

The **Economic Impact** of **Air Service Liberalization**



air transportation

global aviation markets

new travel options

job creation

more service

to more cities

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InterVISTAS-ga² would like to thank the sponsors, listed above, for their support in this study. The study results further illustrate the benefits to communities that have liberalized, or plan to liberalize and expand their air services agreements.

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EXECUTIVE SUMMARY

This study found extensive and significant evidence that supports the generally accepted “conventional wisdom” that liberalization of air services between countries generates significant additional opportunities for consumers, shippers, and the numerous direct and indirect entities and individuals affected by such liberalization. Conversely, it is also evident that restrictive bilateral air services agreements between countries stifle air travel, tourism and business, and, consequently, economic growth and job creation.

Prominent findings of the study are:

- Traffic growth subsequent to liberalization of air services agreements between countries typically averaged between 12 percent and 35 percent, significantly greater than during years preceding liberalization. In a number of situations, growth exceeded 50 percent, and in some cases reached almost 100 percent of the pre-liberalization rates.
- A simulation of the likely results of liberalizing 320 country pair markets that are not today in an Open Skies (deregulated) mode indicate traffic growth, on average, of almost 63 percent. This is substantially higher than typical world traffic growth of around 6 percent-8 percent. Liberalizing only these 320 bilateral agreements of the 2,000 in our database would create 24.1 million full-time jobs and generate an additional \$490 billion in Gross Domestic Product. This corresponds to an economy almost the size of Brazil.
- The creation of the Single European Aviation Market in 1993 led to an average annual growth rate in traffic between 1995 and 2004 that was almost double the rate of growth in the years 1990 to 1994. This produced about 1.4 million new jobs.
- A simulation of full liberalization of the United States-United Kingdom market under a Comprehensive First Step Air Service Agreement (ASA) between the United States and the European Union would produce an almost 29 percent increase in traffic. Some of the increase results from the impact of lower fares, while the remainder would result from allowing any U.S. city to obtain nonstop service to London’s Heathrow or Gatwick airports.

*Liberalizing only 320 bilateral agreements of the existing thousands would create **24.1 million full-time jobs and generate an additional \$490 billion in Gross Domestic Product.** This corresponds to an economy almost the size of Brazil.*

The economic benefits of this liberalization would be substantial. There would be an additional 117,000 new jobs generated, and the incremental GDP impact to both the U.S. and to the U.K. would be roughly \$7.8 billion.

- An examination of 190 countries and 2,000 bilateral air service agreements suggests that there are still a number of countries that place a priority on protecting their flag carrier(s), rather than enhancing the overall welfare of the broader public interest.

A. BACKGROUND

Commercial aviation owes its existence to the rapid development and application of technology. Modern aerospace technology allows aircraft to operate efficiently and safely under a very wide range of conditions, to areas and climates throughout the world. Air service is widely available, and allows even the poorest nations access to the most advanced products. The new, ultra-long range aircraft can operate nonstop flights to points so distant that airlines must decide whether to fly east, over the Atlantic and northern Europe, or west across the Pacific and the Far East to reach their destination. But the most important contribution of technology has been to lower the cost of air travel. Fuel-efficient engines and aerodynamic surfaces, low maintenance and modular components, and improved materials have progressively allowed airlines to lower air fares, thereby allowing more and more people to use air transportation on a routine basis. This diffusion has permitted commercial aviation to play a far more important role in peoples' lives.

However, commercial aviation still faces a challenge common to many of the newer and more technically advanced areas of our society. Air transportation political and trade institutions have not kept pace with the evolution of technology or the needs of the public. Commercial aviation remains encumbered by well meaning but outmoded and arcane rules, principles and institutions. These rules and regulations often prevent fit, willing and able airlines from fully serving passengers and shippers who are completely willing and able to pay. They also impose protective machinery that frustrates innovation, and have in the past directed the evolution of the industry into a contrived and artificial structure. By sheltering airlines from market forces, they reduce the incentives for them to pass the benefits of improved technologies on to passengers, shippers and investors.

International air commerce today is still, in many respects, governed by a framework of rules laid down in the post World War II era. Despite today's trend toward global markets, free trade, the internet, and the economic integration of entire continents, one of the most globalized, technology-intensive industries remains encumbered by rules that stifle competition and prevent airlines, communities, passengers, and shippers from benefiting to the fullest. The "bilateral air service agreements" (ASAs) that continue to govern much of world trade in aviation define the terms under which airlines will link their two home territories. These ASAs often frustrate market growth, force users to pay a price premium, and create a series of vested interests.

The proponents of continuing protection are often large, powerful vested interests, who consider that they have much to lose from its abolition. The beneficiaries are often small and fragmented. They include actual and would-be passengers and shippers, hotel operators, airports, and the huge numbers of people who could or might be employed in the tourism, transportation, or manufacturing industries. The collective benefits, while very large, are so widely distributed that few persons or organizations perceive that they have a major interest in reform. The benefits, permeating throughout the economy, are

often so difficult to trace that many are not even aware that they could benefit. Often, even those who oppose liberalization could gain, but would face certain transitional risks, and would have to modify their business methods.

This imbalance has fostered a “comfortable status quo,” in which the wide but diffuse benefits of air liberalization are subordinated to the interests of the minority. A society that is unaware of the magnitude of the benefits, whose individuals are unaware that a change could help them, and cannot estimate the payoffs in any meaningful way, is unlikely to be able to reap the full rewards of liberalization.

These factors suggest that a key to reforming the regulatory environment surrounding international air travel is **education**. Specifically, a society can only make a rational choice between protectionism and competition if it knows:

- That the incremental benefits can be very large;
- That the benefits are widely diffused among many individuals and organizations;
- That many sectors could benefit, such as the tourism industry, trade/transportation and manufacturing;
- That many persons who may not perceive themselves as actually benefiting could in fact be made better off;
- That even those most opposed to the change could benefit if they can change their behavior accordingly; and
- That these benefits can often be gained at minimal public expenditure.

B. OBJECTIVES OF THE STUDY

The broad objective of this study is to quantify the results of both historical and prospective bilateral air service agreement (ASA) liberalization. In order to accomplish that objective, a number of subsidiary programs have been pursued. Thus, InterVISTAS-ga² examined the economic consequences of the liberalization of air transport throughout the world. Specific subsidiary objectives were:

- To examine recent instances of air service liberalization, or lack thereof, and identify their most important consequences on competition, traffic growth, carrier behavior and national economic benefits;
- To develop a flexible and robust analytical model, with all associated databases, so that the benefits of liberalization can be quantified prospectively **for any arbitrary country-pair, or groups of country-pairs**; and

- To promote a more informed public debate on the historical and potential benefits of liberalization of air services agreements between countries.

This study summarizes the research performed in pursuit of these objectives. This project has created a mathematical framework of worldwide applicability. While the model is unique in its sophistication and versatility, the project is still but one of a large group of analyses of the consequences of liberalization. While the assumptions, methodologies and results vary widely, the models clearly demonstrate the importance of high quality and reasonably priced air service to world economic development and job growth.

C. FINDINGS & CONCLUSIONS

This study demonstrates that air service liberalization can promote traffic growth, with an accompanying growth in non-aviation sectors. The sheer scale of the largest airports, the global reach of the industry, and its technological innovation, supports the often cited statistic that the travel and tourism industry drives 12 percent to 15 percent of the world output of goods and services.

This report summarizes the development of a methodology to quantify the benefits of international air service liberalization.

1. THE ECONOMIC IMPACT OF AIR SERVICES – CURRENT EVIDENCE

This report summarizes the development of a methodology to quantify the benefits of international air service liberalization. The approach developed is unique in that it can apply to any arbitrary country-pair and any level of liberalization. Extensive research attests to the importance of commercial aviation to nations in all states of development. Air service liberalization, which replaces a set of strict and arcane rules with the primacy of the market, has repeatedly proven to be a decisive influence in expanding the industry and making its benefits available to more people. Many airports, airlines, academic institutions, governments and private organizations have documented the relationship between liberalization and economic growth. These efforts have contributed greatly to our knowledge of liberalization. However, most research has been narrowly focused in one or a very few specific markets. Most of the work has been *ex poste* and retrospective, contrasting a situation before and after liberalization. The data and models have been very situation-specific, and could not be quickly and simply applied to other markets.

This study describes a framework to assess the economic benefits of international air service liberalization in any market, anywhere in the world. Its approach is *ex ante*; it estimates the impact of liberalization on any market that is presently restrictive. Its global applicability depends on the use of data generated throughout the world, involving over 190 nations and 1,400 country-pairs. The various statistical relationships that form the model do not merely accommodate but, indeed, require this diversity. The model has a

wider applicability and greater robustness than those developed from more limited and homogeneous sets of data.

In keeping with the global focus of the research, the study draws on, to the fullest extent possible, experience obtained throughout the world. The United States, because of its size, and the relatively lengthy period since its domestic market was deregulated, offers among the best examples of market liberalization. Furthermore, American communities and airports have been most active in pursuing new services, and in evaluating the economic impacts of aviation.

Section III of this study examines recent evidence on air service liberalization. It does not purport to provide a detailed review of the literature. Rather, it summarizes the highlights of recent research, and establishes a point of departure for the approach to developing the model and related framework.

This study, and most others, is based on a causal chain that links changes in air service regulation to changes in the broader economy (Figure ES-1).

Figure ES-1: The Causal Relationship between Air Service Liberalization and Economic Growth



The failure of any one link can halt this process of expansion. Sometimes, the current regulations, however restrictive, do not constrain market behavior. Policy makers may authorize new services, but if airlines do not wish to operate it, the liberalization would be irrelevant. Many bilateral agreements are rife with “unused authority”, services that are allowed but that have no commercial value. The logical and empirical link between better air services and traffic growth is much stronger, and all evidence suggests that the market responds to improved service. The link between traffic growth and economic growth depends on the level of employment, the propensity to import, and whether the increased air travel diverts expenditures from other forms of consumption, savings and investment.

2. AIR SERVICE LIBERALIZATION AND TRAFFIC GROWTH

Airlines are continually fine-tuning their routes to accommodate traffic growth, changes in aircraft technology, airport congestion and other factors. In a mature market, this results in a never-ending “trickle” of schedule changes. When the market fundamentals experience a sudden and dramatic change, a “torrent” of new routes often results. Such

events can include rapid economic growth of the type being experienced in China and India, the availability of new air routes, and, most importantly, market liberalization.

As of 2006, many nations have allowed market forces to govern their domestic routes, while a slow, erratic process of “creeping liberalization” has prevailed on many international air corridors. Liberalization has promoted many new services around the world, as testified by Table ES-1.

Table ES-1: Liberalization and Air Service Growth

Event	Results
U.S. deregulation, 1978	Emergence of hub and spoke systems, low cost carriers with nationwide route networks, new entrants and integrated cargo carriers.
U.K Liberalization of Secondary Airports	Growth of international services to Manchester, Birmingham, Glasgow, etc.
Open Skies Agreements for United Arab Emirates	Growth of Dubai as major international hub.
Domestic deregulation in India	Development of low cost carriers and aggressive, expansion-oriented airlines.
U.K-India Bilateral and Creation of New Frequencies	Growth of capacity, new gateways and additional carriers operating U.K.-India service.
Domestic deregulation in Brazil	Growth of low cost carrier Gol and others.
Single European Market	Growth of low cost carriers. Ryanair, Easyjet, etc. New services, traffic growth, new gateways throughout European Union.

Published aviation statistics testify to the ability of new air service to stimulate traffic. Table ES-2 portrays how new services have stimulated traffic. It compares traffic levels in the year immediately preceding inauguration of the new service to volumes in the first full calendar year of operation. Most of the examples result from changes in bilateral air service agreements, or from specific governmental decisions to relax the restrictive provisions of current agreements.

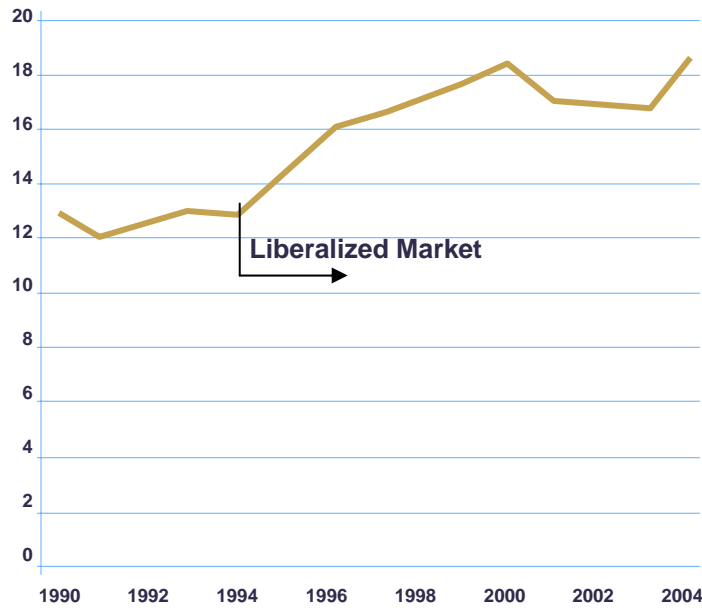
Table ES-2: New International Services and Traffic Growth

City-Pair	Service	Liberalization Event	Gain
Vancouver-Phoenix	America West 1995	1995 Canada-U.S. Bilateral	146.4%
Toronto-Minneapolis	Air Canada 1995, Northwest	1995 Canada-U.S. Bilateral	55.3%
Toronto-New Orleans	Air Canada 1998	1995 Canada-U.S. Bilateral	41.2%
Ottawa-Chicago	Air Canada/ American 1995	1995 Canada-U.S. Bilateral	109.7%
Montreal-Atlanta	Delta 1995	1995 Canada-U.S. Bilateral	55.5%
Atlanta-San Jose CR	Delta 1998	1997 U.S.-Costa Rica	118.5%
Dallas/Fort Worth-Santiago	American 1996	Assignment of routes	336.6%
Chicago-Hong Kong	United 1996 (not daily)	U.S.-Hong Kong Bilateral	21.1%
Chicago-London	United 1995	U.S.-U.K Mini Deal, 1995	42.1%
Chicago-Sao Paulo	United 1997	U.S.-Brazil, 1996	80.4%
Chicago-Buenos Aires	United 1998	Reassignment of routes	41.1%
Houston-Sao Paulo	Continental 1999	U.S.-Brazil, 1997	120.5%
Atlanta-Guadalajara	Delta 1999	U.S.-Mexico, 1991	169.5%
Washington-Buenos Aires	United 2002	Reassignment of routes	208.7%
Washington-Sao Paulo	United 2002	Reassignment of routes	88.4%
Detroit-Beijing	Northwest 1996	U.S.-China, 1995	174.3%
Dallas/Fort Worth-Lima	American 1996	Assignment of routes	482.0%
Houston-Tokyo	Continental 1998	1998 U.S.-Japan	116.6%
Atlanta-Rome	Delta 1999	1998 U.S.-Italy	110.8%
Dallas/Fort Worth-Zurich	American 2000	1995 Open Skies	115.3%

Sources: United States Department of Transportation Databases 1B and 28IS; Statistics Canada Report 51-205, "Air Passenger Origin and Destination, Canada-United States Report," and InterVISTAS estimates.

Table ES-2 understates the stimulation of new traffic into a market by using a strict "year before/year after" timeframe. Traffic usually requires several years to adjust fully to a new service. Despite the conservative approach, nonstop international services can often cause international traffic to double in only a year, even for city-pairs that already have a profusion of one-stop connecting services. Any mechanism that allows international services to proliferate to non-traditional gateways can be a powerful stimulus to traffic. Restrictive bilateral agreements, through confining service to a few named points, can thwart the growth. They also exacerbate the airside and groundside congestion at the largest gateways.

Figure ES-2: Growth of United States-Canada Traffic, 1990-2004
Passengers (in millions)

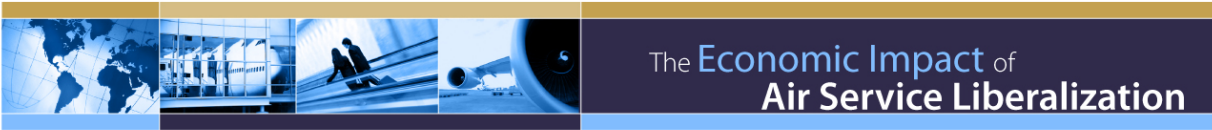


Source: United States Department of Transportation Database 28IM

Figure ES-2 depicts United States-Canada passenger flows. Until 1995, this market was governed by a very restrictive bilateral, negotiated in 1966 and updated in 1974. It prohibited nonstop scheduled services on a large number of routes, including Toronto-Washington, Atlanta-Montreal and Vancouver-Denver. Notwithstanding that the two countries had concluded a free trade agreement in 1988, extended to Mexico in 1994; aviation functioned under a constrained bilateral air services agreement. The liberalization of air service in 1995 allowed carriers of either nation to serve any route desired, at commercially determined prices. As shown by the graph, the previously stagnant traffic saw rapid growth after liberalization.

3. AIR TRAFFIC AND ECONOMIC GROWTH

Tables ES-1 and ES-2 indicate a strong causal relationship between liberalization, air service improvement, and international traffic. Table ES-3 explores the final step of the causal chain; the relationship between traffic and economic development. Many airports have prepared “economic impact statements” to quantify their influence on their communities. Several measures are used, including Gross Domestic Product, output, employment, investment, and tax revenues. Several methods are available, and assumptions vary widely between each such project. Despite the methodological differences, the studies have reached a worldwide consensus that airports and civil



aviation can have an enormous and positive impact on regional prosperity. Table ES-3 summarizes economic impact statements for a cross-section of airports and civil aviation activities throughout the world.

Table ES-3: Economic Impact of Commercial Aviation

	Passengers	Employment	Output	Source
Des Moines, 1998	1.7 million	2,352	\$182 million U.S.	Des Moines International Airport
Newcastle, NSW 2005	.76 million	3,336	\$540 million AU	Newcastle Airport Limited
Cincinnati, 2004	22 million	89,536	\$5 billion U.S.	University of Cincinnati
Reykjavik, 1998	1.8 million (2006)	1,156	11.4 Billion IKr	University of Iceland Institute of Economic Studies
Geneva, 1999	7 million	24,000	9.0 Billion SFr	Aéroports Internationale Geneva
World Aviation, 2005	2 billion	29 million	\$2.96 trillion U.S., 8% of world GDP	Air Transport Action Group
U.K. Airports, 2004	229 million	580,000	£22.2 billion gross value added	Airport Operators Association, 2005
Toronto, 2001	28 million	138,000	\$14 billion CD	Greater Toronto Airports Auth.
Auckland, 2001	8.5 million	235,780	\$14.2 billion NZ	Auckland International Airport
All United States, 2005	746 million	12.3 million	\$1.37 trillion U.S.	Air Transport Association
Inverness Airport, 2005	.5 million	2,297	£ 120 million	Inverness and Nairn Enterprise, Highlands and Islands Enterprise and Highlands and Islands Airports Limited
U.K. Air Freight Industry, 2000	2,526,266 tonnes	80,000-100,000	£ 4.99 billion	U.K. Air Freight Study Report, U.K. Department of Transport

The instances shown in Table ES-3 describe the impacts of facilities operating with a given level of service. A further refinement involves measuring the incremental impact of a specific improvement in air service.

4. CATALYTIC EFFECTS FROM AIR SERVICE DEVELOPMENT

The relationships explored in Table ES-3 view the various impacts as the response of a pre-existing economy to incremental changes in civil aviation. It assumes that there will be no changes to the underlying structure of the regional economy. Growing evidence indicates that new air services can lead to changes in the underlying structure of the regional economy by creating new capabilities, and forming a different set of transactor expectations. These reactions can literally create new industries in a region, and allow the area to compete for economic opportunities throughout the world. These “catalytic

impacts” are the most difficult to quantify. Although most evidence is anecdotal, there is growing evidence that these effects can be large:

- A 10 percent increase in the supply of intercontinental flights creates around a 4 percent increase in the number of headquarters of large firms located in the corresponding urban area ... headquarters of knowledge-intensive sectors are much more influenced by the supply of direct intercontinental flights than are those of non-knowledge-intensive sectors.¹
- Nine foreign-owned companies in Northern Kentucky cited air service as an important factor in their choice of location. The nine firms collectively employ 1,470 persons.²
- In 2003, Kenya exported 50,000 tonnes of flowers by air freight.³
- The growth of European air transport since 1995 has boosted European Union GDP by 4 percent. The expected growth to 2025 will boost GDP of the 25 European Union nations by a further 1.8 percent.⁴
- Air service liberalization in Egypt could increase the GDP of the Travel and Tourism industry by 12 percent by 2011, adding 260,000 full time jobs. Furthermore, the total GDP for all sectors would increase by 1.8 percent.⁵

The evidence cited demonstrates a strong causal link between air service liberalization, traffic growth and economic development. It lends further strength to the need for air service liberalization by illustrating the benefits of successful efforts, and the harmful consequences that have resulted from retaining the status quo.

5. THE ENVIRONMENT

Commercial aviation industries are driven by the business realities of competitive market forces that drive continuous innovations in technology that increase airplane efficiencies and minimize environmental impacts. The aviation industry also recognizes that its members must share the leadership required to minimize environmental impacts resulting from air travel growth.

¹ Germà Bel and Xavier Fageda, “Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters”, Unpublished, September 2005.

² George Vredeveld, Marie Haney, Pooja Sharma and Anthony Apostolides, “The Influence of International Airports on Regional Economic Growth.” Economics Research Group, Center for Economic Education, University of Cincinnati, Cincinnati, 1997.

³ Oladele Samson Fatokun, “African Air Transport in the 21st Century: A Case Study of the Contrasting Experience of Nigeria and Kenya”, MSc Thesis, Department of Engineering, Cranfield University, 2005.

⁴ “The Economic Catalytic Effects of Air Transport in Europe,” Eurocontrol Experimental Centre, Bretigny sur Orge Cedex, 2005.

⁵ “Aviation in Egypt: The Impact on Travel & Tourism, Jobs and the Economy”, World Travel and Tourism Council, 2005.

Industry Environmental Initiatives – Some of the current industry initiatives designed to minimize environmental impacts include:

- The industry is improving fuel efficiency and minimizing emissions
 - > fuel efficiency and associated emission reductions have improved by more than 70 percent over the last 40 years, and aircraft generate only between 2 percent and 4 percent of global CO₂ emissions
 - > manufacturers continue improvements in aerodynamics and reductions in weight, including new technologies such as winglets, raked wing tips, and composite materials
 - > flying on today's new airplanes is one of the most fuel efficient ways to travel – the newest airplanes are as or more fuel efficient than the average car
 - > the industry is pursuing conservation technologies and alternative fuels, operating research and technology centers and contributing technical patents to research institutions
- The industry is minimizing noise
 - > manufacturers are making quieter airplanes – the newest airplanes have achieved noise footprints that fit within the airport boundaries of most airports
 - > industry partnerships are developing and implementing quiet arrival and departure techniques, including the continuous descent approach that will achieve noise reductions by as much as 35 percent
- The industry is achieving business efficiencies that minimize environmental impacts
 - > manufacturer fleets deliver new airplanes for every market to minimize empty seats and are cleaner, quieter and more efficient
 - > new airplanes are creating greater opportunities for point-to-point travel that reduce takeoffs and landings and typically save fuel over the hub-and-spoke, connecting flight approach
- The industry is promoting efficient air traffic management (ATM), recognizing that ATM efficiency benefits represent the greatest short-term opportunities for minimizing emissions and noise impacts. Aircraft manufacturers, airlines, regulators and airports are working together in partnerships to increase capacity and at the same time improve environmental performance through:
 - > Priority departures
 - > Continuous descent
- The industry is addressing global aviation environmental impacts in systemic ways

- > the industry is using life cycle management approaches to environmental considerations that incorporate opportunities to minimize environmental impacts of aviation growth and aircraft development over the entire life cycle – from research/development through retirement
- > the industry recognizes that all components of transportation systems need to be included when considering the environmental impacts of transportation vehicles, including:
 - infrastructures – roads, railways, airports, etc.
 - energy sources – fuel production processes/facilities, electrical production processes/plants, etc.

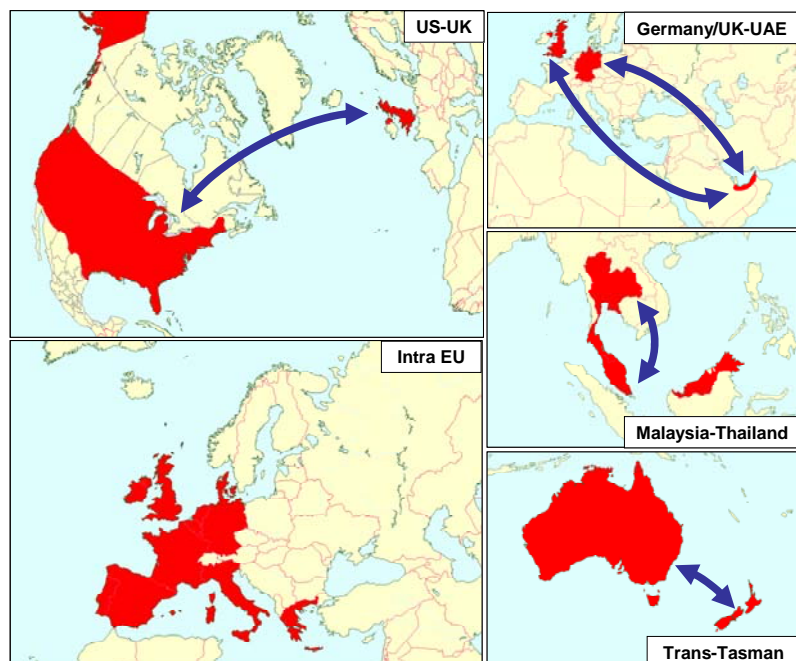
On balance, there are a number of system and technology driven initiatives that are being developed and implemented by the aircraft manufacturer and commercial airline industries to minimize environment impacts through fuel efficiency and associated emissions reductions, and minimizing noise.

D. AIR SERVICE LIBERALIZATION –CASE STUDIES

1. GENERAL RESULTS

In order to test the hypothesis that liberalization leads to market growth and economic expansion, and to validate the results being generated by the economic model, we studied five separate cases.

In each case, we examined the background of the bilateral relationship, the history of traffic growth, and its relationship to benchmark parameters such as GDP growth. In all cases studied, it was apparent that, depending on the size and development of the economies, there was substantial incremental passenger traffic and economic growth after air service agreements between the countries had been liberalized. In some cases, the liberalization was of a “transitional” nature - that is, from a rigid Bermuda I type agreement to something



less than “Open Skies,” while in other cases the liberalization was from a transitional to an Open Skies regime. In one case, we found that liberalization occurred as a result of informal understandings between governments, with no accompanying modifications to the formal air services agreement.

Post liberalization traffic growth tended to exceed pre-liberalization growth levels by anywhere between 12 percent and 35 percent and up to 50 percent, depending on the periods measured. In all cases, the traffic growth produced significant increases in economic output and job growth.

A short summary of the individual cases is outlined below.

2. SPECIFIC CASE STUDIES

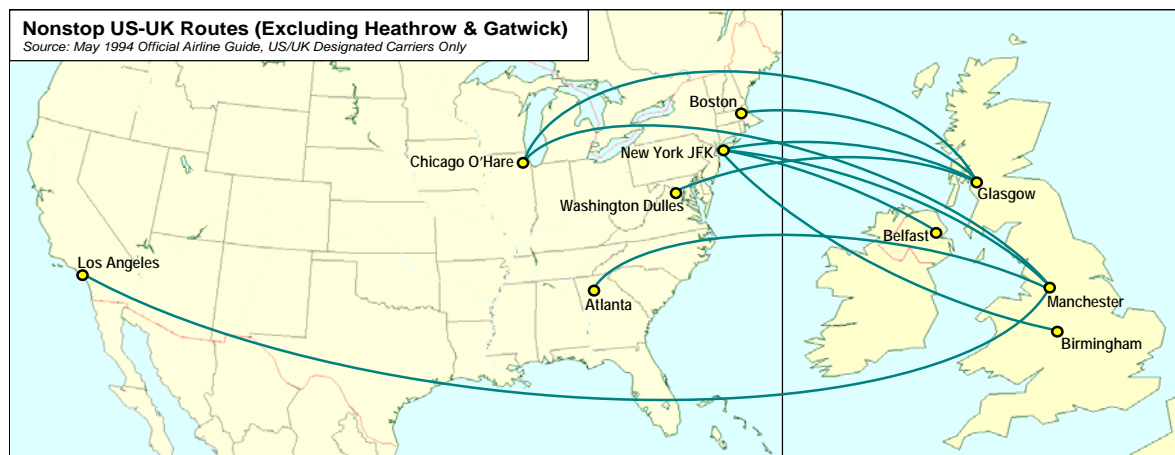
United States-United Kingdom

In 1995, the restrictive Bermuda II agreement saw a partial easing. Airlines of both the United States and the United Kingdom obtained unlimited access between any set of airports, with the conspicuous exceptions of London Heathrow and Gatwick. United Airlines obtained Chicago-London rights.

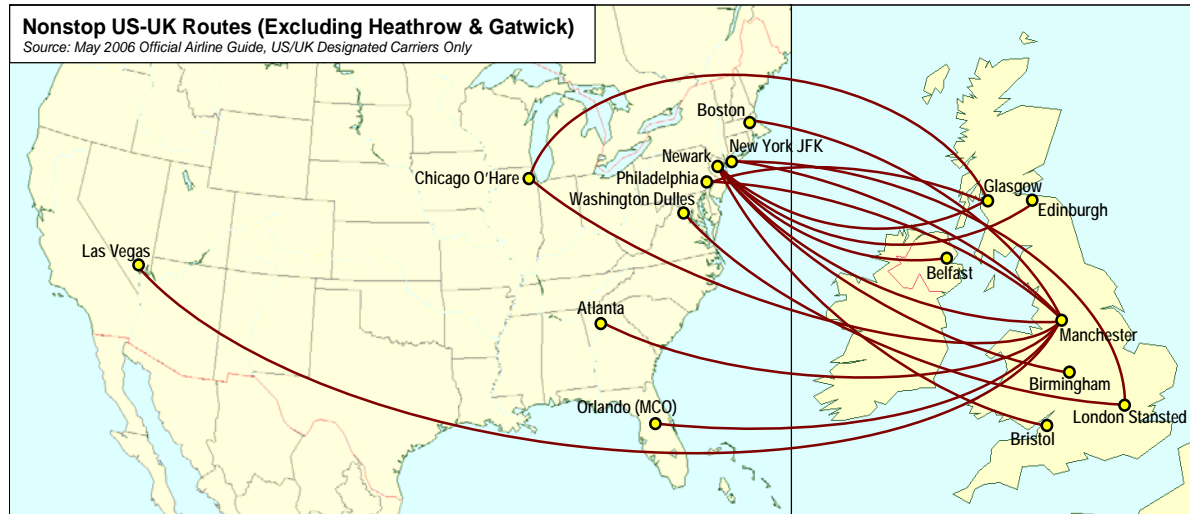
These steps caused a steady expansion of air services and traffic. Since 1995, traffic between Chicago and London has more than doubled. Services have expanded at Manchester, Birmingham and Glasgow, while Bristol and Edinburgh have emerged as trans-Atlantic gateways.

The economic benefits have been significant. By 2004, the additional traffic and services generated 9,197 full-time jobs in the United States and over 16,700 in the United Kingdom. The Gross Domestic Product of the United States expanded by \$747 million; the United Kingdom saw a \$970 million increase.

May 1994



May 2006



With respect to the future, should there be a Comprehensive First Step Air Transport Agreement between the U.S. and the EU, we can expect the impact on the economies of the U.S. and the U.K. to be significant.

A simulation of full liberalization of the United States-United Kingdom market as a result of a Comprehensive First Step Air Transport Agreement between the U.S. and the European Union would result in a 29 percent increase in traffic. The increase would derive in part from lower fares, and in part from allowing any U.S. city to obtain nonstop service to London's Heathrow or Gatwick airports.

The economic benefits of this liberalization would be substantial. Over 117,000 new jobs would be created, and incremental GDP would approximate \$7.8 billion.

Intra European Community

The liberalizations that created the Single European Aviation Market dramatically increased intra-European air travel.

