GOVERNANCE AND THE EFFICIENCY OF ECONOMIC SYSTEMS
GESY

Discussion Paper No. 19

Integrating Industrial Organization and International Business to Explain the Cross-National Domestic Airline Merger Phenomenon

Joseph A. Clougherty*

July 2004

*Joseph A. Clougherty, Wissenschaftszentrum Berlin (WZB), Research Unit: MP-CIC Reichpietschufer 50, D-10785 Berlin, Germany, clougherty@wz-berlin.de

Financial support from the Deutsche Forschungsgemeinschaft through SFB/TR 15 is gratefully acknowledged.

Sonderforschungsbereich/Transregio 15 · www.gesy.uni-mannheim.de
Universität Mannheim · Freie Universität Berlin · Humboldt-Universität zu Berlin · Ludwig-Maximilians-Universität München
Rheinische Friedrich-Wilhelms-Universität Bonn · Zentrum für Europäische Wirtschaftsforschung Mannheim

Speaker: Prof. Konrad Stahl, Ph.D. · Department of Economics · University of Mannheim · D-68131 Mannheim,
Phone: +49(0621)1812786 · Fax: +49(0621)1812785

Integrating Industrial Organization and International Business to Explain the Cross-National Domestic Airline Merger Phenomenon

Joseph A. Clougherty
Wissenschaftszentrum Berlin (WZB)

Research Unit: MP-CIC, Reichpietschufer 50
10785 Berlin, Germany
E-Mail : Clougherty@wz-berlin.de

Abstract: The domestic airline merger phenomenon of the late 1980s and early 1990s sparked a great deal of Industrial Organization literature; yet, that literature neglected non-US merger activity and the potential for international competitive incentives. Using an International Business perspective to complement a primarily Industrial Organization analysis, I argue that factoring international competitive gains helps explain the domestic airline merger phenomenon. A Cournot model of airline competition illustrates the international incentives behind integrating domestic with international routes and behind acquiring domestic competitors. Further, comprehensive panel data tests also support large domestic networks and actual mergers improving the international competitiveness of airlines.

Key-Words: airline-mergers, imperfect-competition, international-determinants

[*] I wish to thank Timothy N. Cason and Vai-Lam Mui, as well as a number of other individuals (Harry Barkema, Martin Dresner, Jean-Francois Hennart, Tae H. Oum, Jong-Hun Park, Michael W. Pustay, and Bernard Yeung) and seminar participants (Academy of International Business, University of British Columbia, Concordia University, University of Wyoming, and Western Economic Association) for helpful comments and suggestions. In addition, vital institutional support was received from the Canadian-American Fulbright program, the Canadian Embassy in the United States, the Transportation Research Board of the National Research Council, and the Boeing Company.

Integrating Industrial Organization and International Business to Explain the Cross-National Domestic Airline Merger Phenomenon

Abstract: The domestic airline merger phenomenon of the late 1980s and early 1990s sparked a great deal of Industrial Organization literature; yet, that literature neglected non-US merger activity and the potential for international competitive incentives. Using an International Business perspective to complement a primarily Industrial Organization analysis, I argue that factoring international competitive gains helps explain the domestic airline merger phenomenon. A Cournot model of airline competition illustrates the international incentives behind integrating domestic with international routes and behind acquiring domestic competitors. Further, comprehensive panel data tests also support large domestic networks and actual mergers improving the international competitiveness of airlines.

Key-Words: airline-mergers, imperfect-competition, international-determinants

INTRODUCTION

A number of domestic airline mergers—the TWA/Ozark, Northwest/Republic, British Air/British Caledonia, and Air France/Air Inter pairings being most notable—occurred in the late 1980s and early 1990s (Pustay, 1992). The high profile nature of these mergers led to a substantial amount of Industrial Organization (IO) literature that split along the familiar market-power (Kim and Singal, 1993; Werden, Joskow and Johnson, 1991; Borenstein, 1989; U.S. General Accounting Office, 1988) versus efficiency-gains (Brueckner and Spiller, 1994; Brueckner, Dyer and Spiller, 1992; Brueckner and Spiller, 1991; Levine, 1987) lines. As for what drove merger activity, one could extrapolate the following from the literature: the market-power camp favoring merged airlines' ability to raise fares via reduced competition, and the efficiency-gains camp favoring merged airlines' ability to reduce costs via hub-and-spoke networks. Yet, the IO literature was less concerned with merger motives and more concerned with the social welfare implications of airline consolidation.

Beyond understudying motivations, the IO literature neglected the international dimensions (cross-national scope and international competitive incentives) of the domestic airline merger phenomenon. First, despite the occurrence of many non-US airline mergers, the IO literature strictly considered US domestic merger activity; thus, failing to take the appropriate cross-national perspective.[1] Second, the IO literature focused on the domestic competitive effects of mergers; thus, paying little heed to any strategic relationship between domestic mergers and international competitive outcomes. While two recent 'revisionist' IO articles—Morrison and Winston (2000) and Clougherty (2002)—begin exploring the international competitive incentives behind domestic airline mergers, even these works restrict the scope to US mergers.

[1] British Airways purchased its largest domestic competitor (British Caledonia) and a significant share of the commuter carrier Brymon. Canadian Airlines completed a series of mergers that resulted in a domestic market duopoly. AirFrance acquired its largest domestic competitor (AirInter), another competitor (UTA), and a French commuter carrier. KLM used acquisitions to control the Dutch domestic market. SwissAir acquired a stake in CrossAir, and there are further examples of domestic consolidation. (Pustay, 1992)

Sizable US domestic markets favor domestic competitive incentives primarily driving US mergers; yet, neglecting international competitive incentives appears problematic when one realizes the cross-national nature of the airline merger phenomenon. Many mergers occurred in nations where international markets outweigh domestic markets; in such markets, firms would seemingly consider the international incentives behind domestic actions.[2] Domestic airline mergers also occurred in some nations (e.g., France) prior to domestic deregulation; in such markets, mergers might seemingly be a response to international competitive realities—not regulated domestic realities. In short, a comprehensive study of the world domestic-airline merger phenomenon requires understanding the cross-national scope of the phenomenon, and that the drivers (or competitive effects) of merger activity might be international as well as domestic in nature.

Accordingly, this work aims to enhance the existing IO literature regarding the domestic airline merger phenomenon of the late 1980s and early 1990s via three means. First, by considering the motivations and drivers—not the social welfare implications—behind domestic airline merger activity. Second, by considering the domestic airline merger phenomenon to be cross-national—not restricted to the US—in scale and scope. Third, by considering the potential for international competitive incentives—not just the domestic competitive incentives—residing behind domestic airline merger activity. Additionally, the reasoning and analysis here are primarily economic (IO in particular) in nature; yet, a subtext throughout the work is that the International Business (IB) literature complements an IO analysis. Specifically, two fundamental tenets of IB (cross-border interactions impact the domestic actions of businesses, and the analytical lens should consider cross-national business activity--Nehrt, Truitt and Wright, 1970) might have helped the IO literature realize the cross-national scope and the international competitive incentives involved with the domestic airline merger phenomenon.

