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## Pricing competition policy in the European airlines industry: a firm behavior model proposal

### Abstract

Airlines are multi-product firms as each route is considered as a different product. Airline firms differ in their cost structure, quality of services and the set of products they are supplying. Traditionally, European aviation has been regulated by highly restrictive bilateral air service agreements between the countries concerned. The purpose of this paper is to examine the impact of liberal bilateral agreements on some European air routes in terms of price competition and market structure. A theoretical model of firm behavior in the airline industry is described both in collusive oligopoly and non-cooperative settings. The proposed model explains firms' behavior in the air services market and characterizes firms' demand and simultaneously pricing policies. Results show that prices are determined as a mark-up on standard cost variables, and the mark-up depends on customers' goodwill.

**Keywords:** airlines industry, bilateral agreements, competition policy, price, strategy, firm behavior, cost structure, productivity, flag carriers.

### Introduction

The introduction of the liberal bilateral agreements on several European air routes has been the first important step in European airline deregulation, ahead of any EC measure. Accordingly, this analysis anticipates the direction of some of the changes that it is expected to be observed after a broader European deregulation. Additionally, changes in firms' cost structure and strategic policies will show if the firms affected may benefit from this regional liberalization by adjusting less traumatically to a more competitive European market.

Airlines are multiproduct firms that differ in their cost structure, quality of services and the set of products they are supplying. Intra-route heterogeneity of firms' characteristics is proposed as the main explanation for differences in market shares and prices. The proposed model explains firms' behavior in the air services market and characterizes firms' demand and simultaneously pricing policies. To isolate the effects of the liberal bilateral agreements, a second set of routes is considered, serving countries with no liberal bilaterals (control group).

The introduction of liberal bilateral agreements has given rise to greater competition both in price and quality attributable to either new entry or increased price competition among the incumbent carriers. It is also found that agreements create greater incentives to improve efficiency with firms increasingly exploiting their cost advantages (e.g., lower unit costs and larger economies of scope). Additionally, firms find it more profitable to improve their perceived quality and, in fact, advertising goodwill becomes more relevant reflecting firms' strategic decisions in order to raise new entry barriers. Moreover, differences in prices and qualities also appear

to affect market structure in spite of flag carriers' incumbency advantages.

These considerations imply that, on the one hand, incumbents enjoy important advantages derived from the control of airport facilities and some other ancillary services but, on the other hand, entrants may also successfully penetrate the market if they enjoy some cost advantages, such as lower wages, that allow them to offer lower prices. The purpose of this paper is to examine the impact of liberal bilateral agreements on some European air routes in terms of price competition and market structure.

### 1. Past literature

Encaoua (1991) provides strong evidence on firms' differences on cost structure and productivity and Evans & Kessides (1993a) show that in the US market intra-route firms' differences explain most of the variation in prices. There is also some evidence on incumbency advantages derived from the control of slot rights, Computer Reservation Systems and a larger network but it also seems that the new firms pay lower wages because they have not suffered from the bargaining power of professional associations under the regulatory framework (McGowan & Seabright, 1989 and Encaoua, 1991).

Abbott and Thompson (1991) analyze the impact of the liberal bilateral agreements on certain routes by comparison to a control group and find that the agreements have given rise to more competition. However, their approach has several shortcomings, because all the routes considered have on common endpoint, London, and British companies have a similar weight in all the routes. This means that, given that some data are available only at the firm level, they cannot derive clear-cut results about the differential characteristics of the firms operating on these two sets of routes. By contrast, in this chapter the control group includes a set of routes among

countries that have not signed any liberal bilateral agreement.

**2. The European aviation: regulation and reforms**

Traditionally, European aviation has been regulated by highly restrictive bilateral air service agreements between the countries concerned. In fact, each route was served by the two national flag carriers that used to jointly set a single price and evenly split the demand. In the absence of entry, and with capacity and price agreements, competition is not possible and a lack of incentives to improve efficiency characterizes the industry. This situation allows firms, in many cases subsidized by their governments, to increase costs inefficiently, sometimes under the pressure of powerful professional associations.

During the eighties some changes took place in the European market. First, there was a boom in the demand for charter services that normally supply holiday routes (Charter flights are not subject to regulation). Second, after 1978 the US started an "Open Skies" policy linked to their domestic deregulation and designed to encourage competition on the international routes. As a result some of the western European countries had to re-negotiate their

bilateral agreements with the US introducing more competition in the North Atlantic routes.

Accordingly, some governments started renegotiating their intra-European bilateral agreements. In 1984, the UK and the Netherlands signed the first liberal bilateral agreement that in 1985 was complemented with further deregulatory measures. Subsequently, some other governments signed similar liberal bilateral agreements, e.g., UK-West Germany (1985), UK-Belgium (1985) and UK-Ireland (1986), among others. Now, entry and price reductions were possible, allowing for more competition.