The 1992 package that created the Single European Aviation Market did away with bilaterals for services within the Community. Its main provisions were:

- Community air carriers were permitted to exercise traffic rights on routes anywhere within the Community. Until 1997 this included only en route cabotage (e.g. Air France flying Paris-Frankfurt-Berlin) provided that no more than 50 percent of the capacity was used for the cabotage service. Freestanding cabotage was liberalized from 1997.
- Safeguards were provided to protect routes where a public service obligation existed, particularly thin routes operated by small aircraft. There was also a provision to enable

Member State A to refuse access to a service using an airport in Member State B to which the airlines of Member State A could not get access for reasons of congestion. It was also possible to refuse or limit the use of traffic rights where serious congestion or environmental problems existed. None of these safeguards has been extensively used and they can be ignored for the purpose of this exercise.

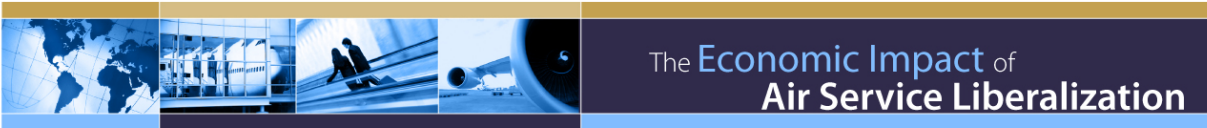
- Capacity limitations were made illegal except in cases of congestion or environmental problems.
- Community carriers were “free to set airfares”. Charter fares and seat and cargo rates charged by Community air carriers were to be set “by free agreement of the parties to the contract of carriage”.
- Safeguards were provided to deal with excessively low or excessively high fares. They have never been used.

A significant impact of the 1992 package was the stimulus it gave to the development of low-cost airline services. An operator could order aircraft confident in the knowledge that he had access to a large market without legislative restrictions was (and is) a major encouragement to investment in new services and in the aircraft necessary to carry them out. The table below sets out the low-cost operators’ share of capacity from 1996 to 2003. Their impact on the market did not begin until 1996. Until about 2000, their presence was concentrated on routes from the U.K.

Year	Low-Cost Operators’ Share of Capacity ⁶
1996	1.4%
1997	2.8%
1998	3.7%
1999	4.2%
2000	6.0%
2001	6.4%
2002	11.1%
2003	20.2%

The Single European Aviation Market resulted in the generation of an incremental 44 million passengers, an increase in post-liberalization years of over 33 percent as contrasted with historical Intra-European market growth of between 4 percent and 6 percent per annum. The additional traffic required an additional 681 daily return flights.

⁶ Percentage of weekly available seats provided by low-cost operators between 1996 and 2003; Source: European Commission (2005). DG TREN: Analysis of the European Air Transport Industry 2003 (Contract number B2-7040B-S07.17962). Brussels: Office for the Official Publications of the European Union.



The traffic expansion spurred development of both the travel/tourism sector and other industries. Fully 1.4 million full-time jobs resulted from the liberalization, and the European GDP grew by \$US 85 billion (62 billion Euro).

United Arab Emirates to the United Kingdom and Germany

Liberalization of the Germany-UAE market in 1986 resulted in high growth rates (both in terms of ASKs and passengers carried), although the absolute traffic figures are not large.

Although the U.K.-UAE route was liberalized much later, the commercial situation on the two routes in 1998 was similar. There were only nine weekly flights by Emirates/Gulf Air between Germany and the UAE. On U.K.-UAE routes, British Airways ran a double daily service and Emirates/Gulf Air a similar one. But in 1998, Emirates was beginning its expansion; in the case of the U.K., Virgin Atlantic was pressing for Gulf route authority.

The conclusion we draw from this analysis is that the major impact of the liberalizing of the two bilaterals lies in the scope they gave to the development of Emirates and in particular to the development of Dubai as a hub for traffic between Europe, on one hand, and the Far East and Australasia on the other. Without Emirates' expansion, we would expect the growth rates to have increased as a result of the development of Dubai as a financial, trading and tourist center, but not to the same extent. Thus, it is reasonable to conclude that the liberal bilateral arrangements between the UAE and the two major financial centers of the EU contributed to some degree to the confidence which is necessary for such developments.

Germany

In 2004, over 1 million persons traveled between Germany and the United Arab Emirates. The liberalization of 1986, allowing a proliferation of direct services between the two countries, prompted a market expansion of almost 167,000 passengers. Traffic was fully 19.7 percent higher than it would have been in the absence of liberalization.

The expanded traffic benefited both nations. In the United Arab Emirates, the equivalent of 745 new full-time positions was created, with a \$15 million increase in GDP. The 2,600 new full-time positions in Germany accompanied a \$152 million growth in GDP.

United Kingdom

The 1998 liberalization, combined with a rising price of oil and rapid expansion by Emirates Air and later, Etihad, prompted a 59 percent increase in total United Kingdom-United Arab Emirates traffic. By 2005, total country-pair traffic exceeded 3.2 million passengers, of which 1.1 million could be attributed to the more liberal air service agreement.

Both nations benefited significantly. In the United Arab Emirates, over 5,300 persons found full-time positions, and GDP expanded by over \$110 million. The expansion created over 18,700 positions in the United Kingdom, and over one billion dollars additional GDP.

Malaysia-Thailand

The original agreement between the governments of Malaysia and Thailand was signed in 1969. This type of agreement (Bermuda I) still defines many bilateral relationships around the world today. While not exactly like the American style of Open Skies, the agreement's Bermuda I style does allow for new services to be introduced to the market. Subsequent agreed upon Memorandum of Understandings (MOUs) between Malaysia and Thailand has allowed services and frequencies to increase, thus driving an increase in overall traffic.

When analyzing the current aviation relationship between the two countries, many aspects of a liberalized market can be found within the rights of the agreement (September 2001 was the last time it was updated with open capacity). This includes no restrictions on points served in the market, multiple designations allowed on routes, code sharing rights and open frequencies. Fifth freedom, intermediate or beyond, rights in addition to seventh freedom cargo operations are not included in the agreement. As in many other bilateral agreements found throughout the world, cabotage is not included.

Malaysia and Thailand have numerous air service agreements with third countries. They have both concluded Open Skies agreements with the United States and other major trading partners. Both currently support a multiple designation policy as a way of increasing their countries respective role in global tourism and trade. With a new international airport in Kuala Lumpur and one planned to open soon in Bangkok, a liberal designation policy helps remove barriers for new carriers seeking access to major international gateways. With regards to points served, Malaysia and Thailand have set up open policies not only in their Open Skies agreements, but in other bilateral agreements. The key restriction on the Malaysia-Thailand bilateral agreement is beyond rights and seventh freedom cargo operations. Code sharing rights have allowed Malaysia and Thai Airways to cooperate on key routes between the two countries. In addition, both countries heavily promote secondary international destination access rights for tourism (Phuket, Thailand – Langkawi, Malaysia – Penang, Malaysia).

In 2005, 1.3 million passengers traveled between Thailand and Malaysia. Of this total, over 370,000 can be attributed to the combination of the liberalized regime and the entry of low cost carriers. This suggests that the direct and indirect effects of liberalization have caused a market expansion of over 37 percent.

The economic and tourism impacts of this increased traffic demand on Thailand and Malaysia are identical. Each nation obtained more than 4,300 full-time positions and a stimulus of over \$114 million to GDP.

Australia-New Zealand (Trans-Tasman)

The first steps towards economic liberalization between these neighbors can be traced to 1966, when the New Zealand and Australia Free Trade Agreement was signed. This agreement was in place for 17 years until March 28, 1983, when the Australia-New Zealand Closer Economic Relations Free Trade Agreement (ANZCERTA) was concluded. The ANZCERTA set a foundation as an innovative agreement, which not only created a liberal business and economic regime for goods and services, but also set a collaborative umbrella to deal with customs, transport, regulatory, product standards and business law issues. The ANZCERTA established a market that continues one of the most open economic trade relationships between any two countries in the world. The ANZCERTA is continually reviewed to ensure that the agreement remains effective in all sectors of the economy.

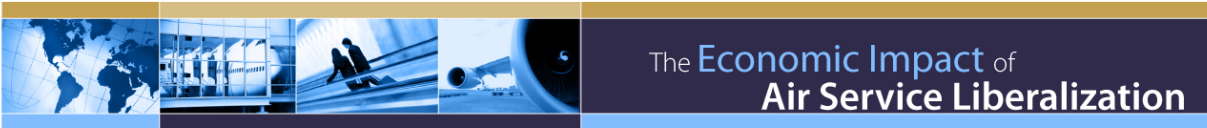
This analysis focuses specifically on the effects of the Single Aviation Market that was established in 1996, preceding full Open Skies in 2000.

Single Aviation Market

Australia and New Zealand concluded a Single Aviation Market (SAM) agreement, effective as of November 1, 1996. The goal of the Single Aviation Market was to bring the two countries closer together within the elements of the ANZCERTA. The main components of the agreement included the opening of ownership and control regulations in the bilateral market, the introduction of unlimited frequencies for Trans-Tasman services and a provision that allowed airlines of either country to operate domestic flights within the other country. While the SAM agreement opened up many new opportunities within the Trans-Tasman market, it did not address beyond markets to third countries. Those markets were still under the original 1961 Australia – New Zealand Air Services Agreement and the subsequent 1992 Memorandum of Understanding. Two different definitions of air carriers were created from the agreement: the “Domestic” and the “SAM” airline. The Domestic airline designation allowed carriers to fly domestic services in each others domestic market and the SAM designation harmonized ownership, control, technical and safety certifications from each countries regulatory agencies.

The importance of the Single Aviation Market agreement was that it broke barriers in the carriage of cabotage traffic, created ownership and control flexibilities, and deregulated capacity, designations, and frequencies. More importantly, the SAM agreement established the foundation for a more liberal agreement that, in the future, would open markets beyond the Trans-Tasman.

The liberalization of 1995 spurred a rapid growth in traffic between Australia and New Zealand. Other factors, including the entry and exit of domestic airlines in both nations, and changes resulting from fifth freedom activity, confound any effort to measure the

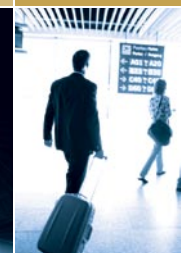


distinct impacts of the relaxation of third/fourth freedom restrictions. However, these events themselves are the direct or indirect results of other liberalization efforts.

By 2005, Australia-New Zealand traffic was fully 56 percent higher than it would have been in the absence of any liberalization. The relaxed market controls increased total traffic by over 1.7 million passengers per year. The additional volume would require a further 27 flights daily.

Each nation gained more than 20,600 full-time positions from the liberalization and the ensuing traffic increase. The GDP of each country grew by \$726 million U.S.

The **Economic Impact** of **Air Service Liberalization**



I. BACKGROUND

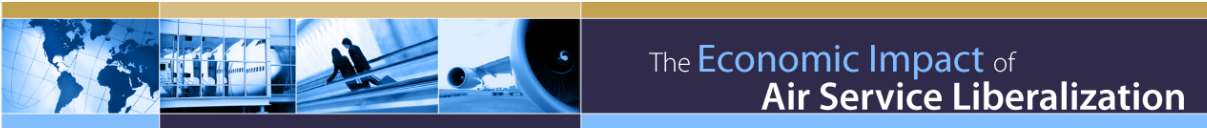
A. INTRODUCTION AND OBJECTIVES

Flying has always been a symbol of freedom. Only in the last hundred years has the dream of flight been realized, and only in the most recent handful of decades has it become widely available. Today, widespread access to flight gives humans the elemental freedom to soar that they have sought for centuries. More importantly, it grants us the freedom to travel, to see new places, encounter new ideas, challenge outmoded stereotypes, obtain access to unique goods, and develop our lives on a global scale. The benefits of commercial air travel are not confined to its immediate users. Entire industries depend on it to bring in tourists, to create access to distant markets for high value or perishable products, and to allow businesses and individuals to look to far off regions for their livelihoods and growth opportunities.

Commercial aviation owes its existence to the rapid development and application of technology. Modern aerospace technology allows aircraft to operate efficiently and safely under a very wide range of conditions, to areas and climates throughout the world. It is widely available, and allows even the poorest nations access to the most advanced products. The new, ultra-long-range aircraft can operate nonstop flights to points so distant that airlines must decide whether to fly east, over the Atlantic and northern Europe, or west across the Pacific and the Far East to reach their destination. But the most important contribution of technology has been to lower the cost of air travel. Fuel-efficient engines and aerodynamic surfaces, low maintenance and modular components, and improved materials have progressively allowed airlines to lower their fares, thereby allowing more and more people to use air transportation on a routine basis.

However, commercial aviation still faces a challenge common to many of the newer and technically advanced areas of our society. Our social and political institutions have not kept pace with the evolution of technology or the needs of the public. Commercial aviation remains encumbered by well-meaning but outmoded and arcane rules, principles and institutions. They often prevent fit, willing and able airlines from fully serving passengers and shippers who are completely willing and able to pay. They also impose protective machinery that frustrates innovation and directs the evolution of the industry into a contrived and artificial structure. By sheltering airlines from market forces, they reduce the incentives to pass on to passengers, shippers and investors the benefits of improved technologies.

Air commerce today is still governed by a framework of rules laid down in the first half of the last century. Despite today's growing internationalism of free trade, global capital markets, the Internet, and the economic integration of entire continents, one of the most globalized, technology-intensive industries remains fettered by rules that stifle competition and prevent airlines, communities, passengers, and shippers from benefiting to the fullest.



The bilateral “air service agreements” (ASAs) that two countries sign to define the terms under which airlines will link their two territories often frustrate market growth, force users to pay a premium, and create vested interests that could oppose any reform.

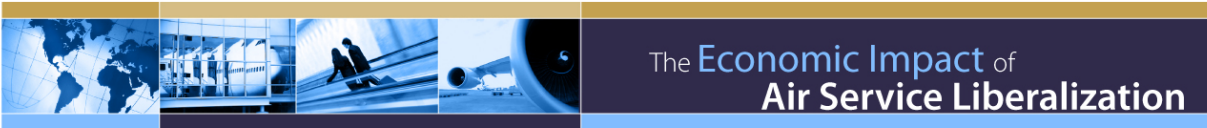
The collective benefits of liberalization, while very large, are so widely distributed that no person or organization perceives that it has a major interest in reform. The benefits, permeating throughout the economy are often so difficult to trace that many are not even aware that they could benefit. Often, even those who oppose liberalization could gain, but would face certain transitional risks and might have to modify their methods of business.

These factors suggest that the key to reforming air travel is **education**. Specifically, a society can only make a rational choice between protectionism and competition if it knows:

- That the incremental benefits can be very large;
- That the benefits are widely diffused among many individuals and organizations;
- That many sectors could benefit, such as the tourism industry, trade/transportation and manufacturing;
- That many persons who may not perceive themselves as actually benefiting could in fact be made better off;
- That even those most opposed to the change could benefit if they can change their behavior accordingly; and
- That these benefits can often be gained at minimal public expenditure, and in an environmentally sensitive way.

In light of the existing environment, this study was undertaken with the primary objectives to define and quantify the results of both historical and prospective liberalization of ASAs. In order to accomplish this objective, a number of subsidiary objectives have been pursued as well, including:

- To examine recent instances of air service liberalization and identify their most important consequences on competition, traffic growth, carrier behavior and national economic benefits;
- To develop a flexible and rigorous analytical framework, with all associated databases, so that the benefits of liberalization could be quantified **for any arbitrary country-pair**; and
- To promote informed public debate on the historical and potential benefits of liberalization of air service agreements between countries.



This study summarizes the research performed in pursuit of these objectives. This project has created a mathematical framework of worldwide applicability. While the model is unique in its sophistication and versatility, the project is still but one of a large group of analyses of the consequences of liberalization. Section III examines other approaches and their findings. While the assumptions, methodologies and results vary widely, the models clearly demonstrate the importance of high quality and reasonably priced air service to world economic development and job growth. They are equally effective in highlighting the costs of adhering to outmoded and timid practices that stifle growth on an international scale.

The **Economic Impact** of
Air Service Liberalization



II. THE SCALE OF AIR TRANSPORTATION

A. MACROECONOMICS

Air transportation has long been the life-blood of trade, commerce, and tourism. It plays a vital role in the economies of individual nations and of the world, and provides employment for large portions of the world labor force, both directly and indirectly. The often referred to “globalization” of world trade can be attributed to many sectors of the world economy, but few play a more significant role than air transport. As aircraft become more technologically sophisticated, and as the range of flight is extended to distances heretofore unheard of, societies, economies, and peoples become more closely bound together. Moreover, the technological advances in aircraft have also brought improving economics to commercial air transport, thus opening air travel to more and more of the world population.

Air transport is the “glue” that links the world and drives growth and development, while improving the social welfare of the population. Commercial aviation creates demand in many sectors of the world economy. The tourism industry is heavily dependent on aviation, and benefits substantially from the fact that airlines of the world are able to transport people to tourist destinations at increasingly more favorable prices.

“In 2004, Visit Britain estimated that the tourism sector employed around 1.4 million people in the U.K. or around 5 percent of total employment. Last year around 28 million overseas visitors came to the U.K. spending around 13 billion pounds. Over 70 percent of these visitors arrived by air and they accounted for around 85 percent of tourism expenditures.”⁷

The globalization of world economies is also dependent on an increasingly efficient and readily available international air transport system.

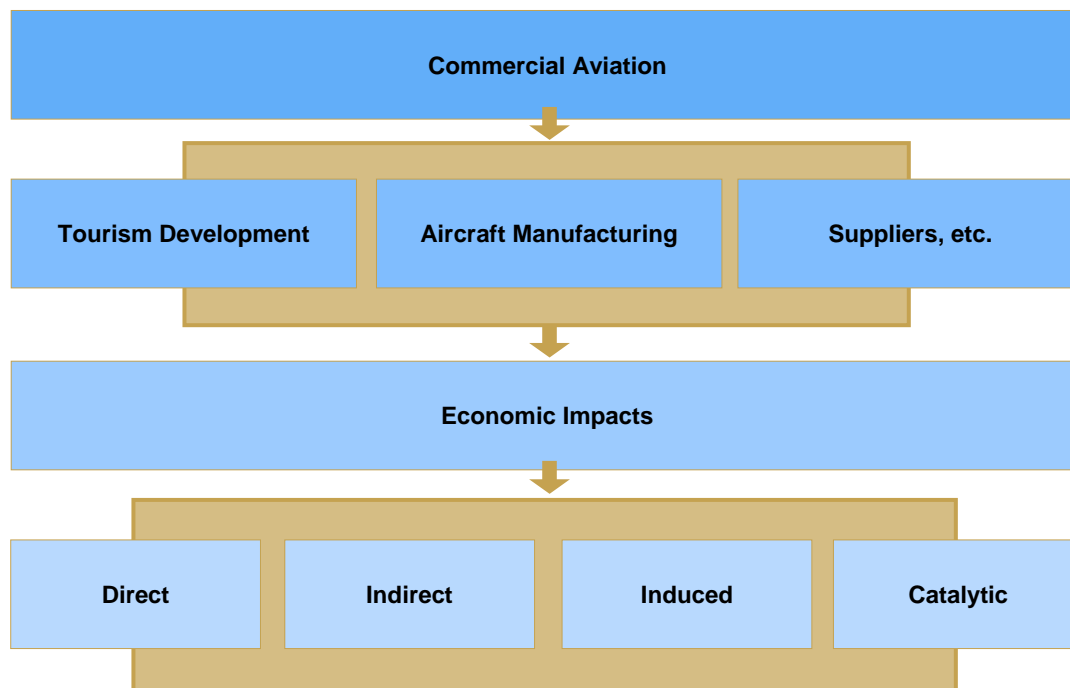
“Within this context, the quality of passenger transportation networks is a key input for processing and transmitting information efficiently because it influences the costs and opportunities for face-to-face contacts between cities. Indeed, it can be argued that large (global) firms should demand international accessibility when choosing a headquarters location.”⁸

The world’s airlines transported roughly 2 billion passengers in 2005, and transported almost 40 percent of world trade (measured by value). The airline industry sector drove economic expansion, as shown by Figure II-1.

⁷ AOA speaking for airports. “The Economic and Social Impact of Airports,” September 2005.

⁸ Gerrma Bel and Exavier Fegeda, “Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters,” Unpublished. September 2005.

Figure II-1: Air Transport – The Driver



First, the **direct impact** of air transport is evident in industry employment and the development and manufacturing of aircraft and engines, the movement of passengers and freight, and the direct employment and materials necessary to support the aviation network. This includes airline employees, air traffic control systems, airports and on-ground services that are essential to the movement of aircraft, e.g., fueling systems.

The world's airlines directly employ over 2 million people.

Second, the **indirect impact** of air transport can be seen in the development of hotel and tourism industries and the producers and suppliers of the goods and services to the airline and related industries, e.g. accounting and legal firms, food and beverage suppliers, etc.

Third, **induced impacts** are driven by, among other things, the "spend" of the people that provide support to the industry.

Finally, there are the **catalytic impacts** of air transport. This includes, for example, the investment made by organizations in plants and facilities, and the increased trade flows driven by the expanding capacity of the air transport system to support these investments.

During the late 1970's and early 1980's Atlanta became the focus of a number of European airlines. As a result of service by Delta from Atlanta to Europe, and European carriers to Atlanta, foreign direct investment increased dramatically. For example, there were 67 U.K. companies operating in Atlanta in 1978 and 201 in 1988. Equally dramatic, there were 23 Netherlands companies operating in Atlanta in 1978 and 116 in 1988, subsequent to the implementation of international air service.⁹

The combined economic impact of the industry has been variously estimated at between 4 percent and 8 percent of world GDP. In its recent Annual Report, the International Air Transport Association (IATA) noted that air transport directly employs four million people and generates \$400 billion in output. In addition, IATA noted that total world output generated by air transport was nearly \$1.4 trillion, 4.5 percent of global GNP.¹⁰

"Air transport is a major contributor to job creation and economic growth. It has an economic impact exceeding \$2.9 trillion or 8% of global GDP and generates 29 million jobs globally, falling into the following categories:

Around 5 million are directly employed;

There are 5.8 million indirect jobs...

2.7 million are induced jobs...

Another 6.7 million direct and 8.8 million indirect jobs are the result of air transport's catalytic impact on tourism"¹¹

The Air Transportation Action Group's study, "The Economic & Social Benefits of Air Transport," also suggests a contribution to world GDP of 8 percent.¹²

Further cases illustrate the power of air transport to generate economic benefit:

1. European airport studies estimate that European airports contribute 2.6 percent of European GDP.
2. Air transport impact on the U.S. economy is estimated to generate 12.3 million jobs and \$1.37 trillion in economic impacts.

⁹ Atlanta Chamber of Commerce.

¹⁰ Annual Report, 2005 International Air Transport Association.

¹¹ ComMark Trust "The Economic Benefits of Liberalising Regional Air Transport – A Review of Global Experience," November 2005.

¹² Air Transport Action Group (ATAG), "The Economic & Social Benefits of Air Transport." Pg. 2.

3. The U.K. Airfreight Industry is estimated to have created 80-100,000 full-time equivalent jobs, and almost 5 billion pounds GDP growth¹³.

While creating consistent growth in world economies, air transport is also increasingly sensitive to the environment. In this regard, "Aircraft entering today's fleets are 70 percent more fuel-efficient than they were 40 years ago. Carbon monoxide emissions have been simultaneously reduced by 50 percent, while unburned hydrocarbon and smoke have been cut by 90 percent."¹⁴

B. INDUSTRY ECONOMICS

Commercial air transportation worldwide generates \$400 billion in revenues. However, over the past five years, it has managed to lose \$40 billion, much of this in the U.S. As a result, there have been bankruptcy reorganizations in the United States and outright liquidations of air carriers in other countries where bankruptcy laws do not facilitate such reorganization.

The world airline industry faced the trauma generated by the tragedy of 9/11, the ensuing slowdown in the world economies, SARS, the Gulf War, the aggressive expansion of the Low Cost Carrier (LCC) worldwide, and fuel price escalation at a rate beyond what it could absorb or pass on to the consumer.

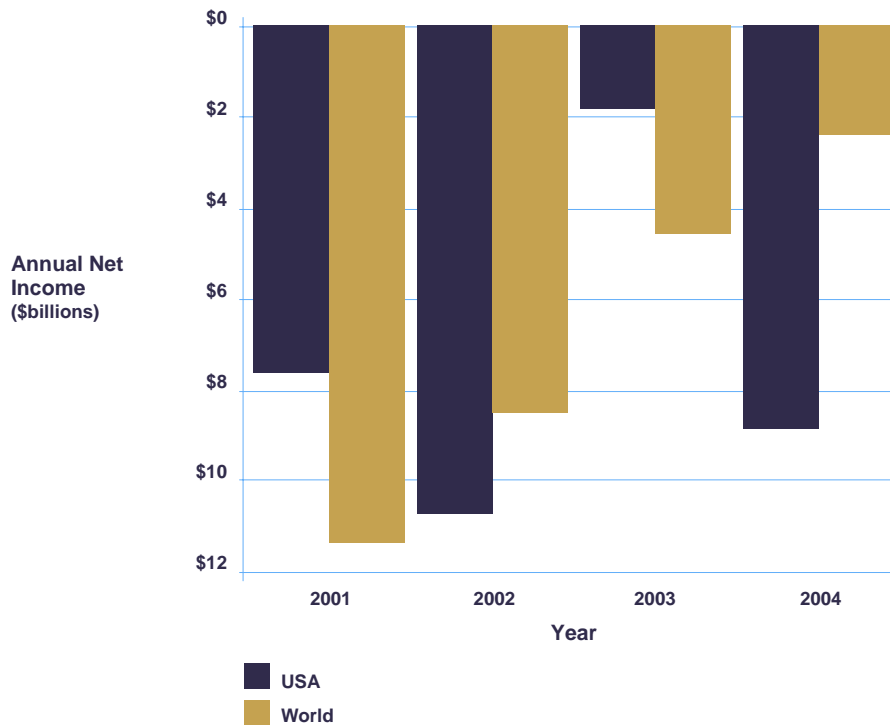
"In 2004, the air transport industry marked its fourth consecutive year of financial aggregate loss, bringing post-9/11 industry losses to over US\$36 billion... The principal cause of the \$4.8 billion loss in 2004 was the industry's \$61 billion fuel bill, \$17 billion more than in 2003. And the situation is getting worse."¹⁵

¹³ Source: United Kingdom Department of Transport, "United Kingdom Air Freight Study", 2000.

¹⁴ *ibid.*

¹⁵ Annual Report, 2005 International Air Transport Association.

Figure II-2: Airline Profit/Loss (2001-2004)
USA and World



Source: Air Transport World, World Airline Report

As of the spring of 2006, however, there are encouraging signs that the industry is moving toward recovery and expansion. During the first quarter of 2006, average fares increased throughout the world, although at a more accelerated rate in the U.S. The increases in airfares are accompanied by cost efficiencies arising from the carrier restructuring that has taken place over the past four years. The net effect is that the year 2006 is likely to be the turnaround point in industry earnings.

The cost efficiencies being implemented by carriers around the world are facilitating a renewed level of competition between and among Low Cost Carriers (LCCs) and between the LCCs and Legacy Network Carriers (LNCs).

According to the Chairman of American Airlines, Gerard Arpey, the airline is “looking under every rock” for cost savings. He noted further that American has targeted \$700 million in additional cost savings for 2006.¹⁶

And from United Airlines’ Glenn Tilton, referring to the past three years,

¹⁶ Comments of Gerard Arpey at the American Airlines Annual Stockholders Meeting, May 18, 2006.

"...required a discipline and a rigor that will now apply to our operations and our financial performance, across every aspect of the organization, as we take the company to the next level."¹⁷

This new discipline, which is evident worldwide, will lead to a more competitive and profitable environment. It will also result in efficiencies that can be translated to stabilization of air fares over the longer run. It will boost customer demand, particularly in growing world markets that have not yet reached the scale or penetration of the U.S. market.

The aircraft market is also recovering. In 2005, Boeing and Airbus booked over 2,100 orders for new aircraft.¹⁸ While 2006 orders are forecast by some experts at only around 1,000, this would still reflect a reasonable two-year cycle.

The commercial airline industry continues to face formidable challenges. The industry has faced up to and resolved many of its inherent cost inefficiencies. For the LNCs, these "uncontrollable" adverse factors were compounded by the LCC, which continued to grow in size, and consequently increasingly dictate fare levels.

The airlines have now taken steps, often through bankruptcy or alternative restructuring, to bring their costs into competitive balance. Thus, having dealt with the cost issues, the airlines must now continue to manage their capacity and pricing. Should they have the discipline to do so, we could see better industry financial health over the next few years, while maintaining solid traffic growth.

However, the world airline industry is still plagued by the arcane network of bilateral air service agreements (ASAs). These agreements, negotiated between governments, often severely restrict the ability of airlines to make sensible and reasonable commercial decisions relative to where they will allocate their aircraft and at what price to the consumer. Thus, the consumer, that "supposed" beneficiary of this regulatory regime, is really the casualty of regulation. Regulation has proven to be a way to protect the inefficient, create artificially higher airfares, and stifle growth.

The next section of this study will demonstrate how effectively markets can function when freed from their historic regulatory bindings.

¹⁷ Chicago Tribune, May 8, 2006.

¹⁸ The Airline Monitor, May 2006, pgs. 4 & 5.

The **Economic Impact** of
Air Service Liberalization



III. THE ECONOMIC IMPACT OF LIBERALIZATION

A. GENERAL – CURRENT EVIDENCE

Extensive research attests to the importance of commercial aviation to nations in all states of development. Air service liberalization, which replaces a set of strict and arcane rules with the primacy of the market, has repeatedly proven a decisive influence in expanding the industry, and making its benefits available to more people. Many airports, airlines, academic institutions, governments and private organizations have documented the relationship between liberalization and economic growth. These efforts have contributed greatly to our knowledge of liberalization. However, most research has been narrowly focused in one or a very few specific markets. Most of the work has been *ex poste* and retrospective; contrasting a situation before and after liberalization. The data and models have been very situation-specific, and could not be quickly and simply applied to other markets.

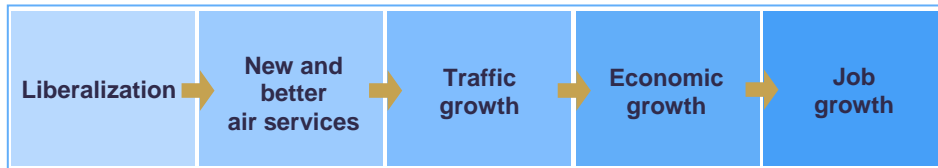
This study establishes a framework to assess the economic benefits of international air service liberalization in any market, anywhere in the world. Its approach is *ex ante*; it estimates the impact of liberalization to any market that is presently restrictive. Its global applicability depends on the use of data generated throughout the world, involving over 190 nations and 1,400 country-pairs. The various statistical relationships that form the model not merely accommodate, but, indeed, require this diversity. The models have a wider applicability, greater robustness, and better statistical properties, than those developed from a more limited and homogeneous set of data.

In keeping with the worldwide focus of the research, this chapter draws, to the fullest extent possible, on experience obtained throughout the world. The United States has high quality statistics on air travel. Because of its size, and the relatively lengthy period since it deregulated its domestic market (airline deregulation became effective in 1978), the United States offers the best examples of market liberalization. Furthermore, American airports have been most active in pursuing new services, and in evaluating the economic impacts of aviation. This combination provides the best data for researching the subject.

This section first examines recent evidence on air service liberalization, and second uses case studies to test the hypothesis that liberalization expands the market and adds economic value and jobs.

This study, and most others, is based on a causal chain that links changes in air service regulation to changes in the broader economy (Figure III-1).

Figure III-1: The Causal Relationship between Air Service Liberalization and Economic Growth



The failure of any one link can halt the process of expansion. Sometimes, the current regulations, however restrictive, may not be a constraint to market behavior. Policy makers may authorize a new service, but the tangible benefits of liberalization will appear only if the airlines exercise the rights. Many bilateral agreements are rife with “unused authority,” services that are allowed but that have no commercial value. The logical and empirical link between better air services and traffic growth is strong, and all evidence suggests that the market responds to improved service. The link between traffic growth and economic growth depends on the country’s level of employment, the propensity to import, and whether increased air travel diverts expenditures from other forms of consumption, savings and investment.

B. AIR SERVICE LIBERALIZATION AND TRAFFIC GROWTH

Airlines are continually fine-tuning their routes to accommodate traffic growth, changes in aircraft technology, airport congestion and other factors. In a mature market, this results in a never-ending “trickle” of schedule changes. When the market fundamentals experience a sudden and dramatic change, a “torrent” of new routes often results. Such events can include rapid economic growth of the type being experienced in China and India, the availability of new air routes, and, most importantly, market liberalization.