---

[2] Ninety percent of US airlines' traffic is domestic, but Canadian carriers find international markets equaling the size of

Though I attempt to deliver on the specific aims above with regard to improving the IO literature on domestic airline mergers, the paper consists of one overriding main contention: domestic airline mergers were driven by international competitive incentives in addition to the domestic competitive incentives focused on by the pre-existing literature. The logic behind this argument is as follows: domestic airline mergers enhance domestic networks; domestic networks generate crucial passenger traffic that increases the efficiency of international operations; and more-efficient airlines earn greater traffic and profits in imperfectly competitive international markets. In sum, airlines—circa the late 1980s—faced a strategic rationale to enhance domestic networks via mergers in order to improve international competitiveness.

In order to both frame the main contention and formally set testable propositions, the paper proceeds as follows. The next section nests the main contention within the relevant IO, and IB, literature. The subsequent section presents a simple Cournot model that captures the essentials of international airline competition and helps generate formal propositions. The last substantive section presents panel data empirical tests—covering the international city-pair markets between twenty-one advanced aviation nations over the 1983 to 1992 period—that support domestic airline mergers which enhance domestic networks and reduce domestic competitors as leading to an improved international competitive position.[3] The last section concludes.

NATIONAL BORDERS, IMPERFECT COMPETITION & NETWORKS

---

domestic markets, and smaller nations--like the Netherlands--find international markets far outweighing domestic markets.

[3] First, international city-pair markets refer to different sets of origin and destination cities as appropriate airline markets; e.g., Boston-London and New York-London are two different markets. Second, the 21 nations--Argentina, Australia, Brazil, Canada, Chile, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Mexico, Netherlands, New Zealand, Portugal, Spain, Switzerland, United Kingdom, and the United States—are referred to as the twenty-one advanced aviation nations. The OECD nations and the four more developed Latin American nations were initially selected, but a few OECD nations were dropped due to insufficient data.

The fundamental argument of this paper is that--in addition to domestic incentives--domestic airline mergers were driven by international competitive incentives. Such an argument requires establishing the imperfectly competitive nature of airline markets and the existence of network economies; yet, the ability to bifurcate the world airline industry into domestic and international markets takes first priority. Caves notes that in IB "strategy issues become distinctive because the multinational enterprise (MNE) serves product markets balkanized by transport costs, government restrictions, and/or differences in tastes and production conditions" (1998, p.5). Hence, I must first establish the bifurcation of the world airline industry into domestic and international markets before further analyzing the strategic dimensions of airline competition.

It is generally agreed that city-pair markets are the appropriate level-of-analysis for actual airline industry competition (Morrison & Winston, 1987). Gimeno and Woo (1999) note that the negligible cross-elasticity of demand across city-pair markets underscores the importance of city-pair markets. While the empirical analysis in this work is faithful to the importance of analyzing city-pair outcomes, the immediate point is that classifying individual city-pair markets into domestic and international markets adds important heuristic insights.

Domestic city-pair markets have traditionally been the exclusive territory of home-nation airlines (Pustay, 1992). Beyond the outright curbs on foreign airlines competing in domestic markets, foreign airlines have also faced government mandated ownership limits that prevent controlling interests in domestic airlines.[4] The European Union (EU) has recently allowed EU airlines to compete in the domestic markets of member nations; however, this freedom did not exist during the period of this study and is still rarely taken-up by airlines. Domestic city-pair markets share some common characteristics as they are subject to the same national regulatory authority and a common set of potential competitors.

[4] Witness the recent difficulties that SwissAir incurred when it took a significant—but not controlling—stake in Sabena Airlines of Belgium.

Consequently, domestic airline markets are very much--to repeat Caves (1998) term--'balkanized'.

International airline markets—the city-pair markets between different nations—also exhibit significant competitive barriers, as they have traditionally been the exclusive territory of the pair-nation's designated airlines. Unlike trade in manufactured goods--which looks to a multilateral organization (the WTO) for institutional legitimacy--airline service between two nations is legitimized via bilateral treaties (de Murias, 1989). These bilateral treaties generally restrict flight authority to airlines from the two treaty nations. For instance, actual city-pair flights between Japan and the US will involve only US and Japanese airlines. Beyond these country-of-origin limits on the number of competitors in a particular international city-pair market, the bilateral treaties often designate which particular airlines have the authority to serve certain markets (Dresner & Oum, 1998). For instance, the privileged positions of American Airlines and British Airways in the city-pair markets linking London with US cities has prevented the two airlines from receiving regulatory approval for a strategic alliance, and prevented reform on the US-UK bilateral agreement (The Economist, 2002).[5] Further, bilateral treaties often involve capacity restrictions for the designated airlines: often involving restrictions on flight frequency, and sometimes involving restrictions on aircraft type (Dresner & Oum, 1998; Mitchell, 1991) In short, particular international city-pair markets are thrice buffered: from worldwide competition; from facing the full set of potential pair-nation competitors; and from facing liberal market conditions. Nevertheless, airlines generally have the ability to change quantity (seats) supplied in a particular international city-pair market.

[5] The much-hyped 'Open-Skies' treaties of the last decade only remove the restriction on the set of pair-nation competitors, and do nothing with regard to the restriction on non pair-nation competitors. In addition, 'Open-Skies' treaties have not been universally applied to all international city-pair markets—in fact these more 'liberal' agreements are still outnumbered by the traditional 'restrictive' agreements between nations. See Ramamurti & Sarathy (1997) for more details on why many nations have not fully embraced this liberalization trend.

The division between domestic and international airline markets owes to the fact that national regulatory policies have consistently made a distinction between domestic and international airline business. Consider that airlines have traditionally been restricted to status as either a domestic (e.g., American Airlines, United Airlines, AirInter) or international carrier (e.g., Quantas, British Airways, PanAm). Until the 1980s, only a few airlines (e.g., TWA) were granted the exceptional status of being both a prominent domestic and international carrier of passengers.[6] We also witness variation in the regulatory approaches taken by nations with regard to domestic and international markets: sometimes domestic markets are regulated while international markets are liberalized; sometimes domestic markets are liberalized while international markets are regulated; and sometimes both domestic and international markets are similar in their degree of regulation (de Murias, 1989). The distinction between domestic and international markets is, hence, an important one—one that is mirrored in a number of other studies (e.g., Pustay, 1989; Weisman, 1990; Ramamurti & Sarathy, 1997; Clougherty, 2001, 2002). Ramamurti and Sarathy capture the contradictions of the world airline industry well when they state that "despite its obvious role in promoting … globalization … the airline industry itself is one of the least globalized, chiefly because governments … have erected large barriers to competition" (1997, p. 391).

