Does market exit of a network airline affect airline prices and frequencies on tourist routes?

Abstract: This paper examines the influence of network airline bankruptcy (and consequently its market exit) on prices and route frequencies. Specifically, the 2011 case of Spanair is analyzed, using Spanish route data for the period 2006-2013. The study finds that the Spanair bankruptcy led to a reduction in prices on those routes where its services were replaced by low-cost airlines. On the other hand, there was no evidence of any clear reduction in flight frequencies. Given that tourist passengers are particularly sensitive to prices, this paper provide evidence about the positive impact of low-cost airlines on tourism.

Keywords: low-cost airlines, tourism, prices, flight frequencies

1. Introduction

A number of previous studies have shown a strong relationship between transport infrastructure and tourism (Chew, 1987; Martin & Witt, 1988; Abeyratne, 1993; Khadaroo and Seetanah, 2007, 2008; Della Corte et al., 2013). Indeed, transportation acts as one of the main determinants of tourist destination as it improves accessibility to a particular location. A large proportion of tourists arrive at their final destination by plane so it is not surprising to find that air services have a high impact on the number of tourist arrivals (Bieger and Wittmer, 2006; Dobruszkes and Mondou, 2013, Albalate and Fageda, 2016).

Thus, entries and exists in the airline market may have significant implications for tourism. Here it is important to mention that the air transport market is dominated by two different types of airlines. First, network carriers exploit transfer traffic through coordinated banks of arrivals and departures at their hub airports. These network airlines are usually former flag carriers and are frequently a part of international alliances. By adopting this strategy they are able to reduce their costs through the exploitation of density economies, and can offer greater flight frequency, which are highly valued by business and connecting passengers (Fageda, 2013).

Second, low-cost airlines operate point-to-point routes. They may be independent airlines or subsidiaries of network airlines but they are usually not integrated in international alliances. Low-cost airlines have been able to reduce their expenditure to compete with network airlines on short-haul routes (Francis et al., 2007). These cost advantages come from greater productivity of capital and labour due to the weak role of unions and high utilisation of the planes and crew. Furthermore, they use one type of plane configured with the maximun number of seats so that they have lower labour costs and maintenance. They also take advantage of easy daily management as they operate direct fligths and do not differentiate between different fare classes. Finally, some leading low-cost airlines like Ryanair choose secondary airports and therefore enjoy low charges and minimal congestion.

Overall, we may expect that low-cost airlines offer flights at lower prices and lesser frequencies than network airlines (Fageda and Flores-Fillol, 2012). This may have consequences for the type of passenger to which network and low-cost airlines offer their services. Given that most trips are made in order to undertake an activity at destination, the demand for transportation services depends not only on the monetary price of the trip but also on the travel time, since the latter implies a disutility for the transport user (Button, 2010). The sensitivity of business passengers to time is much higher than that of leisure passengers. In this regard, an increase in frequency should reduce waiting time, which is calculated as the difference between the desired and real time of departure. Thus, we may expect that low-cost airlines services are more convenient for leisure passengers while network airlines are better for business passengers. Recent studies provide evidence about the strong effect that low-cost airlines have on tourist outcomes (Donzelli, 2010; Chung and Wang, 2011; Rey et al., 2011)

This paper examines an event that may help in identifying the differential impact of low-cost and network airlines on prices and frequencies offered on air routes. Specifically it analyses the case of Spanair, which was a network airline (integrated in the Star alliance) developing hub-and-spoke operations at Barcelona airport in 2011 when it was made bankrupt. Most its services were replaced by low-cost airlines such as Ryanair and/or Vueling although on some routes Spanair was also competing with network airlines like the former Spanish flag carrier (Iberia, integrated in Oneworld) or Air Europa (integrated in SkyTeam).

