents and/or the imposition of Public Service Obligations of peripheral or development regions to allow survival of thin routes which are considered vital for the economic and social development of this region, at the lowest cost possible to the taxpayer (ICAO, 2003). In the first case, discounts are offered on the market fares or a flat rate on the ticket prices. In the second case, the member states have the right to impose PSOs on specific routes where adequate provision of air services in terms of regularity of service, capacity and pricing is not possible if carriers are solely taking their own commercial consideration into account (Williams, 2005) and to activate an open tendering procedure regulating the frequencies, capacity, flight schedules, fares and aircraft types. The PSO route is assigned to the air carrier that claims the lowest or no subsidy for a period of 4-5 years.

3.1. PSO legislation

Public Service Obligations were established in Europe in 1992 with Council Regulation 2408/1992 (EEC, 1992), which permitted the EU Member States and two European Free Trade Association (EFTA) countries (Iceland, Norway) to impose a

PSO and award financial compensation in respect of specific scheduled air services. Regulation 2408/1992 was reformed with Regulation (EC) No 1008/2008 of the European Parliament and the Council of 24 September of 2008, on common rules for the operation of air services in the Community (EC, 2008). Article 16 describes the general principles for Public Service Obligations: "A Member State, following consultations with the other Member States concerned and after having informed the Commission, the airports concerned and air carriers operating on the route, may impose a Public Service Obligation in respect of scheduled air services between an airport in the Community and an airport serving a peripheral or development region in its territory or on a thin route to any airport on its territory any such route being considered vital for the economic and social development of the region which the airport serves. That obligation shall be imposed only to the extent necessary to ensure on that route the minimum provision of scheduled air services satisfying fixed standards of continuity, regularity, pricing or minimum capacity, which air carriers would not assume if they were solely considering their commercial interest."

Additionally, article 17 of the Regulation (EC) No 1008/2008 describes the public tender procedure for Public Service Obligation and article 18 sets the PSO examination requirements that may be asked by the European Commission.

3.2. Overview of PSO routes across Europe

The Member States have a large degree of autonomy regarding the characterization of a specific route as a PSO and about the regulatory authority which may be a national government department (e.g. Spain, Greece, Croatia, Ireland, Lithuania, Estonia and Sweden) or a regional authority, (e.g. Finland and the Czech Republic) or a combination of both (e.g. in Italy and Portugal) or even at the community level, as is the case in France and Great Britain (Bråthen & Eriksen, 2018; Martínez Raya & González-Sánchez, 2020).

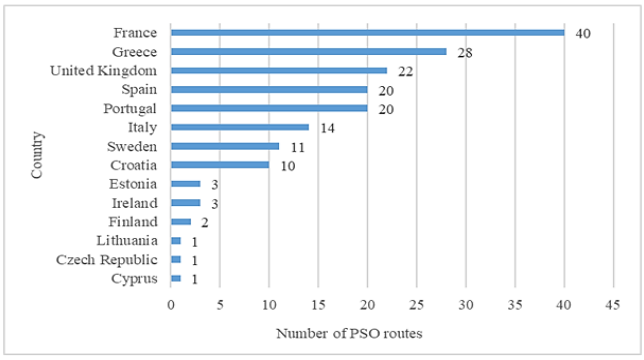

Figure 1. Number of PSO routes across European countries

As a consequence, a large degree of heterogeneity in PSO practices is witnessed across Europe (Figure 1 and Tables 1 and 2). According to the latest (as of 18.9.2019) PSO inventory table published by the European Commission (EC, 2019) there are 176 PSO routes in Europe dispersed over 14 countries. Some countries (e.g., France, Greece, United Kingdom, Spain, Portugal) make extensive use of the PSO policies, while others (e.g., Cyprus, Czech Republic, Lithuania) are more restricted (Figure 1). There are also countries such as Austria, the Netherlands, etc. that do not make use of the PSO program, possibly because of adequate connectivity through surface transport; however, the overall number of PSO routes continues to grow over the years (Merkert & O'Fee, 2013).

