

Booking and Flying with Low-cost Airlines

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ABSTRACT

The first part of the paper develops a theoretical framework for the analysis of strategic behaviour of European low-cost airlines that emphasises the role of product differentiation. The second part uses original survey data to assess the effectiveness of low-cost airlines' distribution strategies. Finally, an econometric model is developed to assess the joint impact of the factors affecting the level of the fares charged by low-cost airlines. The evidence suggests that, among other things, the highest prices normally are paid for tickets bought between 30 and 8 days before departure, and thus indicates an original pricing strategy that differentiates low-cost airlines from traditional carriers. Copyright © 2002 John Wiley & Sons, Ltd.

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INTRODUCTION

The deregulation of the airline industry in Europe became fully effective in April 1997. Liberalisation has brought about numerous advantages to European travellers, both in terms of higher quality offered by airlines and drastic price reductions. However, one of the main and most interesting aspects of the free market has been the entry in the

industry of low-cost airlines (LCA). Pender and Baum (2000) clearly describe the operating features that give LCA a cost advantage relative to traditional airlines.

However, the most relevant distinguishing feature of LCA consists of their ability to combine an innovative distribution system such as the Internet with more traditional ones, i.e. telephone and travel agency. Thus, the industry offers an invaluable opportunity to study the LCA's pricing strategies on the Internet or, more generally, to analyse the relevance for the civil air transport market of some of the dimensions that Smith *et al.* (2000) use to define efficiency in electronic markets. In particular, the present study is concerned with assessing whether:

- (1) differences exist in the way LCA set the price level of their products across distribution channels;
- (2) the Internet limits price dispersion (i.e. whether the spread between the highest and the lowest fare is smaller on the Internet).

To this purpose, the present study uses survey data obtained from LCA's passengers interviewed before departing from the airport of London Stansted. More precisely, price dispersion is evaluated using a descriptive analysis, whereas the investigation into the factors affecting the fares paid by passengers is carried out using regression analysis. The estimated models, in addition to controlling for fare differences owing to the booking method, were used to shed some light on whether LCA adopt a price discrimination strategy based on the date of booking, whereby they charge higher prices for tickets bought only a few days before departure. This is particularly important for the business travel-

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lers' segment, whose need to travel on a short notice may be dictated by emergency or problem-solving considerations (Mason, 2001).

Finally, given the emergent nature of such a market, the study attempts to define some of the distinguishing features of passengers flying with LCA. The data indicate that the customer basis of LCA is widely distributed across demographic characteristics, thus suggesting the future expansion of the demand for this kind of product as word-of-mouth mechanisms start to take place (von Ungern-Sternberg and von Weizsacker, 1985).

Before presenting the main findings from the survey, the present study draws the attention to some theoretical elements of LCA's competitive strategies that have been overlooked by the existing literature, namely strategies based on horizontal product differentiation (Besanko *et al.*, 2000).

A THEORETICAL FRAMEWORK FOR THE ANALYSIS OF LCA'S STRATEGIC BEHAVIOUR

Travel choice decisions are based on the assumption that the traveller is 'a rational decision maker who actively searches for options that satisfy his/her air travel plans, evaluates the identified options, and selects the option with the highest overall utility that satisfies his/her individual scheduling constraints' (Prousaloglou and Koppelman, 1999). Moreover, according to Ben Akiva and Lerman (1985) the probability that an individual selects an option is defined as the probability that its utility is larger than the utility of all other alternatives. According to Prousaloglou and Koppelman (1999), when choosing a flight passengers try to maximise their 'air travel utility' which is a function of such elements as 'the market presence, quality of service, frequent flyer membership, fare levels and travel restriction, and schedule convenience offered by each available flight (p. 195)'. In Porter's (1985) terminology, these attributes correspond to 'benefit drivers' that form the basis of a positioning strategy called 'benefit advantage', whereby a firm tries to deliver value to its customers by differentiating its products

from those of its competitors. Is this approach useful to study the market segmentation strategies of LCA?

On the one hand, it is undeniable that the competitive advantage of many LCA is due to the implementation of the other basic strategy suggested by Porter (1985), namely 'cost advantage', and in their ability to deliver value via lower fares made possible by an apt identification of 'cost drivers'. On the other, the following analysis will argue that it is inappropriate to assume that LCA will turn flights within Europe into a commodity, that is, into a homogeneous good sold in a market where product attributes are not relevant.

Although the role of fare levels is paramount, as the subsequent analysis reveals, the above quote from Prousaloglou and Koppelman (1999) suggests a theoretical approach according to which travel attributes will still matter to passengers. Consider, for instance, the role of 'schedule convenience'. At the time this article was being revised (February 2002), EasyJet was offering three daily flights to and from Barcelona and Nice. Similarly, Buzz offers three daily flights to Milan Linate, and GO flies twice a day to Barcelona and Venice. A quick inspection of the departure times reveals that the flights generally are placed in the early morning, in the early afternoon and in the evenings. This suggests that every attempt is made by LCA to cater for the various passengers' needs, whose preferred departure time may be influenced by such factors as the distance passengers have to travel to get to the airport or the time they need to arrive at their final destination.