By drawing on data for a large number of Spanish routes for the period 2006-2013, price and frequency equations are estimated, controlling for demand, cost shifters and route competition. Similar control variables as those used in previous studies regarding prices and frequencies in the airline market are employed. Studies like those of Borenstein (1989), Brander and Zhang (1990), Evans and Kessides (1993), Brueckner and Spiller (1994), Marín (1995), Dresner et al. (1996), Berry et al. (1996), Morrison (2001), Fisher and Kamerschen (2003), Fageda (2006), Hofer et al. (2008), and Oum et al. (1993) estimate how prices are influenced by route competition, airport dominance, or the presence of low-cost carriers. In a similar vein, Borenstein and Netz (1999), Schipper et al. (2002), Salvanes et al. (2005), Wei and Hansen (2007), Brueckner and Pai (2009), Pai (2010), and Bilotkach et al. (2010) examine the effect of factors such as route distance, competition, or aircraft size on flight frequencies.

The particular contribution of this paper is that it identifies the differential impact on prices and frequencies of low-cost airlines in relation to network airlines, as it exploits information generated by the bankruptcy of a network airline. In this regard, the estimation is made within the framework of a panel data analysis where frequencies and prices on routes operated by Spanair are compared with routes that are not affected by the bankruptcy (because they were not previously operated by Spanair). Among the routes affected by the Spanair bankruptcy, a distinction is drawn between tourist and non-tourist routes, and only those routes where low-cost airlines were operating services after the bankruptcy are identified. Hence, this study is able to specifically analyze the replacement of services of a network airline by low-cost airlines on tourist routes.

As far as we know, only one previous paper has undertaken a similar analysis, but in a market where travel for tourism is more modest than in that analyzed in this study. Bilotkach et al. (2014) analyzed the effects of the Malev bankruptcy at its hub, Budapest, where its services were replaced by low-cost airlines (Ryanair and Wizzair). The authors identified a significant reduction in flight frequency that was not totally compensated for by lower fares on a number of routes.

This paper is organized as follows. Section two outlines the variables included in the empirical analysis, the expected signs and the data used, while section three provides details of the estimation and results. The final section is devoted to the concluding remarks.

2. Data and variables

This study draws on data from 80 routes in 30 different airports. The frequency of the data is semi-annual, as we differentiate between summer and winter seasons in a period that starts in the summer of 2006 and finishes in the winter of 2013. The market exit of Spanair occurred in 2011, so the data contain observations for 12 seasons before exit and 3 periods after the exit. The average market share of Spanair on routes reached 32 per cent, while the range was between 7 and 100 per cent.

The two dependent variables in our models are prices and frequencies. Price information was collected for a sample week for each half year during the period. We considered the lowest mean round trip price charged by all airlines operating the route, weighted by their corresponding market share. The data were collected from the airlines' websites using a homogeneous procedure: every half year prices were collected one month before travelling and the price selected was for the first flight of the week, with the return leg being on a Sunday. Although prices by route and airline change substantially on a monthly/weekly basis, the price data are considered to be reliable. Data are collected at the same time for all airlines and routes, and by imposing the same conditions on all airlines and routes we can be confident in the data variability attributable to the differences between routes. We have collected data manually and in all cases we have identified the price for a round trip flight with the same airline. Finally, prices are corrected for inflation.

Frequency variable shows the weekly number of flights offered by the airlines on each route. This information was obtained from the Official Airlines Guide (OAG) website and refers to the same sample week as prices.

Before detailing the empirical strategy, the following tables include some descriptive analysis that uses changes in average data on the two dependent variables considered: frequencies and weighted prices. In order to do so, we also differentiate between non-tourist (table 1, 2 and 3) and tourist routes (table 4, 5 and 6).

The differentiation between tourist and non-tourist routes has been made on the basis of a document by the Spanish antitrust authority (CNMC, 2014). In this report, a tourist airport is defined as an airport with a high level of national and international competition, a high proportion of low cost carriers or being close to a tourist destination, among others. In our database we included 9 out of 30 airports considered.[1]

The tables below show an analysis of average data for those routes in which Spanair operated (and did not), and also take into account the before-and-after change. The key questions we seek to address are: did frequencies and weighted prices change after Spanair's exit on the routes where it operated? Are low cost-carriers operating on all routes in the same way? Are these changes the same on tourist and non-tourist routes?