Table 1. Characteristics of the European PSO routes

Number of Months of operation per year	Number of PSO routes	Percentage
2	2	1.14%
3	1	0.57%
6	2	1.14%
7	4	2.27%
9	1	0.57%
10,5	1	0.57%
11	3	1.70%
12	159	90.34%
no data	3	1.70%
Sum	*176*	*100.00%*
Number of airlines operating the route		
0	5	2.84%
1	143	81.25%
2	9	5.11%
3	5	2.84%
4	8	4.55%
no data	6	3.41%
Sum	*176*	*100.00%*
PSO justification (More than one may be applicable on the same		
Peripheral route	142	39.89%
Development route	114	32.02%
Thin route	100	28.09%
Open PSO or Restricted to one carrier		
Open PSO	39	22.16%
Restricted PSO	135	76.70%
no data	2	1.14%
Sum	*176*	*100.00%*
Type of PSO route		
within member-state	173	98.30%
cross-border	3	1.70%
Sum	*176*	*100.00%*
Economic		
Yes	133	75.57%
No	41	23.30%
no data	2	1.14%
Sum	*176*	*100.00%*
Preferential fares for residents (Yes/No)		
Yes	63	35.80%
No	113	64.20%
Sum	176	100.00%
Additional discounts for residents? (Yes/No)		0.00%
Yes	28	15.91%
No	148	84.09%
Sum	*176*	*100.00%*
EU air carrier from another Member State		
Yes	21	11.93%
No	146	82.95%
Max fare € (Yes/No)		
Yes	126	71.59%
No	50	28.41%
Sum	*176*	*100.00%*

As seen in Table 1, most routes justified as PSO are Peripheral routes, but they may also be Development or Thin routes, or their combinations. The first two types of PSO routes connect peripheral or development regions with urban centers. A *peripheral* region is typically a remote region or one that is

difficult to reach from the capital and other major cities of a Member State. A *development* region is economically lagging, as measured by factors such as per capita GDP or unemployment rate. Typically, this condition would be met by less developed regions within the context of EU regional policy (where the GDP per capita is less than 75% of the EU average). The qualification as a development region may also be based on a comparison with the national gross domestic product or unemployment rate of the Member State in question, given that the respective situations of regions within the same Member State may vary substantially (C 194/01, 2017). Regarding the *thin* routes, the Regulation 1008/2008 does not define a quantitative criterion for evaluating the "thinness" of a route due to the varying circumstances that may exist in different Member States. On the other hand, based on the Commission's experience in a large number of PSO cases, it appears safe to say that a route with more than 100,000 annual passengers cannot normally be considered a thin route within the meaning of the Regulation (C 194/01, 2017).

The PSO routes are usually operated all year round, but in some cases, they are contracted only on a seasonal basis. When operations on a route exhibit a strong seasonal pattern, air carriers are likely to concentrate capacity during periods of high demand and significantly reduce capacity during other periods on certain routes. In such cases, PSO obligations may be imposed in low-demand seasons to maintain a minimum level of service during those times of the year when the supply of air services tends to be very low (C 194/01, 2017).

About ¾ of the PSO routes are compensated, with the average compensation per passenger (pax) on 124,97€ (Table 2).

Table 2. Statistics of the European PSO routes

Load Factor (pax/actual seats)	**Percentage**
min	2.06%
max	347.92%
average	85.54%
min	2.06%
PSO passengers in 2017 (or 2016)	**Number of passengers**
min	65
max	1.226.762
average	95.534
Minimum number of annual seats	**Number of**
min	1.152
max	1.100.000
average	98.704
Compensation per passenger	**Euros (€)**
min	4.39
max	1.076.80
average	124.97

While the average minimum number of annual seats required by the PSO was 98.704, it wasn't fully covered by the actual passenger volume (95.534 pax). Diverse types of aircrafts operate in PSO routes, with an average load factor of 85,54%. The fares are regulated with a price-cap in most of the cases (71,5%) but preferential fares or additional discounts for the residents are not widely adopted.