More generally, it can be argued that strategies based on horizontal product differentiation will constitute an important competitive weapon of LCA, as minimum differentiation engenders intense price competition, which is not beneficial to firms' profitability (Hotelling, 1929). For instance, Borenstein and Netz (1999) find evidence suggesting that when logistical flexibility in scheduling increased after deregulation in the USA, carriers responded by increasing their differentiation from competing brands. In general, theoretical models of spatial differentiation indicate that firms maximise differentiation by locating far

Table 1. Similar destinations by carrier, departure and arrival airport

Destination ^a	Departure airport and airline companies			
	London Stansted			London Luton
	Go	Ryanair	Buzz	Easyjet
Barcelona	BCN		GRO	BCN
Belfast	BFS			BFS
Bologna	BLQ	RMI		
Carcassone (Toulouse)		CCF	TLS	
Edinburgh	EDI			EDI
Frankfurt		HHN	FMA	
Glasgow	GLA	PIK		GLA
Malaga	AGP			AGP
Marseilles Nimes		FNI	MRS	
Milan	LIN	VBS	LIN	
Nice	NCE			NCE
Palma	PMI			PMI
Venice	VCE	TSF		

^a BCN, Barcelona; GRO, Gerona; BFS, Belfast International; BLQ, Bologna; RMI, Rimini; CCF, Carcassone; TLS, Toulouse; EDI, Edinburgh International; HHN, Frankfurt Hahn; FMA, Frankfurt am Main; GLA, Glasgow International; PIK, Glasgow Prestwick; AGP, Malaga; FNI, Nimes Marseilles; MRS, Marseilles Provence; PMI, Palma; LIN, Milan Linate; VBS, Verona Brescia; NCE, Nice; VCE, Venice Marco Polo; TSF, Venice Treviso.

from their competitors in order to reduce price competition (d'Aspremont *et al.*, 1979). From a more practical viewpoint, the need to locate far from the other competitors in order to relax the incentive to start a price war provides an insight into the LCA's choice concerning the departure or the arrival airports.

Indeed, Table 1 shows that the LCA operating from Stansted Airport never fly to exactly the same destination. For instance, GO and Ryanair both depart from Stansted Airport, but, for instance, they land at Venice Marco Polo Airport and Venice Treviso, respectively. When the same destination is served by two or more airlines, the departure airport is always different, with the unique exception of Milan Linate, where both Buzz and GO land. For instance, GO and EasyJet both fly to Barcelona and Malaga. However, GO departs from Stansted Airport while EasyJet departs from Luton. The same theoretical arguments from spatial competition help explain GO's decision in December 2001 to abandon the routes from Dublin to Scotland, which, as GO's management acknowledged, are dominated by Ryan Air.

Implications for market structure

Does product differentiation confer market power to LCA? In other words, will they be able to make profits above the normal rate of return? Even before the tragic events of 11 September, the European LCA were recording high levels of profitability. On 29 October 2001, Easyjet announced an 82% rise in pre-tax profits in the year to the end of September 2001. In 2001, Ryan Air's capitalisation overtook that of British Airways (*The Economist*, No frills, plenty of promise, 3 November 2001). During the three months following 11 September, passenger traffic in Europe for Easyjet, Ryan Air and GO rose by as much as 30% (*The Observer*, 16 December 2001). To understand what effect LCA will have on the market structure of the deregulated European air transport industry, it is worth looking briefly at the American experience. After deregulation in the USA, an initial period of intense entry determined a drastic reduction in the market concentration. This was followed by a consolidation phase and a return to the concentration levels experienced in the industry prior to

deregulation, with conventional airlines still occupying a dominant role in the market (Pender and Baum, 2000). However, the emergence of low-cost entrants has been identified as a significant component in the recent development of the USA air transport industry (Reynolds-Feighan, 2001). The most notable case in this regard is that of Southwest Airline, whose business model has been followed and replicated very closely by many European LCA (The *Economist*, Air Travel Survey, 10 March 2001). Among the main similarities, it is noteworthy that Southwest Airline operates point-to-point, using secondary airports. Vowles (2001) studies the 'Southwest Effect', that is, the extent to which markets in which Southwest Airlines entered saw an increase in traffic and a decrease in average fares. Evidence is found suggesting that such an effect negatively affected fares even in those markets not directly served by Southwest Airlines. Because Southwest Airlines now constitutes an established player in the USA market, it can be inferred that the presence of the LCA on the European short-haul market will be permanent, thereby benefiting European travellers via lower fares and more variety.