The bifurcation of the world airline industry into international and domestic markets fulfills a necessary economic condition for domestic airline mergers to improve international performance. The notion that providing a protected home market promotes an industry's international competitiveness goes as far back as Friedrick List's (1966[1885]) late 19th century prescriptions for narrowing the British-German industrialization gap. Yet, the national-champion rationale was only formalized—under Strategic Trade Theory—in the 1980s (Brander & Spencer, 1987; Krugman, 1984). While a number of IB/Strategy scholars (e.g., Caves, 1982; Stopford, Strange & Henley, 1991) consider domestic monopolization to

[6] See Ramamurti & Sarathy (1997) and Pustay (1992) for more details on regulatory obstructions.

promote international performance, others (e.g., Porter, 1990) question the impact of softer domestic competition on international performance. Accordingly, careful attention must be paid to the relevant characteristics of the strategic interaction before applying a national-champion rationale.

Krugman (1984) notes that domestic and international markets must be segmented—firms are able to charge different prices in different markets—for the national-champion rationale to hold. As already supported, the world airline industry exhibits this first necessary condition with its bifurcation into domestic and international markets. Krugman identifies two additional conditions necessary for the national-champion rationale: imperfectly competitive markets, and firm economies. In terms of the airline industry: imperfectly competitive international markets provide an incentive for airlines to engage in efficiency-enhancing endeavors since profits accrue to low cost providers; and network economies are one means by which airlines reduce costs and earn greater profits. Consequently, domestic mergers that increase network size should be sought by airlines in order to improve their international competitive position and profitability. The following discussion supports the existence of these conditions in the international airline industry and considers their role in supporting the main contention.

As already noted, international airline markets remain rather restricted despite the liberalization of the last two decades. The regulatory and competitive entry barriers involved with international markets combine to ensure that strategic behavior determines market outcomes; i.e., entry barriers ensure the imperfectly competitive nature of these markets. The Cournot model of imperfect competition emphasizes quantity adjustments by a few firms and can reflect the long-term implications of international aviation competition. While Graham (1998) demonstrates the applicability of such an approach to international competition, Kreps and Scheinkman (1983) show that Cournot can apply to two-stage competition where firms first set quantity and then compete via prices. Cason (1994) notes that airline industry competition is quite similar with firms first setting quantity via quarterly schedules and then competing via prices to fill seats. Even more importantly, a number of scholars (Brander and Zhang, 1993, 1990; Oum, Zhang and Zhang, 1993; Weisman, 1990) have empirically supported that Cournot models best reflect actual airline competition.

One of the key dynamics with Cournot-style competition is that the low-cost competitors obtain the greatest market share and profits. Consequently, airlines have a strategic incentive to reduce costs and garner a larger share of the traffic and profits in international markets. It should be noted that the realm of strategic competition supports a number of market outcomes, as it is difficult to predict competitor actions in a strategic environment. Nevertheless, Kurtz and Rhoades (1992) find evidence supporting a general link between profits and market share; and Adrangi, Chow and Gritta (1989) empirically support a link between international airline profits and market shares.

Establishing hub-and-spoke networks is one means by which airlines improve efficiency. The efficiency gains of airline networks derive from the existence of density economies: cost savings derived from a greater geographic density of customers, as customer density allows more intensive capital asset use (Besanko, Dranove & Shanley, 2000). One gains an insight into the nature of generic density economies by realizing the rough equivalence in geographic area between the US and Canada, and then imagining the efficiency benefits of being a national distributor in the US (with a dense population of 280 mln) compared to a national distributor in Canada (with a sparse population of 30 mln). The seminal study of Caves, Christensen and Tretheway (1984) demonstrates the existence of density economies for the airline industry. One gains an insight into the nature of airline density economies by realizing the high fixed costs (including the acquisition of aircraft, maintenance facilities, gate space, takeoff rights, and even personnel) and low marginal costs (the extra fuel and food consumed by an additional passenger) of providing airline service.

Consequently, average costs decrease significantly on a route and in a network with increased passenger numbers; i.e., airlines exhibit substantial density economies.

Most scholars credit density economies with explaining the rise of hub-and-spoke networks in the deregulated US environment (Levine, 1987; Brueckner et al., 1991, 1992, 1994; Borenstein, 1992). The matching of domestic routes into an integrated national network is certainly driven by density economies; yet, these efficiencies are not restricted to the US or to domestic markets. Domestic networks also generate significant international efficiencies (Weisman, 1990; Pustay, 1992; Dresner, 1994). Matching international with domestic-feeder flights ensures that airlines take advantage of density economies by funneling passengers onto international routes. In short, density economies yield significant competitive implications for airlines as domestic networks impact international business outcomes.

Integrating routes into a network brings up the issue of scope economies, which are sometimes credited with explaining the rise of hub-and-spoke networks (Weisman, 1990). Economies of scope generally refer to the production of two goods or services being managed more efficiently by one firm than by two firms (Panzar & Willig, 1981; Porter, 1985). If one airline more efficiently provides service in two city-pair markets than could two airlines, then scope economies are indicated. By matching an international service (N.Y. to London) with a domestic service (L.A. to N.Y.), an airline increases the number of passengers on each leg and reduces the average cost per passenger via density economies. The matching of different city-pair markets into a network brings about cost reductions; thus, economies from hub-and-spoke networks are often rightly referred to as scope economies (Besanko, Dranove & Shanley, 2000). For convenience, the economies generated by airline networks will be referred to as scope economies or network economies in the remainder of this work. It is important to underscore, however, that these economies are founded on the existence of density economies--the matching of different airline routes promotes greater traffic density and increased capital asset utilization.

A COURNOT MODEL OF INTERNATIONAL AIRLINE COMPETITION

The previous section attempts to set a thorough theoretical background by discussing the critical conditions for the main contention to hold. This section takes a more formal approach by presenting a simple model that captures the essentials of the world airline industry, illustrates the international incentive behind domestic merger activity, and formally yields propositions for empirical testing. The aim then is to establish a complete theoretical foundation involving both analytical richness and formal precision. The Cournot model set out below owes its domestic-international approach to Brander and Spencer (1987) and draws strongly for its aviation applicability from Weisman (1990).

The cost function formulation underpins the model by creating the different market equilibrium outcomes. The total cost function takes the form:

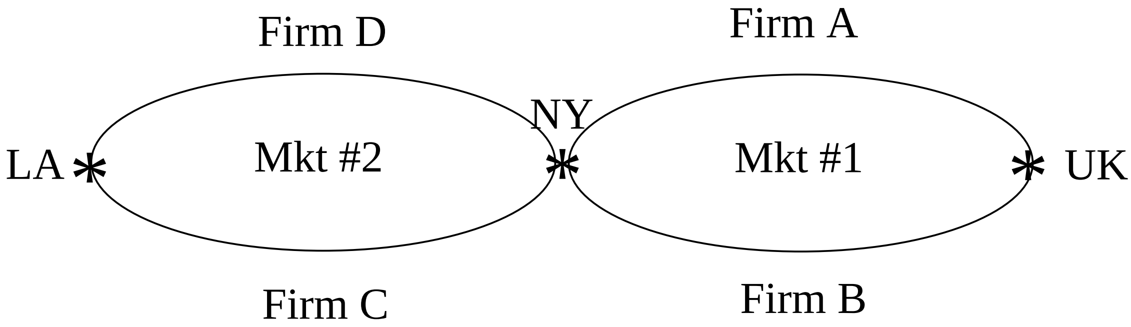
$$TC = c \sum X_i - s * X_1 * X_2 \; ..... \; * X_n$$