As of 2006, many nations have allowed market forces to govern their domestic routes, while a slow, erratic process of “creeping liberalization” has prevailed on many international air corridors. Liberalization has promoted many new services around the world, as testified by Table III-1.

Table III-1: Liberalization and Air Service Growth

Event	Results
U.S. deregulation, 1978	Emergence of hub and spoke systems, low cost carriers with nationwide route networks, new entrants and integrated cargo carriers.
U.K Liberalization of Secondary Airports	Growth of international services to Manchester, Birmingham, Glasgow, etc.
Open Skies Agreements for United Arab Emirates	Growth of Dubai as major international hub.
Domestic deregulation in India	Development of low cost carriers and aggressive, expansion-oriented airlines.
U.K-India Bilateral and Creation of New Frequencies	Growth of capacity, new gateways and additional carriers operating U.K.-India service.
Domestic deregulation in Brazil	Growth of low cost carrier Gol and others.
Single European Market	Growth of low cost carriers. Ryanair, Easyjet, etc. New services, traffic growth, new gateways throughout European Union.

Published aviation statistics testify to the ability of new air service to stimulate traffic. Table III-2 portrays how new services have stimulated traffic. It compares traffic levels in the year immediately preceding inauguration of the new service, to volumes in the first full calendar year of operation. Most of the examples result from changes in bilateral air service agreements, or from specific governmental decisions of how to exercise the provisions of current restrictive agreements.

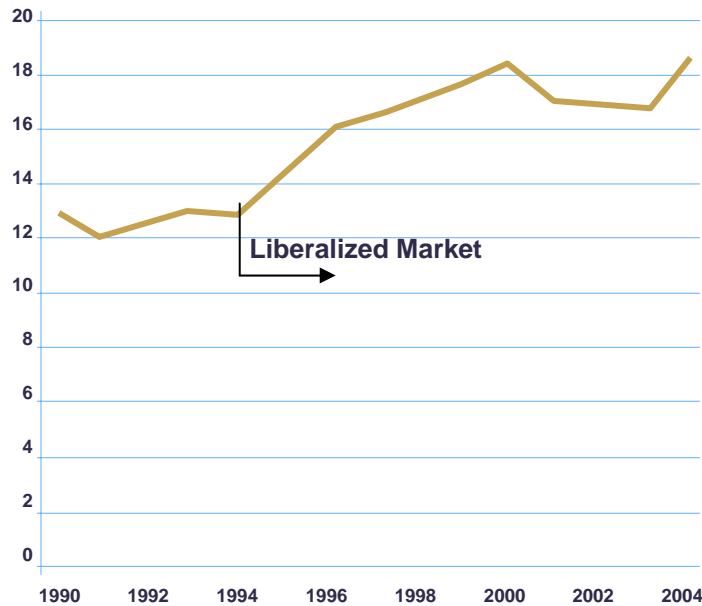
Table III-2: New International Services and Traffic Growth

City-Pair	Service	Liberalization Event	Gain
Vancouver-Phoenix	America West 1995	1995 Canada-U.S. Bilateral	146.4%
Toronto-Minneapolis	Air Canada 1995, Northwest	1995 Canada-U.S. Bilateral	55.3%
Toronto-New Orleans	Air Canada 1998	1995 Canada-U.S. Bilateral	41.2%
Ottawa-Chicago	Air Canada/ American 1995	1995 Canada-U.S. Bilateral	109.7%
Montreal-Atlanta	Delta 1995	1995 Canada-U.S. Bilateral	55.5%
Atlanta-San Jose CR	Delta 1998	1997 U.S.-Costa Rica	118.5%
Dallas/Fort Worth-Santiago	American 1996	Assignments of routes	336.6%
Chicago-Hong Kong	United 1996 (not daily)	U.S.-Hong Kong Bilateral	21.1%
Chicago-London	United 1995	U.S.-U.K Mini Deal, 1995	42.1%
Chicago-Sao Paulo	United 1997	U.S.-Brazil, 1996	80.4%
Chicago-Buenos Aires	United 1998	Reassignment of routes	41.1%
Houston-Sao Paulo	Continental 1999	U.S.-Brazil, 1997	120.5%
Atlanta-Guadalajara	Delta 1999	U.S.-Mexico, 1991	169.5%
Washington-Buenos Aires	United 2002	Reassignment of routes	208.7%
Washington-Sao Paulo	United 2002	Reassignment of routes	88.4%
Detroit-Beijing	Northwest 1996	U.S.-China, 1995	174.3%
Dallas/Fort Worth-Lima	American 1996	Assignment of routes	482.0%
Houston-Tokyo	Continental 1998	1998 U.S.-Japan	116.6%
Atlanta-Rome	Delta 1999	1998 U.S.-Italy	110.8%
Dallas/Fort Worth-Zurich	American 2000	1995 Open Skies	115.3%

Sources: United States Department of Transportation Databases 1B and 28IS; Statistics Canada Report 51-205, "Air Passenger Origin and Destination, Canada-United States Report," and InterVISTAS estimates.

Table III-2 understates the stimulation by using a strict "year before/year after" timeframe. Traffic usually requires several years to adjust fully to a new service. Despite the conservative approach, nonstop international services can often cause international traffic to double in only a year, even for city-pairs that already have a profusion of one-stop connecting services. Any mechanism that allows international services to proliferate to non-traditional gateways can be a powerful stimulus to traffic. Restrictive bilateral agreements, through confining service to a few named points, can thwart the growth shown in Table III-2. They also exacerbate the airside and groundside congestion at the largest gateways.

Figure III-2: Growth of United States-Canada Traffic, 1990-2004

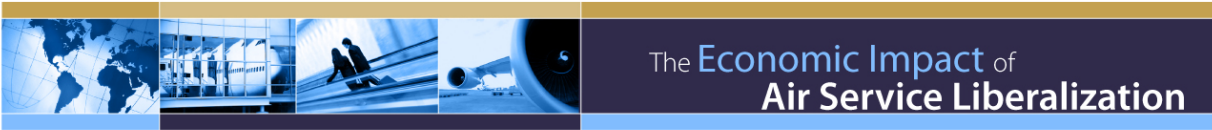


Source: United States Department of Transportation Database 28DM

Figure III-2 depicts United States-Canada passenger flows. Until 1995, this market was governed by a very restrictive bilateral, negotiated in 1966 and updated in 1974. It forbade nonstop scheduled services on many important routes, including Toronto-Washington, Atlanta-Montreal and Vancouver-Denver. Both countries had concluded a free trade agreement in 1988, extended to Mexico in 1994. The February, 1995 air service agreement allowed carriers of either nation to serve any route desired, although temporary safeguards protected Canadian carriers. As shown by the graph, the previously stagnant traffic saw rapid growth after liberalization.

C. AIR TRAFFIC AND ECONOMIC GROWTH

Tables III-1 and III-2 indicate a strong causal relationship between liberalization, air service improvement, and international traffic. Table III-3 explores the final step of the causal chain; the relationship between traffic and economic development. Many airports have prepared “economic impact statements” to quantify their influence on their communities. Several measures are used, including Gross Domestic Product, output, employment, investment, and tax revenues. Several methods are available, and assumptions vary widely between each such project. Despite the methodological differences, the studies have reached a worldwide consensus that airports and civil aviation can have an enormous and positive impact on regional prosperity. Table III-3



summarizes economic impact statements for a cross-section of airports and civil aviation activities throughout the world.

Table III-3: Economic Impact of Civil Aviation

	Passengers	Employment	Output	Source
Des Moines, 1998	1.7 million	2,352	\$182 million U.S.	Des Moines International Airport
Newcastle, NSW 2005	.76 million	3,336	\$540 million AU	Newcastle Airport Limited
Cincinnati, 2004	22 million	89,536	\$5 billion U.S.	University of Cincinnati
Reykjavik, 1998	1.8 million (2006)	1,156	11.4 Billion IKr	University of Iceland Institute of Economic Studies
Geneva, 1999	7 million	24,000	9.0 Billion SFr	Aéroports Internationale Geneva
World Aviation, 2005	2 billion	29 million	\$2.96 trillion U.S., 8% of world GDP	Air Transport Action Group
U.K. Airports, 2004	229 million	580,000	£22.2 billion gross value added	Airport Operators Association, 2005
Toronto, 2001	28 million	138,000	\$14 billion CD	Greater Toronto Airports Auth.
Auckland, 2001	8.5 million	235,780	\$14.2 billion NZ	Auckland International Airport
All United States, 2005	746 million	12.3 million	\$1.37 trillion U.S.	Air Transport Association
Inverness Airport, 2005	.5 million	2,297	£ 120 million	Inverness and Nairn Enterprise, Highlands and Islands Enterprise and Highlands and Islands Airports Limited
U.K. Air Freight Industry, 2000	2,526,266 tonnes	80,000-100,000	£ 4.99 billion	U.K. Air Freight Study Report, U.K. Department of Transport

The instances shown in Table III-3 describe the impacts of facilities operating with a given level of service. A further refinement involves measuring the incremental impact of a specific improvement in air service. Table III-4 summarizes several studies that examined specific instances of new flights or liberalization initiatives.

Table III-4: Incremental Impacts of Improved Air Service

Source	Liberalized Market	Impacts of Liberalization
Montreal, Toronto and Vancouver Airports	Canada-U.S. Open Skies	455 jobs, \$59.6 Cdn. Output, \$31 million CD GDP
Impact of Liberalization on Hamburg, 1999. Gillen and Hinsch	Liberalizing 10 country-pairs	\$1.3 million output, 126 jobs
European Commission study by Brattle Group, 2002	U.S-EU single market	\$8.1 billion in output, \$5.2 billion benefits with lower fares
Denver International Airport	Annual Impact of Daily Flight to Asia	\$142 million impact
Metropolitan Washington Airports Authority	Impact of 4/week service to Japan	\$325 million in activity
Direct Exhibits of Federal Express, Docket OST 99-6323	Impact of new FedEx U.S.-China Services	13,771 jobs, \$1.6 billion expenditures
Baltimore Business Journal, November 28 2005	Mexican service, Baltimore-Mexico City	\$54 million expenditures for Maryland

Table III-4 again attests to the importance of new air service to economic development. In most instances, such improvements are brought about merely by easing the constraints of specific bilateral agreements, and allowing market forces to govern.

D. CATALYTIC EFFECTS FROM AIR SERVICE DEVELOPMENT

The relationships explored in Tables III-3 and III-4 view the various impacts as the response of a pre-existing economy to incremental changes in civil aviation. They assume that there will be no changes to the underlying structure of the regional economy. This simplified approach is not appropriate for many situations. Growing evidence indicates that new air services can lead to changes in the underlying structure of the regional economy, through creating new capabilities, and forming a different set of transactor expectations. These reactions can literally create new industries in a region, and allow the area to compete for development throughout the world. These “catalytic impacts” are the most difficult to quantify. Although most evidence is anecdotal, there is growing evidence that these effects can be very large:

A 10 percent increase in the supply of intercontinental flights involves around a 4 percent increase in the number of headquarters of large firms located in the corresponding urban area ... headquarters of knowledge-intensive sectors are

much more influenced by the supply of direct intercontinental flights than are those of non-knowledge-intensive sectors.¹⁹

Nine foreign-owned companies in Northern Kentucky cited air service as an important factor in their choice of location. The nine firms collectively employ 1,470 persons.²⁰

In 2003, Kenya exported 50,000 tonnes of flowers by air freight.²¹

The growth of European air transport since 1995 has boosted European Union GDP by 4 percent. The expected growth to 2025 will boost GDP of the 25 European Union nations by a further 1.8 percent.²²

Air service liberalization in Egypt could increase the GDP of the Travel and Tourism industry by 12 percent by 2011, adding 260,000 full time jobs. Furthermore, the total GDP for all sectors would increase by 1.8 percent.²³

Between 1995 and 1999, the proportion of tourists who arrived in the Latin American/Caribbean region by air jumped from 47percent to 55 percent.²⁴

E. CONCLUSIONS

The evidence cited demonstrates a strong causal link between air service liberalization, traffic growth and economic development. The next part of this section examines how these interactions have influenced five specific markets. It lends further urgency to the need for air service liberalization by illustrating the benefits of successful efforts.

Section IV of this study will summarize the development of an *extensive* model of liberalization. It was designed utilizing a cross-section of hundreds of country-pairs throughout the world. The resulting structure can be applied to any arbitrary country-pair. The model provides further evidence of the benefits of a liberalized air service regime.

¹⁹ Germà Bel and Xavier Fageda, "Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters", Unpublished, September 2005.

²⁰ George Vredevel, Marie Haney, Pooja Sharma and Anthony Apostolides, "The Influence of International Airports on Regional Economic Growth", Economics Research Group, Center for Economic Education, University of Cincinnati, Cincinnati, 1997.

²¹ Oladele Samson Fatokun, "African Air Transport in the 21st Century: A Case Study of the Contrasting Experience of Nigeria and Kenya," MSc Thesis, Department of Engineering, Cranfield University, 2004.

²² The Economic Catalytic Effects of Air Transport in Europe," Eurocontrol Experimental Centre, Bretigny sur Orge Cedex, 2005.

²³ "Aviation in Egypt: The Impact on Travel & Tourism, Jobs and the Economy," World Travel and Tourism Council, 2005.

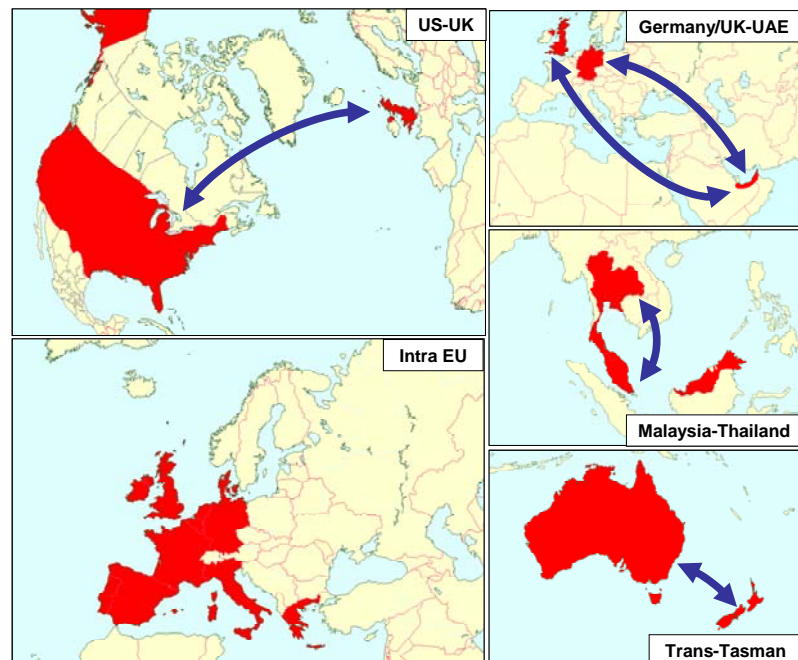
²⁴ "The Contribution of Air transport to the Latin American/Caribbean Economy," Air Transport Consultancy, International Air Transport Association, 2002.

F. AIR SERVICE LIBERALIZATION – CASE STUDIES

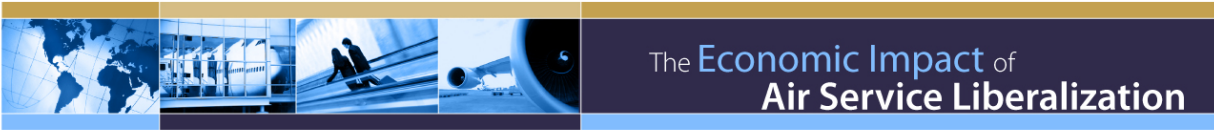
1. GENERAL RESULTS

In order to confirm the premise that liberalization leads to market growth and economic expansion, and to validate the results being generated by the economic model, we studied five separate cases.

In each case, we examined the background of the bilateral relationship, the history of traffic growth, and its relationship to benchmark parameters such as GDP growth. In all cases studied, it was apparent that, depending on the size and development of the economies, there was substantial incremental passenger traffic and economic growth after air service agreements between the countries had been liberalized. In some cases, the liberalization was of a “transitional” nature that is from a rigid Bermuda I type agreement to something less accommodating than “Open Skies,” while in other cases the liberalization was from a transitional to an Open Skies regime. In one case, we found that liberalization occurred as a result of informal understandings between governments, with no accompanying modifications to the formal air services agreement.



Post liberalization traffic growth tended to exceed pre-liberalization growth levels by anywhere between 12 percent and 35 percent and up to 50 percent and greater, depending on the periods measured. In all cases, the traffic growth produced significant increases in economic output and job growth.



CASE STUDY

UNITED STATES – UNITED KINGDOM MARKET

U.S.-U.K. AVIATION RELATIONSHIP – A CASE STUDY

The United States and United Kingdom aviation relationship has, in many respects, provided the origins of today's complex web of bilateral air services agreements (ASAs) that frame trade in the field of commercial aviation. Beginning with the Chicago Convention in 1944, when the United States tried and failed to sell its free market principles to fifty world nations, there has been a tendency toward protectionism and mercantilism led by the British. It was the British that vigorously opposed the U.S. free trade position in 1944, and that led to a compromise two years later in Bermuda. Thus, the Bermuda I standard ASAs that dictated how, when, and where air carriers could do business, and at what price.

A. BACKGROUND

The aviation relationship between the United States and the United Kingdom has been long, sometimes contentious. The U.S.-U.K. bilateral aviation agreement, while liberal in many respects, retains strict limits on designations and operations between the U.S. and the two principal U.K. airports, London Heathrow and Gatwick.

These throwbacks to protectionism have their roots in the 1920s and 1930s. However, in August of 1944, the British government requested that the United States host an international conference on civil aviation. The conference was convened in Chicago on November 1, 1944, i.e. the Chicago Convention of 1944 when 54 nations met to establish a post-war commercial aviation framework. There was much debate relative to the merits of government control versus free trade principles. The U.S. supported what we essentially refer to today as "Open Skies." In that environment, carriers of any country would have been free to operate on the basis of commercially driven decision-making relative to the numbers of services they offered, the places they chose to fly to, and the prices they would charge the traveling public.

The British supported an entirely different regulatory regime. It was the British position that there should be an international regulatory body to administer a rigorous regulatory framework. In part, the British rationalized their position on the basis that the U.S. would be too powerful in the post-war economy. Moreover, they did not trust the marketplace to make judgments, nor did they trust air carriers to make rationale commercial decisions. In any event, the British preference was to regulate routes, carrier designations, market entry and exit, frequency and size of services, and pricing. With these tools, governments were thought to be able to control load factors, market shares, and profitability. At this stage in the development of international aviation, the consumer was not a major consideration.

The U.S., on the other hand, proposed to give the commercial entities discretion as to how they would operate, and at what prices. In effect, the U.S. supported free trade in aviation, although it was prepared to concede certain controls on capacity as a

compromise position. In addition, the U.S. (as it does today) supported a multilateral regime, notwithstanding opposition from Pan American, an airline fearful of competition.

An interesting derivative of the Chicago Convention related to a recommendation of the Canadian government that airlines establish rates and then file those rates with a regional body. In addition, there was a recommendation that carriers should discuss the formation of an international aviation organization. This, of course, led to the establishment of the International Air Transport Association (IATA).²⁵

The lack of agreement at the Chicago Convention led to the Bermuda Conference in 1946, the first major step toward what was to become the traditional “Bermuda I” type bilateral air service agreements.

That framework would be the basis for establishing grants of rights under ASAs over the next 40 years. It also established IATA as the rate setting forum for international air fares, but gave governments the right to reject fare offerings, should they be deemed unacceptable, for whatever reason.

B. CAPACITY AND TRAFFIC ANALYSIS

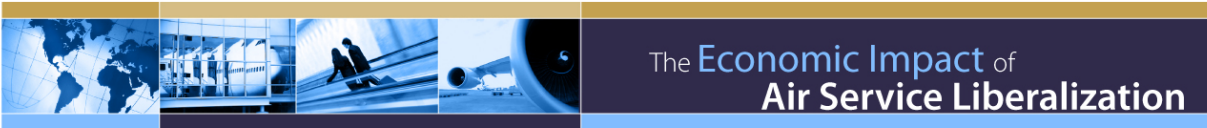
In the years leading up to 1990, United States-United Kingdom traffic represented roughly one-third of total U.S. to Europe traffic. Moreover, growth in the U.S.-U.K. market was generally consistent with that of the U.S.-Europe market.

Capacity (flight frequencies and seats) and traffic grew in response to numerous factors including growth in GDP, personal income, pricing, and liberalization initiatives with other European nations.

When viewing the North Atlantic as a benchmark for the U.S.-U.K. market, we find that the U.S.-Europe traffic exhibits an income elasticity between 1.0 and 1.5, depending on the years measured.²⁶ Growth in given country-pair markets also tended to vary as the U.S. negotiated “Open Skies” agreements with individual European countries, beginning with the Netherlands. Open Skies agreements tend to produce significantly enhanced competition, more flights and seats, and lower fares. These factors combine to generate more traffic to the market in question. Often that traffic is new to the market, i.e. generative, due to the increased service levels and lower fares. However, those same factors will often result in positive traffic diversion from other city or country-pair markets where the regulatory regime is less favorable to the decision making flexibility that air carriers need, and thus less favorable to the consumer.

²⁵ Tanaja, Newal. U.S. International Aviation Policy, pg. 11.

²⁶ European Liberalization and World Air Transport, Wheatcroft and Lipman, May 1990, pg. 127.



In a 1996 study for American Airlines, “Economic Benefits of U.S.-U.K. Open Skies,” Roberts Roach & Associates states:

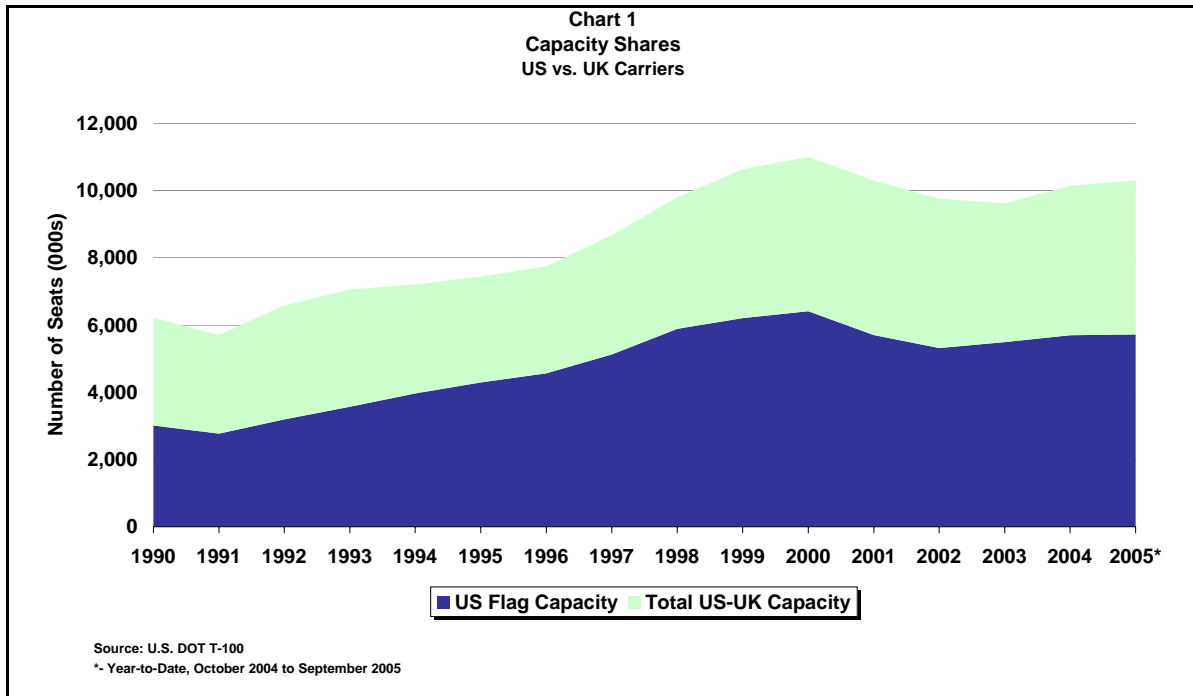
“Wherever the industry remains regulated, each airline seeks to use the levers of regulation to secure advantage for itself and to hobble its opponents. With the U.S.-U.K. Open Skies, of course, one more regulatory forum will be closed; everybody will be free to compete in the marketplace. Those who see an opportunity to gain by manipulating the government—and those who, by nature, prefer regulation—see the alliance approval process as one more chance to seek commercial advantage from the government rather than in the marketplace.”²⁷

During the mid-1990’s, the U.S. and the U.K. agreed to liberalize the traditional Bermuda II agreement that had been in place since 1978. As part of that agreement, the U.S.-U.K. market was essentially deregulated, with the exception of Heathrow and Gatwick airports. Otherwise, carriers could operate any city pairs, and at pricing that was commercially determined. As a result, capacity and traffic grew considerably during the 1990’s.

Capacity, as a result of the liberalization, grew by a compound annual rate of 7.8 percent, and interestingly, resulted in a capacity (seat) share shift over the ten year period from 48 percent U.S. flag carriers in 1990 to 58 percent U.S. flag carrier in 2000. At the end of 2005, the U.S. still had a dominant share of the transatlantic market, with 56 percent, notwithstanding the tendency of U.K. carriers British Airways and Virgin Atlantic to operate more B747 and A340 aircraft. (Figure III-1)

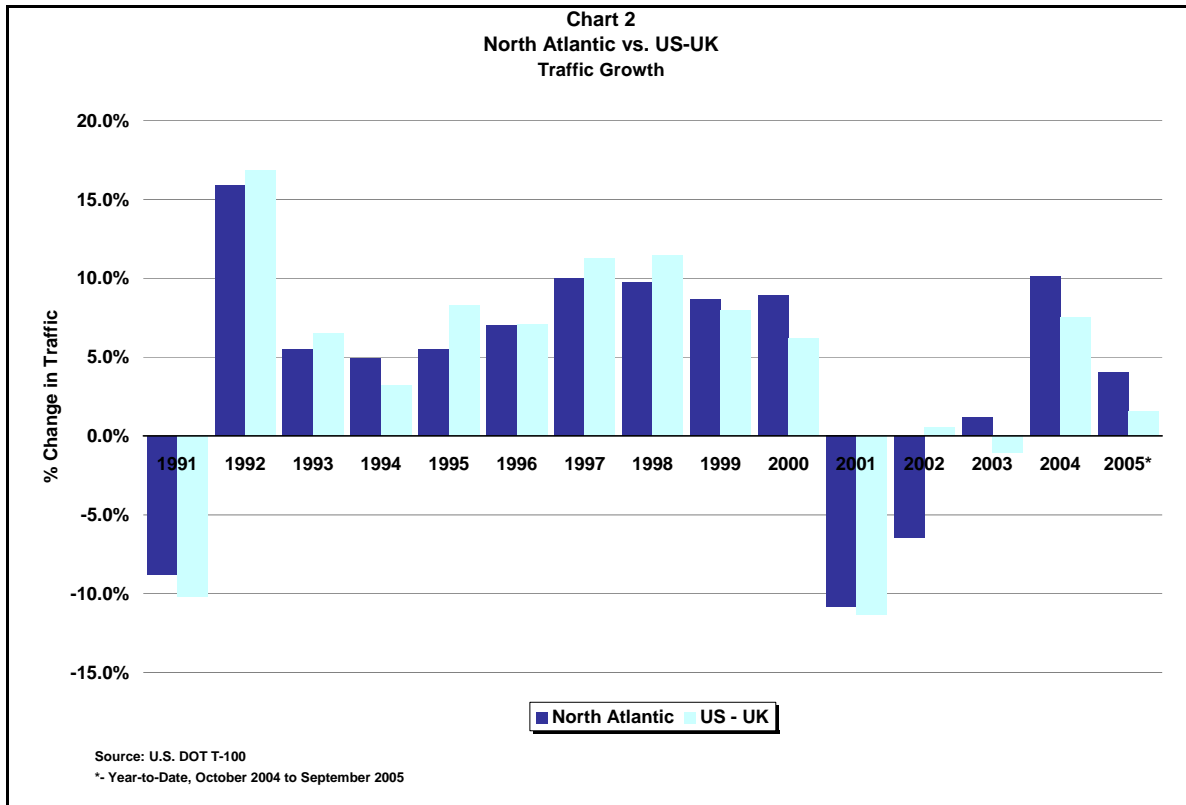
²⁷ Roberts, Roach & Associates, “Economic Benefits of US-UK Open Skies”, October 1996, pg. vii.

Figure III-1: Capacity Shares, U.S. vs. U.K. Carriers



Traffic in the U.S.-U.K. market subsequent to the liberalization tended to grow at a rate in excess of the general North Atlantic growth (Figure III-2). While that trend began to reverse itself in the late 1990's, i.e. the North Atlantic grew at a faster rate beginning in 1999, that reversal may have been more a function of capacity limitations at Heathrow and Gatwick, combined with the maturity of the U.S.-U.K. market subsequent to liberalization.

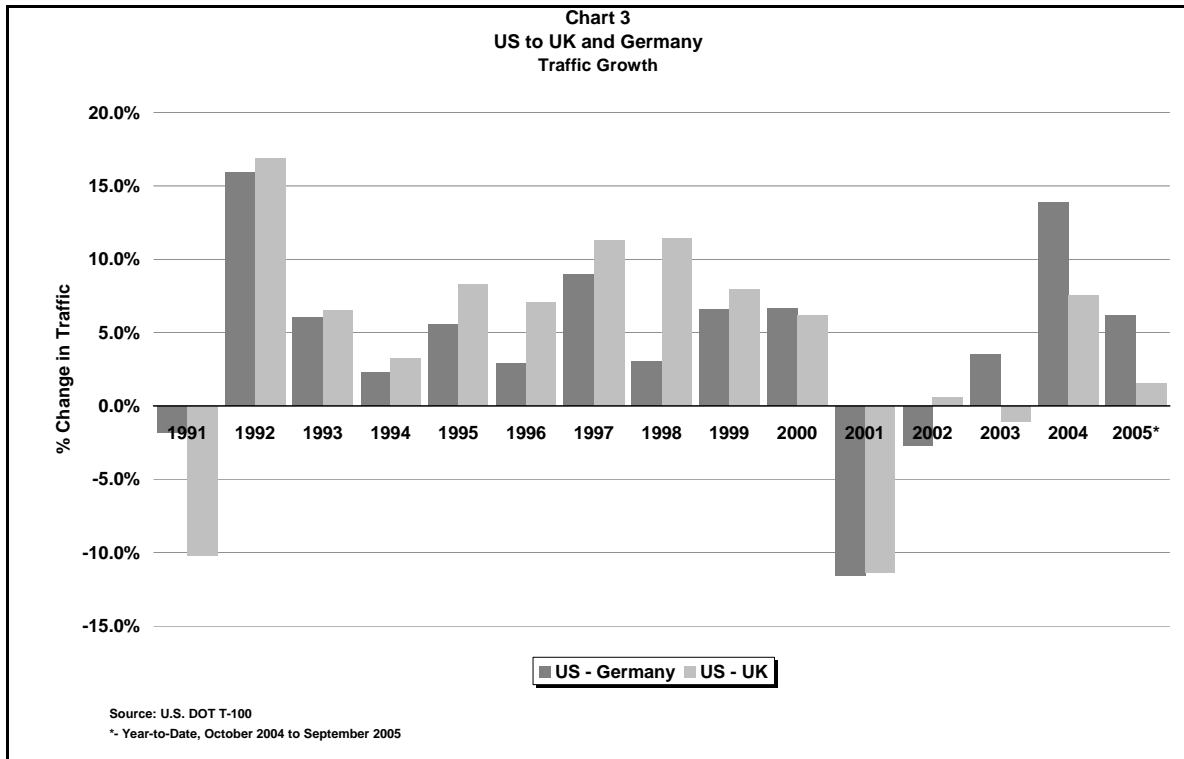
Figure III-2: North Atlantic vs. U.S.-U.K. Traffic Growth



C. TIME LINE OF CAPACITY AND TRAFFIC

The early 1990's liberalization of the U.S.-U.K. market enhanced carrier choice, and clearly led to healthy traffic growth. Exhibit III-3 provides a fifteen year history (1990 to 2005) of traffic between the U.S. and U.K. and the U.S. and Germany. Interestingly, there is roughly the same average annual growth in the U.S.-Germany market over the 15-year period, 4.2 percent, as in the U.S.-U.K. market over the same time frame, 4.1 percent.