Ultimately, the evolution of the industry's market structure will be determined by the interplay of LCA's and traditional airlines' competitive strategies, within the boundaries constituted by the regulatory framework. Marin (1995) argues that although the bilateral agreements introduced in Europe in 1994 increased competition in the short-run, they did not ensure the efficiency improvements that the development of a fully competitive framework would bring about. The author points out that such factors as the control of airport facilities and of other ancillary services by incumbent carriers may have prevented the industry from realising effective competition. These factors are likely to remain crucially important for sustaining a competitive advantage. For instance, in December 2001 GO announced the establishment of a third UK base at East Midlands airport. BMI British Midland, which has been using this airport as its home base for more than 35 years, responded by launching a new low-cost airline offering one-way tickets to such destinations

as Barcelona, Nice, Palma, Malaga and Faro. Such an example suggests the strategic importance that BMI British Midland attaches to maintaining its dominant position at East Midlands airport. It also indicates the possibility that more traditional carriers may create their own low-cost brands to compete more effectively in this market segment. In this case, competition may intensify because the spatial differentiation strategy identified above collapses, as more LCA will be forced to depart from and arrive to the same airport. Indeed, in the East Midlands case, all the airlines involved will be competing head-to-head on the same routes. However, the intensity of price competition may be mitigated by the fact that the increase in the number of available alternatives will induce an increase in demand, and consequently, the possibility for more than one carrier to operate profitably. Vowles (2001) observes that the entry of Southwest Airlines had such a market expansion effect.

Of course, incumbent LCA are not likely to wait patiently for traditional airlines to organise a viable response to their competitive strategies. As the above example illustrates, the main threat for incumbent LCA comes from the creation of low-cost brands owned by traditional carriers. Dixit (1980) demonstrates how investment in capacity can provide the means for an incumbent to deter entry by credibly committing it to behave aggressively if an entrant should enter. Empirical evidence supports Dixit's theory. Lieberman (1987), in his analysis of 38 chemical industries, finds support for the proposition that announcements of entry are followed by expansion of capacity by incumbents. The survey of Singh *et al.* (1998) for the UK indicates that capacity investment is used to raise entry barriers by about 20-24% of the firms surveyed. Quite interestingly, in January 2002 amidst the worst financial crisis that ever hit the industry, Ryan Air placed an order for one hundred Boeing 737-800 aircrafts with options for fifty more planes in a deal worth \$9.1bn. Similarly, EasyJet is considering increasing its fleet by acquiring seventy five aircrafts by 2007.

To conclude, the evolution of the market structure in the deregulated European aviation industry will prove to be a very interesting object of analysis, because of the competitive

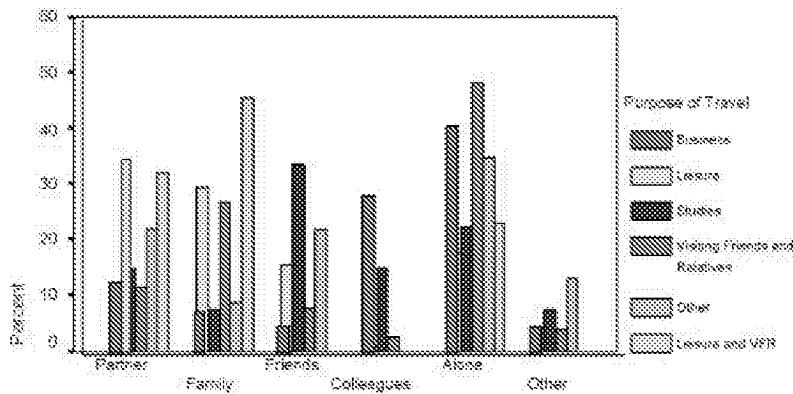


Figure 1. Purpose of travel by type of travel companions

strategies used by all the players involved. It is, however, difficult at this stage to predict whether the eventual market configuration will differ from the current American one. The previous discussion has highlighted how airlines' strategic behaviour may affect the market structure in the short and the long run.

ORGANISATION OF THE RESEARCH AND DATA COLLECTION

The research is based on the analysis of data collected through a survey conducted over a period of three days (two week days and a weekend day) in August 2000 in the airport of London Stansted. The sample includes 347 passengers flying to a number of destinations

served by the airlines Buzz, Go and Ryanair. Passengers were approached while they were queuing for check-in. The same strategy is used in Mason (2001). The information requested regarded the flight chosen, means of transport and distance to both airports of departure and arrival, reservation systems and demographic questions. The same destination was considered only in one day, in order to have comparable measures regarding the price paid. Obviously, as different flight times may attract different prices, each destination was considered only once in a day.