Where X denotes quantity (passengers served in a city-pair market), i is an index of the number of routes in the network (i = 1,...,N), and s is a scope coefficient (where s>0) that broadly captures the efficiency effect of matching routes (Weisman, 1990). Constant average costs (c'=0) are assumed; hence, neither economies of scale nor density economies are specified. The omission of scale economies is in line with previous research (Caves, 1962; Douglas & Miller, 1974; Keeler, 1978; White, 1979; Caves, Christensen & Tretheway, 1984), but as already stated, density economies are crucial to hub-and-spoke network economies. Instead of stipulating declining average costs, this model broadly captures network efficiency with the multiplicative term at the end of the cost function--the multiplicative term can be considered the cost savings of integrating routes within a network.[7]

Three cases are presented to sharpen this analysis: the first case (Case A) examines international duopoly competition without domestic feed flights, the second case (Case B) examines international duopoly competition where one competitor has a domestic feed flight but faces a domestic competitor, and the third case (Case C) examines international duopoly competition where one competitor monopolizes the domestic route. These cases generate two propositions that underpin the main contention.

Case A: International Competition without Feeder Flights

Figure 1: Case A



This first scenario (illustrated in figure 1) has firms A and B competing in the international market (market #1) between points NY and UK, and firms C & D competing in the domestic market (market #2) between points LA and NY. Firms have no matching flights and reap no scope economies. Assuming identical cost functions and symmetrical inverse demand leads to the following solution equations:

$X^*_{A,1} = X^*_{B,1} = X^*_{C,2} = X^*_{D,2} = (a-c)/3b$ (a.1)

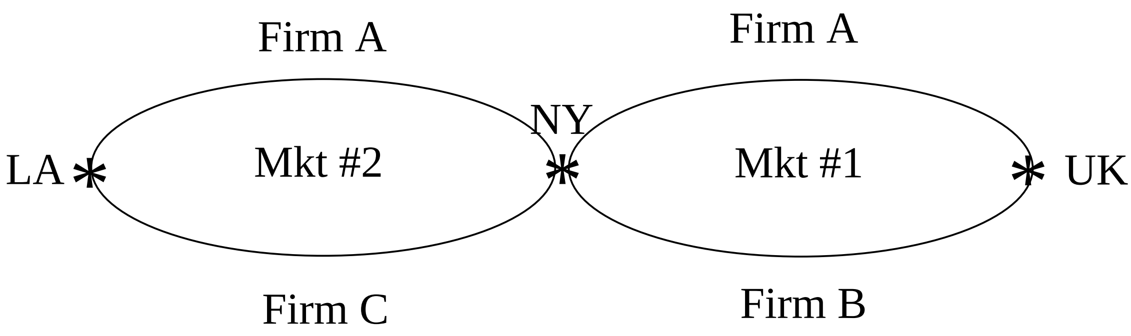
$\Pi^*_A = \Pi^*_B = \Pi^*_C = \Pi^*_D = (a-c)^2/9b.$ (a.2)

[7] Theorists have modeled airline competition with greater specification of density economies (Brueckner et. al., 1991, 1992, 1994; Oum, Park & Zhang, 1995). Instead of broadly capturing network efficiencies as this model does, they stipulate decreasing average costs with more passengers in a route. However, the competitive implications of these models and the model presented here are similar: airlines with larger networks have lower costs and compete more effectively.

Firms split the market output and profits in both the domestic and international markets for this standard Cournot duopoly outcome. This simplest of cases acts as a useful benchmark for comparison with the next two cases.

Case B: International Competition with Domestic Feed and Competition

Figure 2: Case B



The second scenario has firms A and B again competing in the international market (market #1) between points NY and UK (illustrated in figure 2). However, firm A replaces firm D--firm D leaves the market or is acquired--in the domestic market between points LA and NY (market #2) and competes against firm C. While firms B & C have simple cost functions, firm A matches flights and takes advantage of scope economies—firm A's cost function takes the form:

$TC(A) = c\,(X_{A,1} + X_{A,2}) - s\,X_{A,1}\,X_{A,2}$. (b.1)

Again, assume identical demand functions in markets #1 and #2; further, consumers are allowed to purchase flight segments in bundled and unbundled forms. Note, however, that the solutions are not sensitive to these simplifying assumptions. The solution equations yield symmetrical results for equilibrium market outputs:

$X^{*}_{A,1} = X^{*}_{A,2} = (a-c) / (3b-2s)$ (b.2)

$X^{*}_{B,1} = X^{*}_{C,2} = (a-c)\,(b-s) / b\,(3b-2s)$. (b.3)

Firm A has a larger output than both its competitors in markets #1 and #2 if b>s; i.e., the slope of demand curve is greater than the scope coefficient. This condition simply ensures that the scope economies are not so great that the market equilibrium is beyond where the market demand curve lies above the supply curve; similar conditions for other comparisons follow. It can correspondingly be shown that firm A earns greater profits in both markets compared to its competitors. Firm A's total profit is:

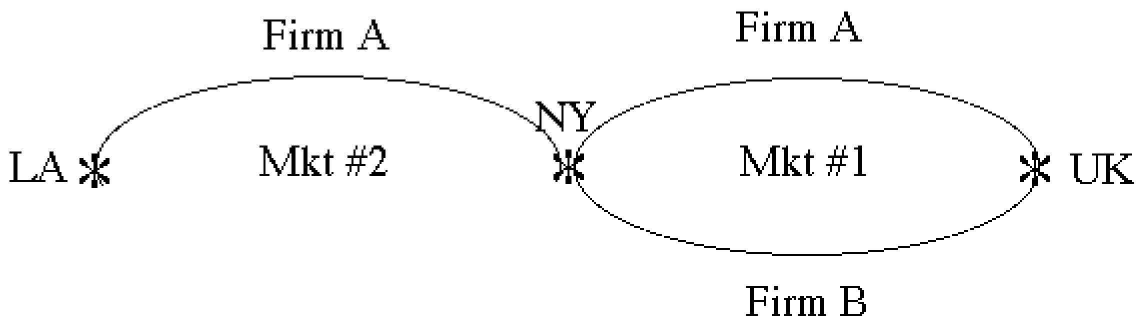
$$\Pi^*_A = (2b-3s)\,(a-c)^2 / (3b-2s)^2 . \qquad \text{(b.4)}$$