Figure III-3: U.S. to U.K. and Germany Traffic Growth

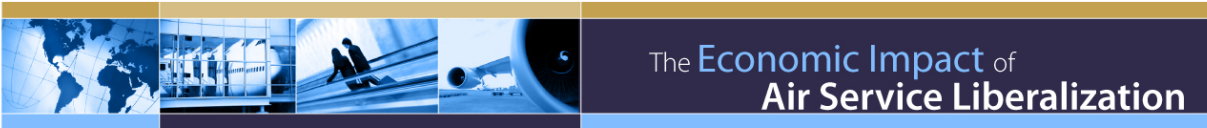


However, in the first 7-8 years subsequent to the liberalization of the U.S.-U.K. market, the U.S.-U.K. market grew more rapidly than the U.S.-Germany market. It was only in 2000 and later that the German market began to grow more rapidly than the U.K. market. This would appear to be attributable to other factors, such as capacity constraints at U.K. airports.

D. ECONOMIC IMPACTS

The transitional liberalization that occurred in the U.S.-U.K. agreement in the mid-1990's generated an incremental 9,197 full-time equivalent jobs in the United States and over 16,700 full-time equivalent positions in the United Kingdom. The Gross Domestic Product of the United States expanded by \$747 million; the United Kingdom saw a \$970 million increase.

The U.S. has been eager to negotiate an Open Skies agreement with the U.K., and that could come about as a result of a U.S.-EU agreement.



In order to test the magnitude of such an agreement, we simulated the impacts of full liberalization on the United States-United Kingdom market and found that it would result in a 29 percent increase in traffic, some of which would derive from reduced fares, while some would result from allowing any U.S. city to obtain nonstop service to London's Heathrow or Gatwick airports.

The economic benefits of this liberalization would be substantial. Over 117,000 full-time equivalent positions would be created and the GDP of the two countries would grow by roughly \$7.8 billion.

The Roberts Roach study²⁸, designed to support Open Skies as a vehicle to ensure antitrust immunity for the American Airlines-British Airways alliance, generated estimates of economic benefits to U.S. communities that could result from an Open Skies agreement. In summary, the study concluded that "Open Skies will open the floodgates to dramatic increases in service by every one of the alliance's existing competitors and by any other U.S. or U.K. carrier that wants to enter the market. It will also permit access to London Heathrow by any U.S. carrier."

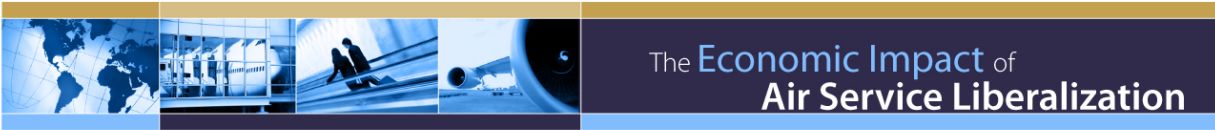
The study further estimated the following over the first five-year transition period:²⁹

- "An 86 percent increase in weekly flights between the U.S. and London
- 9.4 million new passengers between the U.S. and London
- \$9.1 billion in annual expenditures by foreign visitors in the U.S.
- \$3.6 billion in additional annual job-creating foreign investment in the United States"

Thus, the potential results of further liberalization are substantial with respects to enhancing the economies and job opportunities in both countries.

²⁸ Roberts, Roach & Associates, "US-UK Open Skies", October 1996, pg. vii.

²⁹ *ibid* pg viii.



CASE STUDY

INTRA-EUROPEAN UNION MARKET

INTRA-EUROPEAN COMMUNITY

A. BACKGROUND

This case study examines the impact of the legislation dating from 1992, which created the so-called Single Aviation Market within the then twelve Member States of the European Community. It covers:

- (a) the impact of this deregulation on the Community market as a whole;
- (b) the impact of this deregulation on a number of selected routes from Germany.

The process of legislation was spread over a period of six years. It was at the outset, fiercely resisted, both by the industry and by many of the Member States. It is fair to say that the adoption of the final package of legislation in 1992 created an entirely new regime; a predominantly restrictive regime was replaced by a largely unregulated one. All restrictions on cross-border routes within the EU were removed. Sweden, Finland and Norway have had an agreement with the Community under which they adopted the Community's aviation legislation and were in effect part of the Community market.

The 1992 legislation was the third of three packages. The first two (1987 and 1990) retained the bilateral system. In effect, by reaching agreement in the Council, the Member States agreed that in their bilateral relations with each other they would observe rules governing the following main areas:

1. The ability of governments to insist that capacity be tailored to avoid significant departures from the 50-50 rule (capacity sharing or pooling). The first package allowed a government to intervene if its airline's/airlines' share of capacity fell below 45 percent (and in a second step, 40 percent). The second package liberalized the rules further, though again with limits beyond which Member States could intervene.
2. A relaxation of fifth freedom restrictions, greater opportunities for multiple designation and greater freedom to operate third/fourth freedom services, albeit with qualifications.
3. Fares were still subject to control but the process shifted from a watered-down system of double approval to double disapproval, with certain exceptions.

4. The freedom of airlines to enter into co-operative agreements was limited. Revenue pools were restructured and the freedom of airlines to participate in the IATA rate setting machinery was increasingly restricted.

The first two packages removed, or weakened, the provisions which enabled restrictionist governments and airlines to thwart liberalization.

The changes permitted new fifth freedom routes from the U.K. to continental points. But the time-scales involved, and the conservatism of many Member States limited the impact of the changes. The period between them was short and discussions on the next steps started very soon after each of the packages were adopted. The staging was not the result of commercial pressures as much as a rapid development in the political acceptability of an unregulated internal aviation market following in the slipstream of the creation of the internal market for goods.

The 1992 package eliminated bilaterals for services within the Community. Its main provisions were:

1. Community air carriers could exercise traffic rights on routes anywhere within the Community. Until 1997 this included en route cabotage (e.g. Air France flying Paris-Frankfurt-Berlin) provided that no more than 50 percent of the capacity was used for the cabotage service. Freestanding cabotage was liberalized from 1997.

Safeguards protected routes where a public service obligation existed, particularly thin routes operated by small aircraft. A provision enabled Member State A to refuse access to a service using an airport in Member State B to which the airlines of Member State A could not get access for reasons of congestion. It is also possible to refuse or limit the use of traffic rights where serious congestion or environmental problems exist. None of these safeguards has been extensively used and they can be ignored for the purpose of this exercise.

Capacity limitations were made illegal except in cases of congestion or environmental problems.

2. Community carriers were "free to set air fares". Charter fares and seat and cargo rates charged by Community air carriers were to be set "by free agreement of the parties to the contract of carriage".
3. Safeguards dealt with excessively low or excessively high fares. They have never been applied.
4. Exemptions from the competition rules were provided for:
 - a) Joint planning and co-ordination of the schedule of an air service between Community airports. This was to be subject to conditions: the results were to be non-binding; it should be designed to ensure services at less busy times of day.

there should be no limitation of capacity; parties could not be prevented from introducing additional services or withdrawing from the arrangement; it should not seek to influence the schedules of non-participating carriers.

b) Joint operations on very thin routes and between two points where there had been no direct service during the four traffic seasons preceding the beginning of the joint operation; "thinness" was strictly defined.

c) Consultations on passenger and cargo tariffs. These were limited to fares to be the subject of interlining arrangements; the consultations were not binding and did not entail agreements on agents' remuneration.

d) Slot allocation and airport scheduling.

To all intents and purposes, these changes came into force simultaneously, throughout the Community, on 1 January 1993. The exceptions were that the liberalization of freestanding cabotage became effective in 1997; the detailed exemptions from the competition rules in June 1993. Their intent had been part of the package agreed in 1992.

A tabular summary of the legislative developments follows on the next page.

Throughout the negotiating process there was considerable resistance from most of the Member States and their airlines. The impact of the 1992 package can be illustrated by considering the degree of liberalization that existed in the bilaterals which were in force between the Member States immediately before the adoption of the package. In particular the U.K. was the only country whose bilaterals systematically liberalized the rules on capacity. When, therefore, the package came into force on January 1st, 1993, it represented a greater change for the remaining Member States of the Community than for the U.K.

B. CAPACITY AND TRAFFIC

Total Europe

The figures used for the EU market as a whole cover Geographical Europe³⁰ rather than the European Community. The Community traffic represents a large proportion of the total. The data also cover only AEA members but they were usable until 1996 when the low-cost operators began to develop. Thereafter we have applied to both ASKs and RPKs

³⁰ As defined by ECAC, the route area Geographical Europe includes all scheduled services originating and terminating within the 49 countries of the region comprising geographical Europe and European Russia up to the Urals (longitude 55° E).

in order to account for the low-cost operators. This factor has been taken from a relevant Commission study.³¹

Summary of Intra-EU Air Transport Packages³²

Scope	1st package From 1 January 1988 International scheduled passenger transport			2nd package From 1 November 1990 International scheduled passenger transport			3rd package From 1 January 1993 Intra-Community air transport
Fares	Fare types	% of ref. fare	Fares approved by States	Fare types	% of ref. fare	Fares approved by States	Free pricing
	Discount		Automatically	Fully flexible	106-	Unless double disapproval	However, provisions made for States and/or the Commission to intervene against
	Deep Discount	66-90	Automatically	Normal econ	95-105	Automatically	-excessive basic fares (in relation to long term fully allocated costs)
	All other	45-65	Dbl approval	Discount	80-94	Automatically	-sustained downward development of fares
				Deep Discount	30-79	If dbl approval	
				All other			
Designation	Multiple designation by a State allowed if: 250,000 pass (1 st year after notification) 200,000 pass or 1,200 rt flights (2 nd year) 180,000 pass or 1,000 rt flights (3 rd year)			Multiple designation by a State allowed if: - 140,000 pass or 800 rt flight (from Jan 91) - 100,000 pass or 600 rt flight (from Jan 92)			No longer applicable
Capacity	Capacity shares between States 45/55% (from Jan 88) 40/60% (from Oct 98)			Capacity shares of a State of up to 60% Capacity can be increased by 7.5% a year			Unrestricted
Route Access	3 rd /4 th Freedom region to hub routes permitted 5 th Freedom traffic allowed up to 30% of capacity Additional 5 th Freedom rights for Irish and Portuguese Combination of points allowed Some exemptions			3 rd /4 th Freedom between all airports 5 th Freedom traffic allowed up to 50% of capacity Public service obligations and certain protection for new regional routes A 3 rd /4 th Freedom service can be matched by an airline from the other State Scope for traffic distribution rules and restrictions related to congestion and environmental protection			Full access to international and domestic routes within the EU including routes between states other than the base of the carrier Exemptions for Greek Islands and Azores Cabotage is allowed for up to 50% of capacity if the domestic sector is combined with a route to the home country Cabotage is unrestricted from April 1997 More developed public service obligations and certain protection for new thin regional routes More developed scope for traffic distribution rules and restrictions related to congestion and environmental protection

³² European Commission, 1996. The Single Market Review, Impact on Services, Air Transport. Brussels: Office for Official Publications of the European Union.

For the purposes of comparison and to identify trends we have used three four-year periods, i.e. 1990 to 1994, 1994 to 1998 and 1998 to 2002. We have only used the figures of the first and last year of each four-year period. This enables us to ignore short-term variations within the four-year periods such as, in the period 1990 to 1994, the impact of the Gulf War (August 1990-March 1991). The figures for the third period are obviously distorted by the effects of September 11, 2001. To achieve an undistorted trend figure, we have taken the growth rate for the period 1998 to 2000 and applied it to the period 2000 to 2002. The adjusted figure for the third period for Geographical Europe is therefore higher than the actual figure. However on one German route the adjusted level was lower than the actual. The figures for the third period have obviously been affected by the bankruptcy of Swissair and Sabena in 2001.

Table III-5 below and Figure III-7 illustrate the changes in ASK, passenger numbers and operating RPK in the three four-year periods – 1990 to 1994, 1994 to 1998 and 1998 to 2002.

Table III-5 Capacity and Traffic Growth for All Europe, 1990-2002

Market	Increase in ASKs			Increase in passengers carried			Increase in operational RPKs		
	1990-1994	1994-1998	1998-2002 ³³	1990-1994	1994-1998	1998-2002 ³⁴	1990-1994	1994-1998	1998-2002 ³⁵
Total Europe	27.5%	34.9%	36.2%	20.4%	37.8%	40.9%	23.6%	42%	35.2%

Source: Association of European Airlines

The legislation came into force on January 1, 1993. The 1990 package would itself have caused some increase in the figures, although the change would likely have been modest. We would not expect to see any real impact of the 1992 legislation before the summer of 1994 or possibly even 1995. We regard 1994 as a reasonable turning point on which to base our analysis of trends. This led to the choice of the three four-year periods.

The most significant impact of the 1992 package was the stimulus to the low-cost airline services. An operator could now order aircraft confident of a legally assured access to a large market without legislative restrictions. This was (and is) a major encouragement to investment and growth. Table III-6 below sets out the low-cost operators' share of capacity from 1996 to 2003. It will be clear from this that their impact on the market did

³³ Corrected for September 11th, 2001.

³⁴ Corrected for September 11th, 2001.

³⁵ Corrected for September 11th, 2001.

not begin until 1996. Until around 2000, their presence was concentrated on routes from the U.K.

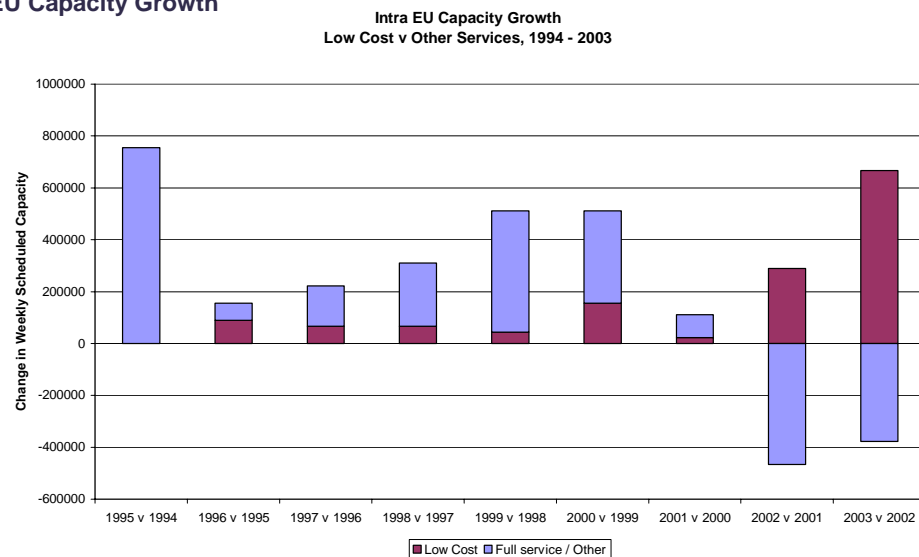
Table III-6 Capacity Shares of Low Cost Carriers

Year	Low-Cost Operators' Share of Capacity ³⁶
1996	1.4%
1997	2.8%
1998	3.7%
1999	4.2%
2000	6.0%
2001	6.4%
2002	11.1%
2003	20.2%

Source: European Commission (2005). DG TREN: Analysis of the European Air Transport Industry 2003 (Contract number B2-7040B-S07.17962). Brussels: Office for the Official Publications of the European Union.

Since July 2001 the full-service sector (including regional operators) has cut capacity in the internal EU aviation market. July 2000 was the last point when full-service airlines posted meaningful growth. The chart below³⁷ (using actual figures rather than figures corrected for September 11, 2001) demonstrates that from 2001 the growth of the low-cost sector matched the decline of the full-service sector.

Figure III-6: Intro EU Capacity Growth



³⁶ Percentage of weekly available seats provided by low-cost operators between 1996 and 2003; Source: European Commission, 2005. DG TREN: Analysis of the European Air Transport Industry 2003 (Contract number B2-7040B-S07.17962). Brussels: Office for the Official Publications of the European Union.

Once the impact of deregulation began to be felt, the operational RPKs and passengers carried increased more than the ASKs. Traffic grew faster than capacity, indicating that deregulation led to higher load factors and better aircraft utilisation. The low-cost operators that entered the market after deregulation introduced lower fares which resulted in higher load factors. Under pressure from the low-cost operators, the other carriers in turn lowered their prices and increased their own load factors.

B. INDIVIDUAL ROUTES

Six specific routes within Europe demonstrate these general patterns. These routes involved are from Germany on one hand to Italy, Belgium, France, Finland, Spain and the U.K. Table III-7 below gives the growth in ASKs and passengers carried for the three periods between 1990 and 2002.

Table III-7 Capacity and traffic Growth on selected Country-Pairs, 1990-2002

Country pair	Rate of increase in ASKs			Rate of increase in passengers carried		
	1990-1994	1994-1998	1998-2002 ³⁸	1990-1994	1994-1998	1998-2002 ³⁹
Germany – Italy	10.3%	51%	45.2%	27.2%	49.1%	48.9%
Germany – Belgium	33%	47%	61.5%	39.6%	71.2%	37.6%
Germany – France	25.5%	31.2%	23.7%	22.6%	44.3%	30.4%
Germany – Finland	23%	43%	16.2%	3.4%	47.7%	38.1%
Germany – Spain	61.7%	20.3%	25.5%	49.6%	28.3%	26.3%
Germany – U.K.	16%	18.2%	44%	11.4%	18.7%	27.9%

Source: German Federal Statistics Office

The figures show that on the first four routes (i.e. Germany to Italy, Belgium, France and Finland) the pattern matches that for Europe as a whole. The routes of course have different characteristics. For Italy, Belgium and France, considerable traffic goes by car or high-speed rail. Air travel is therefore more important for Finland than for the other three.

Two routes that did not follow this pattern are Germany-Spain and Germany-U.K. The divergence for Spain reflects the large share of holiday traffic on charter flights. The

³⁷ European Commission (2005). DG TREN: Analysis of the European Air Transport Industry 2003 (Contract number B2-7040B-S07.17962). Brussels: Office for the Official Publications of the European Union.

³⁸ Corrected for September 11th, 2001.

³⁹ Corrected for September 11th, 2001.

figures for Germany-U.K. show that for the period 1990 to 1998, ASKs and passengers carried grew at similar rates. The U.K.'s bilaterals with Germany had already been substantially liberalized before 1992. The new regime of January 1st, 1993, therefore made much less difference to routes from the U.K. than to routes elsewhere in the Community. The sharp upturn of capacity in the third period (1998-2002) in our view represents the development of the low-cost carriers. Their share of total capacity in Europe as a whole was 3.7 percent in 1998, but this was almost wholly concentrated on routes from the U.K. hence the increase in the rate of growth of capacity during the period beginning in 1998.

Of the six routes from Germany, four saw rapid growth of both ASKs and passengers carried in the period 1994 to 1998. This increase continued, though at a slightly lower pace, in the period 1998 to 2002. The figures for total Europe show a similar pattern.

The contrast with the figures for Germany-U.K. and U.K.-EU15 is instructive. Until the development of the low-cost airline sector in 1998 the growth of both ASKs and passengers carried closely follows GDP growth and does not show the steep increase that appears on the other routes and in the total figures for Europe.

The conclusion is that the sharp change in the regulatory regime of January 1, 1993, resulted in dramatic increases in ASKs and passengers carried. This development started after a time lag of four traffic seasons. The contrast between the growth for total Europe and the German routes on one hand, and those for the U.K. on the other, suggests that the liberalization was the predominant reason.

The other significant conclusion from these figures is that it took roughly five years for the low-cost airlines to make a measurable impact. This impact was limited largely to U.K. routes until 1998. It is only thereafter that the effect can be seen in the rest of the EU. This has been the most dramatic consequence of the 1992 legislation; this is demonstrated by the five-fold increase in the low-cost operators' share of capacity between 1998 and 2003. It may well be that the one factor that brought this about was the contrast between the predominantly restrictive bilaterals before 1992 and the predominantly liberal regime introduced simultaneously on every cross-frontier route in the Community. The growth seen in the market as a whole for the first five years can not be regarded as permanent. The subsequent growth in the capacity of the low-cost sector was to be matched by a decline in the capacity of the full-service sector.

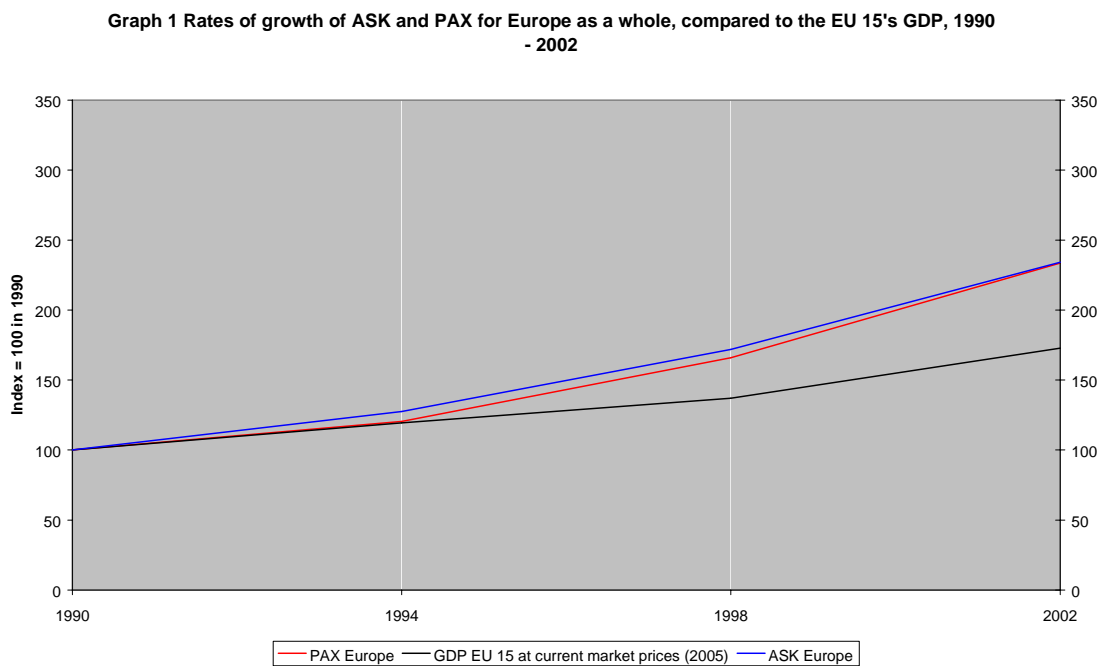
C. TREND IN CAPACITY AND TRAFFIC

The essential events driving changes in traffic and capacity trends are:

1. 1993: Coming into force of the legislation creating a liberalized internal aviation market in the EU (routes between Member States);
2. 1996: First impact of low-cost carriers mainly on routes to and from the U.K.

3. 1997: Extension of liberalization to routes within each Member State.

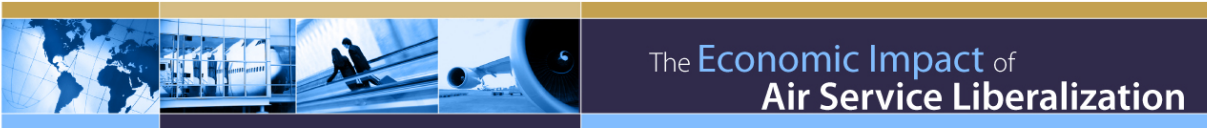
Figure III-7, Rates of Growth of ASK and Passengers for Europe as a Whole, Compared to the EU 15's GDP, 1990-2002



Sources: European Commission, World Bank

As indicated earlier in this paper, the majority of the European flag carriers were initially skeptical of the consequences of liberalization. Only BA and KLM supported it, though eventually SAS joined them. Once the legislation had been adopted, all airlines had to adjust. For some the abolition of the protection they had hitherto enjoyed resulted in a series of applications for state aid. In response the European Commission agreed to these applications on the basis of “first time last time” i.e. aid was allowed to facilitate adjustment to the new situation but thereafter was banned.

By and large the flag carriers have used the abolition of controls on capacity and fares more than they have the freedom of access to routes. The creation of a single market also facilitated the development of alliances among the European airlines (or their membership in the global alliances that came into being at that time) and later of outright mergers (e.g. Air France/KLM).

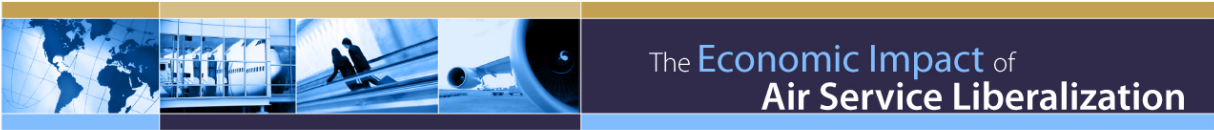


The most marked development, however, has been the growth of the low-cost carriers. They started in the U.K. and are now spreading throughout the 25 Member States. This has transformed the internal market and forced changes of approach by the flag carriers. The impact of these changes on the European airline industry is far from complete.

D. ECONOMIC IMPACTS

The liberalizations that created the Single European Market dramatically increased intra-European air travel. The 44 million additional passengers attributable to the new market regime represented an increase of fully 33 percent. The additional traffic could only be accommodated by 681 new daily return flights.

The traffic expansion spurred development of both the travel/tourism sector and other industries. Fully 1.4 million full-time equivalent jobs resulted from the liberalization, and the European GDP grew by \$US 85 billion.



CASE STUDY

UNITED ARAB EMIRATES-UNITED KINGDOM AND GERMANY MARKETS

UAE TO THE U.K. AND GERMANY

A. BACKGROUND

We have examined the two routes together, although the timing of the introduction of liberal regimes differed. Liberalization of the Germany-UAE regime took place in one step in 1986. Multiple designation was allowed, limits on frequencies and capacity were lifted; choice of aircraft type and schedule were freed; between and beyond points and fifth freedoms were unlimited. The only limitation was on the number of German points that could be served by UAE carriers.

The U.K.'s liberalization of 1998 replaced a restrictive bilateral. The regime negotiated in 1998 was the result of a policy decision taken by the U.K. in the early 1990s to liberalize its bilateral arrangements unless there were good reasons not to do so. The regime from 1998 removed all restrictions on flight frequencies, capacity and fares. Fifth freedom rights were available to other Gulf points and Saudi Arabia; but not between the U.K. and North America (where competition was substantially more aggressive) nor from the UAE eastwards.

B. CAPACITY AND TRAFFIC

To avoid the distortion caused by the effects of September 11th, 2001, we have taken the growth rate for the period 1998-2000 and applied it to the period 2000-2002. The figures for the third period are thus higher than the actuals.

Liberalization of the Germany-UAE market in 1986 resulted in high growth rates (both in terms of ASKs and passengers carried), although the absolute traffic figures are not large. The smaller absolute figures suggest treating the growth rates before 1990 with caution.

Although the U.K.-UAE route was liberalized much later, the commercial situation on the two routes in 1998 was similar. There were only nine weekly flights by Emirates / Gulf Air between Germany and the UAE. From the United Kingdom, British Airways ran a twice daily service, as did Emirates and Gulf Air. In 1998, Emirates was beginning its expansion, and Virgin Atlantic was pressing for Gulf route authority.

Table III-8 below displays similarities for both markets. Figures III-8 and III-9 summarize the increase of ASK and passengers carried on U.K.-UAE and Germany-UAE respectively, against GDP of the EU15 for the period 1990-2002. Graphs 3 set the rates of increase of ASK and passengers carried on U.K.-UAE routes, compared to GDP of the EU15 and GDP of the UAE⁴⁰ for the period 1994-2002.

⁴⁰ Based on Staff Country Reports of the International Monetary Fund (IMF).

The larger growth for Germany for the interval to 1998 reflects the earlier date of liberalization. The statistics for Germany-UAE start from a lower base than the figures for U.K.-UAE and, despite the steeper rise in the Germany-UAE graph from 1998 onwards, the Germany-UAE market is still smaller than the U.K.-UAE market.

The largest change in both cases occurred after 1998. This is attributable to the growth of Emirates Air. Their fast expansion (though not of course their style of operation) is similar to the low-cost carriers in the intra-EU market. It supports the view that the liberalizing of the bilaterals was a necessary condition for the expansion in activity.

Table III-8 Capacity and Traffic Growth, United Kingdom/Germany-United Arab Emirates, 1990-2002

Country pair	Rate of increase in ASKs			Rate of increase in passengers carried		
	1990-1994	1994-1998	1998-2002 ⁴¹	1990-1994	1994-1998	1998-2002 ⁴²
Germany – UAE	22.7%	2.3%	77.1%	118%	59.8%	117%
U.K. – UAE	29.8%	37%	129%	26%	52%	125%

Sources: German Federal Statistics Office, United Kingdom Civil Aviation Authority

This analysis shows that the major impact of liberalizing the two bilaterals results from the expansion of Emirates and the development of Dubai as a hub for traffic between Europe on one hand and the Far East and Australasia on the other. The rise of Dubai as a financial, trading and tourist center alone would have supported more modest growth. It is reasonable to conclude that the liberal bilateral arrangements between the UAE and the two major financial centers of the EU contributed to the confidence which is necessary for such developments.

C. TIME LINE PLOT OF CAPACITY AND TRAFFIC

We have ignored figures before 1990, since although the Germany-UAE bilateral arrangements were liberalized in 1986, the absolute figures were so low that the figures of percentage growth would be misleading.

⁴¹ Corrected for September 11th, 2001.

⁴² Corrected for September 11th, 2001.