DATA ANALYSIS

Given the limited size of the sample relative to

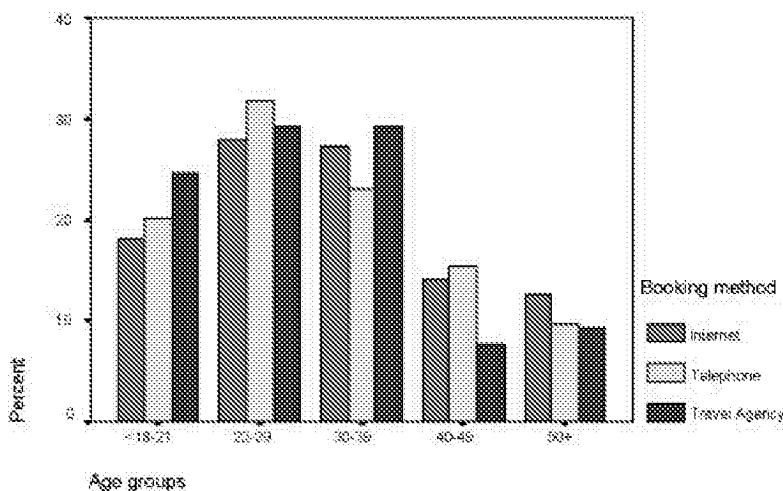


Figure 2. Booking method by age

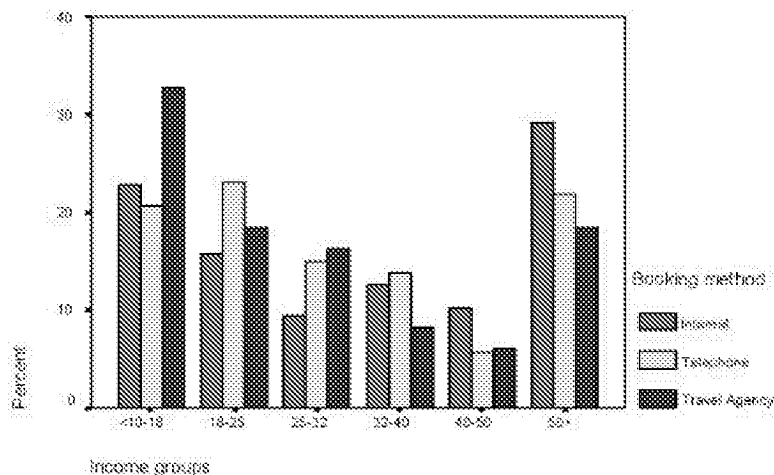


Figure 3. Booking method by family income

the total number of passengers flying with LCA, in order to draw any general conclusions about the effectiveness of the distribution strategies of LCA, and their relationship with the pricing tactics, it is necessary to examine whether the responses given by the passengers are reliable. Figure 1 indicates that the questionnaire's items were, on the whole, carefully provided. Indeed, it shows that the reported "purpose of travel" is generally consistent with the response to the question on travel companionship. Indeed, Figure 1 clearly shows that the majority of those travelling on business either travelled alone or with colleagues.

Similarly, people travelling for 'leisure' or to 'visit friends and family (VFR)' tended to travel with their partner or family and, in the case of VFR, alone. Those undertaking a study trip tended to be accompanied by friends or to travel alone. Having ascertained the reliability of the data, further analysis is conducted in the subsequent sections.

Booking methods

A clear indication of the efficacy of LCA's penetration strategies is represented in Figures 2 to 4, which show how their customer base is

