



Homogeneous service with heterogeneous products: Relationships among airline ticket fares and purchase fences[☆]



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ABSTRACT

A fare table derived from homogeneous service is essential for revenue management applications in the airline industry. Restrictions or so-called fences are usually regarded as a useful tool to differentiate homogeneous seat service. Nevertheless, the relationships among fares and fences are not yet clear. This study aims to investigate passengers' preferences on the choice of ticket alternatives describing by fares and fences and using Taiwan domestic air travel as an example. Regarding the attributes that an airline ticket may be attached such as departure time, booking time, ticket validity, changing fee, refund and fare, stated preference questionnaires are developed with multiple hypothetical scenarios for respondents to select in the experiment. 398 valid samples are collected for the logit model analysis. With the use of mixed logit model to accommodate both passengers' heterogeneity and also the issue of relevant alternatives in the experiment, the results show statistical significance of all applied attributes with correct signs. In addition, passengers possess different attitudes on the fence of booking time, ticket validity, changing fee, and fare. Willingness-to-pay of each fence is further calculated to ultimately generate a fare table based on the combination of fences for practice use.

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1. Introduction

The concept of revenue management (RM) is widely adopted by airline operators to take advantage of market segmentation and create seat-based differential services to attract passengers from different segments. The use of RM is not new but getting more and more important since market competition is getting fierce especially after the entry of low-cost airlines (Fageda et al., 2011). Regarding the contribution of RM to different industries in reality, Rannou and Melli (2003) find 3%–7% revenue increase in an airline simulation study. In addition, Kimes (2005) also show that the utilization of RM may bring 3%–5% extra revenues in the airline, hotel, and rental car industries. With obvious potential for revenue increase, the application of RM has become popular and widespread in many other fields (Chiang et al., 2007; Anderson and Xie, 2010; Cross et al., 2011; Haddad, 2015).

RM constitutes of four vital pillars namely forecasting, pricing,

overbooking, and seat allocation. The role of pricing provides essential fare information to form booking classes and avoid the commoditization of service in order to optimize the use of perishable seat resources (Bobb and Veral, 2008; Anderson and Xie, 2010). With the structure of booking classes or, in other words, the fare table, the tasks of forecasting, overbooking, and seat allocation can then be implemented consequently in the quantity-based RM system (Talluri and van Ryzin, 2004). Taking economic seats for instance, airline operators may simultaneously manipulate multiple booking classes with respective codes such as Y, M, L, and V for a specific origin-destination during the reservation period (Obermeyer et al., 2013; Alderighi et al., 2012). Although these classes all belong to the economic cabin, they may have very different fares due to using conditions. However, the relationships among fares and fences are seldom addressed. In a recent review, Guillet and Mohammed (2015) indicate that price framing, price value relationship, and price competition receive limited attention within the topic of RM pricing.

The determination of booking classes toward homogeneous seat service can be observed and discussed from two perspectives. From the supply side, airlines may consider various factors including operating costs to generate fares for different cabins. The Civil Aeronautics Board in the United States establishes a "Standard

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Industry Fare Level (SIFL)” and periodically updates the SIFL by the percentage change in airline operating cost per available seat-mile. The established SIFL can then be regarded as a reference to form the unrestricted coach fare (USDOT, 2015). International Air Transport Association (IATA) also publishes Passenger Air Tariff (PAT) which contains three types of fares namely unrestricted normal fares, restricted normal fares, and special fares (PAT, 2015; Chang, 2006). Among them, special fares as known as promotional fares are usually applied to stimulate demand during off-peak periods.

On the other side of the coin, understanding how passengers make their ticket choices while facing multiple alternatives is also informative and vital. For instance, some passengers may choose to purchase tickets on-line at low prices with a requirement to pay in advance and also penalties for changing itineraries. Other passengers with less price sensitivity may choose to pay high prices for tickets with more flexibility. Generally speaking, different segments of passengers may have distinct valuations toward homogeneous seat service and result in an opportunity for airlines to deploy market segmentation and differential pricing (Zhang and Bell, 2012). In addition, with intense dynamics and competitions in the airline market, Ratliff and Vinod (2005) argue that more advanced pricing and RM decision support tools are required in the conventional use of fare availability as the primary means of segmentation.

