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Cost Competitiveness of Airlines: An International Comparison

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Summary

Significant structural, institutional and regulatory changes have occurred in the airline industry since the mid-1980s. These changes have intensified competition in both domestic and international air transport market. As the market becomes more competitive, the ultimate ability of a carrier to survive and prosper depends greatly on its cost competitiveness. This paper measures and compares the unit cost competitiveness of the world's major airlines, using the yearly panel data of 23 major airlines over the 1986-93 period. We focus our analysis on identifying the potential factors which influence the observed unit cost differentials among airlines, including input prices, productivity, network and other firm-specific variables.

A translog variable cost function is estimated taking into account of the capacity utilization, that is:

$$VC = V(Y, W, Z, t, uK)$$

where VC is the cost of the variable inputs, Y is the aggregate output index, W is a vector of input prices, Z is a vector of airline characteristics, t is time shifter for technological progress, K is capital stock, and 'u' is capacity

utilization rate (in this case, weight load factor). The results from the variable cost function estimation show that (1) airlines with higher concentration on freight service and non-airline businesses are expected to have lower variable costs; (2) government-owned airlines have about 15% higher variable cost, and tend to use more labour- and capital-using technology than privately-owned airlines; (3) technical progress in airline operations has reduced variable costs by about 8% during the 1986-93 period.

Adopting the methodology proposed by Caves and Christensen (1988), the following formula is used to decompose the total unit cost differential between observations (firm and year), *1* and *2*, into the effects of differentials in size, output mix, input prices, stage length, ownership forms, and residual components:

$$
\begin{aligned}
c^1 - c^0 = {} & S[1/2(d_y^1 C_v + d_y^0 C_v) \cdot (Y^1 - Y^0) - (Y^1 - Y^0)] \\
& + S[1/2(d_k^1 C_v + d_k^0 C_v) \cdot (K^1 - K^0)] \qquad \Big\rangle \ \textit{size} \\
& + (1 - S)[(K^1 - K^0) - (Y^1 - Y^0)] \\
& + S[1/2(d_r^1 C_v + d_r^0 C_v) \cdot (R^1 - R^0)] \qquad \textit{output mix} \\
& + S[1/2(d_w^1 C_v + d_w^0 C_v) \cdot (W^1 - W^0)] \qquad \Big\rangle \ \textit{input prices} \\
& + (1 - S)(W_k^1 - W_k^0) \\
& + S[1/2(d_z^1 C_v + d_z^0 C_v) \cdot (Z^1 - Z^0)] \quad \textit{operation attributes} \\
& + S[1/2(d_t^1 C_v + d_t^0 C_v) \cdot (t^1 - t^0) \quad \textit{time effects} \\
& + S[1/2(d_g^1 C_v + d_g^0 C_v) \cdot (g^1 - g^0) \quad \textit{government ownership}
\end{aligned}
$$

where S denotes the average share of variable cost in the total cost for observations 1 and 0; $d_x^i C_v$ denotes the partial derivative of the variable cost for observation i with respect to variable x. For ease of presentation, American Airlines (AA) is used as the benchmark for comparison.

The results of the unit cost decomposition are used to construct a cost competitiveness indicator after removing the effects of network and output

attributes. This indicator allows one to compare the true cost competitiveness of airlines in a given market, especially in an inter-continental market, and shows us what factors are contributing or harming a carrier's cost competitiveness. Our results can be summarized as follows:

(a) Major Asian carriers (except JAL and ANA) enjoy substantial cost competitiveness over American Airlines (AA) mainly due to their lower input prices, but their cost competitiveness relative to AA has decreased over time;

(b) JAL is 65% less cost competitive relative to AA mostly due to its high input prices;

(c) Major European carriers are 5% (BA) - 60% (SAS) less cost competitive relative to AA, mainly because of their high labour and non-labour input prices; lower productive efficiency is also partly responsible, however, European carriers' productive efficiency has improved relative to AA during the 1986-93 period;

(d) In 1993, AA, United and Delta are similar in cost competitiveness, and US Air is 20% less cost competitive while Northwest and Continental enjoy, respectively, 10% and 15% cost competitiveness over AA;

(e) Canadian carriers and the US mega carriers are similar in cost competitiveness; and Canadian Airlines has about 6% unit cost advantage over Air Canada.

Overall, the input prices together have been a more important factor than productive efficiency for determining a carrier's cost competitiveness in the past. However, the importance of input prices is likely to diminish over time as airlines increase their global sourcing of labour, materials, services and other inputs, and as input prices in the developing (and the NICs) continue to increase faster than in the developed countries. Furthermore, as liberation of the airline industry continues, productive efficiency will become progressively more important in determining cost competitiveness in the future.