Firstly, table 1 illustrates this analysis for frequency on non-tourist routes:

[1] These airports are: Málaga, Alicante, Palma de Mallorca, Tenerife Sur, Gran Canaria, Mahón (Menorca), Ibiza, Arrecife (Lanzarote) and Fuerteventura.

Table 1. Changes in total average frequency. Non-tourist routes

		ROUTE	
		With Spanair	**Without Spanair**
PERIOD	**Before**	9.19 (0.83)	5.07 (0.43)
	After	8.27 (1.73)	2.84 (0.34)**

Source: Own elaboration. * indicates that the *t*-test between before and after shows statistical significance.

As average data show, frequency diminishes on both routes in the period after Spanair's exit, but also on routes where Spanair did not operate (the *t*-test shows statistical significance). The same analysis for average weighted prices is included in table 2.

Table 2. Changes in weighted prices. Non-tourist routes

		ROUTE	
		With Spanair	**Without Spanair**
PERIOD	**Before**	143.84 (6.52)	180.53 (6.38)
	After	160.05 (15.99)	171.90 (17.24)

Source: Own elaboration. * indicates that the t-test between before and after shows statistical significance.

In this case, prices increase in those routes where Spanair operated while they decrease in those where it did not operate. These results may be interpreted as a negative effect for consumers of Spanair's exit, although no statistical significance in the 'before-and-after' is found on either type of routes.

Regarding changes in the presence of low-cost carriers on routes, which will be a variable taken into account later, table 3 is constructed on the basis of the percentage of routes operated only by low-cost carriers. It can be seen that almost half of the routes where Spanair was offering services are now operated uniquely by low-cost airlines following the bankruptcy of the former airline.

Table 3. Percentage of routes operated only by low-cost carriers. Non-tourist routes

		ROUTE	
		With Spanair	**Without Spanair**
PERIOD	**Before**	0 out of 15 (0%)	0 out of 27 (0%)
	After	6 out of 13 (46%)	5 out of 18 (28%)

Source: Own elaboration. We compare routes in 2010 (before) and 2013 (after). Total routes are not the same, due to it not being a balance panel database.

Meanwhile tables 4 to 6 replicate previous average analysis but for tourist routes. Table 4 focuses on average frequency.

Table 4. Changes in total average frequency. Tourist routes

		ROUTE	
		With Spanair	**Without**
PERIOD	**Before**	8.76 (0.50)	4.37 (0.28)
	After	8.59 (0.83)	2.74 (0.27)*

Source: Own elaboration. * indicates that the t-test between before and after show statistical significance.

Frequency decreased for both types of routes, as in the previous case. Nevertheless the reduction is greater in those routes without Spanair than in the treated group. The table also shows statistical significance for the *t*-test.

Table 5 includes data on prices for these tourist routes.

Table 5. Changes in weighted prices. Tourist routes

		ROUTE	
		With Spanair	**Without**
PERIOD	**Before**	163.84 (8.38)	176.60 (7.36)
	After	190.01 (21.39)*	197.71 (17.25)

Source: Own elaboration. * indicates that the t-test between before and after shows statistical significance.

In this case, weighted prices increased on both types of routes, although statistical significance is found only on those routes where Spanair was operating.

Finally, table 6 shows the percentage of routes operated only by low-cost carriers. Data in this table indicate that around one third of the routes where Spanair was offering services are operated only by low-cost airlines following the bankruptcy of the former airline.

Table 6. Percentage of routes operated only by low-cost carriers. Tourist routes

		ROUTE	
		With Spanair	**Without Spanair**
PERIOD	**Before**	0 out of 14 (0%)	2 out of 19 (10%)
	After	4 out of 14 (28%)	8 out of 17 (47%)

Source: Own elaboration. We compare routes in 2010 (before) and 2013 (after). Total routes are not the same, due to it not being a balance panel database.