4. PSO Literature Review

The air PSO literature focuses primarily on theoretical dimensions of the public service delivery program.

Reynolds-Feighan's (1995) study provides a detailed, critical review of the early years of the European PSO program in comparison with the equivalent EAS program in the United States, concluding that there is an apparent gap at the central European level in terms of the uniform definition of the standards for the inclusion of a line in the PSO regime, which results in an uneven distribution of European resources between the member states. In addition, cabotage restrictions prevent the system from operating in a more efficient and flexible manner. All the above factors, acting in combination, do not allow the overall development of European aviation.

Williams & Pagliari (2004) produced a comparative survey of the implementation of the PSO program among European states, spotting large heterogeneities and discontinuities regarding the extent of PSO line coverage networks, minimum service levels, award criteria and financial oversight of the program by regulatory authorities. They proposed that the management and financing of all PSO lines should be taken at a central European level.

Merkert & O'Fee (2013) focused their study on regulatory authorities that impose Public Service Obligations and limitations, with the aim of highlighting best practices among those already in use at the European level. The conclusion of their research was that there is generally a lack of clarity and completeness in PSO contracts and that local authorities should have more freedom and autonomy in establishing the criteria for the provision of the public service to better serve local specificities. They also suggest aligning objectives between airlines, airports and regulators as well as enhancing the transparency of the framework in place with more open dissemination of information across Europe.

A second body of literature deals with demand and competition issues in the PSO routes.

Calzada Fageda (2014) studied the implementation of alternative aviation PSO policies in five European countries over an eight-year period (2002-2010). Their results show that the implementation of discount schemes had the potential to increase air demand in the island regions and possibly enhance competition and increase the number of connections. On the other hand, the imposition of a public service led to a reduction in competition, while the effects on flight numbers varied from case to case, depending on the state restrictions imposed.

Similarly, Socorro & Betancof (2020), studying the ticket subsidy scheme applicable to permanent residents of the Canary Islands, concluded that, if this line operates under a monopoly regime, the monopoly will try to compensate as much as possible the subsidizing residents by increasing the ticket price and burdening non-resident passengers. In order to mitigate this undesired effect, competition should be promoted and one possible way to do this is to increase the resident discount to make it profitable for other airlines to enter. With competition, the undesirable effects of subsidizing residents only are mitigated, such a policy, however, requires significant public expenditure and should be implemented after a prior cost-benefit analysis.

In addition, the study by Alvarez-Albelo et al (2020) has found that the application of passenger-based policies discriminates between permanent residents of remote areas (who are entitled to discounts on ticket prices) and visitors, who are charged higher fares. This phenomenon, according to the authors, can act as a deterrent for the development of tourism in these areas which are very often islands, pushing those interested to choose alternative destinations with lower access costs.

Another category is econometric PSO studies that focus on price and overall efficiency issues.

The research team of Abreu et al (2018) made an empirical assessment of the evolution of the PSO program in Spain. In particular, they studied the PSO lines connecting the Canary Islands, finding that a schedule reform made in 2006 that relaxed restrictions on ticket prices while increasing required frequencies had a strong positive impact on passenger traffic volumes. However, the next reorganization of the program, implemented in 2011, placing exclusive exploitation on the PSO lines, did not have the same results.

Di Francesco & Pagliari (2012) dealt with fare prices and their research findings proved that a possible removal of PSO restrictions from the airline connecting the island of Sardinia with the Italian mainland would lead to an increase in ticket prices and to a change in the mix of travelers, with an increase in tourists and a decrease in the group of Visiting Friends and Relatives (VFRs) passengers. In addition, it could lead to wide variations in the frequency of services, occupancy rates and capacity offered.