Matching flights enables firm A to be the dominant player in both the international and domestic markets. Compared to Case A, where firm A competed against firm B without the aid of domestic feed, firm A's international market output and profits have risen. It can be shown that firm A's international output (market #1) has risen with the addition of a domestic route (market #2), as the right hand side of equation (b.2) is larger than the right hand side of equation (a.1), provided that ($a > c$ and $b > 2/3s$). It can also be shown that firm A's international market profit has risen compared to Case A when it had no domestic routes. One half of the right hand side of equation (b.4) gives the profits earned by firm A in the international market (market #1), and this is larger than the international profits without domestic feed (equation: a.2), provided that ($a>c$ and $b>3/2s$). The model illustrates how the presence of domestic feed can improve the competitive position of an international carrier, as summarized in the following proposition:

<u>Proposition 1</u>*: The matching of domestic routes with an international route enhances an airline's share of the traffic and profits in the international market.*

Case C: International Competition with Domestic Monopolization

Figure 3: Case C



The third scenario (illustrated by figure 3) has firms A and B again competing in the international market (market #1) between points NY and UK. In this scenario, however, firm A no longer faces domestic competition as firm C has either left the market or been acquired. Both cost functions and the market #1 inverse demand function remain identical to Case B; however, the inverse demand function for market #2 now reflects firm A's monopoly position. Solving for the output equilibria we obtain:

$$X^*_{A,1} = (a-c)(b+s) / (3b^2 - s^2) \qquad (c.1)$$

$$X^*_{A,2} = (a-c)(3b+s) / 2(3b^2 - s^2) \qquad (c.2)$$

$$X^*_{B,1} = (a-c)(2b+s)(b-s) / 2b(3b^2-s^2)\ . \qquad (c.3)$$

Unsurprisingly, we observe that Firm A's international market output dominates firm B's (c.1 > c.3). More importantly, firm A's international output has increased compared to the Case B scenario; the right hand side of (c.1) is greater than that of (b.2), provided (b > s). It can correspondingly be shown that Firm A's international profit increases in this domestic monopolization case compared to when Firm A had a domestic competitor (Case B). These results suggest international competitive gains for airlines that eliminate domestic competition and allow the generation of a simple proposition:

<u>Proposition 2</u>: *The reduction of domestic route competition—potentially via a merger—enhances an airline's share of the traffic and profits in the international market.*

The simple model of international airline competition, with its imperfectly competitive nature and role for network economies, illustrates potential international competitive gains for airlines matching domestic and international routes. Case A demonstrated international competition without domestic feeder routes and had the two competitors split market output and profits evenly. Case B exhibited how adding a domestic feeder route--possibly through merger or acquisition--increases an airline’s international market output and profits (Proposition 1). Finally, Case C showed how mergers that eliminate domestic competitors may further increase an airline’s international market output and profits (Proposition 2). Propositions 1 and 2 underscore that airlines improve international competitiveness by enhancing domestic networks and reducing domestic competition—both byproducts of domestic merger activity.

EMPIRICAL TESTS AND RESULTS

The empirical tests examine whether domestic networks (in line with proposition 1) and actual domestic mergers (in line with proposition 2) act to improve an airline’s international competitive position. The intuition behind the tests is that large domestic networks—and the elimination of domestic competitors—allow an airline to take advantage of network economies and become a more efficient and dominant international market competitor. If larger domestic networks and actual domestic mergers improve an airline’s international competitive position, then it behooves airlines to seek domestic mergers; i.e., domestic airline mergers entail an international—as well as domestic—competitive incentive.

Data Set Description

The panel data for the empirical tests involve 24,808 observations covering the international airline markets between the twenty-one advanced aviation nations. Each panel consists of one airline’s performance in a specific international city-pair market; for instance, the performance by British Airways in the London-Montreal market is one panel consisting of ten observations (1983-1992). International market performance data derive from the International Civil Aviation Organization's (ICAO) 'Traffic by Flight Stage' series.[8] Additionally, data representing airline network size derive from the ICAO's 'Traffic' series.

The dependent variable must capture an airline's competitive performance in international markets. An airline's share of revenue passengers carried in a particular international city-pair market for a specific year acts as the dependent variable (referred to as Market-Share). Market-Share captures an airline's international competitive performance in a specific market; and as already mentioned, market share is assumed to correlate positively with market profitability.

Testing proposition 1—domestic networks improve international competitiveness—requires a measure of domestic network size. An airline's number of annual domestic departures acts as the measure of domestic network size (referred to as Domestic-Network). Domestic departures roughly capture domestic network size by representing the large set of domestic flights on which an airline can draw upon in order to establish an efficient domestic network. Expect a positive coefficient estimate, as airlines with many domestic departures—large domestic networks—should be more competitive in international markets.

Testing proposition 2—domestic mergers improve international competitiveness—requires a measure of actual merger activity. Using secondary sources (Pustay, 1992; Oum, Taylor & Zhang, 1993) twelve airlines were identified over the 1983-1992 period as engaging in domestic airline mergers.[9] This data allowed the creation of a merger dummy

---

[8] Unfortunately, the Traffic by Flight Stage series measures segment traffic and includes passengers flying between two international cities that have origins or destinations beyond these cities. General opinion holds that origin-and-destination (O&D) data most reflect airline industry competition, but such data do not exist on a cross-national basis for the period of study. International segment data are the best available alternative. Unreported tests--based on data that aggregate international city-pair markets into country-pair markets--provide qualitatively similar results and support these tests reflecting O&D competition.

[9] The following 12 airlines--for the 1983-1992 period and from the data set--were found to engage in their first domestic merger in the following years: Alaska Airlines, 1987; American Airlines, 1987; Air France, 1988; Braniff, 1988; British Airways, 1987; Canadian Airlines, 1986; Continental Airlines, 1986; Delta, 1986; KLM, 1988; Northwest, 1986; Piedmont, 1985; TWA, 1986.

variable (referred to as Merger-Dummy) that was coded 1 in years subsequent to a merger. Expect a positive coefficient estimate, as airlines engaging in mergers reap international competitive gains from both larger post-merger domestic networks and reduced domestic competition.

Finally, the list of explanatory variables includes two measures of the number of competitors faced in a particular international market. The number of home-based and foreign-based competitors faced by an airline in a specific international city-pair market (referred to as Home-Competitors and Foreign-Competitors respectively) captures simple but important drivers of actual airline market shares. Expect both Home-Competitors and Foreign-Competitors to have negative coefficient estimates, as the presence of an additional competitor in a market will clearly lower an airline's market share. Table 1 reports the standard descriptive statistics—means and correlation coefficients—for all of the above variables.

***** Place Table 1 Near Here *****

Econometric Issues

Proper analysis of the data requires immediate consideration of three econometric issues (reciprocal causation; the panel properties of the data; non-linearity in the explanatory variables), and later consideration of a fourth issue (interpreting partial and full merger effects). Factoring these econometric issues helps in making proper econometric tests.

First, reciprocal causation is evident when the dependent variable (Market-Share in this case) precedes the explanatory variable (Neter, Wasserman & Kutner, 1983). The dangerous econometric implication of reciprocal causation is that the endogenous explanatory variable might be influenced by the stochastic disturbance term; hence, implying the possibility of spurious causal inferences (Maddala, 1992). The coefficient estimates for non-treated endogenous explanatory variables may not be consistent: i.e., they may not converge on their true values as the sample size increases (Gujarati, 1988). Nevertheless, a series of unreported Granger (1969) tests indicate that none of the reported explanatory variables exhibits evidence of reciprocal causation. Hence, reciprocal causation does not appear to be of particular concern for the proposed regression equations.