In sum, frequencies have decreased on those routes where Spanair did not operate, while prices increased on all routes, both in tourist and non-tourist routes. However these results may reflect the impact of Spanair's bankruptcy, but they must be analyzed with caution; being descriptive, they do not account for supply or demand factors and a causal analysis must be undertaken. This causal analysis is implemented in the estimation of the next equations.

Frequency equation: The estimation of the frequency equation for route *i* at time *t* takes the following form:

$$\begin{aligned} F_{it} = \beta_0 + \beta_1 \text{Airpassengers}_{it-1} + \beta_2 DiDOnlyLCC + \beta_3 DiDnontourist_{it} \\ + \beta_4 DiDTourist_{it} + \beta_6 After_t + \beta_7 Aircraft\_size_{it} + \beta_8 HHI_{it} \\ + \beta_9 Season_t + \beta_{10} D_{it}^{HSR} + \beta_{11} LCC'share_{it} + \varepsilon_{it} \end{aligned} \quad [1]$$

Pricing equation: The price of the route *i* at time *t* is approximated by the following equation:

$$\begin{aligned} P_{it} = \beta_0 + \beta_1 \text{Airpassengers}_{it-1} + \beta_2 DiDOnlyLCC + \beta_3 DiDnontourist_{it} \\ + \beta_4 DiDTourist_{it} + \beta_6 After_t + \beta_7 Aircraft\_size_{it} + \beta_8 HHI_{it} \\ + \beta_9 Season_t + \beta_{10} D_{it}^{HSR} + \beta_{11} LCC'share_{it} + \varepsilon_{it} \end{aligned} \quad [2]$$

The dependent variable in the frequency equation F_{it} is the total number of flights that take place on the route *i* in the period *t*, while the dependent variable in the pricing equation P_{it} is the weighted prices on the route *i* in the period *t* (weight is calculated by frequency data by each airline on route). We use the following control variables in both equations:

1. *Air passengers*$_{it-1}$: the number of air passenger carried in those operations in the route *i* during year *t-1*. 'Number of passengers' was obtained from the website of the Spanish Airports and Air Navigation Agency (AENA) and is the number of passengers carried by airlines on a particular route, including direct and connecting flights.

We applied a one-period lag under the assumption that airlines modify their behaviour by taking into account what happened in the previous period. But this variable may be showing an endogenous relationship with the explained variable. So we have implemented an instrumental variable in the estimation of frequency and price equations through the following variables:

1.a. *Tourists$_{jt}$*: the number of yearly passengers in the destination city *j* during period *t*. Source: AENA.

1.b. *GDP per capita$_{jt}$*: Gross Domestic Product per inhabitant (annual data) for the destination city *j* during period *t*. Source: INE.

1.c. *Population$_{jt}$*: Population at destination *j* during period *t*. Source: INE.

The expected sign of the coefficient of *Air passengers* in the frequency equation is positive. It will be the strongest influence variable on the airlines' frequency decisions, since supply must adjust to the levels of demand. In the pricing equation, however, the expected sign is ambiguous. More traffic on a route means it is possible to gain density economies, and in a competitive environment, this should lead to lower prices. However, a higher level of traffic might lead to higher mark-ups if capacity constraints are present.

2. *DiD variables*. Three variables are included in order to control the exit effect of Spanair on the endogenous variable, known as DiD (that is, *difference-in-difference* analysis). Firstly, a binary variable that takes value 1 if all the companies that served the route were Low Cost Carriers (*DiDOnlyLCC*). Recall that low-cost airlines may be offering services at lower prices and lower frequencies than network carriers.

Secondly, a binary variable that takes value 1 if the route was after the market exit of Spanair and was operating on it, in a non-tourist airport (*DiDnontourist*) and in a tourist airport (*DiDTourist)*. These variables show us the relative change of these *treated* routes regarding the *control* group (Routes without Spanair).

3. *After$_t$*: binary variable that takes value 1 after the exit of Spanair, in all routes.

