Variances in Airline Ticket Prices

Do the Competitive Forces Experienced by Airlines Cause the Ticket Price to Disperse?

Liberalization and deregulation has led to profound changes in the airline industry. Diminished governmental influence stimulated airlines to increase their revenues gained by the sales of tickets. Nowadays, airlines issue tickets that are characterized by a great diversity of restrictions to achieve demand segmentation. Most of the current airlines apply complex revenue management systems to determine their ticket prices. These widely applied systems enable airlines to maximize their seat inventory as well as optimizing the charged price for each customer segment. Basically, airlines are charging a wide range of fares to a great diversity of customers for - what is in essence - an identical product. This paper aims to illustrate the effect of market concentration and competitive forces on the airline ticket price variance. In addition it provides insight in the main drivers causing ticket prices to disperse. Potential groups of interest for this paper include aviation professionals, students and airline passengers, will gain a thorough understanding of the fundamentals in ticket price variances.

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Competitive Market Pressures

In the airline industry, competitive pressures substantially influence the airline's financial results. Price changes in competitive markets provide valuable information for the competition. As indicated by Pels & Rietveld (2004), charging a greater fare in a competitive market could very well indicate the airline has accomplished selling all seats in the aircraft. This might imply the number of potential passengers for that market would have been reduced significantly. Therefore the cost of increased competition can be quite high for airlines that are not well prepared.

According to the principles of the monopolistic model, airlines operating in highly monopolistic markets would be more likely charge higher prices to its customer since they are able to exploit their market power. However, this statement does not provide any insight to what extent competitive forces drive the dispersion of prices within a market. Little conclusive evidence is found in modern literature how competitive market forces relates to the behavior of airline price dispersion.

Airline market structures are neither characterized by a pure form of monopoly nor can they be indicated as perfectly competitive. Borenstein (1989) states that an increase in a firm's market share is associated with the ability to set both output and price, which potentially leads to higher prices.

A number of studies indicated that the number of actual competitors significantly affected the market price levels. Fares were - not surprisingly - substantially higher in markets served by a single airline compared to markets characterized by a higher level of competition. Borenstein & Rose (1994) and Dana (1999) indicated that the level of competition has a negative influence on the average price level charged by the airlines. Furthermore, Abramowitz & Brown (1993) and Hurdle, Johnson, & Joskow (1989) found that fares tend to decline significantly with the entry of a second and a third competitor in the market.

The Herfindahl-Hirschman Index (HHI) calculates the market concentration level by squaring the market share of each competitor within a given market. The HHI presents an index

between 0 and 10.000, where 0 represents the baseline for a theoretical perfect competition structure and where 10.000 represents the pure form of a monopoly.

$$\mathbb{HHI} = \sum_{I=1}^{N} S_i^2$$

Here, S_i denotes the individual airline market share in percentages within a given market. The US Department of Justice applies the HHI measure to indicate the level of competitiveness in certain markets. Their standards specify markets under 1000 to be competitive market, between 1000 and 1800 to have a moderate concentration and competition level and an HHI exceeding 1800 suggest the presence of a highly concentrated market, indicating for monopoly powers in the market.

According to Holloway (2008) aspects encouraging airlines to enter and exit markets and thus determine the level of market concentration, include: regulation, economic attractiveness, entry barriers and geography.

Airline Pricing Strategies

Airlines apply different approaches to maximize their ticket sales revenues (Holloway, 2008). The discriminatory pricing strategy enables airlines to charge different prices for the same service to different customers. This suggest a nonlinear relationship between price and the quantity of the good (Nahataa & Ringbom, 2007). According to basic economic literature, monopolistic firms are more able to apply the principles of discriminatory pricing.

The differential pricing is another common used strategy. This enables the airline to charge different prices for different products. As a result, price variances can be observed in the same market within a single airlines' segment (price discrimination) and between competing airlines (price dispersion). A clear example of both pricing strategies is provided by a New York Times quotation.