Second, an obvious issue regards taking advantage of the data's panel-nature by controlling for any panel-specific effects owing to an airlines particular position in an individual international city-pair market (i.e., the panel). Further, time-specific trends in international airline markets may also affect causal inferences on the explanatory variables. The airline industry has been subject to a number of changes in regulation and airline strategy over the 1983-1992 period (Ramamurti & Sarathy, 1997); consequently, introducing period effects can at least partially control for some of the time-specific trends. Accordingly, all of the reported regression equations take advantage of the data's panel nature by invoking a fixed-and-period effects model specification—i.e., both panel and time effects are controlled for. The choice of fixed-effects over random-effects is supported by a Hausman (1978) test.

Third, the regression models are assumed to be linear; however, the variables themselves may be non-linear in functional form (i.e., subject to increasing or decreasing returns). Potential non-linearity in the Home-Competitors and Foreign-Competitors variables is particularly important to capture, as these variables are charged with controlling for both the nature of the imperfectly competitive environment and the source (home or foreign) of actual competition. If the competitor variables capture as much variation in the dependent variable as possible, then we can interpret the coefficient estimates of the main explanatory variables with more precision: i.e., the Domestic-Network and Merger-Dummy variables will then account for any deviation between competitor-projected market share and actual market share. F-tests for the incremental contribution of an added explanatory variable (Gujarati, 1988) were used to gather which explanatory variables were subject to non-linearity and to what degree.

Regression models #1-#3 presented in Table 2 incorporate the concerns outlined above. All three regression models employ a fixed-and-period effects model specification; hence, the panel nature of the data is appropriately controlled. Regression #1 presents a regression model with all the explanatory variables expressed in first-order form. Regression #2 presents a regression model with the addition of squared terms for those variables—Home-Competitors and Foreign-Competitors—which passed the F-test for introducing an additional explanatory variable. Regression #3 presents a regression model with the addition of cubed terms for those variables—Home-Competitors and Foreign-Competitors—which passed the F-test for introducing an additional explanatory variable. Regression #3 provides the most comprehensive—and conservative—coverage of the above econometric issues; hence, it is represented here as follows:

$$\text{Market-Share}_{it} = b_0 + b_1 (\text{Domestic-Network})_{it} + b_2 (\text{Merger-Dummy})_{it} + {}_{j=1}\Sigma^3\, b_{j+2} (\text{Home-Competitors})^j_{it} + {}_{j=1}\Sigma^3\, b_{j+5} (\text{Foreign-Competitors})^j_{it} + \varepsilon_{it} + \alpha_i + \gamma_t$$

where i indexes an airline’s international city-pair market, t indexes time, j allows for a convenient expression of the non-linear variables, α_i represents the panel specific (fixed) effect, and γ_t captures the period specific effect.

Results & Interpretation

The estimation results for Regression’s #1-#3 are presented in Table 2. The three models generate statistically significant results that conform to expectation: the R-squares are above .85 for all the regressions; and all the coefficient estimates for the principal explanatory variables have the expected sign and are significant at the 1% or 5% level. While the estimation results conform across models, Regression #3 (where both the squared and cubed terms for Home-Competitors & Foreign-Competitors are introduced) appears to yield more modest coefficient-estimate interpretations. For this reason, and for brevity, the following analysis concentrates on Regression 3: the most comprehensive and conservative regression model.

Regression 3 estimates a fixed-and-period effects model specification that yields an R-square of .883; hence, the model appears relatively well specified. Further—and more importantly—all the coefficient estimates meet expectation and are significant at the 1-% level (except for the Merger-Dummy variable's coefficient estimate at the 5-% level). The coefficient estimate for Domestic-Network is 1.36; which implies that an airline increasing annual domestic departures by 100,000 increases international city-pair market shares by 1.36 percentage points on average. The coefficient estimate for Merger-Dummy is 1.11; which implies that airlines engaging in domestic mergers increase annual international departures by 100,000 increases international city-pair market shares by 1.11 percentage points on average. The coefficient estimate for Home-Competitors indicates declining market shares with increased counts of home competitors on a route; yet, the squared and cubed terms indicate that the decline is partially moderated at higher levels of home competition. The coefficient estimate for Foreign-Competitors indicates declining market shares with increased counts of foreign competitors on a route; yet, the squared and cubed terms indicate that the decline is reversed when airlines begin to face three or more competitors on an international route.

***** Place Table 2 Near Here *****

Recall that we are most concerned with the Domestic-Network and Merger-Dummy variables. While the above analysis and the Table 2 empirical results report a statistically significant coefficient estimate for both variables, this should not surprise in light of the large number of observations (24,808). The economic significance of the coefficient estimates is far more important than statistical significance. Consider the following actual merger-induced changes to domestic network size to better understand the economic significance of domestic airline networks. Northwest increased its domestic network size by 323,000 annual domestic departures when it acquired Republic Airlines; thus, the coefficient estimate suggests that Northwest increased its post-merger international city-pair performance by 4.4 percentage points. Similar use of the Domestic-Network coefficient estimate allows approximating the international market gains for other domestic-airline mergers: the Delta-Western Airlines merger translates into international city-pair market gains of 2.5 percentage points; TWA-Ozark translates into market gains of 1.76 percentage points; and the series of mergers that led to Canadian Airlines translate into a 1.28 percentage point increase.

Additionally, the coefficient estimate for the Merger-Dummy variable should be interpreted as representing the impact on international competitiveness of the non-network related effects of a merger (since we are holding Domestic-Network constant in the regression). The Merger-Dummy variable then represents the efficiency effects due to reduced domestic competitors (from proposition 2) and other residual benefits of engaging in a domestic merger. Accordingly, the coefficient estimate for the Merger-Dummy variable suggests that merging airlines on average reap an additional 1.11 percentage point gain in international market shares beyond the impact of enhancing their domestic network.

The discussion above illustrates the constraints in interpreting from Regression's #1-#3 the net-effect of a typical domestic airline merger on international competitive performance. Neither the Domestic-Network nor the Merger-Dummy variable generates coefficient estimates representing the full effect of a domestic airline merger on international competitive performance; instead, both variables represent partial merger effects. This owes to the simple fact that airlines engaging in domestic mergers (represented by Merger-Dummy) are likely to enhance the size of their domestic network (represented by Domestic-Network). In order to generate an estimation of the average impact of a domestic merger on international competitive performance, I adopt a procedure to allow the coefficient estimate for the Merger-Dummy variable to fully represent the merger effect.

