The Performance of European Full Service Airlines after Liberalisation: An Econometric Analysis

Lara Gitto - **Fulvio Minervini***

University of Rome "Tor Vergata" and University of Messina

University of Macerata and University of Warwick

Deregulation in the airline industry has forced full service airlines to change their strategies in order to respond to increasing challenges. In this paper, an econometric analysis of the possible determinants of economic performance of full service airlines after liberalisation has been carried out. A fixed effects model was used and the performance of ten European full service airlines has been analysed over a period of 11 years. Variables considered in this analysis were the number and type of aircraft in the fleet, the number and type of destinations, investments, number of employees and alliances. The analysis suggests that full service airlines should adjust fleet composition and re-organise operations on their routes in order to react to the increasingly competitive environment. [JEL Classification: C23, L25, L93]

1. - Introduction

Restrictive domestic and international regulations have historically shaped the structure of the airline industry and have had a strong impact on airlines' performance. Regulations defined, firstly, the geographic markets that could be served by the airlines and, secondly, the type of aircraft that could be used to provide services (Williams, 2002; Doganis, 2002). More crucially, travellers grew accustomed to high airline fares, which were not related to

* <*Gitto@CEIS.uniroma2.it*>; <*minervini@unimc.it*>. The Authors are grateful to two anonymous referees. The usual disclaimer applies.

costs. Market mechanisms were frustrated and the industry was far from competitive. Indeed, before deregulation, airlines had been running their businesses in a protected environment (in particular outside the US), where state-owned airlines were commonplace and enjoyed stronger protection (Neven - Röller, 1996; Tretheway, 2004; Doganis, 2006).

Since 1978 — when the US began deregulating their commercial airline industry — traditional carriers have experienced fundamental changes,[1] especially as a result of transformations that have occurred in a few key areas, and these changes have influenced the airlines' operations in recent years (DT, 1990; Bruning, 1991; TRB, 1991; Borenstein, 1992; CAA, 1998; Kahn, 2003). Formal deregulation did have an impact on subsequent developments, as it made constraints and national borders less stringent. Nevertheless, substantial changes happened later, by shifting patterns of demand in the industry, coupled with external innovations such as the growth in take-up of internet usage.

For the first two decades of deregulation, in fact, its impact on the airline industry was weak (Marín, 1998; Ng - Seabright, 2001; Schnell, 2004). Demand was not driving supply. Airlines could focus on revenue-side strategies and, notably, introduce sophisticated global distribution systems, enhance revenue management and offer frequent flyer programmes. These actions helped bring about demand segmentation, protect revenues and avoid pressures on the level of costs. However, during the last decade, the development of the low-cost airline business, widespread access to internet by travellers and a general reduction in companies' willingness to pay high airline fares (for their employees' journeys) have strengthened the impact of deregulation (Dresner - Windle, 1999; Bhatia, 2004; Franke, 2004; Belobaba - Gorin, 2004; Gillen - Morrison, 2005).[2]

The aim of this paper is to make a contribution to the eco-

[1] Over time, new deregulation initiatives have been implemented in the US and internationally; in particular, European countries started deregulation programmes in 1983 (EC, 1999; DEMPSEY P.S., 2001).

[2] BHATIA K.K. (2004) notes that, in the US market, 80% of an airline revenues were provided by demand of time-sensitive travellers (even if they accounted for only 20% of passengers).

nomic literature that empirically investigates the performance of the so-called full service airlines (FSAs). In particular, this paper presents an econometric analysis of a few possible determinants of the economic performance of FSAs during the last decade. A fixed effects model has been used in order to test the impact of investments and supply-oriented strategies (aimed at widening the fleet as well as increasing flight frequencies) for 10 European FSAs - i.e. traditional flag carriers.

Our findings suggest that, in order to maintain competitiveness, FSAs should adjust their fleet composition and re-organise their routes, which should be more geared towards long-haul destinations.

The paper is organised in the following sections: Section 2 describes data and methods of analysis; Section 3 shows the results obtained by several estimations of a fixed effects model; a discussion of results together with further considerations conclude the paper in Section 4.

2. - Data and Methods of Analysis

This article aims at studying the changes in the business strategies of FSAs in the aftermath of liberalisation.