Quote:

In the first three months of the year 1998, the 7690 passengers who flew from Cincinnati to New York on Continental Airline paid an average fare of $225 one way. But few if any passengers paid the average fare. In fact, 8 percent of them paid $51 to $75 and 26 percent paid $426 to $450. (Source: New York Times, 18th of November, 1998)

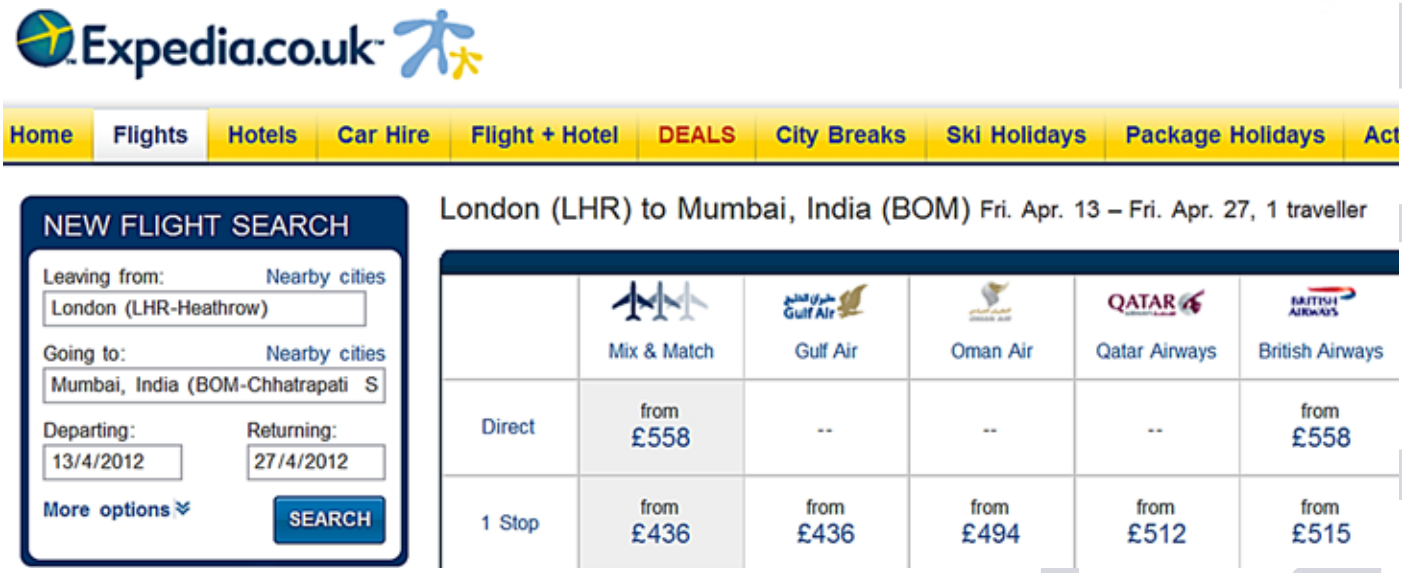
The current revenue management systems apply both discriminatory pricing and differential pricing strategies. As a result, airlines are able to segment demand by applying booking restrictions to maximize revenues. Demand segmentation is based upon the reservation price of a passenger, referring to the price an individual passenger is maximally willing to pay for the service or product. Because each passenger values the ticket characteristics, as in time, flexibility and price, differently, so called fencing mechanisms are applied to prevent passengers from a ticket purchase under their reservation price. These booking limitations or fences are commonly applied to the lower fare products. In general it can be stated the lower the fare product is priced, the more restricted and the less flexible the ticket becomes. Examples of fencing mechanisms found in the modern day fare system include:

- Advance booking requirements
- Saturday night stay over
- Flexibility of ticket
- Class of service
- Cancellation penalties
- Midweek departure requirements
- Ticket refunding
- Valid travel days
- Time limitations

It is important to understand that demand does not just exist, it exist at a certain price which is closely related to the reservation price of customers, where demand elasticities play a vital role. Demand elasticity is a concept which illustrates the sensitivity of demand towards changes in independent variables such as price, income and travel time (Holloway, 2008). Demand elasticity can be considered as the percentage change in demand arising from an one percentage change in the price. Typically, leisure segments show the behavior of elastic demand. Here demand is heavily influence by an one percent change in price. For the business segments, it is common practice to experience the typical behavior of inelastic demand. Moreover, the research of Gillen, Morrison, & Stewart (2004) indicate that demand for short haul travel is more price elastic than for long haul flights.

Causes for Ticket Price Dispersion

Price dispersion, referring to the inequity or variation in charged airline ticket prices across airlines within specified markets is generally caused by two drivers; cost differentials and peak load pricing (Alderigi, 2009). Cost differentials oc-



cur due to the fact airlines operate under different cost structures. Therefore, the cost airlines endure in a given market are likely to differ. The other effect identified is peak load pricing. Airlines use their peak load pricing strategy to smoothen the resource utilization and reduce the possible congestion at peak periods by making the off-peaks more cost attractive. Demand uncertainty plays a major role in peak load pricing, especially when an airline's schedule and capacity is already determined. In that case, peak load pricing depends on the extent airlines are able to adjust their prices in the period the capacity is set. If demand exceeds capacity for a specific flight, it is likely for the prices to increase significantly as the departure moment approaches.