Figure III-8

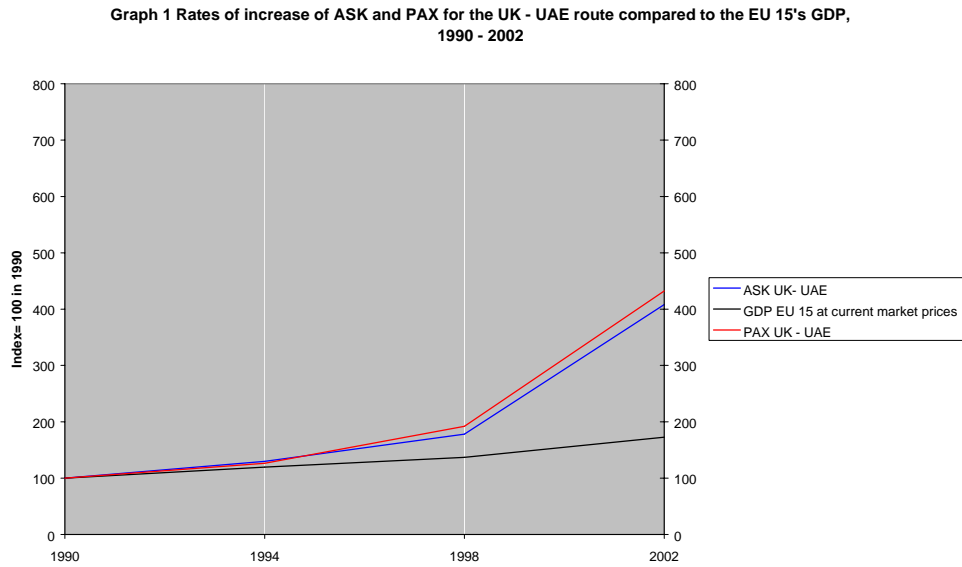


Figure III-9:

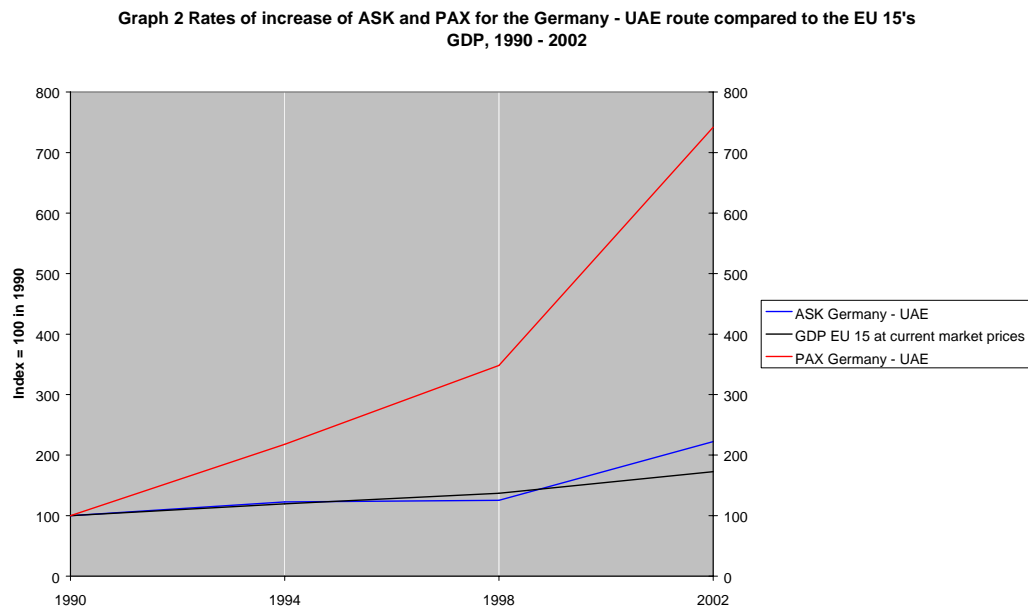
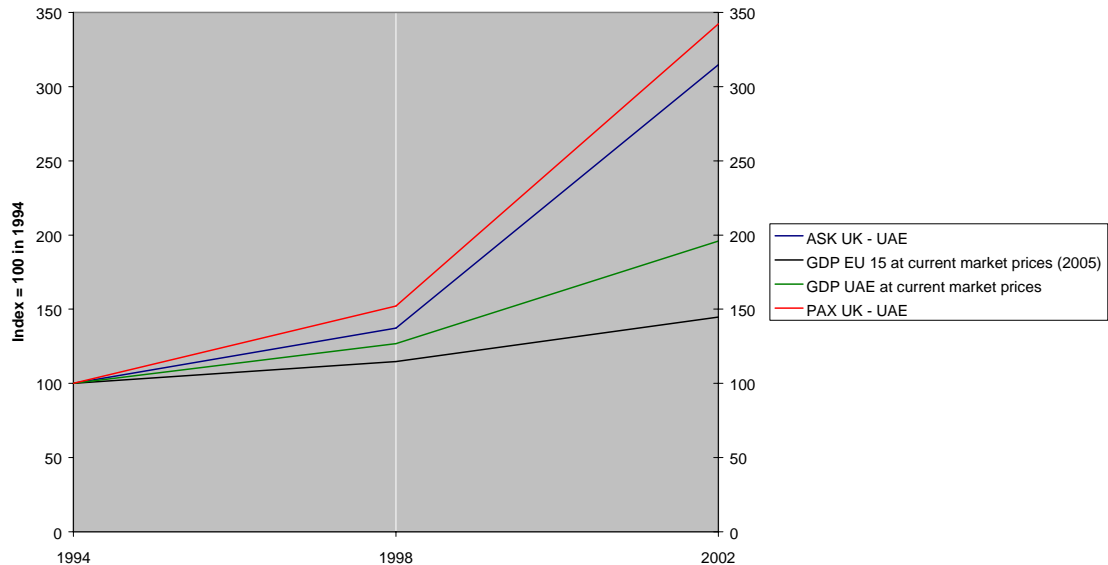


Figure III-10:

Graph 3 Rates of increase of ASK and PAX for the UK - UAE route compared to the EU 15's and the UAE's GDP, 1994 - 2002



D. ECONOMIC IMPACTS

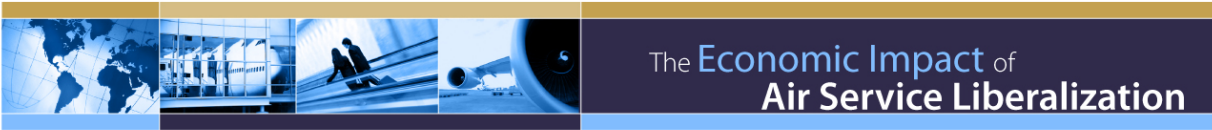
Germany-UAE

The 1998 liberalization, combined with a rising price of oil and rapid expansion by Emirates Air and later, Etihad, prompted a 59 percent increase in total United Kingdom-United Arab Emirates traffic. By 2005, total country-pair traffic exceeded 3.2 million passengers, of which 1.1 million could be attributed to the more liberal air service agreement.

Both nations benefited significantly. In the United Arab Emirates, over 5,300 full-time equivalent positions were created, and GDP expanded by over \$110 million. The expansion created over 18,700 full-time equivalent positions in the United Kingdom, and over one billion dollars additional GDP.

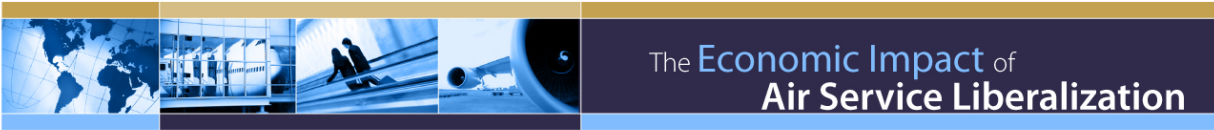
Germany-United Arab Emirates

In 2004, over 1 million persons traveled between Germany and the United Arab Emirates. The liberalization of 1986, through allowing a proliferation of direct services between the two countries, prompted a market expansion of almost 167,000 passengers. Traffic was fully 19.7 percent higher than it would have been in the absence of the liberalization. The



additional traffic required a further two flights daily in each direction, using 150-seat aircraft and a 75 percent load factor.

The expanded traffic benefited both nations. In the United Arab Emirates, the equivalent of 745 new full-time positions was created, with a \$15 million increase in GDP. The 2,600 new full-time equivalent positions in Germany accompanied a \$152 million growth in GDP.



CASE STUDY

AUSTRALIA-NEW ZEALAND (TRANS-TASMAN) MARKET

A. BACKGROUND

This case study traces the liberalization of aviation in the Trans-Tasman market between Australia and New Zealand. These two countries have been closely linked through British Commonwealth colonial ties and, due to their comparative isolation geographically; have consistently worked to liberalize government aviation policies.

The first steps towards economic liberalization can be traced to 1966 when the New Zealand and Australia Free Trade Agreement was signed. This agreement was in place for 17 years until March 28, 1983 when the Australia-New Zealand Closer Economic Relations Free Trade Agreement (ANZCERTA) was concluded. The ANZCERTA set a foundation as an innovative agreement, which not only created a liberal business and economic regime for goods and services, but also set a collaborative umbrella to deal with customs, transport, regulatory, product standards and business law issues. The ANZCERTA established a market that maintains one of the most open economic trade relationships between any two countries in the world. The ANZCERTA is continually reviewed to ensure that the agreement remains effective in all sectors of the economy.

This analysis will focus specifically on the effects of the Single Aviation Market that was established in 1996, preceding full Open Skies in 2000.

Single Aviation Market

Australia and New Zealand concluded a Single Aviation Market (SAM) agreement, effective as at November 1, 1996. The goal of the Single Aviation Market was to bring the two countries closer together within the elements of the ANZCERTA. The main components of the agreement included the opening of ownership and control regulations in the bilateral market, the introduction of unlimited frequencies for Trans-Tasman services and a provision which allowed airlines of either country to operate domestic flights within the other country. While the SAM agreement opened up many new opportunities within the Trans-Tasman market, it did not address beyond markets to third countries. Those markets were still under the original 1961 Australia – New Zealand Air Services Agreement and the subsequent 1992 Memorandum of Understanding. Two different labels of air carriers were created from the agreement: the “Domestic” and the “SAM” airline. The “Domestic” airline designation allowed carriers to fly domestic services in each others’ domestic market and the “SAM” designation harmonized ownership, control, technical and safety certifications from each countries regulatory agencies.

During this time, Air New Zealand held an equity position in Ansett Australia and British Airways a position in Qantas. The Single Aviation Market agreement broke barriers in the carriage of cabotage traffic, created ownership and control flexibilities, and deregulated capacity, designations, and frequencies. More importantly, the SAM agreement laid the

foundation for a more liberal agreement that, in the future, would open markets beyond the Trans-Tasman.

Open Skies

The Australia – New Zealand Open Skies agreement was initialed in November of 2000 and entered into force on August 8, 2002. This agreement removed the last substantive restrictions within the bilateral air services market and served as the culmination of a truly open bilateral air service market. There were no longer any restrictions on flights to, within, and beyond the territory of the other party. Before the Open Skies agreement, beyond rights were limited by weekly frequencies. Seventh freedom cargo operations were included to help extend the single market outwards in the air cargo market. New beyond markets brought greater capacity on the Trans-Tasman as new international connections were created between major cities.

B. CAPACITY AND TRAFFIC

Through liberalization, many new routes have been started by both network flag carriers and low coast carriers on both sides of the Trans-Tasman. In addition to new routes, the liberal market environment has allowed for new secondary gateways to compete for traffic, especially in New Zealand. Figures III-11 and III-12 compare nonstop routes between 1995 and 2006 and illustrate the fragmentation that has taken place in this major market for both business and leisure traffic.

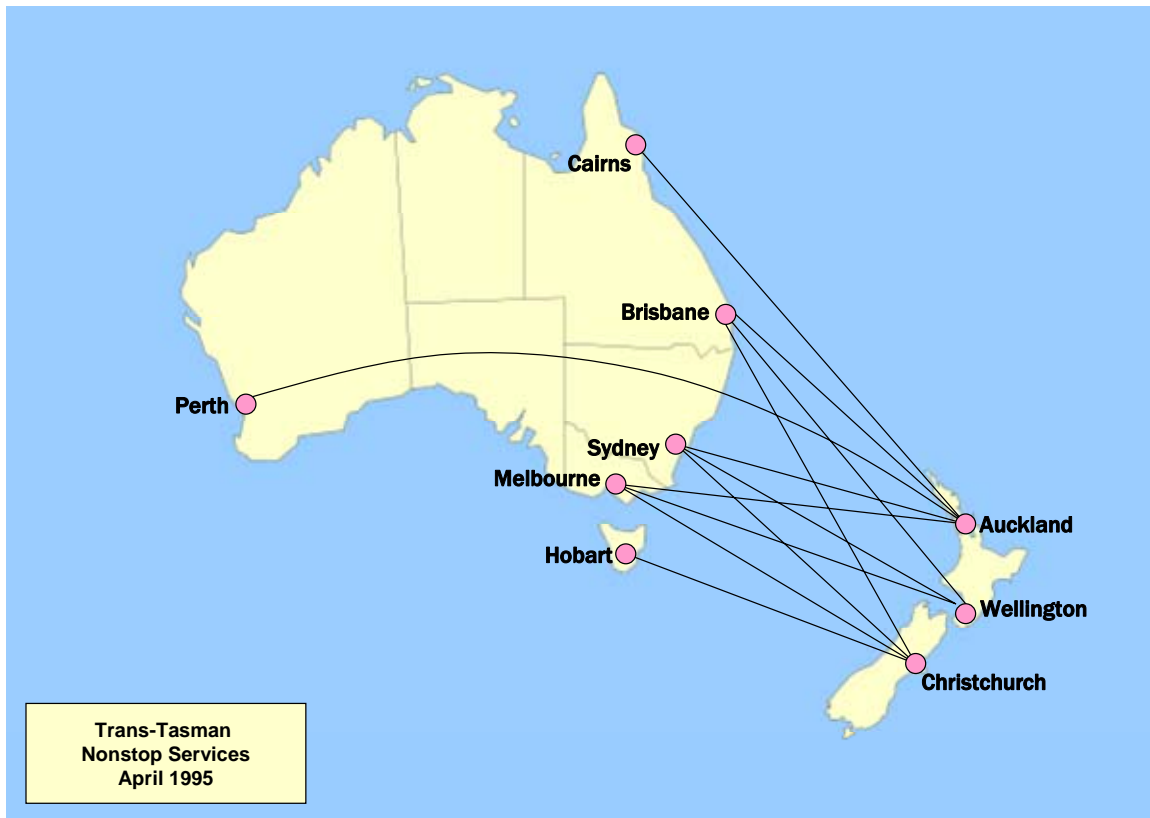
Since 1994, capacity and traffic on services across the Tasman Sea has shown steady growth by most air carriers. While liberalization has facilitated growth, there have not been sharp increases in services. The liberalized agreements have established a regime in which the Trans-Tasman market became a breeding ground for competitive air service by carriers in the bilateral market, and also from third country carriers from the Middle East, Southeast Asia and North America. Carriers such as Freedom Air and Pacific Blue have opened new Trans-Tasman routes to alternate secondary airports and tourist destinations. The flag carriers and incumbents, Air New Zealand and Qantas, have remained dominant forces in terms of passenger growth and market share.

Liberalization in the Trans-Tasman example has resulted in fragmentation of the market and new opportunities for low cost carrier services. With fewer restrictions on frequencies, ownership, control, designations and beyond rights, carriers have been able to expand. This environment has permitted flag carriers to connect the Trans-Tasman to their global networks, while giving low cost carriers flexibility to add markets and frequencies for market presence.

The full spectrum of high volume, tourist-oriented and secondary destinations have grown. Figure III-13 illustrates the ten year trend. The compound annual growth rate (CAGR) in

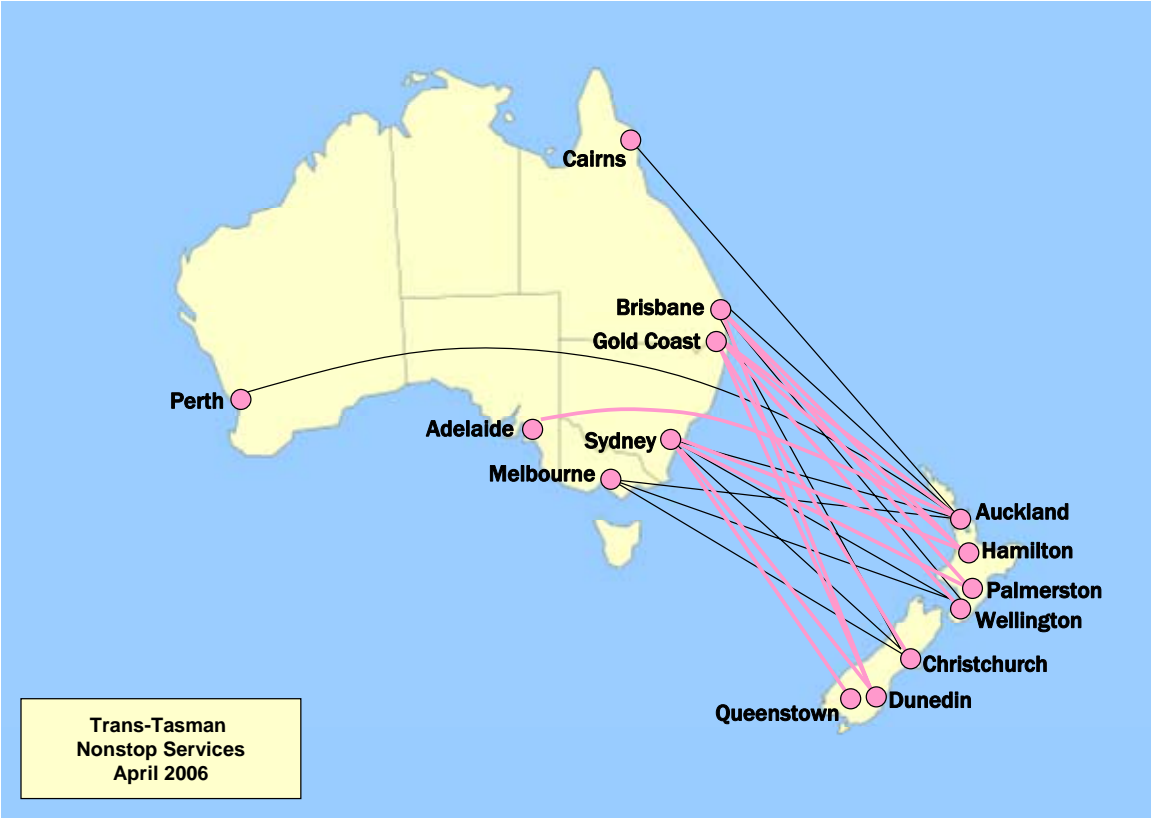
passengers in non-major markets exceeded the growth in major markets, which is frequently the result when liberal agreements allow added competition and permit entry by low fare carriers. The growth of secondary city-pairs was largely driven by Freedom Air and Pacific Blue.

Figure III-11: Trans-Tasman Nonstop Services - April 1995



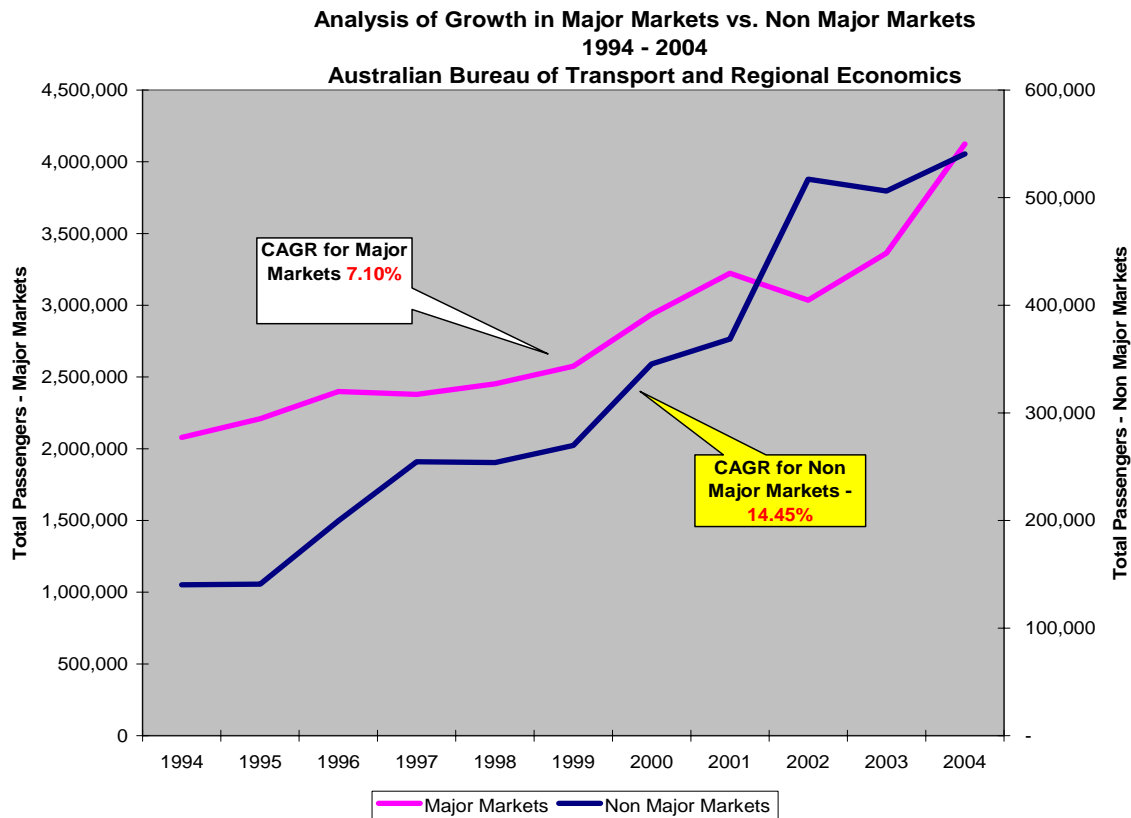
Source: Official Airline Guide

Figure III-12: Trans-Tasman Nonstop Services - April 2006



Source: Official Airline Guide, Freedom Air website

Figure III-13:

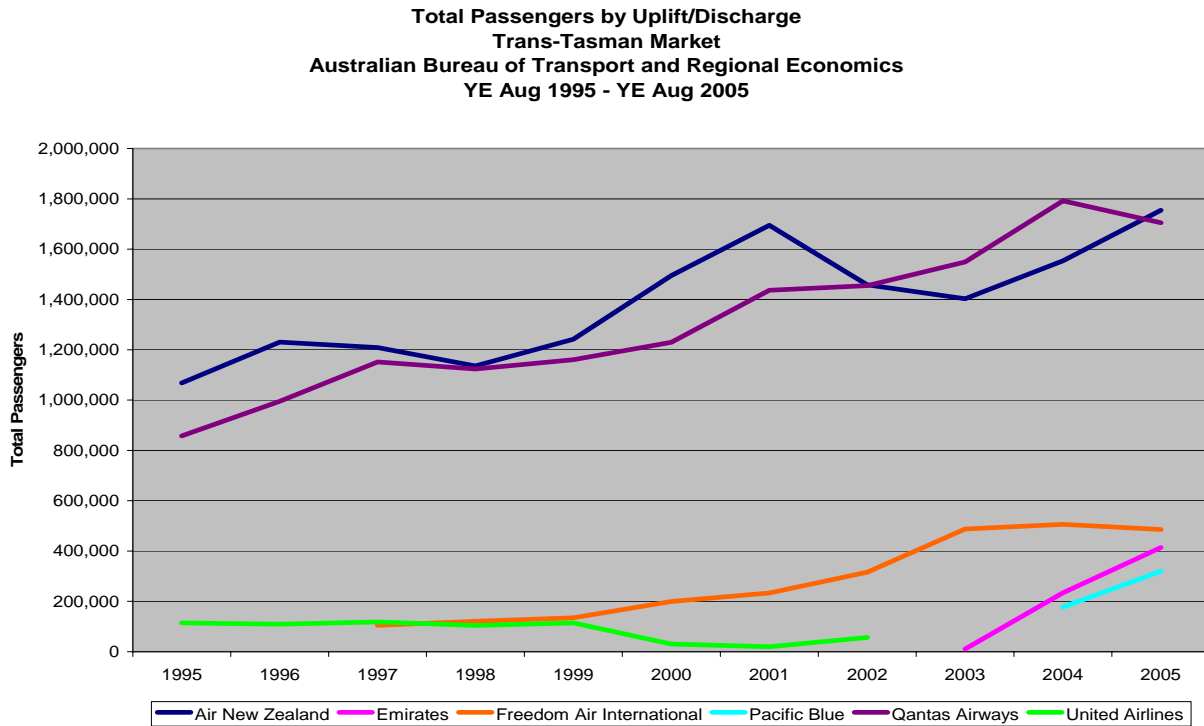


Source: Australian Bureau of Transport and Regional Economics, International City Pair Data
Major Markets includes all routings between main New Zealand markets (Auckland, Christchurch, Wellington) and Australian markets (Sydney, Melbourne, Brisbane, Adelaide, Perth)

C. MARKET TRENDS

The 1996 SAM agreement and the 2000 Open Skies agreement between Australia and New Zealand provided the Trans-Tasman with a liberal government regime for air services. Figure III-14 illustrates total passenger by uplift/discharge in the Trans-Tasman market and Figure III-15 analyzes top countries served by passengers from 1999-2005.

Figure III-14:



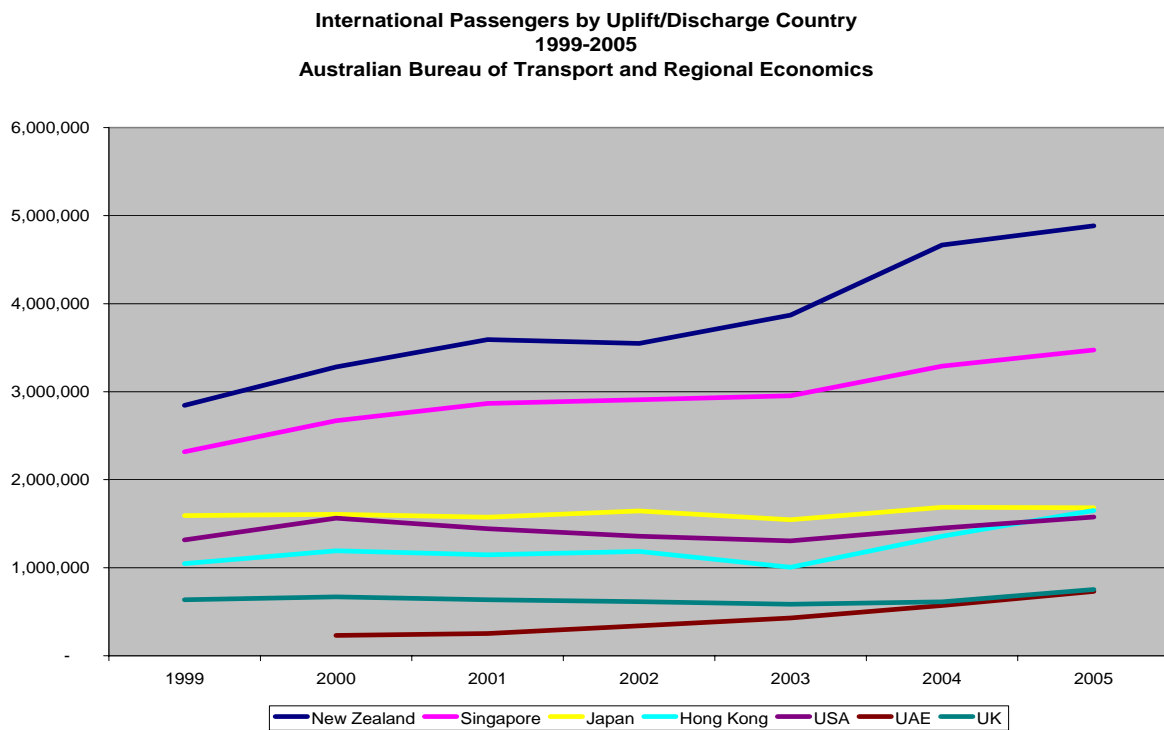
Source: Australian Bureau of Transport and Regional Economics, Airline Data Tables
Data is annually year ended August 1995 – year ended August 2005

The post Trans-Tasman liberalization data demonstrates that different types of carriers have been able to thrive in a deregulated environment. Dominant flag carriers have indeed survived the two liberalizing agreements by growing their traffic and maintaining their market position. Liberal beyond market rights have also helped connect Trans-Tasman to international networks of both Qantas and Air New Zealand.

All of the current carriers in the Trans-Tasman market have experienced growth over many years. Liberalization has clearly changed the dynamics of the Trans-Tasman. Not only have Air New Zealand and Qantas had to continually adapt to new low cost and third country carriers in the market, but the consumer has seen new opportunities for travel, both leisure and business. This is made possible by the liberal aviation policies that govern the Trans-Tasman market.

Figure III-15 compares total passenger numbers to international destination. This chart highlights the importance of the Trans-Tasman routes to both countries. New Zealand has always remained the top destination for air travelers leaving Australia. Singapore, another country known for liberal aviation policies, also shows growth in Chart 5. Other countries such as Japan, Hong Kong, United States and U.K. all illustrate constant service to the Australian market with increases and decreases due to changes in market air carriers.

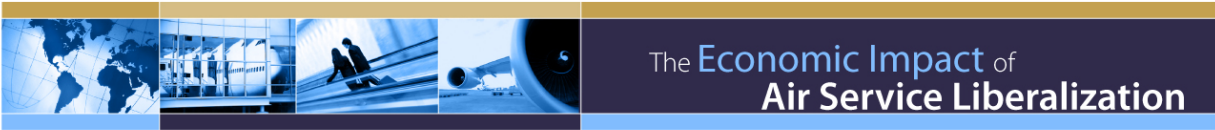
Figure III-15:



D. ECONOMIC IMPACT

By 2005, Trans Tasman traffic was fully 56 percent higher than it would have been in the absence of any liberalization. The relaxed market controls had increased total traffic by over 1.7 million passengers per year. The additional volume would require a further 27 flights daily in each direction, using 120-seat aircraft.

The economic impact methodology uses similar coefficients for both Australia and New Zealand. Each nation gained more than 20,600 full-time equivalent positions from the liberalization and the ensuing traffic increase. The GDP of each country grew by \$726 million U.S.



CASE STUDY

MALAYSIA – THAILAND

A. BACKGROUND

The following case study deals with overall liberalization in the Malaysia-Thailand market. The two Southeast Asia countries sit at a crossroads of global travel. While there is little data available for a thorough analysis of the market, by examining rights within the original ASA and tracking overall capacity trends, one can draw conclusions about the impact of liberalization on the Malaysia-Thailand market.

The original agreement between the governments of Malaysia and Thailand was signed in 1969. This agreement type (Bermuda I) is still seen in many bilateral relationships around the world today. It allows named points, carrier designations, frequencies and capacity to be added in the market based on government consultations. While more restrictive than the American style Open Skies, the agreement's Bermuda I provisions allow new services to be introduced to the market. Subsequent Memoranda of Understanding (MOUs) between Malaysia and Thailand have allowed services and frequencies to increase, thus driving an increase in overall traffic.

Many attributes of a liberalized market can be found within the terms of the agreement between the countries. They include no restrictions on points served, multiple designations, code sharing rights and open frequencies. Fifth freedom, intermediate or beyond, and seventh freedom cargo operations are included in the agreement. As in most other bilateral agreements, cabotage is not included.

Malaysia and Thailand have numerous air service agreements with third countries. They have both concluded Open Skies agreements with the United States. Both currently support a multiple designation policy as a way of increasing their countries role in global tourism and trade. Liberal aviation policies will help both nations develop huge investments in new airports for Bangkok and Kuala Lumpur. With regards to points served, Malaysia and Thailand have open policies. The key restriction in the Malaysia-Thailand bilateral agreement covers beyond rights and seventh freedom cargo operations. Code sharing rights have allowed Malaysia and Thai Airways to cooperate routes between the two countries. In addition, both countries promote secondary international destinations for tourism (Thailand: Phuket, Chiang Mai; Malaysia: Langkawi).

Role of ASEAN

The Association of Southeast Asian Nations (ASEAN) was formed in 1967 by Thailand, Indonesia, Malaysia, Singapore and the Philippines. ASEAN serves as a regional bloc, similar to the European Union or the North American Free Trade Agreement (NAFTA). It works to harmonize policy and encourages cooperation on trade, tourism, and economic growth. ASEAN now includes Brunei, Vietnam, Laos, Myanmar and Cambodia. ASEAN has established an end-goal of full economic integration by 2020.

Within ASEAN, other sub groups have been created such as the BIMP-EAGA⁴³ group and the IMT-GT groups⁴⁴ to further enhance regional cooperation on trade and tourism. One of the trade areas closely analyzed by the ASEAN countries is air transport. In November 2004, all 10 ASEAN member countries signed the *ASEAN Framework Agreement for Integration of Priority Schedules*. This agreement will allow for a phased approach to ASEAN Open Skies. The plan includes unlimited point-to-point operations between ASEAN capital cities in 2008 and unlimited fifth freedom operations from those same cities in 2010. Full cargo open skies are planned for December 2008. The regional Open Skies initiative will also have synergies with other bilateral Open Skies agreements.

To understand fully the Malaysia-Thailand market it is important to examine the key factors that drive governments toward liberalization, including airport development, national flag carriers, low cost carriers and inbound tourism.

B. CAPACITY AND TRAFFIC

Malaysia-Thailand capacity and traffic have changed only when new carrier entry changed the competitive landscape. For many years, the Malaysia-Thailand market was dominated by Malaysia Airlines and Thai Airways. Due to flexibilities in the air service agreement, both were able to serve any points in each other's country while maintaining capacity at levels that were profitable for both flag carriers. Malaysia and Thailand separately had agreements with third countries that accommodated carriers on the Kuala Lumpur-Bangkok route as fifth freedom operators. In the last 10 years, carriers such as Lufthansa, Qatar Airways, and Gulf Air have served this route on a fifth freedom basis.

The ASA allows the flag carriers to enter into cooperative marketing agreements (i.e. code sharing). The two carriers have had code sharing operations for many years, creating control over capacity and traffic growth.

