Journal of Air Transport Management 54 (2016) 1–8

Contents lists available at ScienceDirect

Journal of Air Transport Management

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

Quantity price discrimination in the air transport industry: The easyJet case

Mattia Cattaneo*, Paolo Malighetti, Chiara Morlotti, Renato Redondi

Department of Management, Information and Production Engineering, University of Bergamo, Italy

ARTICLE INFO

Article history:
Received 13 November 2015
Received in revised form
7 March 2016
Accepted 10 March 2016
Available online 25 March 2016

Keywords:
Quantity discount
LCCs
easyJet
Two-part tariff

ABSTRACT

This paper extends the literature on low-cost carriers' pricing strategies by investigating the presence of quantity price discrimination implemented through a two-part tariff in offered fares. By analysing Internet fares for all easyJet flights departing from the Amsterdam Schiphol airport between March and April 2015, we search for price differentials based on the number of seats booked by a single consumer. We find that the lowest average unit price is associated with a single consumer reserving 5 seats. On average, the per-seat discount for a single consumer reserving 5 seats is €9.48, which is 14% of the single-seat fare. Additionally, a multivariate analysis shows that quantity discounts are greater for flights with a larger fraction of available seats at the time of booking, the seats are booked longer in advance, and the destination's gross domestic product per capita is greater. Conversely, quantity discounts are lower for longer routes, larger destination airports, and routes for which easyJet's market share is higher.

1. Introduction

In the airline industry, price discrimination is known to play a crucial role in setting profitable strategies. Traditional carriers have begun to maximise profits by use of a yield management approach, in which they provide different travel classes (business vs. leisure) to suit passengers' various willingness to pay (Giaume and Guillou, 2004; Shapiro et al., 1999). However, this type of price discrimination, namely third-degree price discrimination, cannot generally be implemented by low-cost carriers (LCCs), since they tend to provide the same level of service for all passengers[1] (Moreno-Izquierdo et al., 2015). Instead, LCCs generally rely on inter-temporal price discrimination (e.g. Alderighi et al., 2015). They differentiate between highly price-inelastic business passengers, who typically book just a few days before departure, and price-elastic leisure travellers, who often book in advance, and then they maximise revenues by increasing the fares offered as the day of departure approaches (Bergantino and Capozza, 2015). Furthermore, LCCs have been also found to segment the market with regard to some route features, such as length and frequency, and departure day being on a weekend, bank holiday, or other high-demand period (e.g. Malighetti et al., 2010; Piga and Bachis, 2007; Salanti et al., 2012). Interestingly, only a few recent studies have mentioned that airlines appear to vary fares depending on the number of tickets booked on the Internet by a single consumer, thus relying on nonlinear price discrimination (Alves and Barbot, 2009; Lii and Sy, 2009). To the best of our knowledge, no empirical studies on LCCs have thoroughly investigated the presence of quantity discounts[2] implemented as a part of nonlinear price discrimination.

In this paper, we make a straightforward contribution to the literature by providing evidence of LCCs' nonlinear price discrimination exemplified by easyJet's two-part tariff strategy. Specifically, ticket prices are composed of i) a fixed fee (€17) per booking and ii) a dynamic component that characterizes almost all LCCs' pricing strategies. Moreover, by use of a multivariate framework, we investigate the joint effect of these two components on unit price at the single-flight level.

We use a unique dataset, which includes fares booked on flights from the Amsterdam Schiphol airport (AMS) towards 20 European different destinations during the period between January and April 2015 (1868 flights). Data on ticket prices and characteristics of the flights (destination airport, date of departure, and hour of

* Corresponding author.
E-mail address: mattia.cattaneo@unibg.it (M. Cattaneo).

[1] LCCs' service level is the same for all passengers, aside from the opportunity to board the aircraft first or to choose a specific seat.

[2] In this paper, quantity and volume discount are considered as synonyms (Philips, 1983).

http://dx.doi.org/10.1016/j.jairtraman.2016.03.008
0969-6997/

departure) are gathered daily from easyJet's website. Unit prices are collected for reservations composed of 1 seat, 5 seats, and multiples of 5 seats, up to the maximum reservation that can be booked through easyJet's website, 40 seats.

The remainder of this paper is organised as follows. Section 2 presents the theoretical model that merges the nonlinear price discrimination approach with the dynamic pricing structure implemented by LCCs. Section 3 describes the research methodology, Section 4 reports the results of the empirical analysis, and Section 5 summarizes the conclusions and proposed directions for further research.

2. Dynamic pricing strategy and quantity discounts in the LCC industry

The literature regarding air transport economics has highlighted that low-cost carriers generally are not able to directly segment the market by offering various transport classes to passengers (Alves and Barbot, 2009). Although recently some low-cost airlines have undergone a hybridization process of differentiating themselves from other LCCs by introducing various fare classes (Morandi et al., 2015), most LCCs' pricing strategies mainly consist of intertemporal price discrimination in order to profit from the different price elasticities of business passengers and leisure passengers (Salanti et al., 2012). Indeed, this strategy discriminates passengers according to their willingness to pay. Because leisure travellers generally have lower willingness to pay, they are accustomed to booking tickets in advance in order to pay lower prices. In contrast, business passengers have lower demand elasticity, because they usually decide to fly only a few days before the flight's departure, when ticket prices are higher.

