



Tabulated decision aids and airfare pricing

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ABSTRACT

When people shop for airline tickets, the effort-demanding cognitive process of assessing alternative travel dates may have significant effects on consumer decisions. With the advent of the Internet, consumers are gaining access to a growing number of alternative flights. Decision support tools can assist consumers in their search for travel dates and price combinations. Airline carriers have started offering such tools to support flexible travel-date searches on their websites. In this research, we analyze the economic effects of such tools. We hypothesize that these tools directly affect airline carriers' pricing schemes. As airline carriers display more alternatives on a flexible date search, price variation and number of price changes are expected to decrease, and the average price is expected to increase. We empirically test our hypotheses using airfares from a wide range of US domestic routes. The results broadly support our hypotheses.

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1. Introduction

The travel industry provides one of the most successful examples of online purchasing adoption. Travelers who purchase online account for 83% of all US online consumers (Henry 2007). Expenditures on online travel amounted to US\$111 billion in 2008, and this figure is expected to increase to US\$153 billion by 2013 (Harteveldt 2009). This is not surprising, and the reasons have been well studied in the literature. Generally, airline tickets are “low touch products,” which consumers do not need to feel, touch, smell, or try on, and thus do not require an offline presence prior to purchase (Chiang and Ruby 2003).

Airline tickets have another characteristic that may be highly important in digital purchase environments, their pricing mechanism, which usually prompts high variations in prices. Revenue management systems employed by airline carriers facilitate the pricing of airline tickets as a function of time and demand. While intuitively appealing to sellers, these systems complicate the purchase decision process for buyers: not only do they have to evaluate the product and its features, but they also must consider the timing of the purchase and the timing of consumption. It may very well be that products that differ only slightly on either consumption or purchase date would differ significantly in price.

Given the potential for significant price differences, searching, finding, and deciding on travel dates when purchasing airline tickets can be critical. The Internet provides consumers with enhanced product search capabilities, making this medium even more attractive for travel purchases. Online decision aids can reduce the

cognitive effort required in employing some decision strategies, and therefore can effect decision processes and outcomes.

When useful information is effectively displayed by the decision aid, cognitive effort associated with obtaining information can be reduced, and improved decision strategies can be formulated and employed (Kennedy et al. 1998). Thus, different levels of information accessibility can result in different products purchased by consumers and hence may affect products pricings (Granados et al. 2008). Specifically, in the context of airline ticket purchasing, different levels of access to information are imposed by the decision aid according to the number of alternative travel days displayed in a single table. When a decision aid provides better access to alternative dates, passengers can easily identify flights with lower airfares on alternative dates. Hence, they may purchase tickets that might have otherwise been left unnoticed. This suggests that different demand patterns are experienced according to the properties of the decision aid, and thus, the variance in decision aid properties is expected to affect the pricing of products.

In this research, we examine this relationship in the context of the airline industry. We look at the relationship between the decision aids that carriers provide to their customers, and the resulting pricing realizations. As carriers' websites developed, airlines started offering consumers alternatives to their originally indicated travel dates. Date-flexible search options allow consumers to obtain a quick overview of fares on alternative travel dates, if they are willing to consider changing their trip plans for a lower fare on adjacent travel dates. These date-flexible options, which are commonly presented in a tabulated format, differ across airlines, while some provide lowest fares on 49 different travel date combinations (seven possible departure dates by seven possible return dates), others provide prices on 25 different travel date combinations, and some provide prices on only

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nine different date combinations. These differences provide a unique opportunity to examine economic outcomes resulting from variation in displaying information to support purchase decisions. We examine the extent to which varying levels of information accessibility provided by the decision aid, relate to the realized posted prices of airfares on the Internet. Ultimately, by controlling the information accessibility to their potential customers, airlines can possibly affect the decisions made by consumers.

With more date combinations presented at the time of purchase, consumers are more likely to find and purchase alternatives with lower prices. Improved visibility of low-demand alternatives could potentially smooth demand across flights, or at least divert some of the more elastic demand from busy itineraries to less congested ones, thereby reducing price variations across flights. We, therefore, hypothesize that enhanced information to consumers establishes a negative relationship with price fluctuations. Additionally, since this process is expected to increase the average fill rates of planes (as potential customers are not “rejected” due to full flights or high prices, and select, instead, cheaper alternatives from the same carrier), we hypothesize that higher average travel fares will be charged by carriers.

We test our hypotheses by analyzing a series of airfares for 54 different routes offered by carriers employing similar decision aids, but differing on the number of alternatives they present. Our results show that when the number of alternative dates displayed in a single table is larger, the variance of fares is smaller and the average price charged is higher.