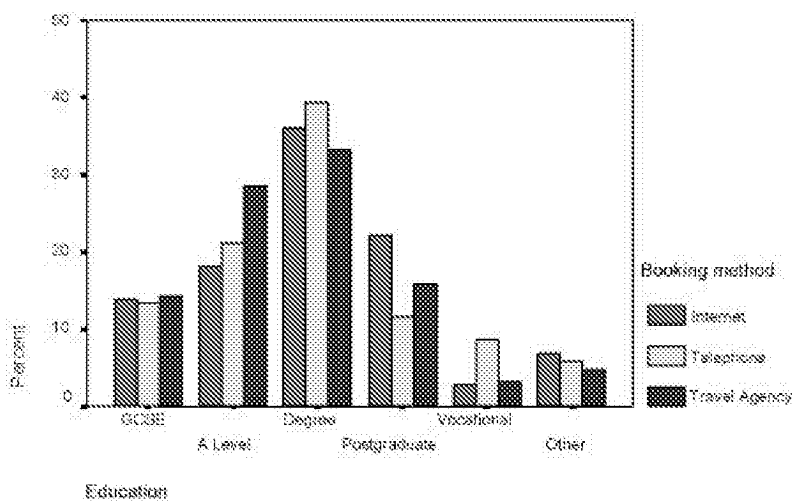


Figure 4. Booking method by education

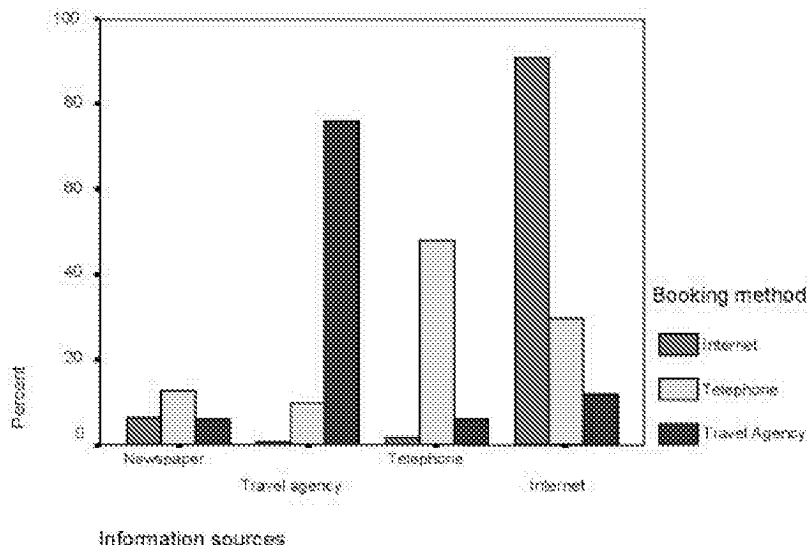


Figure 5. Information sources and booking systems

widely distributed across age cohorts, income groups and type of education. This further supports the claim of reliability of the data. However, an interesting feature is that the data do not indicate any profile of passengers that distinguishes between their likelihood to use a given booking method. Weber and Roehl (1999) find that consumers that purchase travel on-line tend to be middle-aged, highly skilled and high income. Bonn *et al.* (1999) reports evidence suggesting that the people using the Internet to search for travel-related information are more likely to be, among other things, college educated and less than 45 years of age. On the contrary, the data do not point to any clear-cut relationship between demographic variables and the booking systems used to buy the ticket. Indeed, the three booking methods seem to be distributed evenly among age, income and education groups. On the one hand, the data are consistent with the findings in the two previous studies cited above. Indeed, the greatest proportion of Internet bookings were made by passengers aged between 22 and 39, with a university degree or a postgraduate qualification and with a high income. On the other hand, a similar observation can be made for bookings made with the other distribution channel. The survey thus indicates a first rationale for using a multi-channel approach. As the choice of a booking

method seems to be dictated by personal preferences that cannot be related to a set of specific demographic attributes, the most sensible strategic choice for LCA is to rely on a variety of channels and let the consumers choose the one they prefer. A second rationale is indicated by Figure 5, which suggests strong consumer's inertia in the search process leading to the decision to purchase a ticket. Almost 90% of the consumers who booked via Internet gathered information about the flight on the Internet itself. Similarly, almost 80% of those who bought from a travel agent also obtained their information from a travel agent. This suggests that the channel used to gather information tend to be the same channel used to make the purchase. Furthermore, a great proportion of those who obtained information from a newspaper booked using the telephone.

In the next section the reason why and how this inertial behavior may facilitate the implementation of differential pricing strategies across distribution channels is discussed.

PRICING STRATEGIES ACROSS DISTRIBUTION CHANNELS

Shapiro and Varian (1999) challenged the myth that e-commerce would create a frictionless market. Smith *et al.* (2000) use four dimensions

to define economic efficiency in an electronic distribution system, relative to its conventional counterparts. The dimension on which the subsequent analysis is focused is price dispersion, defined as the spread between the highest and the lowest fare, and the average fare levels. Price dispersion traditionally is associated with the presence of search costs or the fact that consumers are imperfectly informed of prices (Crane and Jackson, 2000). As search costs are supposed to be lower in electronic markets where consumers can more readily retrieve useful information, the spread should be smaller in the case of Internet booking.

Smith *et al.* (2000) describe several potential sources of price dispersion online. Their analysis also may shed some light on the differences in prices between electronic and conventional distribution systems. As Figure 5 shows, passengers tended to use the same distribution system both to acquire information and to make the final purchase. Such inertial behaviour may be explained by differences in the value of time among passengers, which in turn give the airlines the opportunity to pursue different pricing strategies based on the distribution system. That is, search costs or switching costs may be incurred when consumers have to use a booking system that differs from the one used to gather information. For instance, after having ascertained on the telephone that availability of a certain flight exists, a consumer may want to check whether a better deal could be obtained on the Internet.

However, various costs would be incurred, were the consumer to choose such a strategy. First, LCA charge a per-minute fee for queries or bookings made on the telephone. Second, finding the home page of the chosen LCA may be easier said than done. With the exception of Ryanair and EasyJet, the other LCA are characterised by URLs, i.e., their address on the Web, that do not fully coincide with their brand name. Furthermore, after accessing the relevant home page, the passenger will still need to devote some extra time and effort to learn how to make enquiries online. Some learning effects reduce the relevance of this last inconvenience over time, but it is fair to assume that some consumers may be put off altogether by the task of having to learn how and where to find the information they need

on the Internet. Clemons *et al.* (2000) observe that the lowest and the highest price in their sample came from two online travel agents that were owned by the same parent company. The two travel agents differed considerably in the quality of their user interface: that of the low-cost agent was more difficult and less intuitive to use, whereas the high-priced agent adopted a more recent, highly sophisticated technological design for its site. Thus, increasing search costs by adopting differential designs constitutes an effective strategy that discourages time-sensitive travellers from engaging in personal arbitrage, thereby facilitating price discrimination and dispersion.