Previous studies into the challenges brought about by liberalisation had to deal with several methodological issues such as data availability and their comparability. International generalisations have been particularly difficult so far because of a lack of data (Oum - Yu, 1998; Schefczyk, 1993).

The increase in the number of observations and, consequently, in the degrees of freedom can be achieved by means of a model using time-series cross-section data.[3] Moreover, with time-series cross-section data it is possible to account for population heterogeneity. Since variables representing the latter are typically

[3] According to Hsiao C. (1986), «by utilizing information on both the intertemporal dynamics and the individuality of the entities being investigated, one is better able to control in a more natural way for the effect of missing or unobserved variables».

not measurable and are unobservable, the problem of heterogeneity might be solved by adding unit-specific dummy variables that affect the outcome in which we are interested.

A fixed effects model, known as "covariance model", allows both individual and/or time effects to be taken into account by adding dummy variables for cross-section units and/or time-periods.

The fixed effects model can be specified as follows:

$$Y_{it} = (\alpha + \delta_i) + X_{it}\,\beta + \varepsilon_{it}$$

where the deterministic part of the equation is composed of a constant term and an individual effect δ_i (the subscript i indicates the unit considered. The subscript t, instead, represents time). The estimator applied in this context is obtained by OLS on a "within" transformed model, that considers for each component the deviation from the mean (Greene, 2003).

The analysis was carried out observing a sample made up of 10 European full service airlines operating domestic and international routes. The FSAs considered are: Aer Lingus, Air France, Alitalia, British Airways, Iberia, KLM, Lufthansa, Olympic Airlines, SN Airlines and Swiss (other European FSAs could not be included in the sample due to insufficient data).

The FSA business model typically favours a high level of service (compared to the low-cost model) and the creation of a large service bundle (in-flight entertainment, meals, drinks, large numbers of ticketing counters at the hub, etc.) to maximise the revenue yields from business and long-haul travellers (Gillen - Morrison, 2005; O'Connell - Williams, 2005).[4]

The low-cost carrier (LCC) business model, instead, is based on a no-frills and low-fare approach, where the ability of the airline management to minimize costs to provide a well-defined type of service is crucial (Bergantino, 2006). This business model brought about a reduction in costs to about 60% less than costs

[4] GILLEN D. - MORRISON W.G. (2005) stress how this circumstance helped to build the market at a time when air travel was more restricted than it is today.

incurred by incumbent airlines, especially in areas such as labour costs, where LCCs have a marked advantage compared to FSAs (Doganis, 2006). Moreover, LCCs have developed new routes (previously not flown by FSAs) and usually fly to less congested airports than those traditionally used by FSAs — a business choice which helps LCCs to keep airport fees at lower levels (Piacentino, 2006).

On the revenue side, LCCs seek high load factors (i.e. the proportion of passengers carried to seats available)[5] and this objective is fostered by a business model that, given the cost advantage, has enabled LCCs to offer fares at much lower levels than those offered by FSAs. As a result, the creation of new markets and booming traffic growth (between 3 and 4 times the previous levels on some routes) could be observed. However, as LCCs have grown, they have increasingly overlapped with markets served by FSAs, hence determining a substantial change in the airline industry (Mason, 2005; Morrell, 2005).[6]

The 10 FSAs selected for our analysis have been considered over an 11 year period, from 1995 to 2005. The data was collected using the Amadeus database, which provides detailed information about European listed companies. However, the panel is unbalanced, because for some airlines it was not possible to obtain observations for the whole 11 year period. A couple of FSAs have experienced bankruptcy, but they re-started operations after a period of restructuring and re-organisation, using a new company brand (for instance, Sabena is now operating as SN Brussels Airlines, and Swissair as Swiss). For other companies (e.g. British Airways and Lufthansa) some observations, in particular in 1995, were not available in the main data source.

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[5] FSAs such as British Airways and Swiss have shown a preference for lower load factors than their competitors, in order to offer their customers a higher level of comfort in the aircraft and better in-flight service, as well as to concentrate on customers with high willingness to pay for air travel.

[6] Since the focus of this research is a micro-analysis of the permanent structural shift experienced in the market after the start of the process of liberalisation, external shocks (e.g. SARS, war and terrorist attacks) that might have had at least a short-term effect on airlines' performances have been neglected.

Descriptive statistics about these companies are shown in Table 1*a* and Table 1*b*.