From a passengers' perspective, it is essential to have perfect information available. As Hopkins (2006) points out, price dispersion can be assigned to imperfect information, where not every customer is aware which supplier charges the lowest price for their demand. Due to the current usage of internet, airline ticket prices have become much more transparent and accessible to customers. This will decrease the level of imperfect information and should decrease price dispersion due to imperfect information.

Model & Data Analysis

This paper explores the influence of market concentration and market structure characteristics on the observed price fluctuations across airlines within given markets. This requires to obtain data concerning: market share, frequency and ticket prices for specified airline markets. However, for European aviation economists, access to the required databases is in many cases restricted. This is mainly caused by the fact airlines consider their pricing policies to be confidential and unlike the U.S., European airlines are not obliged to report a certain percentage of their charged airfares in a government owned database.

Consequently, two databases were established with arbitrary selected markets. The data sources used were twofold. At first, the Official Airline Guide (OAG) provided airline market share, frequency and airline capacity or output. Secondly, www.expedia.nl provided the actual ticket price. Lijesen, Rietveld, & Nijkamp (2002) proved the internet could serve as a suitable tool for collecting ticket prices. For this research, defining an airline market is a crucial aspect. Dataset I applies the terminology of an airline market characterized by an individual origin-destination city pair route. Dataset II however put forward the perspective that those airlines serving routes within an equal catchment area can be considered as the same airline market. Therefore routes serving equal regions obtained in Dataset I are in Dataset II compressed to a single airline market.

Due to the scope of the research strict limitations and assumptions are applied in the data acquiring process. The airfare data were collected for each city-pair market ranging from 60 days up to 1 day prior to departure. Therefore, the data include published fares offered at a broad window prior to the scheduled departure date. Here, only the cheapest available fare charged for an economy class ticket was included in the database to consider the product uniform and cover for product differentiation. Furthermore, the fares obtained were merely direct operated round-trip (retour) flights with a 7 day window in between. As a result the collected parameters include: 54 individual city pair (long and short haul) markets, covering 19 distinct airlines provided 6240 individual fare observations.

The empirical regression model adopts the dependent variable $\mathbb{PD}_{market}$ which represents the observed price dispersion for any given market, expressed as the Coefficient of Variance or CV. The CV provides an indication of the ratio of the standard deviation to the mean. Next, the determinants of price dispersion are categorised by the market power variable x_{HHI}, market competition variables x_{INDFLT} and x_{LCC} and the route characteristic variable x_{HUB}. .

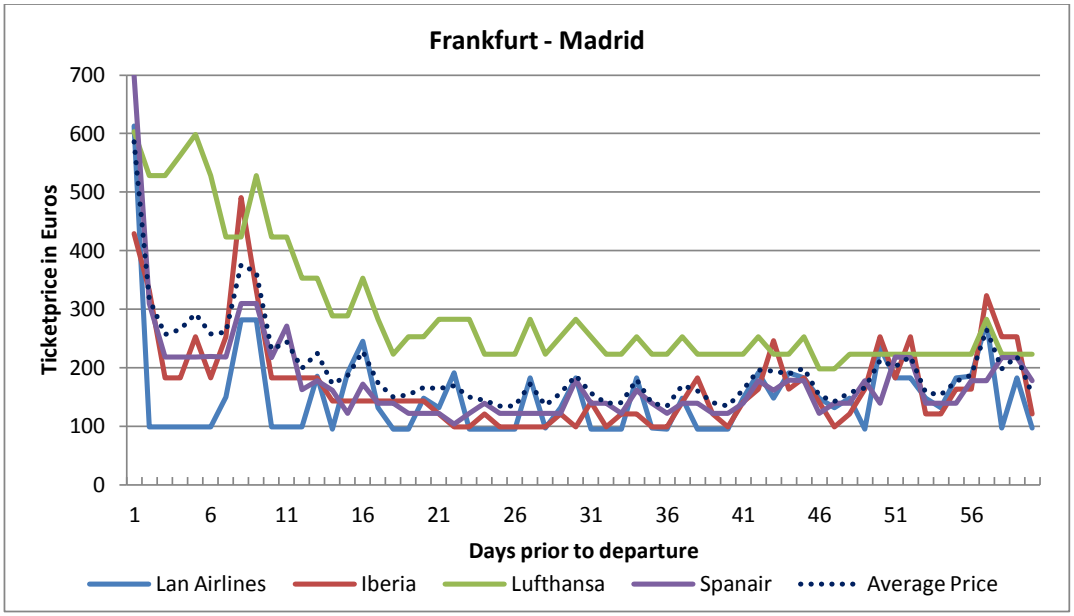
$$\mathbb{PD}_{market} = \beta_0 + \beta_1 \cdot x_{HHI} + \beta_2 \cdot x_{INDFLT} + \beta_3 \cdot x_{LCC} + \beta_4 \cdot x_{HUB} + \varepsilon$$