In the literature, related works focus on the choice of airline carriers or flight service by considering different combinations of service-centric attributes such as in-flight service or seat comfort with corresponding air fares (Balcombe et al., 2009; Wen et al., 2009). Some other papers address the issue on how to determine the number of seats that each booking class should sell given different assumptions (Kim, 2015). Alderighi et al. (2012) address the competition in the European aviation market through mapping relationships among airfares and economic variables. Nevertheless, relatively limited works in the literature focus on how passengers make their choices of tickets (or booking classes) in terms of RM-centric attributes. In practice, RM-centric attributes are usually utilized to differentiate homogeneous seat service by adding restrictions or so-called fences, which are rules that a company uses to determine who gets what price (Kimes and Wirtz, 2003), onto the ticket. As Anderson and Xie (2010) argue in their paper, an important task in RM is to set prices to avoid commoditization of the service and the use of fences may be an effective way to exclude certain segments from specific low fares. As a result, this study aims to contribute to the literature by exploring passengers' preferences on booking classes via the use of RM-centric attributes given homogeneous airline seat service (ie. the same OD/airlines/cabin/seat comfort/in-flight service). With such demand driven preferences of fare classes on hand, airline operators may be able to design a fare table that not only satisfies passengers' needs but also ultimately attracts their attention in the competitive airline market.

2. Literature review

2.1. Service-based attributes

While considering choice preferences in the airline context such as choices of airport, airline carriers and flight service, service-based attributes are commonly investigated as summarized in Table 1. First of all, variables related to airlines such as flight frequency, frequent flyer program, aircraft type, punctuality, check-in service, ground service, airline brand, fairness, access time, online reviews, baggage fees, and safety information are commonly regarded as important variables (Garrow et al., 2007; Hess et al., 2007; Teichert et al., 2008; Wen et al., 2009; Wen and Lai, 2010; Mathies et al., 2013; Gao and Koo, 2014; Yang et al., 2014; Jung

and Yoo, 2014; Koo et al., 2015; Scotti and Dresner, 2015). Other works focus on the features of flights themselves when passengers face several choice alternatives such as schedule time, the number of stopovers, seat comfort, in-flight service, and in-flight travel time (Ortúzar and Simonetti, 2008; Balcombe et al., 2009; Wen et al., 2009; Wen and Lai, 2010; Mathies et al., 2013; Gao and Koo, 2014; Koo et al., 2015). However, all these papers address the choice of non-homogeneous service which may be somehow differentiated by different brands, different markets, different seat service, or different airports. Regarding the application in RM, usually operators need to think about the allocation of homogeneous seat service, which is the research target in this study, for achieving high revenues.

Differentiating homogeneous seat service by adding fences onto the ticket is essential for airline operators to structure booking classes. Although fences are commonly seen while purchasing airline tickets in practice such as departure time, booking time, and premium charges, the real effects of fences are not fully explored yet. In the context of flight service selection, Mathies et al. (2013) have addressed the influence of cancellation fees and time of ticketing. Another work by Denizci Guillet and Xu (2013) also investigate the influence of advanced purchase, refundability, and changing fees on the selection of different flight service. Nevertheless, none of the research investigates the effect of fences on the selection of homogeneous seat service. In this study, the attention will be focusing on the empirical test of fences when passengers face several alternatives. Through understanding the influences of fences from demand perspective, operators may be able to design a more customer-oriented fare table.

2.2. Restrictions and fences

Although individual passengers may regard one specific service with distinct values and are willing to pay different prices in order to use the service, maintaining perceived fare fairness is critical and also essential while practicing differential pricing (Kimes, 2002). The objective here is to ensure that customers are satisfied with the provided service and do not feel ripped off (Haddad, 2015). This is because if passengers perceive differential pricing with attached fences as fair, they are more willing to accept the practice and increase the purchase intention (Chung and Petrick, 2012). In a recent study, Lin and Huang (2015) also suggest that hotel operators should facilitate the RM knowledge and the fairness perception of their customers so as to both effectively utilize resources and provide diversified services. The fairness of fences should depend on whether passengers perceive them to be acceptable or not. In the literature, studies show that familiarity with RM applications are helpful for consumers to perceive RM applications to be fair (Choi and Mattila, 2005; Wirtz and Kimes, 2007; Lin and Huang, 2015).

The reason for building fences is to avoid the phenomenon of spillover which is the migration of passengers from high-paid segments to low ones. Several types of fences have been introduced and applied widely in the service industry. Wirtz and Kimes (2007) have categorized lodging fences into physical and non-physical types. Physical fences contain product characteristics (room class, car size, seat location), amenities (free meal, free cart, valet parking), and service level (priority wait-listing, exclusive check-in counter, personal butler). On the other hand, non-physical fences include time of booking, booking channel, ticket flexibility, time of use, location of consumption, membership, and size of group. In addition to the above non-physical fences, Chen et al. (2011) explore the influence of cancellation in an experiment and show the impact of cancellation deadline on booking decisions. Zhang and Bell (2012) review related works and categorize fences

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