Fageda et al (2017) conducted an empirical assessment of the effects of the European PSO program on fare prices, in islands of five European countries. The research found that there are large differences in the amount of fares offered and that the PSO program has generally not succeeded in reducing the ticket prices paid by islanders for their air transport. In addition, airfares were more expensive on lines that offered subsidies only to permanent residents, especially when a price cap was set instead of a discount rate.

Merkert & Williams (2013), applied the DEA method in order to estimate the technical and economic efficiency of 18 European airlines operating PSO routes, and to identify the factors that contribute to this efficiency. The results of the study showed that the ownership status of the companies has no impact on their efficiency. Conversely, the number of PSO contracts an airline has a positive effect on profitability, and as time approaches for these contracts to expire, profitability decreases.

Bråthen & Eriksen (2018) developed a method to measure the overall level of service (Level of Service, LOS) on Norwegian PSO lines. The study concluded that relaxing PSO restrictions would lead to increased fares and a reduction in the level of service offered.

There are also some studies about intermodality, exploring the possibilities of combining the air routes with other modes of transport.

Angelopoulos et al. (2013) noticed the growing number of Greek PSO routes, the lack of well-defined criteria for the eligibility of any air route as PSO, the high compensation costs and the lack of any provision for network design that would increase the efficiency and the coordination both between air routes and between air and maritime transport. Few studies (Sambracos, 2001; Rigas, 2009) have examined the modal choice between ferry and air transportation concluding that there is complementarity and limited competition between the two modes since they serve separate market segments with different income status and travelling preferences. More specifically, it seems that ferry passengers are more cost-sensitive, while air-passengers are more time-sensitive.

5. Discussion and suggestions about the air PSO program

The efficiency and the effectiveness of the PSO policies has replenished the interest of researchers lately, particularly due to the recent economic and health crisis that call for reexamination of the public funds and spending allocation. The proper planning and implementation of the PSO program can bring substantial benefits to the national economy, as Smyth et al. (2012) determined for the Scottish Route Development Fund (RFD). In addition, the study by Wu et al (2020), argues that these programs also bring about significant development of local economies, mainly by allowing the entry of tourist flow in remote areas and also establishes the positive correlation of these programs to strengthen the connectivity of remote areas, with a range of social welfare indicators, such as standard of living and social cohesion, allowing the inhabitants of remote areas access to critical social infrastructures, such as health, trade, education and public administration. In the same study, however, reservations are expressed regarding the environmental impact of increasing aviation and tourist activity in isolated areas Wu et al (2020).

On the other side, studies of Merkert & O'Fee (2013), Fageda et al. (2017), Calzada & Fageda, (2014); Socorro & Betancof, (2020); Abreu et al, (2018) have recognized serious distortions in the PSO program across Europe, mainly limited competition and inefficiency of the price regulation, partly due to the failure of the bidding process to attract low-cost airlines that could offer lower fares. There is an apparent need to strengthen the competition in these non-commercially attracting routes. This could be done by increasing the discount given to passengers, to make it profitable for other airlines to enter in this specific route (Alvarez-Albelo et al, 2020). Calzada & Fageda, (2014) suggest that the alternative way of granting fare discounts is preferable to the imposition of a PSO regime because it enhances demand and acts as an incentive for new carriers to enter the market. However, the complete removal of the PSO designation from certain lines would lead to higher fares, greater price fluctuations depending on the departure date and greater fluctuations in demand during the year (Di Francesco & Pagliari, 2012). Additional caution is needed to avoid unfair price treatment between local habitats and visitors.

Furthermore, there is no unanimity in the literature regarding the overall efficiency of the PSO program. Efficiency studies focus primarily on ticket prices and passenger volumes (Di Francesco & Pagliari, 2012; Abreu et al, 2018; Fageda et al, 2017), as well as on airlines' profitability (Merkert & Williams, 2013). In an overall assessment of the effectiveness of implemented policies to enhance remote areas, Fageda et al (2019) found that these policies generally achieve the expected results in terms of ensuring affordable prices and high levels of frequencies on protected routes, compared with the commercial ones. However, the results display geographic heterogeneity. For example, the resident fare subsidy scheme has resulted in similar charges for protected and non-protected area routes in France, Portugal, Sweden and Great Britain, lower charges in Norway and higher charges in Greece. Nonetheless, the quality of services offered has attracted little attention (Bråthen & Eriksen, 2018) and needs further research.