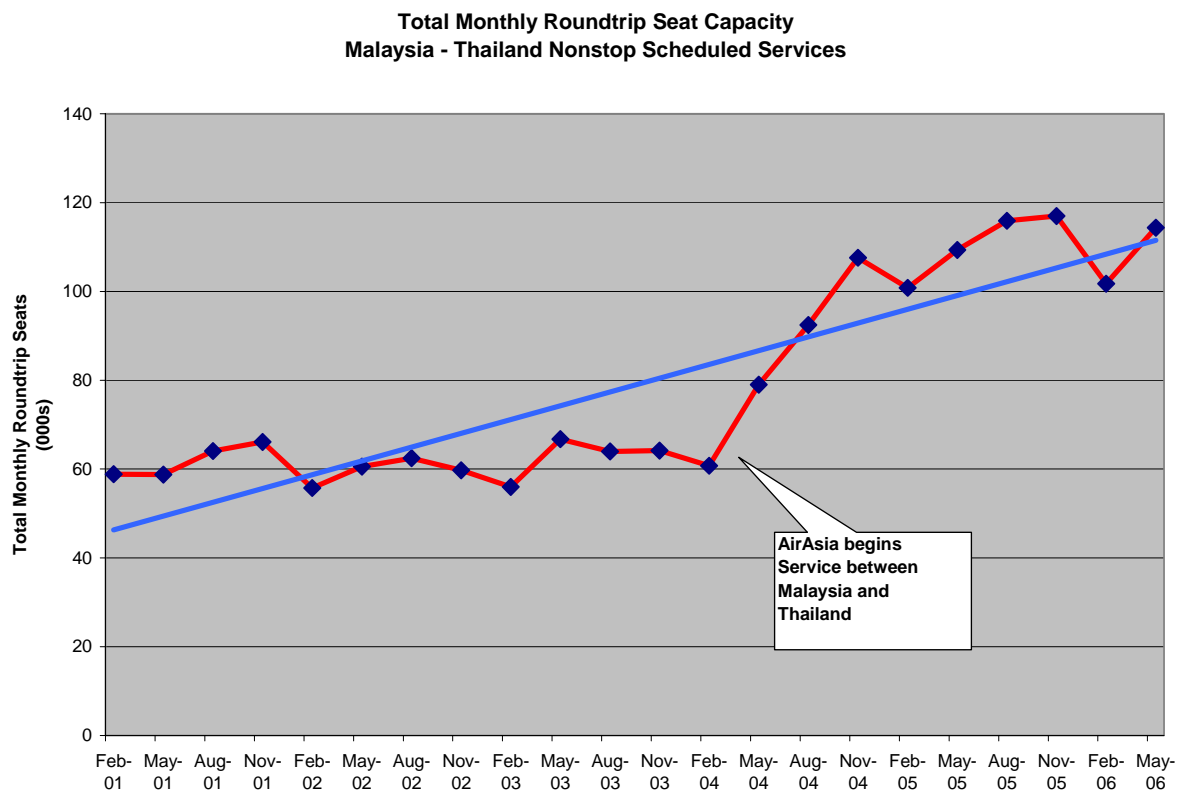
⁴³ Brunei Darussalam-Indonesia-Malaysia-the Philippines – East ASEAN Growth Area.

⁴⁴ Indonesia-Malaysia-Thailand Growth Triangle.

In 2004, AirAsia entered the Malaysia-Thailand market causing a surge in capacity (seats) in the market. AirAsia was targeting the third and fourth freedom markets, i.e., traffic between the two countries.

The bilateral agreement between Malaysia and Thailand permitted AirAsia to expand in the market by new designations and frequencies.

Figure III-16:



Source: OAG Schedules – February 2001 – May 2006

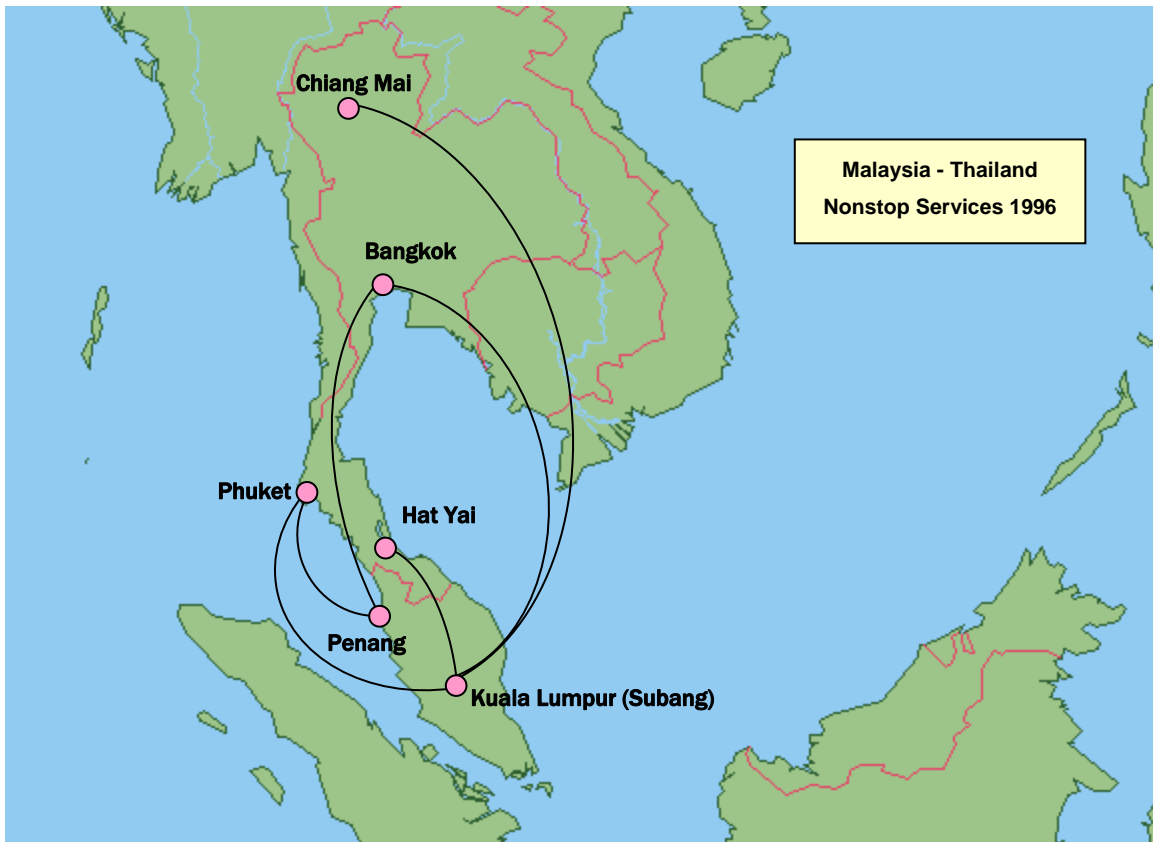
The above chart summarizes the increase in capacity in the Malaysia-Thailand market, driven by AirAsia. AirAsia's low cost structure helped spur traffic while generating increased competition from the incumbent flag carriers.

The growth noted in Figure III-16 is a partial result of the agreement between Malaysia and Thailand. The agreement is not restrictive in terms of allowing new entry into the market. The agreement does maintain the government's role in responding to market demand. AirAsia's interest in serving international markets prompted the government of Malaysia to open designations, frequencies and points in its bilateral agreements. This

regime differs from the U.S. Open Skies model in that it does not remove the government from commercial marketplace decisions.

C. TRENDS IN CAPACITY AND TRAFFIC

Figure III-17: Malaysia-Thailand Nonstop Services 1996



Source: OAG Schedules

Figure III-17 shows service in the Malaysia-Thailand market in April 1996. Most of the routes and capacity remained concentrated around Bangkok and Kuala Lumpur. Routes to tourist destinations were being served on both sides of the border. Service was largely dominated by Malaysia Airlines and Thai Airways.

Figure III-18: Malaysia – Thailand Nonstop Services 2006



Source: OAG Schedules

When analyzing the updated map for April 2006, conclusions can be drawn about the liberalization effects. The total number of routes in Figure III-18 reflects new low cost carrier service in the market and the construction of the Kuala Lumpur International Airport (KLIA). As AirAsia grew domestically it also develop an international network to destinations such as Kuala Lumpur-Bangkok/Phuket and Bangkok-Penang. While these routes were already served in 1996, the total capacity has grown due to AirAsia's low fare presence. Fragmentation has also occurred as evidenced by new routes such as Bangkok-Kota Kinabalu. A passenger seeking to fly this route on a flag carrier would have had to travel over a connecting hub, but as shown in Figure III-18, new point-to-point services offered by AirAsia have developed secondary markets.

As the Southeast Asian market has grown, Malaysia Airlines and Thai Airways have had to change their overall strategies. AirAsia continues to every a major influence on the flag carriers. However, third country carriers have had little effect in the Malaysia-Thailand market.

D. ECONOMIC IMPACT

In 2005, 1.3 million passengers traveled between Thailand and Malaysia. Of this total, over 370,000 can be attributed to the combination of the liberalized regime and the entry of a new low cost carrier. This suggests that the direct and indirect effects of liberalization have caused a market expansion of over 37 percent. To carry the additional traffic, airlines would have needed to operate an additional 5 daily flights in each direction.

The economic and tourism impacts of Thailand and Malaysia are identical. Each nation obtained more than 4,300 full-time equivalent positions and a stimulus of over \$114 million to their respective GDPs.

The **Economic Impact** of
Air Service Liberalization



IV. THE MODEL—DESCRIPTION AND METHODOLOGY

A. INTRODUCTION

A mathematical model of air service liberalization must accommodate a wide range of regulatory change, involving nation-pairs and airlines with greatly varying economic and demographic conditions. With over two hundred sovereign nations, it must apply to over 40,000 country-pairs. It must distinguish between total and partial efforts of liberalization, and must express the socioeconomic consequences using a method, and a series of parameters, with worldwide relevance.

This chapter summarizes the methods for estimating the consequences of air service liberalization on passenger traffic, air freight traffic, employment, gross domestic product, tourism and catalytic impacts for any country-pair. It tests the hypothesis that restrictive air service agreements constrain air commerce, and impose undesirable consequences on the economies of the signatory nations. This chapter summarizes the two methods employed in this study, and how they together provide statistically valid and economically relevant conclusions on air service liberalization.

B. OVERALL METHODOLOGY

Alternate Approaches for Evaluating the Impact of Liberalization on Traffic

Two methods can quantify the benefits of liberal bilateral agreements. Both depend on comparing liberalized regimes to more restrictive ones. They use widely different mechanisms for holding other variables constant. Both are analytically useful, but present a wide range of research challenges. The two methods together provide the means to trace the complicated and situation-specific dynamics of the process, yet generalize it to the most restrictive aviation regimes.

1. TIME SERIES OR CASE HISTORY

This method calls for selecting one or more “representative” country-pairs which have undergone recent liberalization efforts. The impact of the change on the level of traffic can be measured by comparing the levels “before” and “after.” Using the same country-pair helps satisfy any other-things-being-equal requirements, and isolates the factors specific to liberalization.

The five case histories represent an application of this method. However, they also highlight the pitfalls of generalizing any such findings to the worldwide level. The major issues to extending a case history analysis to a generalized and widely applicable model include:

- No two cases are identical. While there is general agreement on what constitutes a liberalized market,⁴⁵ the initial, pre-liberalization conditions can be radically different in countless ways, most of which are impossible to measure.⁴⁶ It is therefore very difficult to relate a particular quantity of traffic growth to a particular level of liberalization. The experience of one isolated and unique case cannot necessarily be generalized to others.
- Even if two nations do liberalize an agreement, both parties will not necessarily make full use of its provisions. Many will not assign a second airline, even if fit, willing, and able, to an international route even if authorized to do so by the agreement
- Some nation-pairs may have highly restrictive bilaterals, creating a very uncompetitive market *de jure*. However, they may, on a discretionary basis, allow numerous deviations, leading to a *de facto* liberalization.
- Sometimes, the two nations are too small, too far apart, or affected by other differences that preclude profitable international air services even under the most favorable bilateral agreements. No traffic growth would result, at least in the immediate term.
- Fifth freedom rights. A country-pair may be served, not only by the airlines of the two respective nations, but by airlines of third countries. They are granted revenue traffic rights only if the bilateral agreements between the third nation and both members of the country-pair include the necessary provisions, although such services face many formal and informal restrictions.⁴⁷
- The airline industry is notoriously volatile. Traffic and earnings are very sensitive to economic cycles, and to geopolitical events such as the 9-11 terrorist attacks on Washington and New York, and the Severe Acute Respiratory Syndrome (SARS) of 2003. Structural changes in the industry, such as airline mergers, failures and strategic alliances create further complications.
- Traffic will often grow despite artificial restrictions, because of economic growth.

⁴⁵ The classical "open skies" definition of a bilateral agreement would allow any airline from either signatory nation to serve any city-pair in any combination. Each airline would be free to set its fares, choose the capacity it wishes to provide, and carry revenue traffic to any third country permitted by the applicable bilateral agreements.

⁴⁶ The initial circumstances could reflect a vast combination of feasible route definitions, capacity controls, pricing distortions, operating time constraints, limits affecting on-airport flight handling, currency repatriation and other concerns.

⁴⁷ Some bilateral agreements, if they do not prohibit such operations altogether, specifically limit fifth freedom capacities or traffic volumes. The airline exercising the rights is usually forbidden from undercutting the designated airlines of the two nations. Although a "hard right," obtained often through intense negotiation, such provisions considered to be partially a privilege. There is often an informal and unspoken understanding that the airlines exercising these rights do so only on a fill-up basis, clearly subordinated to services involving their home countries. They are not expected to inflict commercial damage on the airlines of the country-pair. There are many instances of fifth freedom operators, exercising their fifth freedom rights aggressively, in a manner consistent with the letter of the bilateral agreement, but contrary to the desires and expectations of the competing airline. Sanctions have included predatory competitive prices, limiting fifth freedom rights in subsequent negotiations, and outright renunciation of the agreement. Even without such hurdles, many fifth freedom operations face operational problems and scheduling compromises.

- It is often difficult to identify a “before” and “after” period for liberalization. The impacts often need many years to “work themselves out,” and the more drastic the change; the longer will be the adjustment period.
- Those specific countries which have chosen to liberalize their bilateral agreements are by definition the primary source of “before and after” case histories. This will create a “selection bias,” in that those instances chosen will involve nations with similar aviation policies. A large proportion of the case histories must involve the United States or the European Union.

Only the time series/case history approach can effectively consider the countless behavioral elements that enter into a relationship. It can trace out many dynamic elements, and the subtleties of the pre-liberalization regime, in a manner that is outside the analytical straight-jacket of a formal model. A case history can best illustrate how liberalization takes place and show the pathway of transformation. However, its findings cannot be readily generalized.

The time series or “case history” approach requires a detailed analysis of traffic and socioeconomic variables. It must also consider qualitative issues such as international relationships, the often-convoluted processes of airline industry restructuring, and social issues unique to the specific countries. However, the usefulness of this approach for projecting results to *any arbitrary country-pair* is problematic.

2. THE CROSS-SECTIONAL APPROACH

The cross-sectional approach involves analyzing a minimum of two, but ideally many thousands, of country-pair aviation relationships at the same point in time. Rather than hold certain base conditions constant for a few narrowly defined variables, it assumes that a particular *relationship* between traffic, the extent of liberalization, and socioeconomic conditions applies to every market. Each country pair will display unique traffic volumes, socioeconomic variables, airline industry conditions, and degrees of liberalization in the air service agreements. Through correcting for variations in economic activity and other extraneous factors, this approach seeks to explain variations in the passenger and air freight traffic between different country-pairs to variations in their bilateral agreements. In theory, this method should isolate the separate impacts of route definitions, single/multiple designations, pricing controls, the presence or absence of fifth freedom permissions, and other attributes of air service agreements. Through using a very large sample, involving all regions of the world, nations in all stages of development, and countries with a wide range of approaches to international aviation, the process should, in theory, yield a robust estimate of the impacts for any arbitrary country-pair.

The cross-sectional approach shares many of the pitfalls of the case history/time series methodology. Each nation-pair in the sample faces a unique set of economic and political conditions. The case history approach addresses each aspect individually and corrects for individual variations as they arise. The cross-sectional methodology, using a sufficiently

large sample, assumes random variations in the every element in the sample, and draws patterns from a statistical process.

The cross-sectional approach poses analytical issues of its own:

- An air service agreement is only one, albeit a very important, facet of a broader aviation regime. Bilateral agreements can include literally hundreds of clauses and restrictions, including issues that cannot be expressed in any simple mathematical manner. The cross-sectional methodology, nevertheless, attempts to encapsulate all aspects of the relationship into a few formal and well-structured variables.
- A bilateral agreement reflects every aspect of the aviation policies of each member of the country-pair. The attributes of any agreement are likely to be similar in their reliance on economic forces. This creates estimation problems.⁴⁸
- It does not address the factor of time. The amount of time needed for a market to respond to changes in the underlying regulatory approach can range from a few months to several decades.
- This approach, like any statistical research, is limited by the availability, quality and timeliness of the data. Of the more than 40,000 nation-pairs, data could be obtained for only 1,400. Those countries with good data appear most frequently in the sample. Since the quality of data may be correlated with levels of national wealth and economic activity, this process is systematically biased to evaluating particular markets. This "selection bias" was moderated by using a large and varied sample.
- The process includes country-pair markets of all sizes. Many statistical processes could place unduly large weights on the largest markets. Several adjustments successfully minimized this problem.
- The cross-sectional approach ignores interactions between country-pairs. A strong airline response to the permissive agreements between nations A and B may divert traffic from the more protective A-C and A-D country-pairs. This situation will result in an inaccurate reporting of country-pair flow data, in which the impacts of the liberal A-B agreement are over-estimated by a model, and the adverse consequences of the other restrictive agreements are similarly exaggerated.

⁴⁸ This problem means that certain components of the sample data may have strong interrelationships. For example, a country-pair with a permissive capacity clause in its bilateral agreement will likely also have permissive pricing rules. Should this country-pair exchange more traffic than is commensurate with the GDP, community of interest and other factors, it will be difficult to determine if the variation reflects the capacity provision or the pricing formula. The more bilateral agreements that share these associations of their different attributes, the greater will be the difficulty in determining the incremental impact of each attribute. Very modest changes in the underlying structure can cause drastic changes in the outcome. At the extreme case, where all agreements reflect the associations between one or more attributes, the model will fail to provide any estimates of any determinant. The model will be attempting to obtain more information than the sample can provide. This is a common statistical problem called "multicollinearity", which can result from many factors, ranging from extreme operator carelessness to just bad luck.

- The cross-sectional method does not consider the lengthy history of a relationship. The traffic flows in a recently liberalized market may not have expanded to their equilibrium levels. Through failing to consider the time dimension, the cross-sectional approach would understate the economics of liberalization. Furthermore, this class of models does not consider adjustment times or mechanisms, but merely assumes that every data point displays an equilibrium between traffic, the economy, and the applicable air service agreement.

3. THE APPROACHES SELECTED

Both the time series/case history and the cross-sectional methods offer distinct advantages. Their complementary relationship calls for both to serve as key foundations for this study. The case histories highlight recent and very dissimilar instances of air service liberalization. They consider the dynamics of the process and the path of transition. The cross-sectional model offers a formal and rigorous framework that can be universally applied and that can produce extrapolations for any arbitrary country-pair, but cannot by definition account for individual nuances. The next section summarizes the development of a formal cross-sectional econometric model of the impact of the bilateral regime on air traffic.

C. THE CROSS-SECTIONAL MODEL FOR PASSENGER TRAFFIC

The model expresses the air traffic between any particular country-pair as depending on a vector of geographical, socioeconomic and regulatory variables. The model considers each country-pair as an independent entity; its traffic will not be affected by changes in other country-pairs. Furthermore, events in other economic sectors, such as new consumption opportunities that may compete with air travel, will not affect traffic in any manner.

Each data point consists of one country-pair. The dependent variable consists of the yearly two-way origin-destination traffic between the country-pair. The model views passenger traffic as a function of several socioeconomic and geographic variables, and the chosen attributes of the relevant bilateral air service agreement.

1. DATA SOURCES

The endogenous variable, country-pair origin-destination traffic was provided by IATA.⁴⁹ The World Bank, International Monetary Fund, World Tourism Organization, Population Reference Bureau and the United States Central Intelligence Agency provided data on exogenous variables from several publications and websites.

⁴⁹ Source: International Air Transport Association, "Passenger Forecast 2005-2009," reference 9261-05, Geneva, 2005.

2. SOCIOECONOMIC AND GEOGRAPHICAL VARIABLES

a) Gross Domestic Product

Gross Domestic Product (GDP), calculated from the Purchasing Power Parity method measures the total magnitude of economic activity in any nation. The specification assumes that changes in the GDP of each country in the country-pair will have identical influences in the level of traffic.

The GDP term proved the most important exogenous variable in terms of significance and explanatory power. Its presence in a model sometimes rendered other variables superfluous.

b) “Moment of Inertia”

Travelers must decide between domestic and international flights. A nation with many opportunities for domestic air travel, other factors being held constant, will generate fewer international passengers than one with few domestic markets. For example, a resident of India can fly to a very large range of domestic destinations, offering a huge range of natural and cultural diversity. In contrast, a Singapore national can only fly to a foreign destination. It might naively be concluded that Singapore nationals have a greater behavioral propensity for foreign travel than those of India. Rather, they merely lack domestic destinations to fly to. Several variables were tested to measure domestic travel opportunities, including total area, population, and the number of airports with commercial services in each country. The best measure reflected both the area and the geometrical shape of each country.

In physics, the “moment of inertia” of an object represents its resistance to any rotational force. This quantity reflects the weight of the object and its shape. A long, narrow shape will have a larger moment of inertia around its center than a square shape of the same mass. The “moment of inertia” for a country is calculated from its area, the length of the coastline and the length of its land border. The model views each country as a rectangle, calculates the two dimensions, and applies the definition of the moment inertia⁵⁰ about the geometric center. A large moment of inertia could indicate either or both a large area and an elongated shape, in which there are many cities, and distances between them are large. It could also indicate a nation with many islands. A small moment of inertia could result from a small area, or a square shape. In such a situation, distances between cities will be short, and there will be few domestic city-pairs requiring scheduled air service. For example, Saudi Arabia’s area is 2.1 percent greater than

⁵⁰ For a rectangle about its geometric center, the moment of inertia is one-twelfth the mass times the sum of the two dimensions squared. In this case, the “mass” is defined as unity. The two dimensions are calculated from the area, the length of the land boundary and the length of the coastline.

Indonesia, but the latter's moment of inertia is over 96 times larger. As a huge archipelago, Indonesia offers correspondingly more opportunities for domestic air travel. Similarly, Chile's elongated shape makes its moment of inertia 175 percent greater than that of Myanmar, although its area is only 11.6 percent larger.

The model uses the product of each country's "Moment of Inertia" to represent opportunities for domestic travel, which may compete with an international service.

c) Distance between the Countries

This variable represents "the" distance between the two countries. Each nation is represented as a single point, usually its primary international airport (e.g. Copenhagen for Denmark). St. Louis, close to the geometric and population center, represented "the" location of the United States.

d) Flows of Services

Unlike goods, services are consumed at the same time and place as they are produced. They cannot usually be stored in inventory. Service activities include insurance, financial assistance, medical services, management and consulting. Since they usually require a close interaction between the seller and the consumer, the sale of services is an important determinant of the demand for travel.

Including disaggregated services trade data for each potential country-pair would be costly and awkward. The model therefore uses a gravity-type relationship between each nation's services trade with all countries to define a country-pair propensity. The "Service Flows" term for the country A-B was expressed as:

$$\begin{aligned} & \text{Exports of Services by Country A} * \text{Imports of Services by Country B} \\ & \quad + \\ & \text{Exports of Services by Country B} * \text{Imports of Services by Country A} \end{aligned}$$

No statistical advantages resulted from applying a similar formulation to the Commercial Service, Finance/Insurance or Computer/Communications separately, and incorporating each of the now three predetermined variables individually into the model.

e) Intervening Opportunities

The traffic between any country-pair will be less if passengers could choose from other, closer destinations. For example, Australian residents will view New Zealand

as easier as and cheaper to reach than the United Kingdom. This proximity will correspond to a lower demand among Australians for air travel on the Australia-United Kingdom route. Similarly, individuals and businesses of the United Kingdom may view Canada as a partial substitute for Australia. This would reduce the volume of Australia-destined traffic originating in the United Kingdom.

The passenger model uses an “Intervening Opportunity” quantity as a determinant of country-pair traffic. For each country in a country-pair, the model calculates the sum of the GDPs of every country that is 10 percent or less distant than the other nation in the country-pair. The resulting sum measures the size of closer opportunities. The product of the Intervening Opportunity term for both nations in a country-pair proved to be a useful predictor of country-pair traffic, and displayed the expected negative sign.

3. VARIABLES PERTAINING TO BILATERAL AGREEMENTS

The model represents the attributes of bilateral agreements by five discrete (0 or 1) variables. A “1” designates a restrictive provision. The degree to which each attribute constrains passenger traffic depends on the specific situation. Multiplying the five 0-1 measures by geographical or socioeconomic variables created a new set of exogenous variables that measured the relevance of each bilateral constraint to the country-pair in question. A description of each of the five attributes follows.

a) Permitted Number of Airline Designations

Bilateral agreements usually specify the number of airlines permitted to fly any route between the two countries. A “0” denotes a dual or multiple designation; a “1” otherwise. This digit is then multiplied by the distance between the two countries. A country-pair can only benefit from a multiple designation if one or both countries have more than one airline fit, willing and able to operate the route. Furthermore, each such country must be willing to allow its own airlines to compete.

An airline seeking to operate long distance services must usually use wide body aircraft. It will require a network of feeder services using smaller aircraft. In contrast, many short haul services use much small aircraft, and can serve strictly point-to-point markets. The airline operating long haul services requires very substantial physical and financial resources. Comparatively few countries have more than one airline operating long distance services. Many are more conservative in allowing competition between their airlines on intercontinental routes, compared to shorter and highly fragmented regional markets. A single-designation rule would therefore be more onerous to short distance services than to longer flights.

b) Capacity Controls

Many regulators consider capacity controls as particularly inimical to market growth, and a key trait of a restrictive agreement. Sometimes, the limits are written directly in the agreements. Lengthy negotiations are often necessary to increase the limits. In other instances, such as “Bermuda” agreements, the capacities are subject to a regular process of consultation. In either case, the airlines flying between the two nations have many opportunities to curb capacity growth and maintain high fares.

Sometimes the capacity controls are not binding; more flights are permitted than the airlines actually operate.⁵¹ The nations negotiating bilateral agreements will forecast demand, and negotiate formal limits accordingly. While such agreements reflect a very strong interventionist approach, they do not necessarily constrain traffic. In many conditions, passengers traveling between two countries can transit via third nations. This can mitigate the impacts of the capacity controls governing the direct routing. It can force the negotiators to develop more liberal capacity provisions than otherwise.

Two variables were employed to model the impact of capacity controls. The first was a “1” if capacity was fully predetermined by the agreement (which corresponds to the most inflexible form of capacity clause), and zero otherwise. A second 1-0 vector applied if a Bermuda-type clause was in force. Both dummy variables were multiplied by the GDP, reflecting a hypothesis that capacity controls become proportionately more detrimental to competition as the size of the market grows.

c) Pricing

This variable is assigned a “0” if the bilateral includes a double-disapproval (a proposed fare would be permitted unless both nations veto it) clause to signify the most permissive form of pricing⁵² enforcement. A “1” indicates another regime, such as country-of-origin, zone-of-reasonableness or single disapproval pricing. The resultant quantity was then modified by the product of the per capita GDPs of both countries. This reflected the belief that countries with a large per capita GDP would be most likely to generate large volumes of leisure travelers. They would be especially affected by any price rigidities. Furthermore, airlines are most likely to offer incentive fares on routes with considerable leisure traffic. A restrictive pricing

⁵¹ Indeed, capacity controls often lead to *more* capacity than is appropriate for a market. Sometimes, several airlines of one nation must compete for scarce route authority. Often, a “use it or lose it” rule encourages an airline to continue an unprofitable service, rather than discontinue the route and lose the authority permanently. Liberal bilaterals, by granting carriers freedom to enter a market, also enhance freedom of exit. They help the industry react to shocks such as the traffic downturn following the 9-11 terrorist attacks on Washington and New York.

⁵² Even this provision is stricter than corresponding restrictions in other forms of trade. Anti-dumping rules are often difficult to enforce.

regime, which limits their flexibility, would be a proportionately large obstacle to growth in affluent country pairs.

Specifications that considered the portion of GDP accounted for by manufacturing, primary production or services, the degree of income inequality as measured by the gini coefficient, and the per capita income or GDP failed to produce a model having desirable statistical properties, or intuitively plausible results.

d) Fifth Freedom Rights

A “1” indicates the absence of any fifth freedom rights in the bilateral. A “0” depicts an agreement with such provisions. The data did not permit a more precise delineation of fifth freedom rights, such as between “intermediate” and “beyond” rights.⁵³ Even this definition greatly oversimplifies such rights; the economic value of seemingly identical provisions varies widely. As indicated earlier, there can be a large “grey area” in the interpretation of these rights in any situation.

Fifth freedom rights can be most valuable for long haul services, for which intermediate stops may be technically necessary. An ability to “top off” a long distance flight with incremental short haul revenue, or serve a minor center as part of a longer flight to a more significant destination may be necessary for a profitable route. These factors suggest that a fifth freedom provisions may be more important to nation-pairs that are relatively distant. Furthermore, other significant markets should occur either in close proximity to the great circle flight path between the two nations (for intermediate fifths) or reasonably close to either nation. The 0-1 variable is therefore multiplied by the product of the intervening destinations variable to measure the significance of fifth freedom services for each country-pair observation.

This approach proved statistically meaningful and plausible. The Intervening Opportunities variable depicts intermediate fifth freedom rights as less valuable to flights operating over remote areas or long, trans oceanic sectors (e.g. Auckland-Buenos Aires) than those overflying large and populous land masses. It also assigns a value to relatively short “beyond” rights. Its major weakness is an inability to capture very long “beyond” fifth freedom sectors, and thereby to under-estimate the importance of fifth freedom rights on a small number of specific flights. For example, Air India exercises London-New York traffic rights on its India-United States services. This capability allows it to offer better services between India and the United Kingdom. The model does not, however, consider the United States as an “intervening opportunity” or a potential “beyond” market

⁵³ Consider the bilateral agreement between nations “A” and “B”. An “intermediate fifth freedom right” would allow an airline of nation A to operate a flight that departs from nation A, stops at a point in nation C, and continues on to a point in nation B, carrying C-B local traffic in the process. A “beyond” right would allow an A-B-C routing, again with B-C local traffic rights.

for India-Britain. Any metric that adequately models the relatively few long haul “beyond” fifth freedom sectors would grossly overestimate the value of fifth freedom rights for most country-pairs.

e) Named Points

Some bilateral agreements limit services to a very few rigidly defined destinations; others, following a more liberal approach, allow services to any operationally feasible combination. In many situations, bilateral agreements will stipulate a fixed number of “roving points,” for which each nation can choose the precise destinations at a later date.

A very flexible definition of permissible routes is most conducive to competition when it involves nations with large areas and many potential destinations. A long, linear nation, or one with many distinct land masses, would likely offer several attractive cities able to support international service. Mean travel times from the periphery to a single, central international airport would be longer than for a square-shaped nation of similar area.

This variable was assigned a value of zero for country-pairs with broad route definitions. Those observations with specific point restrictions were assigned a value equal to the product of the moments of inertia of the two participating countries.

f) Other Attributes

Air service agreements can include other provisions, including mandatory pooling, royalty payments, restrictions on airline designations, traffic thresholds to trigger certain actions such as allowing further designations, flight timing restrictions, provisions for charter traffic, access to runway and gate slots at busy airports, currency repatriation and facilitation and others. The complexity and diversity of these provisions can only be examined effectively by a comprehensive analysis of an individual country-pair.

4. OTHER SPECIFICATIONS

Several exogenous variables were tested and subsequently rejected. Most proved statistically significant in certain specifications. This often reflected the large sample size (up to 1,400 data points), which captured even trivial influences. Many did not justify the additional complexity, or exacerbated multicollinearity concerns. Those variables ultimately selected provided the best combination of statistical power, simplicity and policy relevance. Exogenous variables examined and ultimately rejected include:

a) Tourism Demands and Market Drivers

Traffic on some country-pair markets consists primarily of tourists. Traffic flows are far larger than what would be commensurate with the GDP of the destination country. Every country-pair in the model was examined. In some instances, the proportion of employment accounted for by the tourism economy was considerably larger in one country than in the other. In such instances, traffic would be driven primarily by the GDP of the source country. A second factor would be the availability of other tourist-oriented economies located closer to the source country. For example, travel on the United Kingdom-Maldives country-pair would consist primarily of British vacationers. It would be highly sensitive to economic conditions in Great Britain. The model would also consider terms measuring the availability of closer, competing destinations, such as Greece or Spain.

These criteria were incorporated into the simpler specifications discussed earlier. While the regressions generated significant coefficients of the expected signs, their magnitude made little difference in the outcome of the model. The sheer size of the sample, up to 1,400 country-pairs, made it prone to pick out statistically significant but ultimately trivial differences. The tourist activity column vectors contained many 0 elements, exacerbating the problems of multicollinearity. These difficulties were especially severe when the tourism variables were included along with those examining bilateral agreements. The latter set of variables was included because of its more fruitful policy implications.

b) Cultural Affinities

Two nations that together were once part of the same colonial empire may share a common culture and political institutions. They may also have preferential trade or immigration policies. These common factors would encourage air travel between the two countries. Similarly, a common language or religion would, *ceteris paribus*, be expected to exchange more passenger traffic than otherwise. The extreme instance involves Islamic nations and the Haj. The religions were highly aggregated, so that Protestant or Roman Catholic faiths were aggregated into a single "Christian" category, while Shia and Sunni Moslems were considered "Islamic." The model assigned a "1" to nation-pairs sharing one or more religions, and "0" otherwise.

