European Journal of Operational Research 246 (2015) 651–660

Contents lists available at ScienceDirect

European Journal of Operational Research

journal homepage: www.elsevier.com/locate/ejor

Innovative Applications of O.R.

The impact of the internet on the pricing strategies of the European low cost airlines

L. Moreno-Izquierdo[1], A. Ramón-Rodríguez[1], J. Perles Ribes*

Institute of International Economics, University of Alicante, Campus S.Vicente del Raspeig, 03080 Alicante, Spain

ARTICLE INFO

Article history:
Received 28 November 2014
Accepted 4 May 2015
Available online 9 May 2015

Keywords:
Low cost airlines
Airline pricing
ICT
Travel industry strategies
Air fares

ABSTRACT

This study seeks to analyse the price determination of low cost airlines in Europe and the effect that Internet has on this strategy. The outcomes obtained reveal that both users and companies benefit from the use of ICTs in the purchase and sale of airline tickets: the Internet allows consumers to increase their bargaining power comparing different airlines and choosing the most competitive flight, while companies can easily check the behaviour of users to adapt their pricing strategies using internal information.

More than 2500 flights of the largest European low cost airlines have been used to carry out the study. The study revealed that the most significant variables for understanding pricing strategies were the number of rivals, the behaviour of the demand and the associated costs. The results indicated that consumers should buy their tickets before 25 days prior to departure.

1. Introduction

In recent years, the analysis of prices in the air transport sector has focused on the dispersion of fares and optimal pricing in line with the developments made in yield management. This analysis has evolved from the first articles by Smith, Leimkulher, and Darrow (1992) or Botimer (1996), related to strategies to address last-minute demand or overbooking to the recent studies by Aydin and Morefield (2010) or Ater and Orlov (2010), in which optimal pricing strategies are considered as being structural and inherent in industries with high semi-fixed costs.

The literature published in the last decade has referred to a wide range of elements that intervene in the yield maximisation of airlines, such as the number of seats sold, the geographical location, the distance or the behaviour of demand. Despite these studies, there is no reliable model for predicting the optimal purchase timing by consumers (Button & Vega, 2007), although certain repeated patterns depending on the market type have been observed, as we shall see in this paper.

One of the variables affecting both optimal pricing strategies and optimal purchase timing is related to the inclusion of ICTs in the airline market. The appearance of the Internet has changed how demand and supply are communicating, with the creation of platforms where users and buyers interact (Rochet & Tirole, 2003). As Ramón-Rodríguez, Moreno-Izquierdo and Perles-Ribes (2011) pointed out, the Internet effect has been observed from two different perspectives in the air transport industry: first, it provides a higher volume of information for sellers than ever before, creating new possibilities for price adjustment and dispersion thanks to an abundance of real-time user data (Dana & Orlov, 2009); second, according to Ackerman (2006), the Internet allows consumers to compare different airline fares and airport combinations in a matter of seconds, which implies an increase in the bargaining power of users, forcing airlines to be more competitive. However there are asymmetries of information that benefit companies. Airlines obtain a wealth of data from consumer behaviour to establish pricing, but on the other hand users do not know relevant information as how many seats have been sold or when companies are going to change their fares.

This paper studies this double effect of the ICTs on price configuration seeking a real approximation of how the Internet is affecting airlines pricing. To do this, the study has been based on a general price determination model which includes more than twenty variables, most of which are described in the literature review in Section 2 of this paper, including three Internet related variables. Section 3 defines the empirical model for a sample from 2011 representing low cost tourist flights in Europe (Section 4). Finally, in Section 5, the results are presented and conclusions are drawn, with the aim of responding to two questions: how does the Internet affect purchases and sales in the air transport sector? May this model be used to improve benefits for other industries?

* Corresponding author. Tel.: +34 965903609.
E-mail addresses: luis.moreno@ua.es (L. Moreno-Izquierdo), anar@ua.es (A. Ramón-Rodríguez), jf.perles@gmail.com, jose.perles@ua.es (J. Perles Ribes).
[1] Tel.: +34 965908732.

http://dx.doi.org/10.1016/j.ejor.2015.05.013
0377-2217/

2. Current research

In recent years there has been a growing interest in price determination in the air transport industry and other perishable products distributed by the Internet, with the analysis focusing particularly on price dispersion and revenue maximization (Anjos, Russell, Cheng & Currie, 2005; Otero & Akhavan-Tabatabaei, 2015). On the whole, this is explained by a structure of very high fixed and semi-fixed costs, which obliges companies to optimise each fare sold in order to make flights profitable (Bilotkatch, 2005; Aydin & Morefield, 2010). In addition, there is a considerable influence from external variables and macro variables such as GDP, population, exchange rate or oil prices (Dresner, Lin& Windle, 1996; Verlinda & Lane, 2004).

Price dispersion in the industry became more acute with the emergence of the low cost companies, generating a decrease in average prices and consumer welfare gains, according to Schipper, Nijkamp and Rietveld (2007). These companies still set the trend in the air transport industry, particularly in Europe.

2.1. Dynamic pricing and low cost airlines strategies

Dynamic pricing, or yield management, allows companies to increase profits –especially when a product expires at a point time-basing on the demand information. Then the Internet and the ability to collect detailed information about customers' behaviour are crucial in order to understand dynamic pricing and companies' benefits (Elmaghraby & Keskinocak, 2003). Dynamic price competition has been deeply studied in Industrial Economics (see Tirole, 1988), and some theories from Industrial Organization, as the fat cat effect (Fudenberg & Tirole, 1984) has been used to explain the competitive behaviour of airline market.

