Tourism Management 47 (2015) 152–163

Contents lists available at ScienceDirect

Tourism Management

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

Airline pricing under different market conditions: Evidence from European Low-Cost Carriers☆

Volodymyr Bilotkach [a], Alberto A. Gaggero [b], Claudio A. Piga [c, *]

[a] Newcastle University Business School, 5 Barrack Road, Newcastle upon Tyne, NE1 4SE, United Kingdom
[b] Department of Economics and Management, University of Pavia, Via S. Felice 5, 27100 Pavia, Italy
[c] Keele Management School, Keele University, Keele, ST5 5BG, United Kingdom

HIGHLIGHTS

- Various forms of yield management interventions are considered in the study.
- Is dynamic yield management effective in raising a flight's load factor?
- Active yield management has a strong positive impact on a flight's load factor.
- This effect does not appear to depend on the degree of competition in a route.
- The impact is non significant in routes that are mainly used by leisure travellers.

ARTICLE INFO

Article history:
Received 17 December 2013
Accepted 18 September 2014
Available online 10 October 2014

Keywords:
easyJet
Dynamic pricing
Panel data
Ryanair
Yield management

ABSTRACT

Traditional theories of airline pricing maintain that fares monotonically increase as fewer seats remain available on a flight. This implies a monotonically increasing temporal profile of fares. In this paper, we exploit the presence of drops in offered fares over time as an indicator of an active yield management intervention by two main European Low-Cost Carriers, and measure its effectiveness. We find that reduction of the offered airfare by one standard deviation raises a flight's load factor on average by 2.7 percent, a measure unaffected by the intensity of competition in a route. Furthermore, yield management interventions are less effective the higher the share of leisure (holiday and visiting friends and relatives) traffic on the route. This result runs counter to the common perception of leisure passengers being more responsive to price changes.

1. Introduction

Pricing in the airline industry is known to be very complex, resulting in substantial and well-documented price dispersion (Gerardi & Shapiro, 2009). Deneckere and Peck (2012) point out that the airline industry belongs to a rather wide class of markets, in which a good is offered for sale for a limited length of time, capacity is set in advance, and aggregate demand is uncertain. Furthermore, airlines operate in service markets with a different mix of business and leisure customers. To cope with these complexities in a competitive environment, airlines have developed and perfected a dynamic capacity pricing approach, commonly known as yield management (hereafter, YM), that allows them to adjust their prices in response to changes in demand.

The goal of YM, both systematic and stochastic, is to maximize load factors and profits. Load factor maximization is important due to economies of traffic density (falling per passenger cost with increasing load factor). Under systematic YM, the high- or low-demand periods can be predicted with sufficiently accurate precision, while stochastic YM entails the management of demand conditions that could not be determined a priori.

Following Dana (1999a), systematic yield management can be effectively related to the practice of setting fares as an ex-ante (non strictly) increasing function of an aircraft's capacity utilization. However, in the event the forecasts turn out to be particularly

☆ We are grateful to three anonymous referees for helpful comments, which contributed to ameliorate this paper. We wish to thank Marcus Asplund, Paolo Bertoletti, John Kwoka, Mark Schaffer, participants of the EARIE Conference in Stockholm, the IIOC Conference in Arlington, the RCEA workshop in Rimini, and the seminar participants in Bremen, Pavia and Turin. The responsibility for the arguments and results expressed in this paper is entirely ours.

* Corresponding author. Keele Management School, Keele, ST5 5BG, United Kingdom. Tel.: +44 (0)1782 733059.
E-mail addresses: volodymyr.bilotkach@newcastle.ac.uk (V. Bilotkach), alberto.gaggero@unipv.it (A.A. Gaggero), c.piga@keele.ac.uk (C.A. Piga).

http://dx.doi.org/10.1016/j.tourman.2014.09.015
0261-5177/

imprecise and/or unexpected contingencies arise, the need to deal with stochastic YM may induce airlines to revise the pricing schedule they devised under systematic peak load conditions. Stochastic YM and dynamic pricing can thus be seen as synonymous in the sense that they identify changes to a systematic (i.e., defined a priori) pricing schedule. This practice is particularly important when the actual demand is much lower than expected so that, in the absence of any rectifying intervention that shifts at least some fares downward, the aircraft would likely depart with many empty seats. Alternatively put, if airlines relied exclusively on systematic YM, i.e., if they did not use stochastic YM to respond to exogenous shocks affecting the demand of a particular flight, in econometric studies there would be no need to correct for the endogeneity bias induced by the simultaneous determination of fares and load factors (Alderighi, Nicolini, & Piga, in press).

Using a unique dataset of price profiles offered by the two leading European low cost carriers, in this study we provide a quantitative evaluation of the effectiveness of dynamic pricing interventions. Specifically, we observe both the evolution of price quotes for a number of flights as the departure date nears, and the final load factors of those flights. This allows studying the impact of YM interventions observed at various time intervals prior to a flight's departure on the resulting load factors. Instances of drops in offered prices as the departure date nears are used to identify interventions by the yield managers. We measure the extent to which different levels of price drops are successful in raising a flight's load factor and whether this effect differs in leisure versus business markets.