Here, the variable x_{HHI}, characterizes the market concentration, expressed by the Herfindahl-Hirschman Index. Furthermore, the obtained variable x_{INDFLT} specifies the number of suitable indirect flights (alternative flights) still able to compete with the concerned direct markets. Moreover, x_{LCC} presents a dummy variable representing the presence of a low cost airline operating in the specific market. Finally the variable x_{HUB}. indicates whether either the origin or destination airport is accountable for the airlines' hub airport.

Analysis & Discussion

The findings suggest that as the market becomes increasingly concentrated or monopolistic, price dispersion tends to decrease substantially. In other words, as a market becomes more competitive (with an increasing amount of competitors), price variation is expected to increase. Moreover, the analysis indicates that prices will disperse more as the departure moment is approaching. An graphical illustration of the latter statements

Graph 1: *Fare overview days prior to departure in Frankfurt – Madrid market (Nederlof, 2010)*



is visualized in graph 1. This graph clearly demonstrates the increase in price dispersion in the final 16 days prior to departure. In addition, the market expressed in the graph is one of the least monopolistic market obtained in the dataset and displays a strong dispersion over the course of the 60 days prior to departure.

The distinct market definitions applied in each dataset put forward similar results. Both models were able to predict the observed price variation for respectively 37 and 44 percent, which represents a substantial amount. In both cases, all obtained variables have a negative effect on price dispersion, however not all proved to be significant. Market power and indirect flights variables proved to be having a significant and negative influence on the observed dispersion.

Moreover, both models indicate that 7 out of the 10 markets with the least dispersed markets have a monopolistic market structure. Furthermore it can be stated that for each model, the mean HHI of the 10 least dispersed markets is substantially higher than the mean HHI of the 10 most dispersed markets. This finding supports the belief that airline markets facing more direct competition will experience a greater level of dispersion in the charged ticket prices. In addition, no conclusive evidence was found in the data regarding the difference in price dispersion for long and short haul flights.

Conclusion

The empirical results of both models put forward similar results, suggesting that an increase in the level of competition, would increase airline fare dispersion substantially. In other words, as the market becomes more concentrated (monopolistic), the ticket price variation will decrease considerably.

Airlines that are enjoying a substantial market share are more capable to price discriminate and segment their diverse demand by influencing both price and output levels. Here, price inelastic demand, with high time and service valuation is separated from price elastic demand with high price valuation and low service and time valuation.

In practice, every airline is experiencing market power to some extent, based on e.g.: network, frequency and dominancy at airports. Therefore, even for an airline that is facing an market with many competitors, it is possible to retain market power and apply discriminatory pricing mechanisms over the inelastic demand segments. The price elastic demand segments on the other hand have the tendency to be insensitive to the applied market power by the airlines, regardless of their market structure. Consequently, airlines aiming for elastic demand segments have to lower their charged ticket prices in less concentrated markets to stay competitive. This implies that the revenue management systems of the airlines have the tendency to react on the competition by segmenting passengers more violently by charging a greater variety of prices to their passenger, causing prices to disperse more widely in less concentrated markets.

Therefore airlines are – in a sense – competing within an airline market over different price elastic demand segments while market power is exploited in other inelastic demand segments within the same market. Airlines have the tendency to apply competitive pricing strategies, causing substantial variations in the elastic demand segments of the market to attract the price sensitive passengers. Inelastic demand is here likely to experience less aggressive pricing methods because airlines are able to exploit their market powers for their inelastic segments.

Given the summed clarifications, it may be concluded that airline price dispersion is more likely to increase in markets characterized by a more competitive market structure, with a high and diverse demand volume. Moreover, additional research is required to examine the exact price dispersion over the different demand segments. An extensive database should control for market irregularities, but also to distinguish between cost-based and demand-based price dispersion.

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