The affinities specifications proved significant, with the expected positive signs, when superimposed on a model containing only socioeconomic variables. However, the estimation process broke down when the metrics for bilateral agreements were also included. The sparse matrices, and multicollinearity, greatly reduced the usefulness of the estimates.

c) Tourism and Travel Industry Exogenous Variables

Several variables measuring the size of each nation's tourism and travel industries were examined. They were generally significant, but not remarkably so. In a model of country-pair traffic flows, these variables should be considered as endogenous, thereby introducing fundamental issues with the estimation algorithms.

d) Quality of Service

The large database of schedules maintained by the Official Airline Guide provides a mechanism to develop measures of the quality of air service between any country pair. It should reflect aggregate capacity, frequencies, number of city-pairs served, number of airlines offering competitive services, and competing routes that use connections in third countries. Such a measure is so strongly correlated with the level of traffic that it will overwhelm the exogenous variables. It could serve as an instrument for demand.

e) Price

The effective price of air travel is a critical determinant of travel demand. Liberalization affects price in many ways, through creating greater flexibility, depriving a nation of the ability to veto prices charged by its airlines' competitors, forcing airlines to address cost issues, permitting capacity growth, encouraging new entrants, and forcing the incumbent airlines to address the threat of new entrants. A two-step model could relate liberalization to reduced prices, and use demand elasticities to calculate the ensuing growth of traffic. It could also model the consequences of international service by low cost carriers. A lack of high quality information on average fares by country pair precluded any detailed consideration of price influences.

f) Other Variables

Other candidate determinants of travel included total merchandise imports and exports, the distribution of income, as measured by the gini coefficient, population and the degree of urbanization. None of these variables demonstrated any significant value as exogenous variables, once the GDPs had been included in the model. The number of airports with commercial service was tested as an alternate variable to the moment of inertia. It was weaker, and could pose problems for updating the data matrices in the future.

D. ESTIMATION OF PASSENGER MODEL

1. REGRESSION ANALYSIS

The preliminary estimation process used an ordinary least squares algorithm on a double-log specification. This reflects the assumption that many of the processes being modeled are multiplicative. For example, a restrictive bilateral would cause a greater absolute loss of traffic in a large market than in a small one.

As is common with many cross-sectional models, the preliminary specification showed problems with heteroscedasticity,⁵⁴ as determined by a significant Goldfeldt Quandt statistic. A general least squares procedure, using the GDP variable as a weighting factor, produced the estimates shown on Table IV-1.

Table IV-1: Regression Results for the Passenger Model

					95% Confidence Interval	
	Variable	Coefficients	Standard Error	"T" Statistic	Lower	Upper
1.	Intercept	-0.42345	0.277463	-1.52615	-0.96809	0.121191
2.	Single Designation	-0.02101	0.011204	-1.87533	-0.043	0.000981
3.	Predetermined Capacity	-0.03687	0.01397	-2.63921	-0.06429	-0.00945
4.	Bermuda Capacity	-0.02578	0.014781	-1.74384	-0.05479	0.003239
5.	Single Disapproval Pricing	-0.03629	0.015276	-2.37542	-0.06627	-0.0063
6.	Fifth Freedoms	-0.00036	0.003121	-0.11385	-0.00648	0.00577
7.	Authorized Points	-0.05866	0.027313	-2.14783	-0.11228	-0.00505
8.	GDP Product	0.240543	0.040627	5.920825	0.160796	0.32029
9.	Commercial Flows	0.14279	0.033162	4.305882	0.077696	0.207884
10.	Intervening Opportunities	-0.05739	0.005125	-11.1966	-0.06745	-0.04733

⁵⁴ Any regression model seeks to explain each observation of a "y" variable, in this case traffic, in terms of one or more "x" variables. There is usually an unexplained quantity for each data point; the disparity between the predicted value and the actual observation. Over the entire sample, this "residual" averages to zero. Sometimes, this residual varies according to some pattern, rather than being totally random. For example, the residuals for country-pairs with a large GDP may average zero, but could consist of many large negative and positive values. Observations with a small GDP could include only small positive and negative deviations. This property, called "heteroscedasticity," means that the ordinary linear regression, while producing estimates with many desirable properties, has failed to extract all of the information available from the sample. Furthermore, some of statistical tests lose validity. Various estimation techniques can overcome these problems and produce new estimates of the model with superior properties. While statistically significant, the magnitude of the heteroscedasticity was smaller than expected.

Multiple R	0.671431
R Square	0.45082
Adjusted R Square	0.444641
Standard Error	0.099722
Observations	810

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic
Regression	9	6.530724	0.725636	72.96844
Residual	800	7.955614	0.009945	
Total	809	14.48634		

The regression shows a reasonable “fit,” and the signs are consistent with expectations. The variables 2-7 investigate the impact of selected constraints of bilateral agreements on traffic volumes. **The uniformly negative signs are evidence that the artificial constraints posed by bilateral air service agreements constrain the growth of traffic. Furthermore, these obstacles operate, not only between specific well-studied country-pairs such as between the United States and the United Kingdom, but also in a huge variety of markets, involving countries of all sizes, stages of economic development, and political systems, in every part of the world.**

These results therefore support the hypothesis that restrictive bilateral agreements constrain traffic development. They lead to the rejection of the null hypothesis, that restrictive bilateral agreements have little impact on traffic.

The “fifth freedom” variable was negative, indicating that bilateral agreements with fifth freedom provisions could promote traffic development in the corresponding third and fourth freedom markets. However, the coefficient was not significantly different from zero. The model therefore does not support a liberal policy on fifth freedom rights. Rather, it is far more important to “get it right” on the third and fourth freedom clauses.

This negative finding on fifth freedom rights is not remarkable. As traffic grows, more country-pairs can support nonstop turnaround services. Aircraft manufacturers are developing ultra-long range aircraft, smaller than those that have traditionally operated on

long distance services, to offer nonstop flights on “long and thin” routes. The market fragmentation could see nonstop international services to city-pairs that once relied on intermediate hubs. As traffic grows, third and fourth freedom airlines can use their market strengths to displace fifth freedom operators. For example, Malaysia Airlines shifted its Newark-Dubai-Kuala Lumpur flight to a routing via Stockholm when Emirates commenced nonstop New York-Dubai flights in 2005.

The coefficient for GDP is much lower than that estimated by other studies. Most research concludes that traffic grows faster than GDP, as indicated by a coefficient, representing the elasticity that exceeds unity. Although the estimated coefficient refers to the **product** of the respective GDPs, and should therefore be doubled to provide a basis of comparison, the resulting elasticity is still much less than generally accepted values. Most studies trace the growth of one nation’s air travel demand and its GDP over time. The cross-sectional approach captures very different economies at a single point of time. The differences in GDP and air travel demands between a small, undeveloped nation and a large, industrialized economy are far more profound than the differences relating to one economy and a before-after interval of a few years. The resulting elasticities are not comparable.

The diversity of country-pairs in the model generated these disparities. A simplified model, investigating a greatly reduced data set of countries with large GDP’s, high volume traffic flows, and an established history of direct services, and exploiting the a-priori knowledge available in more traditional approaches, yielded estimates of elasticities that are fully consistent with prevailing time series studies and elasticity measures.

2. ADJUSTMENTS

The regression model described in the previous section relates traffic volumes between any arbitrary county-pair to socioeconomic parameters and the bilateral air services agreement. Variables (2)-(7) together define the incremental traffic growth resulting from total or partial liberalization of the air services agreement.

The model demonstrates the importance of liberalization to the growth of international air traffic. However, the idealized model poses several challenges to any attempts to apply it to specific situations. The model uses a double-logarithm specification. This reflects the interdependency of the exogenous variables. However, such models tend to dampen any disparities between predicted and actual traffic observations. Even a small residual of such a model can result in a very large disparity when the coefficients appear as exponents.

The coefficient corresponding to the Bermuda capacity control was not statistically significant. Although lower than the predetermined capacity coefficient, it is believed that the model may still overstate the traffic stimulus arising from the abolition of Bermuda controls. The predictive model therefore assumes that a Bermuda clause is half as detrimental as a capacity stipulated directly in the bilateral agreement. The raw model

also suggested that a very large stimulus of 75 percent or more would result from liberalizing price clauses (Variable 5). The results, when applied to several country-pairs, appeared excessive. A separate analysis, isolating this term alone, suggested a stimulus of 4.1 percent was more appropriate. This finding was superimposed on the predictive model, although it is fully recognized that this ad hoc measure is a methodological compromise.

The predictive model reflects a view that restrictive bilateral agreements, whatever their economic justification, are the global status quo. It is usually thought that any unjustified change in the status quo is a more serious error than mistakenly retaining the current circumstances. This in turn means that an error in over-estimating the consequences of liberalization is more serious than any under-estimation. The model therefore tests each prediction. Should the predicted stimulus exceed a particular critical value, the stimulus is reduced to that particular value. No such correction applies if the model appears to under-predict the consequences of liberalizing a particular country pair. Furthermore, a “grand limit” capped the total growth resulting from a full liberalization.

The limits were estimated by taking a sample of 600 country-pairs in various stages of liberalization. Each attribute of the relevant bilateral agreements was examined in turn, and subject to a step-by-step liberalization. The model calculated the conditional expectations of traffic resulting from each perturbation of the bilateral for each observation, generating a series of calculated stimuli. For each attribute in the bilateral, a maximum limit on the traffic gain from an incremental liberalization was calculated using Chebyshev’s Inequality.⁵⁵ The process yielded, for each attribute, and for a total liberalization, a level of stimulation that would be exceeded by only 10 percent of the observations. To eliminate the risks of over-estimating the stimulus from liberalization, the model superimposed the limits shown in Table IV-2 on any extrapolation produced by by the regression model.

Table IV-2: Maximum Stimulation Limits

Liberalization Measure	Maximum Permissible Traffic Growth
Single to Multiple Designation	50.7%
Predetermined Capacity to Open Capacity	25.0%
Bermuda Capacity Control to Open Capacity	17.8%
Single Refusal to Double Refusal Pricing	4.1%
Including Fifth Freedom Rights	8.8%
Named Point Route Annexes to Open Routes	97.3%
Fully Restrictive to Fully Liberal	166.4%

⁵⁵ Chebyshev’s Inequality describes very broad characteristics that govern any statistical population. It is “distribution free” in that it does not require any prior knowledge of the population, except that it have a mean and variance.

The procedure also generated lower limits to stimulation factors. The simulation did not enforce the lower limits, in keeping with its conservative stance on the air service issue.

Liberalization is a necessary but not a sufficient condition for traffic growth. No new services can result if there is no underlying demand to support them. The model therefore examines the air services already operating between the country-pair in question. If any such flights already operate, it is assumed that capacity can expand to accommodate demand. If no such flights exist, the algorithm determines the aircraft most appropriate for a route of that length.⁵⁶ If the traffic available is insufficient to support an arbitrary three weekly return flights with a 70 percent passenger load factor, the algorithm considers that no service is feasible. The model then examines the bilateral agreement to ascertain if fifth freedom rights are available. If so, it allocates half of the capacity to the fifth freedom market, and chooses an aircraft appropriate to half of the distance between the two countries. Only if the country-pair can meet the 70 percent load factor and frequency requirements will it obtain direct service. Otherwise, the liberalization is considered moot; no traffic increase could occur.

E. ESTIMATION OF CARGO MODEL

1. INTRODUCTION – THE MODELING CHALLENGE

Liberalization can be especially important to air cargo. Indeed, the rise of integrated carriers such as UPS and FedEx is itself a direct consequence of airline deregulation. Many bilateral agreements have liberalized provisions for all-cargo services, including “seventh freedom”⁵⁷ rights. All-cargo services are sometimes used as a means to test the consequences of liberalization before extending the process to include passenger services.

Air freight⁵⁸ poses a particular challenge. It is very heterogeneous, and includes documents, machinery, foodstuffs, live animals and literally anything else that people wish to ship. Shipments range in size from single-page documents to huge movements requiring charter of several wide body all-cargo aircraft. The institutions vary. The “integrated carriers” offer a seamless, door-to-door service. They perform all functions in-house: sales development, pickup and delivery, tracing, carrying the goods by a variety of modes, customs clearance, insurance, and often, warehousing, inventory control and other

⁵⁶ There is a rough relationship between aircraft size and flight distance. Large, twin-aisle aircraft operate most intercontinental routes. Smaller aircraft customarily serve shorter routes. An analysis of Official Airline Guide worldwide schedules for March, 2006 identified the type of aircraft appropriate for each stage length. The economically meaningful maximum range of an aircraft was defined as that distance exceeded by 10 percent of the flights.

⁵⁷ See Glossary, Appendix B.

⁵⁸ “Air cargo” is usually viewed as any kind of movement of merchandise by air. It includes air mail, which is tendered by a government-owned postal service, usually under a long term contract. “Air freight” is a narrower definition, that excludes air mail. It consists of revenue-generating traffic tendered by entities other than the post office. This Report will use “air freight” in this narrower sense. Any mention of “cargo” will include air mail.

aspects of the management of a client company's supply chain. Flights are scheduled to meet the needs of air freight, and the carrier holds all route authorities.

In contrast, traditional airlines regard air freight largely as incidental revenue, using the otherwise empty belly space of passenger flights. Many entities, forwarders, customs brokers, truckers, pickup and delivery operators, sufferance warehouses, etc. will participate in a single shipment. Besides its heterogeneity and its by-product status, air freight differs from passenger traffic because goods usually travel in only one direction. Services on an individual country pair may face a chronic traffic imbalance, with loads in one direction continually exceeding the other. Sometimes, the airline will carry more traffic in the "weak" direction, accommodating dense, low yield items such as perishables. The airlines' commitment to cargo varies widely, with Asian and European airlines usually showing the greatest interest. Carriers usually design their networks and schedules for passengers. The air freight industry makes extensive use of supplemental trucking services, and published statistics usually provide limited information about the fundamentals of a particular traffic flow.

These complications complicate development of a simple, accurate air freight model that can apply to any country-pair. Rather, an intensive, market-by-market approach is essential. This approach considers the underlying economic fundamentals, the industrial base, the available air services, directional balances, cargo yields, the passenger market, intermodality and the identities and strategies of specific shippers and consolidators. Instead, the model developed for this report has the less ambitious target of **estimating the changes in air freight and their economic impacts as consequences of the liberalization of passenger services**. It does not consider how liberalization could affect the supply and demand for capacity on all cargo aircraft.

The air freight model therefore does not attempt to relate traffic directly to liberalized air service agreements.⁵⁹ Rather, it calculates the additional passengers resulting from the liberalization, the incremental passenger capacity that they will need, and the new belly cargo capacity that would be forthcoming. The model then assumes that airlines will manage their cargo yields so as to fill the new capacity. This capacity-driven implies that belly air freight traffic will grow at the same rate as passenger volumes. However, shipper demands for cargo capacity respond to a radically different series of stimuli. This simplification therefore does not explain growth in pure freighter services.

⁵⁹ Directional imbalances are of such profound importance to the air freight industry that traffic in each direction of a country-pair must be considered as a separate observation, as a minimum. The IATA publications from which the country-pair traffic was assembled did not provide directional breakdowns. They showed directions by nation to certain geographical regions, and consolidated flows by nation pair. It was necessary to estimate directional breakdowns through an iterative, multi-step procedure. Nevertheless, many country-pair data, especially for important trading nations, had to be allocated into directional components. This data shortcoming alone limits to model to belly air freight on combination carriers.

2. THE AIR FREIGHT MODEL

The air freight model is similar to the passenger traffic model. Both use a gravity-type double-logarithmic specification. The air freight model considers each direction of a country-pair as an independent observation, and benefits from a correspondingly large number of data points.

The GDPs of both the importing and the exporting countries were important determinants of demand. The coefficient of the exporting country was both slightly larger and more significant than that of the importer. The presence of closer opportunities, whether as markets for the exporter or competing sources of supply for the importer, was significant and negative. Distance was a positive and significant factor. A large distance between the exporting and the importing country implies higher freight rates, but also suggests major advantages for air freight over surface modes.

During the process of developing the model, other variables emerged as candidates. These included exports and imports of food and merchandise, the total manufacturing GDP, degree of urbanization, and relationships between exchange rates and purchasing power parity measures (as a proxy for the price competitiveness of exports). None of the augmented specifications generated enough explanatory benefits to justify the added complexity.

Table IV-3 summarizes the results of the air freight regression. The ordinary least squares algorithm provided significant estimates. Despite the size and diversity of the cross-sectional sample, heteroscedasticity did not pose a complication. Although many of the exogenous variables were correlated, multicollinearity did not affect the estimation process.

Table IV-3: Ordinary Least Squares Estimation of the Air Freight Model

					95% Confidence Interval	
	Variable	Coefficients	Standard Error	"T" Statistic	Lower	Upper
1.	Intercept	-2.81649	0.195981	-14.3713	2.71E-44	-3.20088
2.	Distance	0.580981	0.053722	10.81455	2.07E-26	0.475613
3.	GDP Exporting Country	0.501725	0.023073	21.74534	9.67E-93	0.456471
4.	Intervening Opportunities – Exporter	-0.11546	0.022093	-5.2261	1.94E-07	-0.15879
5.	GDP Importing Country	0.454237	0.022648	20.05604	1.65E-80	0.409815
6.	Intervening Opportunities - Importer	-0.09314	0.021884	-4.25626	2.19E-05	-0.13607

Multiple R	0.612228
R Square	0.374823
Adjusted R Square	0.372991
Standard Error	0.712438
Observations	1712

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Statistic
Regression	5	519.1548	103.831	204.5657
Residual	1706	865.9107	0.507568	
Total	1711	1385.065		

The overall model views the growth of air freight as an incidental result of the growth of passenger traffic. Additional passenger traffic calls for additional flights, which in turn increases the supply of belly capacity. On routes already served by direct flights, the model assumes that the fleet mix will remain unchanged. The supply of air freight capacity will then grow at the same rate as the passenger capacity and the passenger demands.

Section E-2 explained the rationale for assigning passenger capacity between newly liberalized country-pairs, where no services presently exist. The process involves assigning three weekly frequencies of a distinct type of aircraft to the country-pair. The total incremental air freight volume is determined from the capacity of the aircraft, the frequency, and whether capacity must be allocated to a fifth freedom destination.

The “capacity” of a particular passenger aircraft for air freight is often ambiguous. The space relegated to cargo will depend on the number of passengers carried, their personal luggage, and their preferences for checking items versus carry-ons. Passengers and luggage often have a higher loading priority than air freight. Airlines may deliberately leave belly space unused in order to accommodate any last-minute travelers. Low cost carriers in particular have rapid station turnarounds, and their ground crews may be unable to process air freight. Many shippers greatly prefer wide body aircraft with container capabilities superior to bulk-loaded narrow body equipment. The quantity of air freight that can be accommodated, usually measured by its weight, will depend on the density of the items, their overall dimensions (large items often cannot be accommodated, especially on narrow body aircraft), the type of materials (some hazardous materials cannot be carried on passenger aircraft), whether the flight is carrying air mail, and the

airline's internal policies on loading priorities. Sometimes, the total gross takeoff weight for long distance flights, or those forced to use short or contaminated runways, will be limited for safety reasons, and the airline will forego all revenues for air freight. The complications render published payload statistics of little relevance for defining the effective air freight capacity of a flight.

The United States Department of Transportation's T-100 Domestic and International Segment reports offer a mechanism to calculate the effective air freight "capacity" of different types of aircraft. A review of a full year of operating data for combination flights generated a matrix of air freight weights carried per segment for each type of aircraft for each month. The records for each type of aircraft were ranked in descending order according to the average quantity of air freight carried. That segment corresponding to the 80 percentile defined the average effective air freight capacity for that aircraft type. Capacities for aircraft missing from the T-100 report were estimated. For example, the TU-154 was assumed to offer the same cargo capacity as the 727-200.

The air freight regression model plays a relatively limited role in this analysis. It defined the extent to which shippers could use the additional capacity on passenger aircraft. It also defined directional balances, with air freight volumes for the "weak" direction reduced accordingly. The model is an essential part of the economic impact calculations, but does not directly drive the links between liberalization and economic development.

F. ECONOMIC AND CATALYTIC IMPACTS

1. INTRODUCTION

While it is clear that air transportation has increased as economies have grown, it is also recognized that air transportation is an important facilitator of general economic growth. Not only is aviation a major industry in its own right, employing large numbers of highly skilled workers, but more importantly it is an essential input into the rapidly growing global economy. For example:

- Air transportation is a vital contributor to the development of tourism in many parts of the world. This includes not just leisure tourism, but also business travel, conferences and conventions.
- Air transportation is used for the transportation of many high value goods to markets around the world, and plays an essential part of just-in-time production and distribution management.
- It is an important input to many service and high-tech industries where interpersonal communications are crucial. Air transportation can enhance the productivity of these businesses.

- The availability of air transportation can attract investment and new businesses. As discussed in more detail below, company investment and location decisions are strongly affected by transportation links, including air transportation. Countries and regions with higher levels of air service are likely to attract more new businesses and encourage existing businesses to expand.

This report examines three ways in which increased levels of air transportation can spur economic development and employment:

- **Aviation Sector Impacts:** economic activity in the aviation sector is related to the servicing, management and maintenance of additional air services. This includes activities at airlines, airports, air navigation and other businesses that support and supply the aviation sector. The impact can “spin-off” into the wider economy (“multiplier effects”) – e.g., trucking, warehousing and logistics businesses facilitating air cargo, or firms supplying food for catering on flights.
- **Tourism Sector Impacts:** air service facilitates the arrival of larger numbers of tourists to a region or country. This includes business as well as leisure tourists. The spending of these tourists can support a wide range of industries: hotels, restaurants, theatres, etc. Of course, air service also facilitates outbound tourism, which can be viewed as reducing the amount of money spent in an economy. However, even outbound tourism involves spending in the home economy: travel agents, taxis, etc. Money spent by tourists flying abroad would not necessarily be spent on tourism at home if there were no air service.
- **Catalytic Impacts:** this includes the role of air transportation in facilitating growth and productivity in the general economy by increased trade, business activity and greater personal productivity.

Ultimately, through these three impacts, air transportation can contribute significantly to rising GDP, higher disposable incomes and higher standards of living.

2. WHAT IS ECONOMIC IMPACT?

Economic impact is a measure of the spending and employment associated with a business, a sector of the economy, a specific project, or a change in government policy or regulation. Economic impact can be measured in various ways. Two of the most popular ways to assess economic impact are the dollar value of output produced⁶⁰ or the person years (also known as full-time equivalents - FTEs) of employment generated. These

⁶⁰ The two most common measures are *economic output* (Output) and *gross domestic product* (GDP). Economic output roughly corresponds to the *gross* revenues of goods or services produced by an economic sector, while GDP measures only *value-added* revenues. GDP removes the revenues to suppliers of *intermediate* goods and services and only includes the contributions from labor and capital. Alternatively, economic output adds all revenues at each stage of production together as a measure of total production in the economy. Economic output will always be greater than GDP (also termed as value-added).

methods both attempt to assess the gross level of activity or expenditure in any economy. They are not “net” measures that weigh benefits against costs, but are still useful to understanding the size of businesses, projects, investments and economic sectors.

Definitions of direct, indirect and induced economic impact within the aviation sector can be defined as follows:

- **Direct economic impact** is employment, value-added or economic output that can be attributed to the operation of air services to/from specific countries. In the aviation sector, for example, the direct employment base includes employees of airlines, fixed base operators, aircraft maintenance, and other firms located at airports.
- **Indirect economic impact** is employment, value-added or economic output created in industries that supply goods and services to air transport related firms. For example, a wholesale food distribution company that supplies food to airlines would be part of indirect economic impact.
- **Induced economic impact** is employment, value-added or economic output generated because of expenditures by individuals employed directly or indirectly by the air transport industry. For example, if an air carrier employee decides to expand or re-model his/her home, this would result in additional (induced) employment hours in the general economy.
- **Total economic impact** is the sum of direct, indirect and induced effects. The multiplier (indirect and induced) economic impacts represent the maximum potential stimulus to the economy resulting from air transport related activities.

Indirect and induced economic impacts are typically measured by the use of *economic multipliers* which are derived from economic/statistical/accounting models of the general economy. They come in a variety of forms and differ greatly in definition and application. Thus, great care must be exercised in choosing the appropriate set of multipliers to use.

The use of multiplier analysis is limited by a number of factors, these are:

- the accuracy of the structure and parameters of the underlying model
- the level of unemployment in the economy
- the assumption of constant returns to scale in production
- the assumption that the economy's structure is static over time and
- the assumption that there are no displacement effects.

Multiplier impacts must be interpreted with caution since they may be illusory when the economy experiences high employment and output near industry capacity.

3. AVIATION SECTOR IMPACTS - DEFINITIONS

In order to quantify the impact of change in air freight and passenger traffic on the aggregate performance of the economy, a set of coefficients was developed to estimate the direct, indirect and induced economic impacts.

Aviation Sector World Regions

The economic impact of aviation can be different in different types of economies and in different regions. Accordingly, this study identified 14 categories of nations based on a combination of geographic location and country classifications used by international organizations such as the United Nations, the OECD and the World Bank. Figure 1 provides the fourteen world regions for the aviation sector economic impacts.

Figure 1: Aviation Sector Economic Impact World Regions

<ul style="list-style-type: none"> • Developed Countries North America • Developed Countries Europe • Developed Countries Asia-Pacific • Emerging European Markets • Emerging Markets Latin America • Emerging Markets Asia Pacific • China 	<ul style="list-style-type: none"> • India Sub-Continent • Developing Countries Mexico & Caribbean • Developing Countries Markets Latin America • Developing Countries Middle East • Developing Countries Africa • Developing Countries Asia Pacific • Least Developed Countries
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3. AVIATION SECTOR IMPACTS – METHODOLOGY

The aviation sector ratios and economic impact multipliers were estimated from several industry statistical publications and reports, individual airport economic impact studies⁶¹ and government data.

Existing industry data and reports which provided regional or global impacts included:

- The Air Transport Action Group – The Economic & Social Benefits of Air Transport (2004 data)

⁶¹ An advantage of individual airport economic impact studies is that the researcher typically has access to the most detailed local data available and develops the most appropriate data and multipliers.

- Airports Council International Europe – The Social and Economic Impact of Airports in Europe (2003 data)
- Airports Council International North America – The Economic Impact of U.S. Airports (2002 data)
- Airports Council International North America – The Economic Impact of Canadian Airports (2002 data)
- Airports Council International – 2005 Economic Survey
- International Civil Aviation Organization – Airports: Vital Catalyst for Economic Growth (2003 data)
- International Civil Aviation Organization – Economic Contribution of Civil Aviation: Ripples of Prosperity (1998 data)
- Wilbur Smith Associates – The Economic Impact of Civil Aviation on the U.S. Economy (2000 data)

The ATAG study was used as the starting point for establishing indirect and induced employment multipliers, as well as direct, indirect and induced GDP multipliers. The numbers were generally consistent with other existing studies, as well as government input-output tables and other published data sources. However, the ATAG study only provided impacts for six world regions (North America, Europe, Latin America, Asia-Pacific, Middle East and Africa). In order to provide a greater level of geographic distinction within individual world regions, input-output data, employment and GDP data for the transport industry was utilized. This data was generally available only at the total transportation industry level, although some jurisdictions had detailed aviation data available. This allows the model to provide separate economic impacts, for example, for China or the India-sub continent, rather than using a broad set of multipliers for the entire Asia-Pacific region.

Economic impact studies commissioned by individual airports were also analyzed to provide additional detail and serve as a cross-check for the regional and global studies. Airport economic impact studies were most readily available for airports in North America and Europe.

In order to link changes in air passenger volumes to economic impact, a ratio of direct employment to air passenger volumes was developed. The ratios were based primarily on the ACI 2005 Economic Survey and ACI 2005 preliminary global traffic results. However, because the ACI study included breakdowns for only five world regions (North America, Europe, Asia/Pacific, Latin America/Caribbean and Africa/Middle East) and only limited country level data was available for other world regions, the ratios are generally similar within each geographic area.

The employment to passenger volume ratio has been converted to a workload unit basis in order to be applicable to both air passenger and air cargo volumes. One workload unit is the equivalent of one air passenger or 100 kilograms of air cargo, which loosely corresponds to the weight of an average air passenger plus their baggage.

4. TOURISM SECTOR IMPACTS

Air service facilitates the arrival of both leisure and business tourists to a region or country. The spending these tourists make in the destination country can create direct, indirect and induced economic impacts in a wide range of tourism related industries: hotels, restaurants, theatres, ground transportation, attractions, shopping, etc.

Countries were divided into tourism world regions according to geographic location and development of the local tourism industry. A total of 13 tourism economic impact categories were created as illustrated in Figure 2.

Figure 2: Tourism Sector Economic Impact World Regions

<ul style="list-style-type: none"> • North America Well Developed • Europe Well Developed • Latin America Well Developed • Africa Well Developed • Asia Pacific Well Developed • Mexico & Caribbean • Middle East 	<ul style="list-style-type: none"> • China • India • Europe Less Developed • Latin America Less Developed • Africa Less Developed • Asia Pacific Less Developed
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Tourism related expenditures, employment, GDP and multipliers were based primarily on data published by major tourism organizations:

- U.N. World Tourism Organization (UN-WTO)– *Compendium of Tourism Statistics* (1999-2003 data)
- World Travel & Tourism Council (WTTC) – *Country League Tables* (2005 data)

Additional individual country level data was obtained directly from national tourist departments, statistical offices and academic papers.

In order to determine the economic impact of international tourists arriving at individual countries by air transportation, various tourism ratios were developed including:

- Inbound tourist arrivals as a percentage of total arrivals – inbound tourist ratios were based on total inbound/outbound tourist volumes reported by the UN-WTO. The ratios are based on total international visitors traveling by all modes because air-only data was not available. The percentages were estimated by region-pair. By applying the appropriate ratio to the total increase in air traffic between two countries or regions, an estimate of total inbound tourists can be calculated.
- Average expenditure per international tourist visit – international tourist expenditure data was sourced from a combination of UN-WTO and WTTC publications. The data includes all expenditures made by tourists within a destination country or region including hotels, restaurants, sightseeing, local transportation, retail purchases, etc., but does not include purchases made in their home country prior to departure (e.g., air transportation, package tours, etc.). The expenditure data was based on all international visitors, including same-day visitors and visitors arriving by all modes.
- Employment per \$1 million of tourist expenditure – total tourism related employment was generally sourced from national tourism satellite accounts published by individual countries. Because the employment figures were only available at the industry level and not attributable to domestic versus international sectors, the employment ratios are based on combined domestic and international data. The tourism data has been adjusted to remove the air transport related employment in order to avoid double counting the employment impacts already included in the air transport economic impact above. Based on select country tourism satellite accounts which provided employment by sector, an estimated 8 percent of employment was removed to account for air transport related jobs.

In order to establish the total economic impacts on the broader economy, multipliers were developed from WTTC data sources and tourism economic impact studies for individual tourism markets.

5. CATALYTIC IMPACTS

Several studies have examined the impact of air transportation on business location, economic development, investment and employment. Some have examined the importance of air transportation in the location decision making of businesses. For example, the Atlanta Chamber of Commerce (1988) surveyed 264 foreign-based firms located in and around Atlanta and found that the extent of direct international air service was the third most important factor in location decisions. Ernst and Young, reviewing the decisions of 57 European companies, found that the extent of air transport network was the third most important factor in the selection process. The Amsterdam Chamber of Commerce found that the availability of an airport was one of five key factors considered in company relocation decisions.

The studies described above demonstrate that air transportation plays an important role in business location decisions. Other studies have uncovered empirical evidence

demonstrating a strong linkage between air service and economic development and investment.

Irwin and Kasarda (1991) examined the relationship between the structure of airline networks and employment growth at 104 metropolitan areas in the United States. Using data for a 30 year period, the researchers conducted regression analysis relating employment in the manufacturing and service sectors in a metropolitan area to number of explanatory factors including population, road infrastructure, telecommunication infrastructure and measures of airline network serving the area.⁶² This regression analysis showed that expansion of the airline network serving a region had a significant positive impact on employment in that region. The effect was particularly significant in the service sector. Furthermore, analysis was conducted (using nonrecursive models) which confirmed that increases in the airline network were a cause rather than a consequence of this employment growth.