Moreover, when selecting a booking method, consumers may prefer to deal with the distributor on a personal basis, especially when they are not willing to release their credit card details online. Such wary behaviour is compounded by the fact that LCA operate a ticket-less system. The need to reassure the buyer about their trustworthiness explains why all LCA have introduced the possibility of confirmation of online bookings via e-mail.

The evidence presented in Table 2 does not seem to indicate any clear pattern that links lower prices or less price dispersion to a specific booking system in each specific route. The evidence presented clearly shows that passengers on the same flight are very likely to have paid fares that differ considerably. However, it is not possible to draw any definitive conclusion as to whether price dispersion on the Internet is lower than in other distribution channels. This may be due to the fact that the surveyed fare levels are affected by relevant factors other than the distribution system. The joint analysis of these factors is carried out in the next section.

METHODOLOGY AND HYPOTHESIS

The impact of the factors that are likely to affect fare levels can be examined using a regression analysis.

The dependent variable is the price paid for the ticket, as reported by the interviewees. In order to control for specific effects owing to differences in the final destination or in the pricing strategies pursued by the airlines, two

Table 2. Price dispersion by destination and booking method

Destination	Internet			Telephone			Travel agent		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Carcassone	105	44	215	150	65	280	139	130	147
Biarritz	122	100	162	120	120	120	119	107	140
Barcelona	115	73	150	93	61	150	144	90	198
Bilbao	79	68	99	220	150	255	—	—	—
Madrid	67	60	150	86	70	100	233	233	233
Malaga	168	128	248	100	90	125	—	—	—
Alghero	95	50	150	220	220	220	75	30	120
Genoa	73	73	73	—	—	—	107	78	200
Ancona	115	90	140	150	150	150	139	78	250
Rimini	92	25	130	112	50	170	99	99	99
Treviso	128	29	244	166	131	200	88	81	94
Venice	91	37	182	118	115	120	120	115	125
Lametia T.	72	60	82	103	70	135	95	81	114
Brescia	109	50	230	200	200	200	74	62	88
Milan	81	78	83	106	78	130	—	—	—
Edinburgh	84	38	142	146	140	152	140	140	140
Glasgow	5	5	5	—	—	—	180	180	180
Dublin	42	22	62	200	200	200	140	140	140
Shannon	79	30	150	54	27	75	56	35	75
Knock	103	66	140	68	68	68	136	136	136

models are estimated. In the first, twenty dummies for each destination with at least four entries in the data base are included. The second model includes a dummy identifying all passengers flying with one of the airlines, i.e. 'Ryanair'. It is expected that the two models should yield similar results as only a few destinations are served jointly by the two airlines. After rejecting cases with missing values, the number of questionnaires considered in the estimation is 247.

The explanatory variables or regressors can be classified into three categories: distribution channels, date of booking and market specificities. The expected effect of each variable on the price paid is indicated in the following discussion.

(1) *Distribution channels*. Interviewees were asked from which of these channels they had chosen to buy the ticket: Internet, a travel agency or the telephone. Two dummy variables were constructed, 'Internet' and 'travel agency', that equal 1 if the ticket was bought using one of the channels. Because no dummy is constructed for the

'telephone' system, the coefficients associated with the included dummies report if fares are higher or lower for tickets bought from an agency or on the Internet, relative to the telephone system. Previous literature indicates that prices on the Internet generally are lower for homogeneous products (Brynjolfsson and Smith, 2000). Thus, a negative sign for the coefficient of Internet is expected, while a priori no hypothesis is made regarding the 'agency' variable, as it is not clear whether airlines would choose to charge less or more for tickets bought via an agency or on the phone.

(2) *Time of booking*. Differences in price elasticity among different consumers' groups constitute the economic rationale for price discrimination (Carlton and Perloff, 2000). Traditional airlines tend to charge higher prices for tickets bought only a few days before departure, on the grounds that the demand of such passengers is highly inelastic. Respondents were asked whether the booking was made: 'Within one week', 'Within two weeks', 'within one month', 'within two months', or 'more than 2

months' before departure. Three dummy variables were constructed to assess the differences in the cost of tickets bought within a week (*one week*), within two weeks (*two weeks*) or within a month (*one month*), relative to those bought more than a month in advance. Again, it is not clear a priori which sign one should expect for these variables. On the one hand, Pender and Baum (2000) argue that the cheapest seats are sold first, which would imply that the coefficient of '*one month*' should be smaller than that of the other two dummies and that of '*One Week*' should be the greatest. On the other hand, given the relatively low prices charged by these airlines, customers who want to secure a place well in advance on a given date may be willing to pay a premium price because, for instance, they want to avoid having to reschedule their entire holiday plans. Hence, it is profit maximising for the airlines to charge higher prices for tickets booked well ahead of the departure date. Moreover, yield management considerations may induce airlines to lower prices for tickets bought only a few days before the departure date. Thus, according to this strategy, the coefficient of '*One Week*' should be lower than the other two.