Aircraft_size$_{it}$: Mean size of the aircrafts used on the route. We expect a negative sign in the pricing equation. For a given capacity, airlines may exploit density economies by using larger aircrafts. Hence, they may use more efficient aircrafts in terms of the consumption of fuel. Furthermore, they may be able to achieve higher load factors as the capacity is offered with lower frequencies. The latter also implies that we can expect a negative sign of the aircraft size variable in the frequency equation.

4. *HHI$_{it}$*: herfindhal-hirschamn index on frequencies by route *i* at period *t*. This variable tries to evaluate the level of concentration at route *i* at period *t*. We expected a negative sign in the frequency equation, since fewer flights will be offered, as less competition exists

in the route. Otherwise, a positive coefficient is expected in the price equation, since less competition should result in higher prices being charged. HHI is computed as the sum of the square in terms of flight frequencies, whose information has been obtained from OAG.

5. *Season$_t$*: binary variable that takes value 1 if data is in the winter season, to take into account differences across seasons. The dummy variable for the season was constructed on the understanding that the summer season starts on the last Sunday of March and finishes on the last Saturday of October, both inclusive.

6. *LCC' share$_{it}$*: these covariates evaluate the market share of frequency of flights of the low-cost carrier on the route *i* during period *t*. We expect a negative sign both in the price and frequency equations given that low-cost airlines usually operate with lower prices and frequencies than other carriers. Source: Own elaboration.

7. D_{it}^{HSR} : binary variable that takes value 1 after the entrance of High Speed Rail (HSR) on route i during period t. This variable is included for negative effects on airlines frequencies, as described by Jiménez and Betancor (2012). In the price equation we expect a negative relationship, because more intermodal competition that generates lower prices is possible.

In the following table the main descriptive statistics of our database can be seen.

Table 7. Main variables in the database and descriptive statistics

Explanatory variable	Mean	Standard deviation	Minimum	Maximum
Frequency	7.14	7.72	1	86
Weighted price	169	94	27	680
Passengers	478,861	581,970	8,832	4,842,969
GDP per capita (average)	24,547	2,129	17,842	32,457
Tourists (destination)	5,684,942	3,887,568	154,989	1.5 e7
Population (average)	3,061,169	992,292	1,001,062	6,017,656
DiD OnlyLCC	0.014	-	0	1
DiD NonTourist	0.017	-	0	1
DiD Tourist	0.022	-	0	1
HHI	0.62	0,27	0,18	1
Season	0.44	-	0	1
Aircraft Size	127.84	48.76	43	207
LCC' share	0.27	0.29	0	1
D^{HSR}	0.10	-	0	1

Source: Own elaboration.

3. Estimations and results

This study has estimated frequency and pricing equations by an instrumental variable procedure in a panel data setting. As we previously explained the demand variable might be endogenous and we have to take this fact into account to eliminate any possible bias in the estimation using the two-stage squares estimator. Furthermore, we perform the estimation using a technique that takes advantage of the panel nature of our data: the route fixed model. The use of this model allows us to consider unobserved route heterogeneity.

In this regard, a clear advantage of the fixed effects model is that it allows us to control for any omitted variables that correlate with the variables of interest, which do not change over time. As such, the fixed effects model is more reliable than other estimation techniques. A shortcoming of the fixed effects model is that the effect of time-invariant variables like distance cannot be identified. However, the fixed effects will capture the impact on prices and frequencies related with distance and time-invariant variables that are not observable.

The main results of the frequency equation are shown in the next table. The first column shows the results for the whole dataset but excluding the variable of LCC share on the route; the second includes this variable and the final column restricts the estimation only for a balanced panel. We report results of these three different specifications to check whether the results for the difference-in-difference variables may be affected by the LCC share variable or missing observations.