Overall, there is a great heterogeneity in the sample: companies differ in their level of revenues (represented by Earnings Before Interests and Taxes - EBIT), investment strategies (measured by total and fixed assets), number of passengers carried per year (going from 2,341.8 of Sabena SN in 2002, up to 48,255.5 carried by Lufthansa in 2004) and number of destinations, especially overseas (a small airline such as Aer Lingus has only 4 overseas destinations on average, while Lufthansa has always scheduled a high number of destinations, with a peak of 206 overseas routes served in 2002).

Apart from data reported in the tables above, data about fleet

TABLE 1.*a*

DESCRIPTIVE STATISTICS

Observed variable	No. of observ.	Mean	Std. dev.	Min	Max
FSAs	110	5.5	2,885	1	10
Year	110	2000	3,176	1995	2005
EBIT	97	-722,558	9,626,931	-9.43e+07	3,994,197
Total assets	96	1.28e+07	3.29e+07	51,064	2.37e+08
Fixed assets	96	7,715,304	2.08e+07	2,104	1.58e+08
No. of employees	95	30,511.64	28,418.64	299	102,722
Passengers (thousands)	97	20,509.3	13,234.42	2,341.8	48,255.4
ASK (millions)[a]	97	63,193.98	46,775	5,419.3	168,259.7
RPK (millions)[b]	107	45,481.1	35,484.96	2,606.1	118,889.7
Passengers load factor	97	78.012	67.926	48.1	738
Total load factor	97	66.005	7.952	39.4	80
No. of aircraft (Airbus)	100	46.05	46.733	0	171
No. of aircraft (Boeing)	100	59.12	61.680	0	245
No. of aircraft (others)	100	43.36	41.355	0	176
Total no. of aircraft	100	148.53	102.293	29	409
Fleet heterogeneity	100	0.73	0.446	0	1
No. of dest. (domestic)	90	17.55	13.93	1	60
No. of dest. (intra-European)	90	56.73	26.802	21	128
No. of destinations (overseas)	90	58.92	50.002	3	206
Total no. of destinations	90	133.21	77.542	29	357
Alliances	100	0.66	0.476	0	1

[a] Available Seat Kilometres (ASK), that is the number of seats available for passengers (given the fleet), times the distance flown.

[b] Revenue Passenger Kilometres (RPK), that is the number of passengers on board who have bought a ticket, times the number of kilometres flown.

TABLE 1.*b*

AVERAGE VALUES ALONG OBSERVATION PERIOD (STANDARD DEVIATIONS IN BRACKETS)