- (3) *Market specificities*. Given the period when the survey took place (August 2000), it is reasonable to assume that the demand of outward journeys by UK citizens, especially towards southern European destinations, is greater and more inelastic than the demand for travel by southern European citizens towards Britain. Indeed, the latter have more possibility to substitute the journey to Britain with an alternative form of vacation. If this is the case, it is revenue enhancing to set the price in the more inelastic market at a higher level (Carlton and Perloff, 2000). To take these differences into account, the airlines can easily apply different fares depending on whether the departing airport is based in UK. Therefore a dummy variable that considers whether the passenger is resident in the UK is included. If the assumption that the demand of journeys to other European countries is more inelastic in the

British market is correct, then we should expect the coefficient of this variable to be positive.

However, the ticket fare is only one element of the total travel cost that passengers incur, which also includes the cost of reaching the airport from the place of residency. This can be both an opportunity cost, i.e. the value of an individual's time spent on the journey to the airport, and a monetary expense, i.e. the cost of the service used to reach the airport. Individuals residing far from the airport may be, *ceteris paribus*, more price sensitive as they have more incentives to shop around in search of the best bargain. The interviewees provided information about the distance between their place of residency and the airport. This information was used to construct the variable '*transfer distance*'. It is expected that the further the passengers reside from the airport, the lower is the price at which they would be willing to buy. Thus, the expected sign for the '*transfer distance*' coefficient is negative.

Finally, a dummy variable was included to identify those passengers whose main purpose of travel was '*business*'. On the one hand, it is not possible for the airlines to identify the reason for travelling. Thus one should not expect to observe business travellers being charged more. On the other hand, as Mason (2001) finds, a certain proportion of business travellers indicate '*emergency/problem solving*' as their travel purpose. This implies that they may be forced to buy their tickets only a few days before departure, and thus pay a premium. To test this hypothesis, the dummy '*Business*' was interacted with the dummy variable '*Fortnight*' indicating those tickets bought within 2 weeks from departure. The discussion above suggests that this variable should be positive.

The statistical and econometric methodology

The above models are estimated using ordinary least squares (OLS) regressions. The use of such a methodology to assess whether the factors under analysis have a statistical significance in determining fare levels is correct only under certain circumstances, one of which is the absence of heteroskedasticity.

Table 3. OLS regressions: Dependent variable is ticket price

	Model 1 ^a	Model 2 ^b
Constant	100.5 (7.77)***	103.48 (13.4)***
Internet	-13.28 (-2.13)**	-14.9 (-2.35)**
Travel agency	2.16 (0.23)	-4.3 (-0.48)
Business	4.35 (0.51)**	-2.77 (-0.32)*
Business* fortnight	28.11 (1.94)**	32.61 (1.97)**
One week	-3.7 (-0.37)	0.8 (0.092)
Two weeks	14.77 (1.4)	23.07 (2.16)**
One month	14.56 (1.73)*	20.72 (2.53)**
UK resident	13.7 (2.24)**	20.98 (3.05)***
Transfer distance	-0.063 (-1.63)*	-0.052 (-1.4)
Ryan Air		-13.96 (-1.97)**
R ² – adjusted R ²	0.252–0.152	0.15–0.114
N	247	247
F test	F[29,217] = 2.52***	F[10,236] = 4.17***
Breusch–Pagan test for homoscedasticity	$\chi^2(29) = 50.22$ ***	$\chi^2(10) = 20.96$ ***

^a Dummy variables for 20 destinations were included in the regression. Wald Tests conducted for the following linear restrictions: joint significance of 20 dummy variables, $\chi^2(20) = 35.156$ **^{*}; joint significance of one week, two weeks and one month, $\chi^2(3) = 6.52$ *; joint significance of travel agency and Internet, $\chi^2(2) = 5.28$ *.

^b Wald Tests conducted for the following linear restrictions: joint significance of one week, two week and one month, $\chi^2(3) = 11.84$ ***; joint significance of travel agency and Internet, $\chi^2(2) = 5.67$ *. and t-statistics in parentheses are significant at, respectively, the ***1%, **5% and *10% levels.

This occurs when the regression residuals, i.e. the differences between the actual and the estimated values of fare levels, have different variance. It is necessary to take a remedy against heteroskedasticity as it makes the statistical inference of the regression's coefficient invalid. In other words, failing to correct for heteroskedasticity implies that it is not possible to determine accurately if a coefficient is statistically different from zero using a standard *t*-value test. A standard procedure in the economic and econometric literature is to use White's standard errors for residuals to correct for heteroskedasticity (Johnston and DiNardo, 1997). Indeed, the Breusch–Pagan test in Table 3 shows that such a correction was necessary, as the null hypothesis of homoskedasticity was rejected by the test at a high significance level. Furthermore, to assess the correctness of the model's specification, the Wald tests reported at the bottom of Table 3 are used to test the hypothesis that the coefficients of a set of regressors are jointly equal to zero. If the hypothesis is rejected, then we infer that the regressors help explain the variability of fare levels in a statistically meaningful way. The tests' results for all the estimated model

reveal that the destination dummies, the variables 'one week, two weeks and one month' and the variables 'travel agency and Internet' can all usefully be included in the analysis of fare levels.