The main advantage of our dataset is that the data come from an environment which very closely resembles the one described by various theoretical YM models. Specifically, all the tickets are offered as strictly non-refundable contracts, irrespective of the price, and the airlines do not practice any discrimination between one-way and round-trip customers. Furthermore, there is no pricing-in-network considerations to account for, because the two carriers only sell tickets for point-to-point services. To measure the effectiveness of YM, we employ a flight-level fixed effects model that accounts for the potential endogeneity of the observed price variables. Econometric estimates indicate that, other things equal, one-standard deviation reduction of the offered airfare results on average in a 2.7 percent higher load factor. For a typical Ryanair 189-seat aircraft, this is equivalent to about 5 extra seats that are sold following such yield management intervention.

The empirical analysis fails to detect any substantial differences across markets with different concentration levels, suggesting that price reductions do not appear to lead to passengers substituting between the competing airlines' flights on the route. This finding is largely consistent with the view that the emergence of low-cost carriers in Europe has been a driving force in the expansion of the overall demand for airline services (Alderighi, Cento, Nijkamp, & Rietveld, 2012). Moreover, the effectiveness of yield management interventions decreases with the increase in the share of leisure traffic on the route. This conclusion appears to be counter-intuitive, as leisure passengers are perceived as being price sensitive. A potential explanation for this outcome may be related to the tendency of leisure travelers to make their plans well in advance, which, in turn, enhances the role of systematic YM and makes dynamic pricing less effective.

To sum up, YM comprises a wider range of other forecasting and pricing practices that in this study are treated as fixed effects (McGill & Van Ryzin, 1999; Weatherford & Bodily, 1992). This makes it possible to focus on one particular manifestation of YM, i.e., sustained fare reduction induced by stochastic peak load pricing considerations but also to control for other more traditional forms of YM such as systematic peak load pricing. Ideally, data on both the number of available seats and fares at a given point in time would be needed to gain a more in-depth description of how both pricing methods work. Such data are proprietary and so the literature has relied on online sources to obtain estimates of flights' load factors over the booking period. Alderighi et al. (in press) test some of Dana's predictions regarding systematic YM and find that fares increase as the plane fills up. Similarly, in Clark and Vincent (2012) the evolution of prices is found to depend not only on the number of days before the take-off, but also on the number of available seats remaining. While in theory estimated load factors from online sources could be used to measure the impact of YM interventions, in practice they can be rather imprecise, especially when a flight is close to being sold out, making them more suitable for the investigation of systematic peak-load pricing. Due to its use of official statistics on final load factors provided by the U.K. air transport regulator and to its focus on dynamic pricing, this study thus complements the works by Alderighi et al. (in press) and Clark and Vincent (2012).

The rest of the paper is organized as follows. The relevant literature is presented in the next section; Sections 3, 4, and 5 discuss data, the empirical strategy together our definition of YM intervention, and results, respectively. Section 6 concludes. Some secondary results are in the Appendix.

2. Literature review

This paper makes a contribution to a small but growing empirical literature on the application of yield management in the travel industry. McAfee and te Velde (2007) acknowledge the scarcity of, and the need for, empirical studies on yield management. Up to now, this empirical literature has developed two strands. Some studies are aimed at testing the theories of pricing in the airline and other related industries, while the other strand looks at more practical aspects of yield management, including studying the differences in application of this pricing technique to business and leisure passengers and markets. Our study is more closely linked to the latter of this empirical literature.

The following works are most closely related to our paper. Salanti, Malighetti, and Redondi (2012) demonstrate that prices offered by easyJet on predominantly leisure markets show less dynamic behavior as compared to prices on markets with predominantly business traffic. Malighetti, Paleari, and Redondi (2010) show that Ryanair's price setting tactics have recently developed towards a less dynamic pattern, so that the discounts offered by the carrier for tickets purchased in advance are not as steep as they used to be. Abratea, Fraquelli, and Viglia (2012) find that European hotels offer last minute discounts for stays on weekdays, but not on weekends, mirroring evidence from the airline industry that pricing is less dynamic on predominantly tourist markets. Balaguer and Pernías (2013) demonstrate, however, that leisure travelers exhibit a higher degree of substitutability between hotels as compared to business customers. Becerra, Santaló, and Silva (2013) show that higher quality hotels tend to offer fewer and shallower discounts to all customers. Overall, our study confirms the findings of these empirical works. Yet, we are also able to measure the effectiveness of YM interventions in terms of the number of further seats sold, in addition to analyzing the effect of competition between the airlines on effectiveness of such interventions.

Studies testing yield management theories of pricing in the airline industry include Escobari and Gan (2007), Escobari (2012), and Puller, Sengupta, and Wiggins (2009). The first paper analyzes fare quotes for a number of flights, tracing the evolution of offered prices as the departure day nears. The authors also derive a proxy for the load factor at each date of fare collection to evaluate the probability that the flight will be sold out. The main finding is that