Variables/Carriers	Aer Lingus	Air France/ KLM	Alitalia	British Airways	Iberia	KLM	Lufthansa	Olympic	SN Brussels Airlines	Swiss
EBIT (thousands of €)	45,573.14 (68,470.97)	412,026.3 (385,069.6)	-202,826.3 (211,799)	564,557 (355,736)	156,351.4 (102,481.5)	123,204.5 (301,114.7)	788,800 (661,631.5)	8,771,350 (3.01e+07)	-3,374.7 (13,523.91)	-108,101.9 (221.896.6)
Total assets (thousands of €)	1,330,499 (201,274.6)	12,659,499 (3,618,473)	4,295,747 (911,320.2)	12,397,700 (1,666,658)	4,189,497 (620,531)	8,510,251 (739,783.9)	15,186,400 (3,589,317)	59,218,003 (9.14e+07)	72,917.1 (17,931.82)	1,480,765 (901,658.6)
Fixed assets (thousands of €)	558,607.8 (91,242.43)	8,477,428 (2,477,900)	2,909,933 (550,066.4)	9,738,800 (1,706,806)	2,551,130 (287,174.6)	6,218,480 (527,121.8)	9,924 (2,233,934)	29,602,774 (6.12e+07)	14,403.7 (4,194.947)	991,951.6 (450,711.5)
No. of employees	5,566.3 (2,111.2)	71,566.5 (21,318.03)	26,967.6 (6,535.55)	57,985.6 (5,735.24)	26,278.4 (941.34)	32,648.5 (1,804.93)	76,424.9 (16,515.6)	4,803.6 (2,906.57)	606.2 (141.95)	5,137.6 (3,426.08)
Passengers (thousands)	5,524.4 (976.65)	34,858.86 (11,113.69)	23,314.19 (1,510.34)	34,940.53 (1,881.91)	21,121.28 (4,702.27)	16,118.34 (2,788.90)	40,744.34 (5,521.59)	6,141.93 (561.69)	6,398.26 (31,03.84)	11,435.34 (2,347.15)
Passenger load factor	73.72 (1.57)	75.36 (1.76)	70.35 (1.51)	72.02 (1.59)	138.54 (210.63)	78.03 (2.27)	74.02 (3.28)	64.91 (1.72)	62.4 (6.29)	69.48 (4.60)
No. of aircraft	34.1 (3.38)	225.2 (35.23)	161.5 (12.65)	289 (28.33)	138.6 (19.25)	115.7 (10.31)	334.3 (52.04)	44.5 (8.16)	58.3 (20.28)	84.1 (26.40)
Domestic destinations	5 (1.85)	37 (13.20)	23 (1.05)	20 (4.53)	31 (7.62)	3 (1.58)	21 (2.93)	30 (11.28)	1 (0.5)	4 (1.45)
European destinations	27 (5.74)	71 (7.04)	52 (11.75)	61 (3.95)	31 (2.06)	66 (15.09)	107 (24.17)	25 (2.20)	60 (17.57)	68 (20.36)
Overseas destinations	4 (1.01)	114 (36.51)	39 (9.90)	83 (7.51)	32 (1.96)	69 (12.23)	153 (54.53)	15 (3.56)	23 (7)	58 (26.81)
Total number of destinations	36 (5.10)	222 (47.03)	114 (17.59)	164 (6.18)	94 (8.09)	138 (26.84)	281 (80.47)	70 (13.89)	84 (24.19)	130 (42.09)
Alliances	Oneworld from 1999	Skyteam from 2000	Skyteam from 2001	Oneworld from 1998	Oneworld from 1998	With Northwest till 2002, Skyteam from 2003	Star from 1997	No	Qualifier till 2001	Qualifier till 2000 Star from 2005

composition are of some interest: some of the airlines tend to deploy a wide variety of aircraft, while others use only a few types of aircraft in their fleet. On average, Boeing aircraft are the most used by FSAs. Nevertheless, the number of Airbus aircraft has been increasing in the last year for almost all the companies (KLM and Olympic are exceptions to this). In Table 1*a*, the "fleet heterogeneity" dummy variable indicates if FSAs have in their fleet different aircraft types (Airbus, Boeing or others). Fleet heterogeneity is likely to involve higher costs for the airline, particularly in the areas of maintenance and labour. Significantly, LCCs tend to use only one type of aircraft. Although Boeing and Airbus have categories of aircraft that can be considered as generic substitutes, the cost of operating different aircraft models can differ (e.g. there are aircraft with two, three or four engines, the latter burning more fuel).

After liberalisation, alliances among airlines have become significant and more widespread. For example, KLM has always been involved in strategic alliances. Olympic Airlines, on the other hand, has never been part of any alliance. Most alliances have been created since 1996: Lufthansa joined Star Alliance in 1997; British Airways and Iberia joined One World in 1998 (which Aer Lingus entered in 1999). Air France has been a part of Skyteam since 2000 and Alitalia since 2001. Other FSAs have followed different patterns: Sabena SN and Swiss have been part of the Qualifier alliance until 2000-2001 but, probably because of financial problems, they have withdrawn from that alliance.

Some authors (Negandhi - Ganguly, 1986; Backx *et* al., 2002) have emphasised how financial performance has to be considered jointly with efficiency (both organisational efficiency and in-flight equipment efficiency) to evaluate company success, in particular when the company is partly state owned. However, financial performance is arguably the most important dimension of a firm's performance, especially in a liberalised market with increasing competition.

In order to test the impact of liberalisation of the air transport market on economic performance, a proxy related to FSAs' level of profits (measured by EBIT) has been regressed on a set of variables, which represent the policies adopted to increase supply and keep down costs (i.e. changes in investment policies, as measured by the level of fixed assets; changes in the destinations served; fleet modifications; variations in labour costs — due to employee numbers — and corporate strategic variations, e.g. alliances).

It would be interesting to include other strategic variables, in order to analyse the impact of airline connection strategies ("hub-and-spoke" or "point-to-point") on quality and customer satisfaction. In this study we simply included a dummy variable for alliance agreements.