Table 8. Frequency equation using panel data estimations with instrumental variables

Covariates	Model 1	Model 2	Model 3
Passengers	2e-5 (6e-6)***	2e-5 (6e-6)***	3e-5 (7e-6)***
DiD only LCC	**-1.07 (2.01)**	**-1.25 (2.01)**	**-1.41 (2.20)**
DiD Tourist	**2.67 (1.31)****	**2.70 (1.31)****	**2.89 (1.47)****
DiD Non-tourist	**0.74 (1.64)**	**0.78 (1.65)**	**1.07 (1.81)**
After	-0.77 (0.69)	-0.82 (0.70)	-0.87 (0.83)
Aircraft Size	-0.04 (0.01)**	-0.04 (0.01)**	-0.04 (0.01)**
HHI	-4.43 (0.90)***	-4.40 (0.91)***	-4.71 (1.10)***
Season	-0.35 (0.27)	-0.37 (0.27)	-0.47 (0.34)
HSR entrance	-0.83 (1.37)	-0.78 (1.37)	-0.50 (1.64)
LCC's share		0.47 (0.72)	0.32 (0.87)
Observations	784	784	640
Sample	All	All	Only routes with all data (balanced panel)
Under / Over identification tests for instruments	22*** / 2.4	22*** / 2.5	20.5*** / 2.8
F Test	17.54***	15.77***	12.76***

Note 1: *** 1%, ** 5%, *10% significance test. Standard errors in brackets.
Note 2: The passenger variable has been estimated using the following instruments: average GDP, tourists at destination, average population, and binary variables at Madrid and Barcelona's airports.
Note 3. The under-identification test is the Anderson canon. corr. LM statistic and the over-identification test is the Sargan test.

Results show that the difference-in-difference variable for tourist routes is positive and statistically significant, so that the change in frequencies is higher in routes previously operated by Spanair (treated routes) than in the routes not affected by the exit of Spanair (control routes). Having said this, the coefficient is negative (although not statistically significant) when we consider routes where only LCC are offering services after the bankruptcy of Spanair.. Overall, these results confirm that LCC operate with lower frequencies than network airlines although the result is not strong enough to reach statistical significance. Furthermore, frequencies have even increased in tourist routes affected by the exit of Spanair so that the bankruptcy of the network airline does not seem to have had negative implications for passengers, at least in terms of flight frequencies..

If we examine the control variables we can see that in general they have the expected signs. Number of passengers is positive and significant at one percent level. Note also that tests for this variable confirm that the instruments are strong and exogenous. Otherwise frequencies are smaller on routes with a greater level of concentration. The coefficient of the HSR and LCC's share variables are negative (as expected) but not statistically significant. The binary variable *After* do not show statistical significance and the *Aircraft size* is negative. Finally, neither is the season variable statistically significant. Results for the pricing equation are presented in table 9.

In the case of pricing equation the difference-in-difference estimator for routes where only LCC offer services is negative and statistically significant. Hence, we find evidence that the replacement of services of a network carrier (in this case Spanair) by low-cost airlines (Ryanair or Vueling) has led to a reduction in prices. So that tourist passengers has even take benefit from the bankruptcy of Spanair due to they are generally sensitive to prices. In contrast, prices are higher for the other difference-in-difference variables, so that prices are higher after the bankruptcy of Spanair regardless of whether they are on tourist or non-tourist routes.

Regarding the three difference-in-difference variables, the coefficient of the LCC variable is higher than those of the two other variables. Hence, both in tourist and non-tourist routes, prices are lower if Spanair services are substituted by low-cost carriers. In contrast, those routes where Spanair services were replaced by network airlines like Iberia or Air Europa prices are higher. Thus, we find evidence that what makes a difference is the type of airline that has substituted Spanair services (ie; a low-cost airline or a network airline), while the type of route (ie; tourist or non-tourist) has not affected price changes after the bankruptcy of Spanair.

The control variables present in general the expected signs. We find a positive effect of the number of passengers so that prices are higher on denser routes. This means that the mark-up effect is stronger than the density economies effect. Again, tests for this variable confirm that the instruments are strong and exogenous. Furthermore, the HHI variable is positive and statistically significant so that prices are higher on routes with weaker competition. Furthermore, we find a negative effect of the LCC's share variable and the season variables, so that prices are lower when the presence of LCC on the route is stronger and in the winter. Finally, the HSR is negative, as literature suggests, but not statistically significant.

