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End of Boeing's Monopoly: How Does Airbus' A380 Introduction Affect Large Commercial Aircraft Industry?

Abstract.

Since the first delivery of Boeing 747 the large commercial aircraft industry has been Boeing-only segment of the civilian aircraft market. For last 30 years Boeing has been enjoying the monopoly power in this market segment. As Airbus launched the A380 superjumbo the monopoly era of Boeing seems to be over. Questions this paper tries to address are: (1) how the entry of Airbus' A380 will affect the large commercial aircraft industry, i.e. how Boeing and Airbus will divide the market shares in this Incumbent-Entrant game; and (2) how big is the effect of the aid from European governments to Airbus.

Motivation for this paper is the tensions between two major civilian aircraft producers - The Boeing Company and Airbus. These corporate tensions are reaching a new point due to the escalating situation in large commercial aircraft market. On 19th of December 2001, Airbus officially announced plans for the A380 superjumbo – the world's largest commercial aircraft which will seat 481 – 840 passengers and fly up to 9,206 miles. Airbus' this credible commitment is the beginning of the end of Boeing's more than 30 years exclusive monopoly era in the large commercial aircraft industry. Boeing 747 has been the only airliner that could seat more than 400 passengers. Shortly after the Airbus' announcement Boeing withdrew its counter

plans for developing the competitor for a new A380. Boeing has decided to take "accommodate" path in this Incumbent – Entrant game.

Tensions do not have only corporate character. Introduction of A380 adds another chapter in United States - European Union trade disputes history. The A380 development is a $10.7 billion project, about one-third of which will be funded by European governments - members of Airbus consortium. The United States has warned the European Union that loans that European government - members will be making to Airbus to help fund the development of the A380 must be at the market rates in order not to violate US - EC 1992 bilateral agreement. This bilateral agreement between US government and European Commission limits governments' involvement and financial assistance.

In spite of all corporate and political disputes we believe that questions this paper addresses are actual for the large aircraft industry. The paper provides simple and interesting approach to the problem of future market division.

We use classical Cournot capacity game as a basic model. The model set up is as follows: Boeing already has an incumbent's position in the large commercial aircraft market by producing 747. Airbus challenges Boeing by introducing the new A380 superjumbo. For our model we use slightly changed approach of R. Baldwin and P. Krugman for deriving the market demand for aircraft. Product consumers in our case are airlines. Since aircraft are durable goods, this approach is based on maximizing airlines' discounted sum of profits, taking aircraft price as given. We use $\Pi_t^{'} = (q_A + q_B)^{-1/\varepsilon}$ as a functional form for the airlines' profit derivative and show that the total market demand equation is of the following form:

$$Q_t = k\left(p_t \frac{1-\delta}{1-\delta^N}\right)^{\varepsilon},$$

where ε = demand elasticity, δ = discount factor, N = aircraft's lifetime (years);

For the supply side we employ the learning curve's nature of decreasing production costs as a result of experience accumulation. Producers' cumulative production will be reflected in the marginal cost by the following functional form: $c = \gamma(E_t)^{-g}$, where c is the marginal cost of production and g is the elasticity of cost with respect to output. Obviously, Airbus and Boeing will have different but constant marginal costs of production. Parameter g - elasticity of cost with respect to output is simply the elasticity of the learning curve.

We obtain the information about the model parameters based on Airbus' and Boeing's published annual reports, their market forecast reports, different data on airlines, and from the relevant literature available for the large commercial aircraft industry.

Solving this model yields results that are quite realistic. We found that A380 introduction results in capturing 24% of the large commercial aircraft market by Airbus. Boeing ends up with remaining 76% of the market share. This results definitely constitute the end of Boeing's monopoly power in large commercial aircraft industry.

Finally, we analyze the effect of the European governments' aid to Airbus by incorporating the adjusted fixed cost of development into the model. We find that this aid is not crucial in capturing the substantial market share.