Since the present analysis focuses on individual economic performances, it does not take into account the impact of macroeconomic factors in determining a modification in the market framework after liberalisation.

The main objective of this study is, thus, to test empirically the following hypotheses:

HYPOTHESIS A: FSAs economic performance depends upon their choice of supply-oriented strategy, concerning especially the number of aircraft and destinations (quantitative variables) as well as (qualitative) variables such as the level of comfort, measured by passenger load factor.

HYPOTHESIS B: Competitiveness depends upon cost reducing efficiencies, which lower costs. For FSAs the latter rely mainly on labour and fuel. On the one hand, difficulties in negotiating job contracts and reaching agreement between employees' representatives and airlines managers (especially if the airline is not fully privatised) result in high labour costs; on the other hand, fuel costs cannot be easily reduced, crucially in the short term, when the number and the type of aircraft in the fleet is given.

It might be argued that an increase in the economic performances of FSAs represents an encouraging response to liberalisation policies: FSAs can coexist together with LCCs without losing significant market share, while, at the same time, increasing their competitiveness.

LCCs are exploring a market segment that has been growing (in particular because of demand for leisure travel). Customers travelling for leisure might be attracted by low fares and the possibility of reaching new destinations, often through point-to-point connections, as well as the same destinations as served by FSAs.

FSAs face a hard task to beat the increasing competition with LCCs. Although in principle, the market segments served by FSAs and LCCs might seem distinct: the former operating for business customers with hub-and-spoke connections, the latter mostly serving leisure travellers and only some of the traditional destinations served by FSAs. However, this distinction in market segments is increasingly blurred by LCC network expansion.

3. - Results

Several models have been estimated using a fixed effects approach.

EBIT, a proxy for economic performance, is always the dependent variable. In the first regression, independent variables are: lagged fixed assets; passenger load factors; total number of aircraft; number of domestic, intra-European and inter-continental destinations.

Results can be seen in Tables 2*a*, 2*b* and 2*c*.

We observe a negative effect of the variable fixed assets. Moreover, the estimated coefficient is highly significant: this result could imply that an investment policy focussed only on infrastructures does not have a positive impact on economic performance. This supports the argument that investment policies should be better planned, including, for example, process innovations (perhaps to explore ways to offer services of higher quality to passengers).

Economic performance and the number of employees is, unexpectedly, positively correlated: given high labour costs, one might expect revenues to increase once employee numbers have been reduced. This result could rely on the fact that airlines with the highest revenues face fewer pressures on employment levels and, consequently, labour costs. An increase in employee numbers

Table 2.*a*

FIXED EFFECTS MODEL (1ST SPECIFICATION)

R^2: within = 0.9960; between = 0.7376; overall = 0.9576		Corr (u_i, Xb) = -0.1246; $F(6,55)$ = 2279.18; Prob > F = 0.0000	
Variable	Coefficients	Std. Error	*t-ratio*
Lagged fixed assets	-.6022536***	.0051625	-116.66
No. of employees	16.316	14.949	1.09
Passengers load factor	-386.006	1212.027	-0.32
Total no. of aircraft	8915.111*	4686.499	1.90
Total no. of destinations	-7669.904**	3148.644	-2.44
Alliances	468335.4*	271929.4	1.72
Constant	1983679**	903987.1	2.19
*** = significant at 99%; ** = significant at 95%; * = significant at 90%		sigma_u 2305499.2; sigma_e 749156.3; rho .904496; F test that all u_i=0: $F(9,55)$ = 23.13; Prob > F = 0.0000	

could be a good strategy choice, if this allows FSAs to offer a better customer service. Furthermore, a reduction in the number of employees might signal a critical phase for the company, and hence negative economic performance.

It is not possible to evaluate the effect of load factor, which, in the economic literature, is considered as a key performance indicator in the airline industry. In our analysis, we did not find that variable to be significant; in another specification, not reported here, total load factor (which also includes cargo) was considered. Compared to the passenger load factor, this is positively correlated, but again not significant.

Load factor was not considered in the second specification of the model: here, significant variables such as number of aircraft and number of destinations were differentiated according to a broad division by type of aircraft used (Airbus, Boeing, other aircraft) and type of destinations (domestic, intra-European and overseas).