Further research is also needed on the central network design and coordination both between air routes and between air and maritime transport, as highlighted by Sambracos, 2001, Rigas, 2009 and Angelopoulos et al. (2013). Additional issues that call for further consideration is the inclusion of passengers and other stakeholders (i.e., local communities, airports)' views in the PSO planning that is currently dominated solely by regulatory authorities and airlines (Bråthen & Eriksen, 2018). It is also suggested that the central role of EU should be enforced to guarantee that the application of PSO program from the member states serve the objectives of the EC Regulation 1008/2008.

Finally, the issue of transparency and the need for more open dissemination of information across Europe is also emphasized in the literature (Merkert & O'Fee, 2013). It is characteristic that, although the European Commission provides current data about the calls for tenders in every Member state on its official webpage (transport.ec.europa.eu), the list of the PSO routes (PSO inventory table) has not been updated since 18/9/2019, something that does not serve the need for transparency and disclosure about the implementation of the PSO scheme from each Member State. With remote European areas hit hard by lockdowns and mobility restrictions imposed during the covid-19 pandemic, air connectivity remains a top priority and relevant data should be available to the public.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

Abreu, J., Fageda, X., & Jiménez, J. L. (2018). An empirical evaluation of changes in Public Service Obligations in Spain. Journal of Air Transport Management, 67, 1-10.

Álvarez-Albelo, C. D., Hernández-Martín, R., & Padrón-Fumero, N. (2020). The effects on tourism of airfare subsidies for residents: The key role of packaging strategies. Journal of Air Transport Management, 84, 101772.

Angelopoulos, J., Chlomoudis, C., Christofas, P., & Papadimitriou, S. (2013). Cost assessment of sea and air transport PSO services: The case of Greece. International Journal of Maritime, Trade and Economic Issues, 1(2), 3-49.

Bråthen, S., & Eriksen, K. S. (2018). Regional aviation and the PSO system–Level of Service and social efficiency. Journal of Air Transport Management, 69, 248-256.

C 194/01 (2017). Interpretative guidelines on Regulation (EC) No 1008/2008 of the European Parliament and of the Council — Public Service Obligations (PSO). European Commission.

Calzada, J., & Fageda, X. (2014). Competition and public service obligations in European aviation markets. Transportation Research Part A: Policy and Practice, 70, 104-116.

Costa, J., Alves, T., Andrade, A. R., & Kalakou, S. (2021). Assessing efficiency in public service obligations in European air transport using Data Envelopment Analysis. Case Studies on Transport Policy, 9(4), 1783-1809.

Di Francesco, A., & Pagliari, R. (2012). The potential impact of removing public service obligation regulations on air fares between the Italian Mainland and the island of Sardinia. Journal of Transport Geography, 24, 332-339.

Dijkstra L. and Poelman H. (2008). Remote Rural Regions: How the proximity to a city influences the performance of rural regions, Regional Focus N°1/2008, EU - DG REGIO, Brussels.

EC (2008). Regulation. No 1008/2008 of the European Parliament and of the Council of 24 September 2008 on Common Rules for the Operation of Air Services in the Community (recast). Commission of the European Communities, Brussels, Belgium. /https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32008R1008

EC (2019). PSO inventory table. European Commission https://ec.europa.eu/transport/sites/transport/files/pso_inventory_table.pdf

EEC (1992), Regulation No 2408/1992 of the European Parliament and of the Council on access for Community air carriers to intra-Community air routes, Council of the European Communities, Brussels, Belgium. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992R240 8

ERA (2016). Public Service Obligation (PSO) routes in Europe. European Regions Airline Association. United Kingdom. https://www.eraa.org/system/files/170105_pb_pso_brochure_2016.pdf

Fageda, X., Jiménez, J. L., & Fageda et al., Valido, J. (2017). An empirical evaluation of the effects of European public policies on island airfares. Transportation Research Part A: Policy and Practice, 106, 288-299.