The procedure is to generate an implied estimate for the Domestic-Network variable that strips it of the merger effect with regard to network size (see Clougherty, 2002 for a similar treatment). The first step in the procedure involves generating an instrumented variable for Domestic-Network by regressing it upon the lagged value for Domestic-Network and Merger-Dummy. The second step involves estimating the implied effect of Merger-Dummy on Domestic-Network by taking the coefficient estimate for Merger-Dummy from the above instrumental regression and multiplying it by actual Merger-Dummy variables. The third step involves subtracting the implied effect from the instrumented variable to yield an implied estimate for Domestic-Network from which the merger effect is removed.

Regression #4 is identical to regression #3 with the exception that the implied estimate for Domestic-Network (stripped of a merger effect) is substituted for the actual network size value. The results of regression #4 conform rather well to those of regression #3 with the only noticeable difference being that the coefficient estimate for the Merger-Dummy variable has increased (from 1.11 to 1.42). The import here is that the coefficient estimate for Merger-Dummy can now be interpreted as representing the full effect of a domestic airline merger on international competitive performance. In short, airlines engaging in domestic merger activities experience post-merger increases of some 1.42 percentage points on average in their international city-pair market shares post-merger.

In sum, the empirical results clearly support the presence of an international competitive incentive behind large domestic airline networks and the completion of domestic airline mergers.

DISCUSSION AND CONCLUSION

My main contention has been that the domestic airline merger activity of the late 1980s and early 1990s had an important international dimension, as domestic mergers can improve an airline’s international competitive position. The domestic competitive incentives (efficiency-gains and market-power) focused on by the IO literature clearly play a significant role in determining airline merger activity; however, a complete explanation of the cross-national domestic airline merger phenomenon appears to require consideration of international incentives. International competitive gains are particularly vital in explaining the proliferation of domestic airline mergers to nations where international markets predominated and/or where domestic markets remained regulated.

The main contention that domestic airline mergers have a significant international dimension is supported by a Cournot model of airline competition and by comprehensive panel data tests. The simple Cournot model reflects the theoretical backing, generates formal propositions, and establishes the logic behind the empirical tests. Further, the model formally clarifies the main contention by illustrating that mergers—which enhance domestic networks and reduced domestic competitors—generate international competitive gains. The empirical results—based on comprehensive panel data covering the international airline markets between twenty-one advanced aviation nations over the 1983-1992 period—find large domestic networks and actual mergers to improve the international competitive position of airlines. Accordingly, the empirical results support an international competitive incentive behind seeking large domestic networks and engaging in domestic merger activity.

Domestic airline mergers appear to have an important international dimension; hence, completely understanding the domestic airline merger phenomenon requires analyzing both the international context and international determinants of domestic merger activity. An IB perspective can then complement the traditional IO approach to airline competition issues by widening the analytical frame to include cross-national business activity (e.g., non-US domestic airline mergers) and by prodding the discovery of cross-border interactions that affect domestic strategies and actions (e.g., international competitive incentives behind domestic mergers).

In sum, the argument here is simple but important: first, the IO and IB perspectives complement each other by helping better diagnose and analyze the motives behind the domestic airline merger phenomenon; second, the cross-national domestic airline merger phenomenon was driven by international, as well as domestic, competitive incentives.

REFERENCES

Adrangi, Bahram, Garland Chow, and Richard Gritta. 1989. Market Structure, Market Share, and Profits in the Airline Industry. *Journal of Transportation Research Forum*, 29(2): 223-227.

Besanko, D., D. Dranove and M. Shanley. 2000. *Economics of Strategy*. New York: John Wiley & Sons, Inc.

Borenstein, Severin. 1989. Hubs and High Fares: dominance and market power in the U.S. airline industry. *Rand Journal of Economics,* 20(3): 344-365.

Borenstein, Severin. 1992. The Evolution of U.S. Airline Competition. *Journal of Economic Perspectives*, 6: 45-73.

Brander, J.A. and B.J. Spencer, 1987. Tariffs and the Extraction of Foreign Monopoly Rents under Potential Entry, In J.N. Bhagwati, editor, *International Trade: Selected Readings*, Cambridge: MIT Press.

Brander, J.A. and A. Zhang. 1993. Dynamic Oligopoly Behavior in the Airline Industry. *International Journal of Industrial Organization*, 11: 407-35.

Brander, J.A. and A. Zhang. 1990. Market Conduct in the Airline Industry: An Empirical Investigation. *Rand Journal of Economics*, 21: 567-83.

Brueckner, J., and P.T. Spiller, 1991. Competition and mergers in airline networks. *International Journal of Industrial Organization*, 9: 323-42.

Brueckner, J., and P.T. Spiller. 1994. Economies of Traffic Density in the Deregulated Airline Industry. *Journal of Law & Economics,* 37: 379-415.

Brueckner, J., N. Dyer and P.T. Spiller. 1992. Fare Determination in Airline Hub & Spoke Networks. *Rand Journal of Economics*, 23(3): 309-333.

Cason, Timothy N. 1994. The Strategic Value of Asymmetric Information Access for Cournot Competitors. *Information Economics and Policy*, 6: 3-24.

Caves, D.W., L.R. Christensen and M.W. Tretheway. 1984. Economies of Density Versus Economies of Scale: Why trunk and local service airline costs differ. *Rand Journal of Economics*, 15(4): 471-89.

Caves, Richard E. 1962. *Air Transport and Its Regulators: an industry study*. Cambridge, MA: Harvard University Press.

Caves, Richard E. 1982. *Multinational Enterprise and Economic Analysis*. Cambridge, MA: Harvard University Press.

Caves, Richard E. 1998. Research on International Business: Problems and Prospects. *Journal of International Business Studies*. 29(1): 5-19.

Clougherty, J.A. 2001. Globalization and the Autonomy of Domestic Competition-Policy: An Empirical Test on the World Airline Industry. *Journal of International Business Studies,* 32(3): 459-478.

Clougherty, J.A. 2002. US Domestic Airline Mergers: The Neglected International Determinants. *International Journal of Industrial Organization*, 20(4): 557-576.

De Murias, Ramon. 1989. *The Economic Regulation of International Air Transport*. Jefferson, NC: McFarland.

Douglas, G.W. and J.C. Miller III. 1974. *Economic Regulation of Domestic Air Transport: Theory and Policy*. Washington, DC: Brookings Institution.

Dresner, Martin. 1994. Hubbing Effects on the Canada-U.S. Transborder Air Market. *Logistics and Transportation Review*. 30(3): 211-21.

Dresner, Martin and T.H. Oum. 1998. The Effect of Liberalized Air Transport Bilaterals on Foreign Traffic Diversion: The Case of Canada. *Journal of Transport Economics and Policy*. 32(3): 1-14.

Gimeno, Javier and Carolyn Y. Woo. 1999. Multimarket Contact, Economies of Scope, and Firm Performance. *Academy of Management Journal*. 43(3): 239-259.

Graham, Edward M. 1998. Market Structure and the Multinational Enterprise: A Game-theoretic Approach. *Journal of International Business Studies*. 29(1): 67-83.

Granger, C.W.J. 1969. Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica*. 37: 24-36.