In our second estimation, number of aircrafts (Airbus, Boeing, others) shows almost always a positive coefficient, significantly

TABLE 2.*b*

FIXED EFFECTS MODEL (2^{ND} SPECIFICATION)

R^2: within = 0.9970; between = 0.7460; overall = 0.9519		Corr (u_i, Xb) = -0.2107; $F(9,55)$ = 2044.34; Prob > F = 0.0000	
Variable	Coefficients	Std. Error	*t-ratio*
Lagged fixed assets	-.5981786***	.0045705	-130.88
No. of employees	17.323	12.973	1.34
No. of aircraft (Airbus)	19502.64**	9436.584	2.07
No. of aircraft (Boeing)	6461.744	9855.009	0.66
No. of aircraft (others)	8086.321*	4942.987	1.64
No. of destinations (domestic)	-86465.22***	19289.51	-4.48
No. of destinations (European)	-8989.961	8917.723	-1.01
No. of destinations (overseas)	6.624	5909.765	0.02
Alliances	219301.6	333695.9	0.66
Constant	2671334***	955192.6	2.80
*** = significant at 99%; ** = significant at 95%; * = significant at 90%		sigma_u 2467142.7; sigma_e 646194.42; rho .93580195; F test that all u_i=0: $F(9,55)$ = 4.79; Prob > F = 0.0001	

correlated with earnings: this positive factor on performance levels should be considered together with the fact that the number of destinations (domestic and European) has a negative influence on performance. As far as the number of destinations is concerned, only domestic destinations are significant and show a higher effect compared with other routes.

These results suggest that passengers appreciate a higher frequency of flights on a given route. This circumstance would lead us to conclude that airlines should deploy more aircraft on well-known routes, thus serving traditional routes with higher frequencies rather than developing new routes, whose effects could be that of increasing total costs.

It would be interesting to add further specifications about the type of aircraft used by airlines. The distinction we have made regarding Airbus, Boeing and other aircraft is based on the manufacturer of the major aircraft models: it is not sensitive to the differences between various aircraft, which is described better by considering the length of fuselage, engine size, etc. (Kilpi, 2007).

The findings also suggest that there is no need for more domestic destinations in order to achieve a better economic outcome: for short-haul flights, the same aircraft can be used for round trips (an example is provided by Ryanair's business model). An increase in the aircraft numbers would allow higher flight frequencies on medium-haul (i.e. intra-European) destinations.

This evidence confirms the statement that an important part of the service offered by a company is the convenience created through fully flexible tickets and high flight frequencies. High frequencies can be developed on spoke routes, employing smaller aircraft (a strategy traditionally available to FSAs): the use of a hub, with feed traffic from spokes, allows more flights for a given traffic density and cost level. More flights reduce the total trip time and increase flexibility (Gillen - Morrison, 2005). According to our analysis, this could be true for intra-European and overseas destinations, but not for domestic connections.

The analysis also supports the argument that fleet composition of an airline is important in affecting its operational performance. Seristö - Vepsäläinen (1997) suggest that a uniform fleet generally leads to better financial results. The challenge of airline management in fleet planning is aimed at allowing a wider choice of aircraft for different routes: moreover, growth in the airline industry brings with it a wider range of available aircraft types (Kilpi, 2007).

De Borges Pan - Espirito Santo Jr. (2004) developed an index suitable for comparing the composition of different aircraft fleets.[7] In recent years, the uniformity of airline fleets has been steadily decreasing, while the average fleet scale has been steadily increasing. The authors observe how, during an economic boom, airline fleets expand in size and variety, showing more diversity

[7] However, their "Fleet Standardization Index" only takes into account the variety of the fleet and ignores its size, thus allowing comparisons between airlines of very different sizes.

in their composition and increasing their scale. This happens as new aircraft are taken into fleets in order to replace older ones. During an economic downturn, airlines retire or park older aircraft, thus adjusting their capacity to better meet the new situation: this increases uniformity if aircraft types leave the fleet entirely and decreases scale when the number of aircraft decreases.

In order to test this hypothesis, in the last specification, we introduced a dummy variable assuming value = 1 if the FSA is characterised by heterogeneity in the fleet composition (Airbus, Boeing and other aircraft) and = 0 otherwise.