Generally, the literature in the field (Alderighi et al., 2011; Malighetti et al., 2009) expressed the unit price of a seat on a flight as follows:

$$P_{it}(1) = f(a_{it}, d_{it}, c_i) \tag{1}$$

in which the unit price for a seat, purchased by a single consumer at time t, on a flight on route i ($P_{it}(1)$), is a function of the number of days of advance booking at time t (a_{it}) (e.g. Alderighi et al., 2011; Bergantino and Capozza, 2015; Malighetti et al., 2009), the number of seats available at time t (d_{it}) (Alderighi et al., 2011), and other characteristics of the carrier and route (c_i), such as the route concentration (Giaume and Guillou, 2004; Malighetti et al., 2009; Moreno-Izquierdo et al., 2015; Stavins, 2001), the size of the destination airport, (Malighetti et al., 2009, 2010; Salanti et al., 2012), and the destination's gross domestic product (GDP) (Malighetti et al., 2009, 2010; Moreno-Izquierdo et al., 2015; Salanti et al., 2012).

Although the topic has received much attention during the past decade (Alderighi et al., 2011; Dana, Jr. 1998; Li et al., 2014), few studies have suggested that fares may change according to the number of tickets reserved by a single individual (e.g. Lii and Sy, 2009). An experiment carried out by Alves and Barbot (2009) reported the presence of surges in prices offered by Ryanair for flights from London-Stansted to Alicante during November 2007: Per-seat prices varied from £49.99 for 14 seats up to £149.99 for 21 reserved seats. However, no studies have thoroughly analysed the possibility of LCCs utilizing nonlinear price discrimination, in which the unit fare changes according to the quantity of seats being booked by a single consumer. LCCs could instead discriminate passengers by offering quantity discounts, thus falling into the nonlinear price discrimination case (Armstrong and Vickers, 2010). Specifically, LCCs may implement a two-part tariff, introducing a fixed, per-booking fee (i.e. a charge that does not depend on the number of seats included in the booking).

Applying the typical two-part tariff rationale to airlines' dynamic pricing strategies, the resulting total fare is made up of two components:

$$P_{it}(q) = \overline{p_{it}^{v}}\, q + F \tag{2}$$

in which the total amount of money paid by a single consumer at time t for a flight reservation consisting of q seats on route i ($P_{it}(q)$) is a function of the average variable price component charged to a consumer booking one seat ($\overline{p_{it}^{v}}$),[3] and the fixed fee (F). The quantity discount becomes evident when considering the unit price $p_{it}(q)$ (Ho and Zhang, 2008) as equal to $\overline{p_{it}^{v}} + F/q$. Due to the complexity of the LCCs' pricing system, $\overline{p_{it}^{v}}$ is not a fixed, easily computable variable. In fact, it depends on different factors, such as the number of seats booked, as well as the other attributes $(a_{it},\ d_{it}, c_i)$ previously described.

Accordingly, the unit price is ultimately equal to the following:

$$p_{it}(q) = P_{it}(q)/_{q} = \overline{p_{it}^{v}}(q;\ a_{it},\ d_{it}, c_i) + F/q \tag{3}$$

Considering the interdependence between the number of seats that are available at the time of booking and the price at which the seats are offered (Alderighi et al., 2015; Escobari, 2012; Li et al., 2014; Puller et al., 2008), when a consumer books two or more seats than just one seat, two effects arise simultaneously. On one side, the component d_{it} brings to a more rapid saturation of the flight's available seats, which may cause the unit price to increase. On the other side, the F/q component causes the unit price to decrease, because the fixed component of the total booking fare is divided among a greater number of reserved seats. Hence, when the effect of F/q prevails over the effect of d_{it}, the unit price for a single consumer reserving more than one seat is lower than the unit price for a single booked seat; this is a quantity discount.

Our objective is to identify whether and how an average percentage quantity discount ($\overline{D_{it}}(q)$) is present, by use of the following formula:

$$\overline{D_{it}}(q) = \frac{p_{it}(1) - p_{it}(q)}{p_{it}(1)} \tag{4}$$

in which $p_{it}(1)$ and $p_{it}(q)$ (see Equation (3)) are the unit fares offered to a single consumer reserving 1 or q seats, respectively, at time t for a flight on route i.

In this regard, easyJet represents a valid example. In addition to having instituted a dynamic pricing strategy according to advance booking (e.g. Koenigsberg et al., 2008; Malighetti et al., 2015; Salanti et al., 2012), the company has stated that it charges a €17 fixed fee per reservation,[4] automatically divided among the number of seats booked in a single reservation.

In order to empirically analyse the effects of the applied two-part tariff strategy under a typical LCC's framework, in the next sections we first investigate the existence of quantity discounts in the easyJet case (Section 3.2). Second, by relying on single-flight observations, we investigate the determinants of the value of the quantity discount implemented by easyJet (Sections 3.3 and 4); these include the number of days in advance of departure the consumer books the reservation, the number of seats that are

[3] For the sake of clarity, p_{it}^{v} in Equation (2) represents only the variable component, while $P_{it}(1)$ in Equation (1) stands for the entire unit price. This allows us to make explicit the presence of a fixed component, F, which has not been yet highlighted in the previous literature.

[4] This information is available at *http://www.easyjet.com/en/terms-and-conditions/fees-and-charges*.