Fageda, X., Suárez-Alemán, A., Serebrisky, T., & Fioravanti, R. (2018). Air connectivity in remote regions: A comprehensive review of existing transport policies worldwide. Journal of Air Transport Management, 66, 65-75.

Fageda, X., Suárez-Alemán, A., Serebrisky, T., & Fioravanti, R. (2019). Air transport connectivity of remote regions: the impacts of public policies. Regional Studies 53:8, 1161-1169.

Fu, X., Oum, T. H., & Zhang, A. (2010). Air transport liberalization and its impacts on airline competition and air passenger traffic. Transportation Journal, 49(4), 24. https://www.jstor.org/stable/40904912

GTP (2019). Greek Island Residents Can Now Claim Air Transport Discounts. Greek Travel Pages.https://news.gtp.gr/2019/05/21/greek-island-residents-can-now-claim-air-transport-discounts/

ICAO (2003). European Experience of air transport liberalization. International Civil Aviation Organization. Montreal, Canada. https://www.icao.int/sustainability/casestudies/statesreplies/europeliberalization_en.pdf

Martínez Raya, A., & González-Sánchez, V. M. (2020). Tender Management Relating to Imposition of Public Service Obligations on Scheduled Air Routes: An Approach Involving Digital Transformation of Procurement Procedures in Spain. Sustainability, 12(13), 5322.

Merkert, R., & O'Fee, B. (2013). Efficient procurement of public air services—Lessons learned from European transport authorities' perspectives. Transport Policy, 29, 118-125.

Merkert, R., & Williams, G. (2013). Determinants of European PSO airline efficiency–Evidence from a semi-

parametric approach. Journal of Air Transport Management, 29, 11-16.

OECD (2011). OECD regional typology. Directorate for Public Governance and Territorial Development.

Poulaki, I., Papatheodorou, A., Panagiotopoulos, A., & Liasidou, S. (2022). Exclave accessibility and cross-border travel: the pene-exclave of Ceuta, Spain. Tourism Geographies, 24(1), 152-176.

Reynolds-Feighan, A. (1995). European air transport public service obligations: a periodic review. Fiscal Studies, 16(1), 58-74. https://www.jstor.org/stable/24437967

Rigas, K. (2009). Boat or airplane? Passengers' perceptions of transport services to islands. The example of the Greek domestic leisure market. Journal of Transport Geography, 17(5), 396-401.

Sambracos, E. (2001, December). Air-sea transport: competitiveness or complementarity in the Greek insular market. In Proceedings "International conference on Air Transport and Airports evolution in the 21st Century" (pp. 3-4).

Smyth, A., Christodoulou, G., Dennis, N., Marwan, A. A., & Campbell, J. (2012). Is air transport a necessity for social inclusion and economic development? Journal of Air Transport Management, 22, 53-59.

Socorro, M. P., & Betancor, O. (2020). Air transport subsidies for resident passengers: The unexpected effects on competition. Research in Transportation Economics, 79,100772.

Williams, G., & Pagliari, R. (2004). A comparative analysis of the application and use of public service obligations in air transport within the EU. Transport Policy, 11(1), 55-66.

Williams, G., (2010). European experience of public service obligations. In: Williams, G., Bråthen, S. (Eds.), Air Transport Provision in Remoter Regions. Ashgate Publishing, UK.

Wu, H., Tsui, K. W. H., Ngo, T., & Lin, Y. H. (2020). Impacts of aviation subsidies on regional wellbeing: Systematic review, meta-analysis and future research directions. Transport Policy 99, 215-239.

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