According to Malighetti, Paleari and Redondi (2010), the price dispersion of low cost airlines can be explained, on the whole by the number of days before departure when ticket purchases are made. However, this is not the only determining factor. In fact, the evolution of fares of companies such as Ryan Air or EasyJet is not usually linear, but follows an irregular "U" curve. According to previous research, such as Alderighi, Cento, Nijkamp and Rietveld (2012) for Europe, or McAfee and te Velde (2006) in the case of the United States, middle bookers are those who obtain the cheapest rates. According to Piga and Bachis (2007) this strategy may lead to situations where the fares of low cost companies are even higher than those of scheduled airlines during the last few days before departure. These authors explain the price dispersion of low cost airlines as the adjustment between the real load factor and the predictions made, particularly during the last two weeks before the flight.

For many authors, price discrimination is related to market concentration, although no clear conclusions have been drawn. Studies carried out prior to the expansion of the low cost model found a positive relationship between market concentration and price dispersion (see Borenstein, 1989; Hayes & Ross, 1998; Stavins, 2001, among others), although in European markets this relationship was found to be negative (see Giaume & Guillou, 2004; Gerardi & Saphiro, 2007; Gaggero & Piga, 2011). According to Giaume & Guillou (2004), this difference could be due to the fact that the European routes are usually operated by several companies with a lower concentration of market power than in the American routes, in which traditional, charter and low cost companies with a low capacity are competing against each other.

It could be said, therefore that the competition between low cost airlines in Europe generates a reduction in prices that is higher than that generated by the rivalry between traditional airlines (Alderighi, Cento, Nijkamp & Rietveld, 2011), which, in turn, leads to a greater dispersion of prices.

Contrary to the traditional airlines, the low cost companies do not use third degree price discrimination formulas beyond charging more to passengers who wish to board the aircraft first or choose a seat. Therefore, airlines such as Ryan Air or EasyJet must segment the market depending on the type of route or flight. Different authors have observed that holidays (Malighetti, et al., 2010), the day of the week or the month of purchase (Salanti, Malighetti & Redondi, 2012), or even the number of days that the passenger is to stay in the destination (Alderighi, et al., 2011) are used by airlines to differentiate between business passengers and tourists. The results of the study of EasyJet conducted by Salanti, et al. (2012) reveal that tourist routes exhibit lower dispersion and lower average fares than business routes, and other variables such as GDP, the population volume or predominant economic activity in the regions of origin and destination could be behind the different strategies implemented by the airlines (see Table 1).

Another factor that is fundamental to understanding price dispersion in the air transport industry is the emergence of the Internet, as pointed out by Bachis and Piga (2011) based on their study of different European low cost airlines. The effect of the Internet has been particularly significant in domestic markets, as indicated by Orlov (2011), where the average price of fares reduces as the possibilities of price variation increase without being penalised by the demand. This effect has awakened greater interest in the evolution of prices in the short term, with almost daily monitoring. In previous studies, such as Keeler (1972), Butler and Huston (1988), Morrison and Winston (1990) or Evans and Kessides (1993) among many others, the timeframe used is much longer than one year. However, the more recent studies analysing price dispersion use timeframes of months (such as Alderighi, et al., 2011 or Salanti, et al., 2012) or even days. For example, Escobari and Jindapon (2008) use a sample of eighty-two days; Stavins (2001) thirty-five days; and Giaume and Guillou (2004) twenty-two days, with almost daily observations of the fares.

2.2. Measuring the impact of the internet on air fares

According to many authors, e-commerce generates a greater efficiency of markets in terms of prices and elasticity (see Smith, Gunther, Rao, & Ratlife, 2001; Gillen & Lall, 2004; and Verlinda & Lane, 2004). In general terms, Ernst (2003) points out that the Internet promotes the direct interaction between companies and users which implies that, despite the distances involved, it is close to achieve markets of perfect competition. This adjustment leads to a decrease in prices and a greater dispersion according to Sengupta and Wiggins (2006), Brunger (2010) or Piga and Filippi (2002) among others. At the same time, according to Dana and Orlov, (2009) these effects lead to a higher average load factor in regions with a larger number of Internet users, which reinforces the effect of the ITCs on the supply of the sector[2].

In the case of the demand for air transport, the Internet provides users with more information about the market. According to the study carried out by Baye, Morgan and Scholten (2004), there are three types of different users in online sales: those who search and find the most economic fares; those who directly search a brand due to recognition and expected quality; and finally, those who want to obtain the lowest prices but are not familiar with the tools that they need to use in order to find them. As highlighted by Brunger (2010), over time, the first group is becoming consolidated, generating a reduction in fares.

The penetration of the Internet in a society is directly related to the access of information by users, as mentioned by Garín-Muñoz and Pérez-Amaral (2011). This effect has also been observed in the air transport sector by Orlov (2011), who found an inverse relationship

[2] It is true that in some articles, such as Clemons, Hann and Hitt (2002) or Lehman (2003) price changes generated by the effect of the Internet have not been observed although Brunger (2010) puts this down to the collection of data at a very early stage when the Internet had still not become consolidated as a rival for travel agencies.