Under all these pressures, the European Economic Commission provided several reports (European Economic Commission, 1984) and finally the European Community introduced a package of measures at the end of 1987 that can be considered as an upper bound in terms of market regulation. These measures were extended by the second and third packages introduced in 1990 and 1993, respectively. Table 1 summarizes the main features of the 1985 UK-Netherlands liberal bilateral agreement and the 1987 and 1993 EC packages of deregulatory measures in terms of entry, frequencies, capacities and fares.

Table 1. The main features of the 1985 UK-Netherlands liberal bilateral agreement and the 1987 and 1993 EC packages of deregulatory measures

Deregulatory measures	Entry	Frequencies/Capacities	Fares
1985 UK-Netherlands Liberal Bilateral Agreement	Freedom of market entry to any UK or Dutch airline designed by its government.	No restrictions on frequency or capacity.	Freedom to offer any fare unless it is disapproved by both governments.
1987 EC package of measures	Multiple designations on the busiest routes.	Less restrictive capacity sharing agreements (either country could operate up to 55% of capacity in 1988 and 1989 and 60% in 1989).	Limited freedom to compete on cheap promotional fares.
1993 EC package of measures	Multiple designation and freedom for the EC airlines to operate any cross-border services.	No restrictions on frequency or capacity.	Freedom to offer any fare unless it is regarded as either too high and, therefore, harmful to the consumers, or so low that produces losses for all the companies involved.

During the second half of the eighties, it is possible to consider two different frameworks operating in the European market:

- ◆ routes serving pairs of countries that have signed liberal bilaterals;
- ◆ routes serving pairs of countries in which the 1987 EC upper bound for regulation applies.

The main concern of this paper is to test the impact of liberal bilaterals on the first set of routes. Therefore, the 1992 and 1999 routes are analyzed. As some of the changes registered could have happened, for instance, owing to the new European regulatory framework, the second set of European routes are used as a control group, affected by all factors other than the liberal bilateral

agreements. The second set of routes in 1992 and 1999 are analyzed and, therefore, the effect of the first package of measures introduced by the EC is tested, as well as, the different impact of the two alternative legislations. Additionally, it is avoided considering any route where there is some evidence of charter competition in order to isolate the effects of the liberal bilaterals on market structure and pricing policy.

**3. A theoretical model of firms' behavior**

In this part a theoretical model of firm behavior in the airline industry is described both in collusive oligopoly and non-cooperative settings. These environments correspond to the regulated regime and the situation after the introduction of the liberal bilateral agreements, respectively.

Airlines can be thought of as multiproduct firms, each route being a different product (it is assumed that the cross-price elasticities among different routes are negligible). Assuming that the air services markets could be characterized by a model of oligopolistic competition with vertical product differentiation, it is possible to represent the firm decision process as a four stage game (Sutton, 1991), as follows:

- ◆ At the first stage, a firm decides whether to enter the airline industry, and if so, it makes a choice about its technology.
- ◆ At the second stage, the firm decides whether it is profitable to enhance customers' willingness to pay for its products by increasing perceived quality (denoted by  $u$ ), and if so, what is the customers' goodwill that it wishes to achieve.
- ◆ At the third stage, the firm decides the set of specific markets where it wants to operate given expected profits and the extra sunk costs incurred for each market.
- ◆ Finally, at the last stage, firms face different competition regimes and set prices,  $p$ , accordingly.

This process can be regarded as a sequential game and can be solved by backward induction starting from the last stage. For the purpose of this paper, only the last stage of the decision process needs to be considered, when firms take as given their stock of goodwill and the set of markets they operate in. At this stage a firm produces a set of products that share some brand image or perceived quality:  $u_i$  and compete with other firms' products in each market.

Since each consumer chooses the good that maximizes the quality-price ratio  $u_i/p_i$ , Sutton (1991) proposes the following equilibrium condition for the prices of all those firms enjoying positive sales:

$$u_i/p_i = u_j/p_j, \tag{I.1}$$

for all firms  $i, j$ , i.e., the equilibrium prices must be proportionate to the perceived qualities.

Let us consider two alternative regimes separately. Firstly, a tightly regulated market is assumed where entry is banned and the "competing" firms set prices jointly and split the market among them. In this oligopolistic framework with perfect collusion, the quantity sold by firm  $i$ ,  $q_{ikt}$ , when there are  $N_{kt}$  firms operating in market  $k$  and period  $t$ , is equal to the market demand,  $Q_{kt}$  over  $N_{kt}$ . In turn, the market demand depends on the market average perceived quality,  $u_{kt}$ , the market price  $p_{kt}$ , and some other exogenous market factors,  $z_{kt}$ . This can be represented as follows:

$$q_{it} = Q_{kt}(u_{kt}, p_{kt}, z_{kt})/N_{kt} \tag{I.2}$$

The  $N_{kt}$  firms jointly maximize market profits, that can be expressed as:

$$\pi_{kt} = p_{kt} Q_{kt} - c_{ikt}(q_{it}, w_{it}, C_{it}), \tag{I.3}$$

where  $c_{ikt}$  and  $w_{it}$  are firm  $i$ 's variable cost function and vector of input prices in market  $k$  in period  $t$ , correspondingly, and  $e_{ikt}$  represents the number of markets where firm  $i$  operates weighted by their proximity or relatedness to route  $k$ , i.e. it is economies of scope. Let us assume that input prices and economies of scope are given to the firm in period  $t$ .