This coefficient is not significantly correlated, so perhaps another index of heterogeneity should be introduced; however, in accordance with the paper by De Borges Pan - Espirito Santo Jr. (2004), negative correlation could be an indicator that the airline transport market is in an economic downturn phase.

Fleet composition should be adjusted, increasing the number

TABLE 2.*c*

FIXED EFFECTS MODEL (3^{RD} SPECIFICATION)

R^2-sq: within = 0.9965; between = 0.5977; overall = 0.9238		Corr (u_i, Xb) = -0.2288; $F(9,55)$ = 2325.70; Prob > F = 0.0000	
Variable	Coefficients	Std. Error	*t-ratio*
Lagged fixed assets	-.5974174***	.0049205	-121.41
No. of employees	26.270**	13.128	2.00
Fleet heterogeneity	-238129.2	288097.1	-0.83
No. of destinations (domestic)	-81752.5***	20874.62	-3.92
No. of destinations (European)	-4263.785	9097.683	-0.47
No. of destinations (overseas)	-5133.663	5864.641	-0.88
Alliances	612892.6**	268095.3	2.29
Constant	3892000***	735504.3	5.29
*** = significant at 99%; ** = significant at 95%; * = significant at 90%		sigma_u 3188523.7; sigma_e 686790.79; rho .95566221; F test that all u_i=0: $F(9,57)$ = 29.81; Prob > F = 0.0000	

of aircraft likely to cover long-haul flights. No-frills airlines (i.e. LCCs) are gaining a consistently increasing substantial share of the intra-European market. The negative correlation of domestic flights with successful performance, suggests how, in local markets, price rather than convenience has become a driver of consumer choice (especially for those passengers travelling for leisure).

Generally, airlines operating on a high number of routes at high frequencies are more successful than those companies operating on a small number of destinations with low frequencies. A decision to increase flight frequency on a given route, however, has to take into account whether the estimated demand is likely to generate revenues to cover marginal costs; finally, there might be scale economies and/or network externalities.

4. - Conclusions

The purpose of the analysis in this paper was to highlight some factors that might have an influence in determining FSAs' economic performance after liberalisation in the European air transport market.

We wanted to test two hypotheses:

1) The success of FSAs after liberalisation depends on the choices made by companies to enhance a supply-oriented strategy; this means mainly increasing the number of aircraft and destinations.

According to the results obtained, rather than increasing the number of aircraft, FSAs should adjust the composition of their fleets. Long-haul destinations should be the main focus for FSAs, and domestic destinations do not appear to be profitable (this might be due to a high level of competition on these routes).

Load factors (both total load factors and passenger load factor) do not appear significant in explaining economic performance. Customer satisfaction indicators were not considered and this could be a good point for further research.

2) A strategy for enhancing companies' competitiveness relies

on efficiency increases, and, hence, on a reduction in the level of costs, the latter depending mainly on labour and fuel.

A reduction in the number of employees is not associated with a reduction in costs. A high number of employees is positively correlated to successful economic performance, whereas investments in fixed assets do not appear to exert a 'positive' effect on economic performance.

Some final remarks can be outlined.

First of all, competition might not be on a level paying field because of subsidies that some companies receive from governments at different levels (AEA, 2003). This applies to FSAs as well as LCCs, although subsidization takes different forms and might follow a number of ways (for instance, LCCs might receive subsidies from airports, whereas stated-owned FSAs might get financial assistance from the national government). In a broader perspective, the analysis might include institutional variables related to the financing of companies and to the role of public sector in supporting FSAs.

Secondly, airline companies have to take into account efficiency in airports.

Last, future analysis could compare economic performance after liberalisation (i.e. in the period between 1997 and 2002) and after the year 2002 (when many companies have experienced a downturn in their level of revenues). However, such a comparison is still premature, given the lack of available information.[8]

[8] A considerable change could take place in the next future. In fact, after more than four years of negotiations between EU countries and the US, the Open Skies Agreement has recently been signed. Such agreement will open up the lucrative transatlantic flight market by April 2008. It allows EU airlines to fly from any city in Europe to one in the US, while in turn airports in the EU are opened up to US companies. According to European Commission Jacques Barrot, the agreement has the potential to pave the way for cheaper fares, add an extra 26 million passengers to the route and create 80,000 new jobs. Therefore, the agreement could be worth € 12 billion *(www.europarl.europa.eu)*.

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