The models' results

The empirical estimates reported in Table 3 provide support for the hypotheses made above. The findings suggest that bookings through the Internet are, on average and in a statistically significant sense, cheaper than those made using the alternative channels, even after controlling for specific factors such as the destination or the airline. No evidence is found for differences in charges for purchases made via a travel agent, relative to those made on the telephone. The premium paid for booking offline may be justified by the consumers' unwillingness to release their credit card details online and by the trust that a more personalised service engenders.

Furthermore, the empirical findings show that tickets bought only a few days before departure are cheaper than those purchased within the four preceding weeks. Indeed, the

coefficients of 'two weeks' and 'one month' are greater than that of 'one week', and statistically significant. The evidence thus suggests the use of a pricing strategy that distinguishes according to the customers' willingness to gamble on whether they will be able to obtain a place on a flight due on a specific date. Those who do not want to face any uncertainty, book in advance to assure a seat, and pay a premium. This is especially relevant in this survey, which was carried out during the peak season of mid-August, when the likelihood of finding a place on a flight due on a convenient date is reduced by high demand. However, because in model 2 the coefficients of the three variables are all positive, *a fortiori* the evidence suggests that the tickets reserved 31 days or more before the departure date cost the passengers less, in line with the argument put forward by Pender and Baum (2000). That is, cheaper flights are also offered well in advance the day of departure. However, the present analysis indicates that the higher charges are not made just before the departure date, but between 30 and 8 days before departure.

Finally, the assumption that market characteristics in Britain should lead to higher prices for UK residents is supported by evidence. Individuals residing in the UK pay, on average, a premium price of almost £14 in the first model, and almost £21 in the second. Moreover, the evidence suggests a negative correlation between the price paid by passengers and the distance they travelled to reach the airport, thereby indicating that consumers evaluate the total cost of travel before making their purchasing decisions. Finally, as expected, on average business travellers did not pay higher fares. However, those who booked within fifteen days from departure paid a premium of £28 in the first model, which rises to almost £32 in the second. Such differences are statistically significant at the 5% level. This finding further supports the previous discussion on booking dates.

To sum up, the econometric evidence provides support to the hypothesis that LCA practice price discrimination tactics based on the location of the originating airport, the method and the date of booking. Although it is clear that the incentive to implement such tactics may be greater during the high season

period, when these tactics may yield very high premiums, it is not obvious a priori whether such strategies should not be used also in other periods. More research is needed to verify the relationship between price discrimination in this market segment and seasonality.

CONCLUSIONS

The study showed that the success of LCA may not depend only on their ability to keep operating costs low, but also on the implementation of pricing strategies that attract various segments of consumers and increase the carriers' load factors, thus helping to maintain low fixed costs. Indeed, the study identified an innovative way used by LCA to differentiate their flights from those of their main competitors. Using the main tenets of spatial competition theory, it was argued that LCA relax price competition by choosing a maximum differentiation strategy, which is implemented practically by serving different destinations. Thus, not only lower landing fees may justify the choice of smaller, regional airports, but also strategic considerations. When the same destination is offered by two LCA, it is usually the case that the departing flight originates from a different airport. The pricing and product differentiation strategies highlighted in this study, and the LCA's success in attracting a wide variety of consumers using alternative marketing channels, help explain the excellent financial performance of European LCA. Finally, an econometric model was developed to estimate the impact of such factors as date of booking and method of booking, on the price paid by the passengers participating to a survey organised in August 2000 at Stansted Airport. The econometric analysis reveals that, at least during the high season, LCA try to price discriminate by charging different fares depending on the country in which the flight originates, the method and the date of booking. More research is needed to assess the relationship between price discrimination and seasonality.

It is thus worth concluding by pointing out some potential areas of future research. As Varian (2000) suggests, 'one great advantage of the online world is that it is easy to monitor

sellers' behavior'. This should facilitate research aimed at evaluating whether price matching occurs online, especially in those destinations located in areas where two or more LCA operate. Furthermore, monitoring airlines online could indicate the frequency with which they change the advertised prices, thereby providing an indirect estimate of the menu costs that online retailing strategies entail.

Finally, the arguments developed in the first part of the study indicate that the evolution of the market structure in the deregulated European aviation industry will continue to attract the interest of academics, practitioners and policy makers. The present study suggests that the equilibrium market configuration will be shaped by the interplay of the strategic behaviour of LCA and traditional carriers, to the extent that competition authorities could soon be called to assess if anti-competitive behaviour has occurred in the industry.

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