This research has many interesting business implications. If a relationship between the accessibility of information provided to consumers on e-commerce sites and vendors’ pricing exists, it is possible that sellers can foster decision processes that will help divert customers to purchase low demand products and, thus, increase their demand.¹

This paper is organized as follows. In Section 2, we review the literature. Section 3 develops the hypotheses. In Section 4, we describe the empirical test of our hypotheses. Section 5 explains the research settings. In Sections 6 and 7, we provide the empirical analysis and discuss the results. In Section 8, we conclude and suggest directions for future research.

2. Price dispersion in the airline industry

The US airline industry has gone through some significant changes in the past three decades. We first provide an overview of the US airline industry, and then we review the sources of price dispersion related to this industry.

2.1. Airline industry background

Under the historical conditions of airline regulation, the Civil Aeronautics Board (CAB) controlled prices in the US, and used a mileage-based formula to ensure equal prices for equal distances, ignoring all differences (even substantial) in the operating costs of the routes (Belobaba et al. 2009). The Airline Deregulation Act of 1978 signaled the prelude to an evolution of an entire industry, as this act eliminated the strict relationship between airline fares and distance traveled. Furthermore, with the deregulation, different origin–destination (O–D) markets can have prices that are not related to the distance traveled or even the airline’s operating costs, resulting in one of the most profound consequences of the deregulation, the emergence of low-cost carriers. The emergence

of these low cost carriers induced major carriers to match the low-fares in order to maintain their market presence and their share of traffic.

Generally, all legacy carriers use similar revenue management pricing schemes based on the same set of factors. On top of the traditional distance based pricing, the newly-introduced factors include the presence of low-cost carriers and characteristics of the O–D market. Based on these factors, revenue management pricing combines three economic principles: cost-based pricing, demand-based pricing and service-based pricing (Simpson and Belobaba 1992).²

Cost-based pricing stems from the microeconomic practice of “marginal cost pricing,” in which the producer sets its prices equal to the marginal cost of producing an incremental unit of output. The marginal costs of carrying an incremental passenger are very low and airlines could not possibly cover their total operating costs under a strict marginal pricing scheme. Yet, some elements, such as distance traveled, will come into play under this principle (Belobaba et al. 2009).

Demand-based pricing gives rise to segmenting the consumers according to their willingness-to-pay. Elements contributing to these pricing schemes would include business travelers, compared to leisure travelers, as the former is typically willing to pay more than the latter. This research is associated with price sensitive consumers and, in line with the mainstream literature on airfare pricing, is concerned with the lowest fares offered by the airline. By contrast, service-based pricing highlights the importance of the quality of the product, giving rise to product differentiation (e.g., first class versus coach). Since this research is concerned with the leisure traveler, the analysis is limited to coach seats.

The airline industry provides a wealth of data that has stimulated a rich empirical research stream which studies, among other topics, pricing and price dispersion. Traditional work has used transacted data (from the US Department of Transportation) such as the work by Borenstein and Rose (1994). Recent work has turned to online posted prices – a stream that studies aspects of pricing such as the behavior of prices over time, substitution, and dispersion. McAfee and te Velde (2007) studied, among other things, whether competition reduces variance of prices, and whether the prices of substitutes are correlated. Piga and Bachis (2007), find that volatility tends to increase in the last four weeks. The research, thus far, has not studied how the design of the websites and the level of information accessibility could potentially affect consumers’ decisions and, hence, the realized prices and their dispersion.

2.2. Sources of price dispersion

Price dispersion is inherent in many markets and, as Varian (1980) has stated, “the ‘law of one price’ is no law at all.” Several works (e.g., Borenstein and Rose 1994, Gerardi and Shapiro 2009, Liu and Serfes 2006) have explored the relationship between different variables and price dispersion using transacted ticket data from the US Department of Transportation’s Origin and Destination Survey database. Together, these studies have shown that price dispersion is associated with three major factors: market structure (e.g., competition intensity), route characteristics (population and distance), and competitors’ specifics (e.g., operations structure). With respect to search costs, a stream that explores online prices has revealed that while the Internet has reduced consumers’ search costs in general, the actual search employed by online consumers is, in fact, limited. Hann and Terwiesch (2003) have found that the number of steps consumers are willing to undertake in online environments is limited. Johnson et al. (2003) provide a model that suggests that ease of use and experience affect the willingness-to-search.

¹ When considering imposing decision processes that may affect consumers’ decision making, firms may need to further consider customer value. This trade-off is important, however, competition may, ultimately, force firms to adopt inferior choices.

² The theory and practice of pricing and revenue management are provided in Talluri and van Ryzin (2004), Phillips (2005), and Boyd (2007).

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