Gujarati, D.N. 1988. *Basic Econometrics*. USA: McGraw-Hill.

Hausman, J. 1978. Specification tests in econometrics. *Econometrica*. 46, 1251-1271.

Keeler, T.E. 1978. Domestic Trunk Airline Regulation: An Economic Evaluation. In *Study on Federal Regulation*, Washington, DC: U.S. Government Printing Office.

Kim, E.H. and V. Singal. 1993. Mergers and Market Power: Evidence from the Airline Industry. *American Economic Review,* 83(3): 549-569.

Kreps, D. and J. Scheinkman. 1983. Quantity Pre-commitment and Bertrand Competition Yield Cournot Outcomes. *Bell Journal of Economics*, 14: 326-37.

Krugman, Paul R. 1994[‘84]. Import Protection as Export Promotion: International Competition in the Presence of Oligopoly and Economies of Scale. In G.M. Grossman, editor, *Imperfect Competition and International Trade*. Cambridge MA: MIT Press.

Kurtz, Robert D. and Stephen A. Rhoades. 1992. A Note on the Market Share-Profitability Relationship. *Review of Industrial Organization*, 7: 39-50.

Levine, Michael. 1987. Airline Competition in Deregulated Markets: Theory, Firm Strategy, and Public Policy. *Yale Journal on Regulation,* 4: 393-494.

List, F. (1966[1885]) *The National System of Political Economy*. Augustus M. Kelley, New York.

Maddala, G.S. 1992. *Introduction to Econometrics,* New York: Macmillan Publishing Company.

Mitchell, Donna. 1991. Canadian International Air Transport: Historical Background and Current Policy. *Ministerial Task Force on International Air Policy: Research Reports*. Ottawa: Transport Canada.

Morrison, S.A. and C. Winston. 1987. Empirical Implications and Tests of the Contestability Hypothesis. *Journal of Law & Economics,* 30: 53-66.

Morrison, S.A. and C. Winston, 2000. The Remaining Role for Government Policy in the Deregulated Airline Industry. In Sam Peltzman and Clifford Winston, editors, *Deregulation of Network Industries: What’s Next?*. Washington DC: Brookings Institution Press.

Nehrt, Lee, Frederick Truitt and Richard Wright. 1970. *International Business Research: Past, Present, and Future*. Bloomington: Bureau of Business Research, Indiana University.

Neter, J., W. Wasserman and M.H. Kutner. 1983. *Applied Linear Regression Models.* Homewood, Ill.: Richard D. Irwin Inc.

Oum, Tae H., A.J. Taylor and Anming Zhang. 1993. Strategic Airline Policy in the Globalizing Airline Networks. *Transportation Journal*, Spring:14-30.

Oum, T.H., A. Zhang and Y. Zhang. 1993. Inter-firm Rivalry and Firm Specific Price Elasticities in Deregulated Airline Markets. *Journal of Transport Economics and Policy*, 27: 171-92.

Oum, T.H., J.-H. Park and A. Zhang. 1996. The Effects of Airline Codesharing Agreements on Firm Conduct and International Air Fares. *Journal of Transport Economics and Policy,* 30(2): 187-202.

Panzar, J.C., and R.D. Willig. 1981. Economies of Scope. *American Economic Review*, 71: 268-272.

Porter, M.E. 1985. *Competitive Strategy*. New York: Free Press.

Porter, M.E. 1990. *Competitive Advantage*. New York: Free Press.

Pustay, Michael W. 1989. Liberalization of US International Aviation Policy: A Preliminary Assessment. *Quarterly Review of Economics and Business*, 29(2): 15-26.

Pustay, Michael W. 1992. Toward a Global Airline Industry: Prospects and Impediments. *Logistics and Transportation Review,* 28(1): 103-128.

Ramamurti, Ravi and Ravi Sarathy. 1997. Deregulation and Globalization of Airlines. *The International Trade Journal*, 11(3): 389-432.

Stopford, John M., Strange, Susan & John S. Henley. 1991. *Rival states, rival firms: competition for world market shares.* Cambridge: Cambridge University Press.

The Economist. 2002. BA Thwarted: AA=No-No. January 31.

U.S. General Accounting Office. 1988. *Airline Competition: Fare and Service Changes at St. Louis Since the TWA-Ozark Merger.* Washington DC: General Accounting Office, Report No. GAO/RCED-88-217BR.

Weisman, E. 1990. *Trade in Services and Imperfect Competition: Application to International Aviation,* Dordrecht, Holland: Kluwer Academic Publishers.

Werden, G.J., A.S. Joskow, and R.L. Johnson, 1991. The Effects of Mergers on Price and Output: Two Case Studies from the Airline Industry. *Managerial and Decision Economics,* 12: 341-52.

White, L.J., 1979. Economies of Scale and the Question of 'Natural Monopoly' in the Airline Industry. *Journal of Air Law and Commerce,* 44: 545-73.

Table 1: Correlation Coefficients & Means for All Variables					
	Market-Share	Domestic-Network	Merger-Dummy	Home-Competitors	Foreign-Competitors
Mean	66.370	160,729	0.255	0.236	0.649
Market-Share	1.000				
Domestic-Network	-0.099	1.000			
Merger-Dummy	-0.062	0.466	1.00		
Home-Competitors	-0.430	0.358	0.212	1.000	
Foreign-Competitors	-0.654	-0.069	0.003	0.190	1.000

Table 2: Panel Data Regression Results

- All Models Incorporate a Fixed-&-Period Effects Specification

Dependent Variable: Market-Share

Explanatory Variables	*Regression #1: First-Order Terms*	*Regression #2: Squared Terms*	*Regression #3: Cubed Terms*	*Regression #4: Cubed Terms & Implied-Estimate*
Domestic-Network *- 100,000 departures*	1.38 ** (0.27)	1.40 ** (0.25)	1.36 ** (0.24)	1.44 ** (0.32)
Merger-Dummy	2.00 ** (0.53)	1.15 * (0.49)	1.11 * (0.48)	1.42 ** (0.47)
Home-Competitors	-11.48 ** (0.36)	-19.78 ** (0.57)	-27.26 ** (0.91)	-27.28 ** (0.91)
(Home-Competitors)^2		2.87 ** (0.16)	8.70 ** (0.59)	8.70 ** (0.59)
(Home-Competitors)^3			-0.89 ** (0.086)	-0.89 ** (0.086)
Foreign-Competitors	-22.44 ** (0.30)	-39.11 ** (0.43)	-53.37 ** (0.64)	-53.36 ** (0.64)
(Foreign-Competitors)^2		6.86 ** (0.14)	18.96 ** (0.43)	18.95 ** (0.43)
(Foreign-Competitors)^2			-1.83 ** (0.062)	-1.83 ** (0.062)
Constant	80.92 ** (0.48)	86.51 ** (0.45)	88.27 ** (0.45)	88.06 ** (0.57)
R-squared	.855	.876	.883	.883
Observations	24,808	24,808	24,808	24,808

( ) = Standard Errors; ** = 1% Significance; * = 5% Significance