Table 9. Pricing equation using panel data estimations with instrumental variables

Covariates	Model 1	Model 2	Model 3
Passengers	3e-4 (1e-4)**	3e-4 (1e-4)**	3e-4 (1e-4)**
DiD only LCC	**-128.43 (44.29)*** **	**-105.40 (41.85)** **	**-102.14 (41.02)** **
DiD Tourist	**94.74 (33.80)*** **	**93.09 (32.28)*** **	**92.65 (31.88)*** **
DiD Non-tourist	**89.30 (40.29)** **	**86.13 (38.43)** **	**87.57 (37.73)** **
After	-5.13 (20.9)	3.89 (20.1)	3.62 (20.2)
Aircraft Size	-1.23 (0.39)***	-0.56 (0.38)	-0.68 (0.37)*
HHI	64.56 (23.88)**	57.42 (22.73)**	37.36 (23.80)
Season	-39.96 (7.00)***	-38.12 (6.68)***	-42.24 (7.16)***
HSR entrance	43.02 (30.77)	44.38 (29.45)	41.54 (30.78)
LCC's share		-83.52 (19.19)***	-81.01 (19.05)***
Observations	626	626	535
Sample	All	All	Only routes with all data (balanced panel)
Under / Over identification tests for instruments	28.7*** / 1.22	29.96*** / 0.51	27.23*** / 0.56
F Test	6.29***	7.57***	7.68***

Note 1: *** 1%, ** 5%, *10% significance test. Standard errors in brackets.
Note 2: The passenger variable has been estimated using the following instruments: average GDP, tourists at destination, average population, and binary variables at Madrid and Barcelona's airports.
Note 3. The under-identification test is the Anderson canon. corr. LM statistic and the over-identification test is the Sargan test.

4. Conclusions

This paper has shown that the bankruptcy of Spanair has led to a reduction in prices on those routes where its services were replaced by low-cost airlines. In contrast, we do not find a clear reduction in frequencies. Given that tourists are particularly sensitive to prices, we find evidence that the replacement of services of a network airline by low-cost airlines has benefits in terms of the promotion of tourism.

In Europe, low-cost airlines have developed an extensive network of routes and they operate in different types of airports including large and small airports and airports located in big cities or tourist destinations. In contrast, network airlines have increasingly concentrated their services in their hub airports. Hence, they run short-haul flights simply to feed the hubs where they offer a wide range of non-stop long-haul flights. To date, low-cost airlines have become dominant on short-haul flights while network airlines are still competitive on long-haul flights.

The results of this paper suggest that the dominance of low-cost airlines in intra-European routes may have helped to promote tourism within Europe as low-cost airlines are able to offer services at lower prices than network airlines. Hence, we provide evidence about the positive impact of low-cost airlines on tourism.

Currently, there is a concern among managers of network airlines about the increasing presence of low-cost airlines at their hubs and the expansion of low-cost airline services on long-haul flights. However, the results of our analysis suggest that government intervention to support hub-and-spoke operations is not justified as the cheap air tickets that low-cost airlines are able to offer may allow the expansion of tourist activities, with positive knock-on effects in terms of economic growth.

In fact, most of airports located at tourist destinations are managed by state-owned agencies. Such agencies may have as an objective to spur tourism at their sites. To this point, airport managers have different tools to attract low-cost airlines in order to support tourism growth.

First, low-cost airlines are more sensitive than network airlines to airport charges. Hence, airports that set low airport charges (or discounts over regular charges) may have more opportunities to attract low cost carriers. Second, low-cost airlines are less willing to pay for auxiliary facilities like fingers. Thus, airports with cheap aprocedures for embark and disembark passengers may be more attractive for low-cost airlines. Furthermore, low-cost airlines grounds their profitability on a high utilization of the planes and the crew so that airports should not be congested if they want to attract them. Finally, joint marketing initiatives between the airport and low-cost airlines may can also be helpful.

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