Given that firms maximize profits subject to the market demand represented in (I.2), then the first order condition for prices is equal to:

$$\eta_{kt} = -(dQ_{kt}/dp_{kt})(p_{kt}/Q_{kt}), \tag{I.4}$$

where  $dQ_{kt}/dp_{kt}$  is the market price-demand elasticity, and  $c_{kt}$  – the average variable cost function for the firms operating in market  $k$  in period  $t$ . This condition coincides with the standard monopoly outcome, i.e., prices are only affected by cost variables and the price-demand elasticity. It is obvious that, given a single market price and joint profit maximization, only a measure of the average input prices for the firms operating in the market may affect the output price, i.e., firms heterogeneity cannot be taken into account. Additionally, condition (I.1) implies that when all the firms are constrained to set the same equilibrium price they have no incentive to deviate from the average perceived quality in the market.

Secondly, let us assume a market with free entry and price competition, according to the new liberal bilateral agreements. In this context, the quantity sold by firm  $i$  in period  $t$  and market  $k$  depends on firm  $i$ 's perceived quality,  $u_{ikt}$ , the market output prices,  $(p_{ikt}, \dots, p_{Nkt})$ , and other factors exogenous to the firm,  $z_{ikt}$ . The basic problem with the individual demand function is that generally its derivatives depend on all cross price derivatives. However, given condition (I.1), it can be expressed as:

$$q_{ikt} = q_{ikt}(u_{ikt}, p_{ikt}, u_{lkt}/u_{ikt}, \dots, p_{lkt} u_{Nkt}/u_{ikt}, z_{ikt}). \tag{I.5}$$

Firms maximize profits, subject to (I.5). Firm  $i$ 's net profits in market  $k$  and period  $t$  can be expressed as follows:

$$\pi_{ikt} = p_{ikt} q_{ikt} - c_{ikt} = (q_{ikt}, w_{it}, \varepsilon_{ikt}). \tag{I.6}$$

Assuming non cooperative Cournot-Nash behavior, profit maximization provides the first order condition:

$$\eta_{ikt} = -(dq_{ikt}/dp_{ikt})(p_{ikt}/q_{ikt}), \tag{I.7}$$

where  $dq_{ikt}/dp_{ikt}$  is firm  $i$ 's price-demand elasticity.

Under these assumptions, prices are determined as a mark-up on standard cost variables, and the mark-up

depends on customers' goodwill. In a competitive framework firms have stronger incentives to minimize their unit costs. Note that in equilibrium the entry of more efficient competitors would force the exit of cost disadvantaged firms. Additionally, at the second stage, any firm  $i$  has an incentive to improve its brand image when the effect on its total net profits  $\pi_{it}$ , derived from a certain improvement in its brand image more than offsets the increment in its total sunk costs.

## Conclusions

The analysis of the firms' pricing policies and market structure suggests that while the first package of deregulatory measures introduced by the EC has not had any observable effect, the introduction of liberal bilateral agreements on some European air routes has had several effects.

The liberal bilateral agreements have been followed by entry and competition. Under regulation firms behave as in an oligopoly with perfect collusion; regulation makes cheating impossible and entry is totally banned. Under these circumstances there are few incentives to increase efficiency. After the liberalization, firms start acting independently and competing in prices. New variables become relevant showing that firms try to exploit their cost advantages, such as lower labor costs and larger econo-

mies of scope. As a result, some new competitors have consolidated their position leading the industry towards a more fragmented structure.

In spite of this, the impact of competition on market structure is not so evident. Product characteristics, customers' goodwill and some other important incumbency advantages derived from the control of airport facilities and other ancillary services allow the flag carriers to maintain high market shares. Additionally, they also enjoy some cost advantages owing to the existence of economies of scope. Therefore, sharp changes are not expected in the short run. Nevertheless, price differentials also appear to have some relevant effect on market shares and may facilitate entry and penetration by new competitors where they benefit from lower unit costs.

Finally, incumbent carriers have a first mover advantage that may allow them to develop new strategic policies and maintain their market power in the long run. In fact, advertising intensity seems to be quite effective in stimulating a firm's individual demand. This may facilitate entry if the incumbents' standards can be matched rapidly by entrants. However, incumbents may also use this factor to increase their incumbency advantages and raise further barriers to entry leading the industry towards a more concentrated structure.

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