Hansen and Gerstein (1991) investigated the relationship between Japanese air service to the United States and Japanese direct investment in the United States. Using data from 1982 to 1987, the analysis related the amount of Japanese investment in each U.S. state to measures of level of air service operated between Japan and that state (and other background factors). The analysis found a significant positive relationship between investment and air service. The results also suggested that the amount of service provided by Japanese carriers had a larger impact on investment than service provided by U.S. carriers. The issue of causality is also addressed (i.e., does more air service lead to greater investment or does greater investment lead to more air service), with the authors concluding that the evidence indicates that air service impacts on investment rather than the other way around. The authors concluded that better air service supports the input needs (i.e., labor and materials) of the Japanese ventures in the U.S. and enables greater awareness and information flows in Japan for U.S. regions.

Button, Lall, Stough and Trice (1999) examined empirically the link between high-tech employment in a region and whether the region is served by a hub airport. Using data from 321 U.S. metropolitan areas in 1994, the authors regressed high-tech employment against a number of controlling factors, including a dummy indicating that the region was served by a hub airport.⁶³ The analysis found that the presence of a hub airport increased high tech employment by an average of 12,000 jobs in a region. The authors also addressed the issue of causality (i.e., does the presence of a hub airport lead to more employment, or does higher employment in a region increase the likelihood of a hub airport being developed). Using the Granger causality test, the authors found that there

⁶² The researchers used specific definitions of manufacturing and service sector employment which excluded most of the employment associated with the aviation sector and tourism.

⁶³ "High-tech" employment included IT, telecoms, biotechnology, electronics, and certain types of high-value manufacturing. It excludes aviation (except for manufacturing) and tourism. The study used the Federal Aviation Authority's standard definition for a hub airport (using this definition, there were 56 hubs in the U.S. in 1994).

was statistically significant evidence that the presence of a hub airport caused an increase in high-tech employment.

A similar study by Button and Taylor (2000) examined the link between international air service and economic development. Using data for 41 metropolitan areas in the U.S., the authors regressed “new economy” employment against a number of control factors, including the number of direct routes to Europe offered by airports in the region.⁶⁴ The analysis found that there was a strong and significant relationship between employment and air services to Europe. The impact was largest for regions which initially had very limited services to Europe. For example, increasing the number of European routes served from 3 to 4 (40,000 additional passengers per annum) generated approximately 2,900 “new economy” jobs. However, increasing the number of routes served from 20 to 21 (10,000 passengers) generated 440 “new economy” jobs. This analysis suggests that each 1,000 enplaning/deplaning (E/D) passengers increases employment by 44 to 73 jobs, depending on the number of routes already served. To address the issue of causality (and to allow for a lagged response to the new air service), employment in 1996 was regressed against the number of routes in 1994.

Another study, Brueckner (2002), also looked impact of air service on employment in the U.S. The author regressed employment in 94 metropolitan areas in the U.S. against a number of factors, including measures of air service. The analysis found that a 10 percent increase in passenger enplanements in a metropolitan area leads to an approximately 1 percent increase in employment in service-related industries. However, the analysis found that there was no impact on manufacturing and other goods-related employment, suggesting that air travel is less important to these industries than it is to service-related industries. Using Chicago as an example, the author estimates that each additional 1,000 E/D passengers increases employment by 22 jobs.⁶⁵ The author also conducted analysis (Granger causality test) to address the issue of direction of causality and found statistically significant evidence that air traffic was a cause of employment.

A study commissioned by EUROCONTROL (2005) examined the catalytic effects of air transportation in Europe.⁶⁶ The study examined the contribution of air transportation to tourism, trade, location/investment decisions and productivity. It estimated the net contribution of air transportation to trade (i.e., export minus imports) to be €55.7 Billion in 2003 across the 25 current EU members, or approximate 0.6 percent of GDP. The study

⁶⁴ Similar to high-tech employment, “new economy” employment included IT, telecoms, biotechnology, electronics, and certain types of high-value manufacturing, but generally excluded aviation (except for manufacturing) and tourism.

⁶⁵ Unlike some of the previous studies, the definition of employment does include aviation sector and tourism employment.

⁶⁶ EUROCONTROL is a civil and military organization established in 1963 to facilitate a safe, seamless pan-European Air Traffic Management (ATM) system. While the initial focus of the organization was on safety and operations, its remit has expanded over time to include capacity management and development, operating costs, and fees and charges. EUROCONTROL is not an EU institution, but includes nearly all the EU members, as well as countries outside of the EU such as Switzerland, Turkey and Norway.

analyzed the relationship between air transportation and business investment. Using Equilibrium Correction Mechanism (ECM) equation analysis of data from EU member countries, and controlling for other factors, the results indicated that a 10 percent increase in air transportation usage (relative to GDP) will tend to increase business investment by 1.6 percent in the long run (the impact takes approximately five years to fully manifest). The authors estimated that between 1994 and 2003, air transportation increased business investment by 5.8 percent in the 25 EU member countries, worth €66 billion.

The study also investigated the relationship between air transportation and productivity. Again using ECM analysis of data from EU member countries, the analysis indicated that a 10 percent increase in air transport usage (relative to GDP) increases underlying productivity by 0.56 percent in the long run. Productivity is boosted by firms being better able to exploit economies of scale, access a wider pool of labor, and experience greater exposure to competition. This promotes innovation and efficiency.

Combining these impacts together (excluding the impact of tourism), the study estimates that air transportation contributed to a 4.6 percent growth in GDP across the 25 EU members between 1994 and 2003, worth a total of €480 billion.

The studies described above provide strong evidence that air transportation is a significant contributor to economic growth and development. They have also been used in this study as the basis for estimating the catalytic impact of air transportation.

The study by Button and Taylor (2000) found that 44-73 jobs are generated for each additional 1,000 E/D passengers while the study by Brueckner (2002) found that 22 jobs were generated by each additional 1,000 E/D passengers.

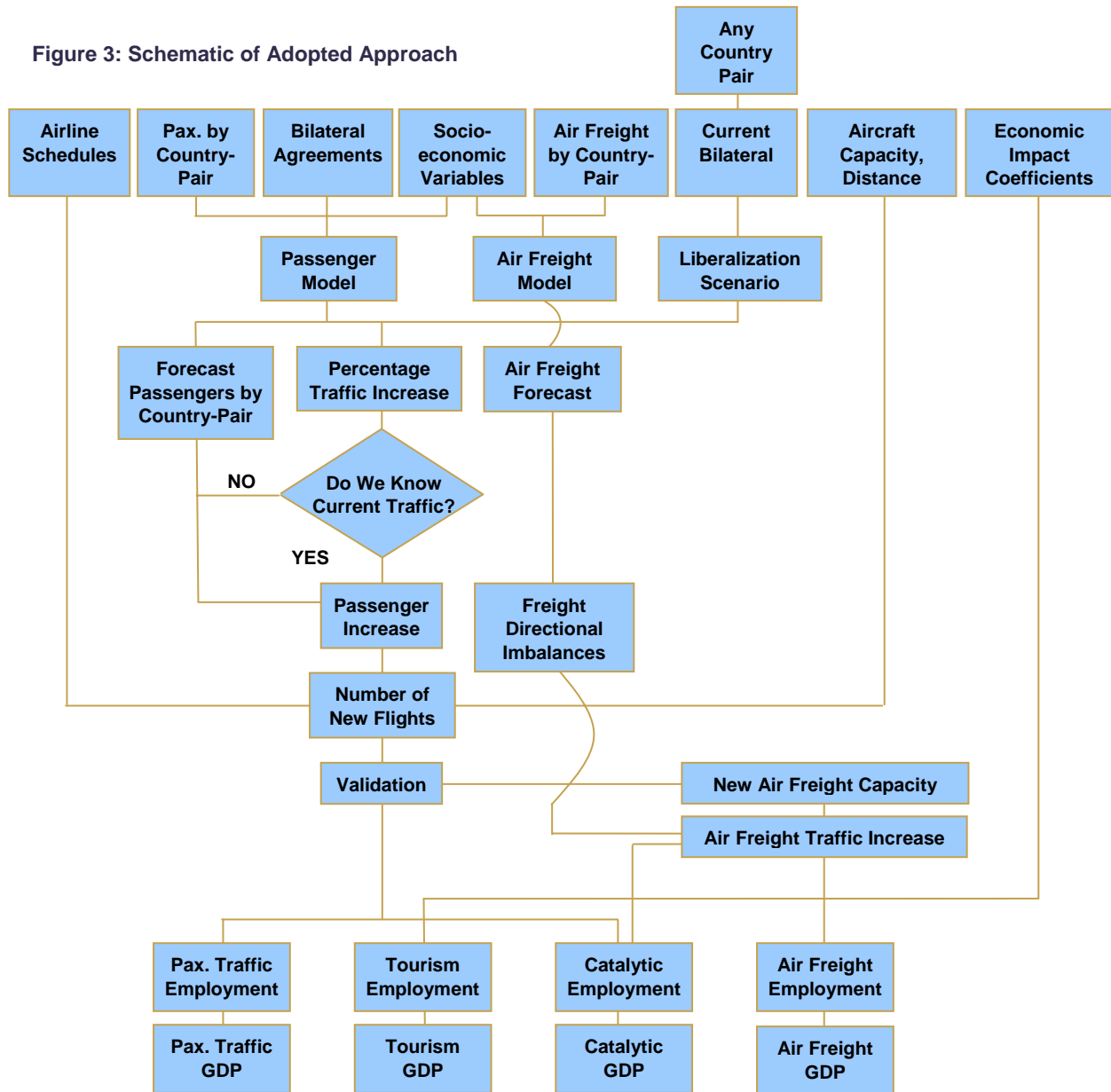
On the basis of these studies, it has been assumed that approximately 30 full-time equivalent jobs are generated for each additional 1,000 enplaning/deplaning passenger.

G. SUMMARY OF MODEL

The passenger, freight and economic impact models, while seemingly separate entities, are components of a larger and integrated framework. This section summarizes the interactions between each part, and how they together form a model of liberalization with worldwide applicability relationships binding these parts, and the framework culminates in a model of liberalization with worldwide applicability.

Figure 3 shows a simplified schematic of the adopted approach. The algorithm includes separate single-equation models for passenger traffic and air freight⁶⁷.

Figure 3: Schematic of Adopted Approach



⁶⁷ The passenger and air freight traffic demands between any country-pair depend on a wide range of factors, each of which belongs to either of the broad categories of “supply” or “demand.” According to economic theory, the “price” variable equilibrates both factors. This means that a particular set of price-quantity combinations in isolation says nothing about either supply or demand. Unless the researcher exercises considerable caution, and uses specialized techniques, efforts to obtain information about the underlying relationships could generate misleading and inaccurate results. The model does not use price to explain demand, partly because suitable information on prices and costs was not available. Rather, it applied a “reduced form” approach in which traffic flows were deemed as determined solely by factors “outside” the model.

The passenger model relates traffic to the scale of economic activity and the constraints posed by air service agreements. The model was developed from information about 800 country-pairs. The model can quantify the total number of passengers traveling between literally any country-pair, including those for which no traffic data is available. Since the model includes information about the bilateral agreements, it can readily estimate the increase in traffic resulting from liberalization.

Passenger traffic for some country-pairs is already available. That part of the model that includes terms for the bilateral can produce an estimate of the percentage increase in traffic corresponding to different degrees and types of liberalization. This percentage can be applied to the current traffic base. If the base traffic is not available, the model can generate forecasts of the traffic before and after the liberalization. Either approach will calculate the number of “new” passengers resulting from the agreement. The resulting economic benefits are calculated from either measure.

The incremental passenger traffic is subject to a series of tests of reasonableness. If the country-pair in question already obtains direct service, the model assumes that seat capacity will expand in proportion to the new traffic. If not, the algorithm examines prevailing relationships between aircraft size and useful range, and calculates the number of flights required to meet a seat and load factor target. If demands are too small to justify a certain minimal level of service, the model concludes that no traffic growth can result, and that the liberalization will generate no immediate economic benefits.

The complexities of air freight limit the methodologies used and the applicability of the final results. The algorithm therefore pursues the less ambitious goal of modeling the impacts of increased air freight that result from an expansion of passenger services following liberalization.

Two conditions may occur. The country-pair may already have scheduled passenger services. Since the model assumes no change in the mix of aircraft, air freight capacity will rise in the same proportion. Airlines and freight forwarders will sell this additional capacity, and air freight traffic will grow accordingly. The similar passenger and passenger growth rates in no respect indicate that the demands grow in the same manner, but, rather, that belly air freight volumes are intimately linked to passenger marketing decisions, and is sold as a form of incidental revenue. A second case governs country-pairs with no current passenger flights. The growth of passenger traffic resulting from the liberalization could lead to new services. The frequencies would be determined by passenger demands; the aircraft type, with its pre-defined air freight capacity, would be assigned by the passenger model. Under the by-product assumption, air freight flows would passively adjust to use the additional capacity. The capacity in the “heavy” direction would be fully utilized; incremental freight traffic in the “light” direction would reflect the directional imbalances estimated by the econometric model.

Matrices developed from several sources define the relationships between additional passenger and air freight traffic, and increases in employment and Gross Domestic Product. They consider effects that arise from increased passenger travel, increased international tourism, a growth of air freight, and catalytic effects. The coefficients apply to each nation in a country-pair.

H. THE MODEL - ISSUES

The cross-sectional modeling approach demonstrates that economic fundamentals such as Gross Domestic Product, the level of trade in services, and geographical variables are by far the most important determinants of traffic between any country-pair.

Variables that reflect the severity of the artificial restrictions posed by bilateral agreements play a smaller role in defining traffic. Their influences are unquestionably significant, both in the narrow statistical definition and in the broader social sense. They are the only variables over which our societies can exercise a large degree of control, and change quickly at relatively low cost.

The research included developing a simple and highly structured measure of the liberalness-restrictiveness of any particular bilateral. It applied a composite score of each attribute – number of airlines designated, pricing provisions, capacity clauses, route schedules, fifth freedom rights, etc., into a penalty index ranging continuously between zero and unity. The total traffic was expressed as a product of this function, and as a function of the purely socioeconomic variables. This specification necessitated a non-linear estimation process, which converged rapidly and displayed the necessary mathematical conditions.⁶⁸ Several other linear and non-linear methods isolated the regulatory/bilateral influences.

No benefit was gained from the additional complexity of these approaches, either in terms of desirable statistical properties or in usefulness of the results. The model stated above, estimated with a generalized least squares algorithm, offered the best tradeoffs between simplicity, statistical goodness of fit, and an ability to make useful inferences about liberalization policy.

The air freight model served a limited role. A view of air freight as strictly subordinated to passenger traffic, with capacity growth tied to additional passenger volumes, cannot, by definition, simulate air freight as an independent business. Air freight traffic patterns are very specific to the situation. They are governed by the habits of individual shippers, airlines, exchange rates, the demands for specific commodities, consolidator business practices and very unique local circumstances. For example, IATA reports that Japan

⁶⁸ A vector of zero first derivatives, stability, and a negative-definite Hessian.

exchanges 25 percent more air freight with the Marshall Islands than with the United Kingdom.⁶⁹ Very strong and situation-specific conditions govern many air freight markets.

The models yielded statistically satisfactory results. The decisive majority of the coefficients were significant. The signs were as expected; for example, the positive coefficient of the GDP variable shows that large traffic volumes are associated with high levels of economic activity. Restrictive bilateral agreements do constrain traffic.

The r-square measures were weak. The r-square, which ranges from zero to unity, measures the proportion of the total variation of series of interest (passenger or directional air freight by country-pair) that is explained by the model. The low values obtained show that other factors besides GDP, bilateral agreements and other variables explain traffic.

Cross-sectional models of the type developed often have low r-squared's. The models developed in this Study are not atypical. In contrast, a time series model, that evaluates a single process over specific period, can easily develop an r-square exceeding .9. This result, however attractive, in no way credits the underlying research.

The estimation process considered many other variables besides those finally selected. While many different specifications are reasonable, none resulted in such a large improvement in the goodness of fit to generate a cosmetically attractive r-square. The biggest gap in the model likely concerns issues of personal taste. The Nouveaux Beaujolais wine, which is shipped by air in large quantities, is very popular around the world, and part of an annual ritual that "just is." Central America is popular for ecotourists, while Walt Disney World has a unique international identification. It appears that the demand for air travel and air freight depends on a few very important and easily definable quantities, but also on a vast number of very country-specific preferences and customs. While individually small, they are collectively important. They are difficult to model effectively.

Any effort to raise the r-square through a diligent search for *something* that works is poor methodology. The items in question will inevitably be found, but the underlying purpose of the search, and the inevitability of the outcome, make the results trivial, if not deliberately misleading.

⁶⁹ Source: International Air Transport Association, "Freight Forecast 2005-2009", (Geneva, 2005) Page 151.

The research shows that good statistical fit, as indicated by an r-square measure close to unity, is very unlikely. It is in the very nature of commercial aviation; in its financial volatility, the huge variation of economic and social factors throughout the world, and the changing industry structure, that is very complex, and defies any simple modeling or any easy predictability. There was no initial reason to expect it to conform closely to any formal model.

The air freight model did not effectively accommodate the problem of directional imbalances. If traffic volumes and directional ratios were provided by the data, the model assumed that post-liberalization directional patterns would continue. If country-pair data is not available, the model must rely on the regression model to impute directional ratios. The coefficients for the exporting and importing nations are too similar to generate the types of imbalances so prevalent on major trade corridors such as the North Pacific.

The sheer complexity of air freight poses a challenge to any effort to develop a simple, compact model that can accurately depict the consequences of liberalization in any market at all. Such an algorithm must consider the minutiae of the importing and exporting economies, alternate country markets and suppliers, directional imbalances, the availability of belly capacity on passenger aircraft, exchange rates, intermodal services, the consolidation practices of forwarders, and other details. It might even need to address the practices of specific importers and exporters. Air freight services often depend on fifth and sixth freedom markets, or international feed by trucks, so no country-pair or direction should be viewed in isolation. A “bottom-up” approach for air freight, developing forecasts for a single market from a micro-analysis of many variables, both present and historical, is preferable to a “top-down” method that seeks worldwide patterns of behavior.

Other studies and models have examined the consequences of liberalization for a small, localized and clearly defined market. These models can therefore incorporate many details about current traffic volumes, socioeconomic variables, the current level of air service and the applicable bilateral agreements. Their findings reflect a micro-analysis of the different minutiae governing carrier behavior. They are *data-intensive*.

In contrast, the approach outlined above is *data-extensive*. Since it must apply for any arbitrary country-pair, there is no opportunity to assemble detailed economic data and calibrate a model for a specific market. Rather, it uses a relatively small amount of data for a particular country-pair. However, it considers over a thousand country-pairs, spanning a huge range of conditions. The very diversity of the sample supports a model of extremely wide applicability. However, this versatility comes with a penalty. The predictions will be less accurate, and less focused to the unique circumstances of a market, than a traditional route-specific before liberalization-after liberalization analysis.

The **Economic Impact** of
Air Service Liberalization



V. FINDINGS AND CONCLUSIONS

The principal findings are outlined in the Executive Summary Section of this study. There is little doubt that liberalization of aviation bilateral air services agreements, and the deregulation of domestic aviation markets, has brought substantial benefits to economies and consumers. For these reasons, the vast majority of world governments have given either explicit or implicit support for the concept, if not always the practice of liberalizing air service.

Our research, and the design and development of the economic model (reviewed in Section IV), lead to the conclusions that:

1. Liberalizing bilateral air service agreements (ASAs) can generate significant gains, worldwide, in terms of expanding economies and creating employment.
2. Even gradual expansion of rights under ASAs can lead to significant gains for carriers, consumers, and the communities at large, e.g. the recent U.S.-China agreement.
3. There is a continuing opportunity for governments of the world to liberalize air services, and thereby expand their economies and create jobs for their constituents. Our model simulation of the scope of the change that would take place if 320 ASAs were fully liberalized produced economic benefits almost as large as the GDP of Brazil.
4. A U.S.-European Union First Phase Air Transport Agreement would free an additional four major country-pair markets, i.e. the U.S. to the U.K., Spain, Ireland, and Greece. Such an agreement would generate an additional 117,000 jobs and \$7.8 billion between the U.S. and the U.K. alone.
5. Market fragmentation is increasingly offering non-stop opportunities to consumers between countries and cities where traffic would have been insufficient 10 years ago. Moreover, longer-range aircraft are driving this fragmentation to connect points almost halfway around the world.
6. The creation of the Single Aviation Market in Europe in 1993 has been one of the single most prominent success stories in aviation deregulation. Traffic post 1994 ultimately grew at average rates that were double those of pre-1994 years.

In light of the above, it is evident that the continued education of the world community on the benefits of free trade in aviation is a worthwhile undertaking.

The **Economic Impact** of
Air Service Liberalization



APPENDIX A: THE INTERNATIONAL AVIATION FRAMEWORK

A. INTRODUCTION

This study has examined the effects of political and institutional restrictions on international air service. While these constraints vary widely by nation, market and city-pair, most originate from the **bilateral air service agreements** and the associated regulatory machinery that governs international air commerce. This Appendix describes the political and regulatory institutions of international aviation; their history, structure, and ways in which they can limit the free flow of people and goods. The fundamental issue in this study is that commercial aviation is one of the very few sectors that has been exempted from the principles of economic liberalism, free trade and atomistic decision making by the market.

B. FREE TRADE, PERSONAL FREEDOM AND COMMERCIAL AVIATION

Personal freedom and economic efficiency require a free flow of resources (people, capital, land, commodities, etc.) between alternate uses. Most nations have therefore adopted liberal economic policies that allow and encourage individuals, and groups of individuals, to develop their opportunities to the fullest. While tariff and non-tariff barriers are widespread, most countries extend these freedoms to international trade, where **any activity is permitted unless specifically forbidden**.

While embracing the ideal of economic freedom, all societies have accepted in principle that certain constraints on individual liberties are reasonable and necessary. Such limits may curb abuses of power (e.g. the legal system and the laws that regulate common behavior), eliminate socially destructive activities (trading in recreational drugs or explosives) or promote collective security (military conscription). Others assist members of the society judged unable to make sound decisions (compulsory school attendance for minors), protect the weak (rules reserving certain seats on rapid transit systems for sick or elderly persons) or direct resources to activities that could be overlooked by individual decision makers (assessing taxes to support public programs). Sometimes, individual liberties are curbed in order to raise or stabilize incomes of particular groups (rules restricting free trade in agricultural products). While such rules are universal, they are purely exceptions to a wide degree of freedom available to the inhabitants of virtually all nations, including those under even the most rigid centralized planning.

Aviation is an exception. Political and legal interference in the free flow of civil aviation opportunities has often been embraced in many parts of the world. Commercial airlines have historically been viewed by governments as playing an important role in national defense and political sovereignty. Their special strategic role ostensibly made them too

important to be governed by market forces. Furthermore, any industry that so readily “slipped the surly bonds of earth” could pose clear safety issues, which might be undermined if operators were exposed to market pressures. These concerns serve as the basis for a worldwide legal framework that is still quite intrusive.

Even well before the Second World War, commercial aviation had proven its potential. It was used for premium air mail. Several nations used air transport to integrate their far-flung colonial holdings. Aviation had proven crucial in both world wars. The lack of any worldwide regulatory framework posed a challenge to all nations. In 1944, delegates met in Chicago to establish a mechanism for further expansion.

C. THE CHICAGO CONVENTION AND BILATERAL AIR SERVICE AGREEMENTS

The Chicago Convention of 1944 laid down the current framework for international aviation. The Convention saw a very close association between national governments and the airlines that would operate the international services. In the immediate postwar era, most airlines were owned by their respective governments, and were considered to play important roles in national defense, “showing the flag” by operating high profile but money-losing routes, and serving as important tools of foreign policy. The very high fares made them largely unimportant as a mode of transportation. Their roles of generating income as businesses and fostering economic development in the communities they served also were largely irrelevant.

The Convention stipulated that two nations, seeking to be linked by commercial services, would negotiate the terms through concluding a “bilateral air service agreement” or “bilateral.” This would specify the conditions under which the proposed services would operate, in terms of the privileges granted by either signatory country to the airline or airlines of the other party. The agreement would cover such items as:

- The allowable routes that could be operated. This could range from a general statement such as “any point in Country A to any point in Country B” to an exhaustively detailed specification of individual airports, and what points could or could not be combined on a particular flight and in what order.
- Whether the flights between countries A and B could involve third countries. The agreement would often state that cities in third countries could be served only as enroute stops (“Intermediates”) on flights linking nations A and B, or by flights that continue onward after operating the A-B or B-A sectors (“Beyonds”).⁷⁰ In many instances, the bilateral agreements specify in meticulous detail what services could be operated, whether the airline(s) can carry revenue traffic on such flights, what

⁷⁰ An airline of country A seeking to operate a flight from A to B and on to nation C would require that both the A-B and A-C bilateral agreements would permit the service.

combinations of intermediate/beyond points are permissible, frequency restrictions and other minutiae.

- The number of airlines that each country may designate to the international services.
- The capacity that the airlines of each country could offer.
- A method for setting fares on the route. The agreement would specify the conditions necessary for a fare proposed by the airline of one country to become operative.
- Various “doing business” issues such as repatriation of currencies, the ability to select handling agents at foreign airports and use of computer reservations systems.

Once the two nations have concluded the bilateral agreement, each country is permitted to select the airline or airlines to operate the routes. This capability is considered an important expression of national sovereignty. Some agreements do restrict these choices. Virtually all bilateral agreements allow a nation to designate only those airlines that can demonstrate that they are corporate citizens of that country. This requires that they be substantially owned and under effective control by nationals of that country. This rule reflects the traditional identification of airlines with specific countries; a situation prevailing when the Convention was signed. It does not accommodate a regime where airlines are an industry “like any other,” with multinational ownership, control and operations.

The Chicago Convention framework clearly distinguishes between international and domestic services. Domestic services are strictly a matter for the respective national government. Virtually all countries prohibit foreign airlines from offering purely domestic services. They may, however, allow foreign operators to operate international flights to third countries, such as Singapore Airlines’ Los Angeles-Tokyo-Singapore route.

The Chicago Convention and the underlying bilateral agreements have become increasingly controversial. The next section summarizes how this machinery can limit international aviation.

D. BILATERAL AGREEMENTS - ISSUES

The framework of the Chicago Convention has proven to be very durable and flexible. It can allow a wide range of market regimes, from highly restrictive agreements with rigidly defined descriptions of allowable city-pairs, a precise definition of allowable capacities and frequencies and intrusive pricing methods; to the very liberal “open skies” agreements that allow free entry of airlines of either signatory nation to any route, unrestricted capacity, and full pricing freedom.

The system of bilateral agreements poses a growing obstacle to the full development of worldwide air commerce. The shortcomings originate from three sources:

1. THE CONTENT OF THE AGREEMENTS

Most bilateral agreements constrain the routes that airlines may fly, the number of airlines that could compete, their capacities and the rates they may charge. The agreements may rule out some otherwise viable services, perpetuate certain inefficient services, and deprive the airlines of the flexibility needed to manage. Sometimes, the relevant airlines may fully recognize the need for changes to the agreement, but the timing will be subject to the willingness of governments to make changes.

2. THE ASSUMPTIONS UNDERLYING THE FRAMEWORK OF AGREEMENTS

The machinery laid out in the Chicago Convention assumes a close identification between an airline and a nation state. Every airline operating international services is assumed to be closely associated with one nation through ownership and control by nationals. This perpetuates a fragmented and often inefficient industry structure, because an airline seeking foreign capital or a foreign merger partner could lose the ability to operate international flights. A country usually cannot designate a foreign country to exercise the rights it has obtained through bilateral negotiations. While commercial aviation is arguably among the most cosmopolitan and outward-looking industries in the world, its entities cannot evolve into genuine multinationals.

Many leading international airlines have joined strategic alliances such as the Star Alliance, SkyTeam and oneworld. These associations include airlines from throughout the world, and allow their members to operate a largely seamless, self-feeding global network. They increasingly coordinate their products on a worldwide basis, involving dozens of individual countries. The Chicago Convention framework, which operates on a country-pair basis, is increasingly unable to accommodate the multi-airline alliances.

3. THE IMPACT OF THE BILATERAL FRAMEWORK AIRLINE-GOVERNMENT RELATIONS AND AIRLINE BEHAVIOR

This issue is arguably the most complicated aspect of the current framework. Restrictive bilateral agreements must be viewed not merely as static barriers of trade precluding certain flights, and imposing a degree of friction on market growth, but as active features of the market landscape. They have a dynamic impact on the market, creating a partnership between governments and airlines, and affecting the competitive advantages of different airlines. Airlines often behave differently in a restricted market, creating a host of distortions.

The system of bilateral agreements has given for-profit airlines a form of economic protection backed by the full coercive powers of the state. It often allows, even encourages, airlines to block specific competitors or services; not to the benefit of the economy, the national interest, or personal safety, but for airline managers, shareholders and employees. It can foster an unwholesome relationship between governments and the airlines they are protecting.

This rationale was valid for the years immediately following World War II. Technological advances have dramatically lowered the cost of air travel, and it has since expanded far beyond the limited role foreseen in the Convention. The widespread privatization of airlines, while far from complete, further weakens the close government-carrier relationships that governed the industry in the 40's and 50's. Commercial aviation has become a for-profit industry "like any other," and no longer requires a pervasive system of economic regulation. Most importantly, the emergence of mass travel, and the widespread use of air freight for high priority shipments, has created a huge group of new stakeholders: the users. With users of different communities either well or poorly served by airlines, bilateral agreements have become an important factor in regional economic development, and a source of dissension between the have- and the have-not communities.

Despite these changes, the current framework still requires a close association between airlines and governments. An airline wishing to begin an international service must obtain the permission of the national government. If no bilateral agreement exists, that government must approach the government of the other nation to request bilateral negotiations. That nation in turn will seek input from its own airlines as to the ideal terms of the agreement. If its airlines have no interest in obtaining parallel rights, or have no "wish list" of their own, the effort could easily falter at this stage. In some cases, it will simply be unable to obtain the rights it seeks. In others, an airline will not propose to serve a desired route, since it may view the pursuit of such rights as inevitably futile.

- The horse-trading of bilateral negotiations, as envisioned by the Convention, implicitly defines the "balance of benefits" in a very narrow fashion. There is a tendency to consider only the airlines as stakeholders and to neglect the broader needs of passengers, shippers, and others who depend directly or indirectly on high quality transportation. Government air service policy officers are fully aware of the impact of air service on regional development. However, it is very difficult to incorporate an economic development role into any bilateral negotiating position, or to define what negotiators actually seek. Regional economic concerns are often overlooked in this vacuum. The interests of airlines, and the benefits and costs of different tradeoffs, can usually be estimated with considerable accuracy. The negotiating mandate is usually some variation of "get as much as possible for our side, and give as little as necessary to their side."
- Airlines can easily estimate the impact of any change in an air service agreement. A drop in profits that would result from allowing a foreign carrier unreciprocated entry to a city may be far smaller than the economic benefits the new flight would bring. However, they would be borne entirely by a strong and sophisticated entity that could raise a powerful resistance. The benefits, while much larger, are diffused across many individuals. On a per-person basis, they would be too small to encourage any strong support for the change.

- Good air negotiators are shrewd, tough and highly competitive people. They often judge themselves by their ability to make as few concessions as possible. This sometimes prompts them to restrict foreign carrier operations in their own countries to the fullest extent possible. This means that they will only permit new services by foreign airlines if it is a necessary step for obtaining rights for their own carriers.
- The commercial sensitivity of bilateral agreements and the manner in which they help or hinder communities obtain air service makes them potentially very controversial. Some U.S. negotiations are accompanied by intense lobbying, placing the persons and institutions involved in international aviation in an unwanted limelight. As a result, many countries do not publicize even important information about certain bilateral agreements. The communities then do not even know the nature of the air service constraints that they face.
- Airlines often compete for the authorities granted by restrictive bilateral agreements. Many airlines are closely identified with certain communities or interest groups. The allocation processes can make political pressures almost inevitable.
- In some circumstances, aviation negotiators will conclude a restrictive agreement, but also incorporate a flexibility to accommodate market growth. For example an agreement might allow only one airline from each nation to serve a particular route. However, as traffic increases, negotiators may wish to permit greater competition. One means is to allow further designations after the traffic attains a certain level. While well meaning, such measures are often totally anti-competitive. The two airlines operating the route are fully aware of the provision, and would not welcome further competition. They have a strong incentive not to develop the route; to manage fares and capacity so that traffic remains just below the threshold. As a duopoly, they can tacitly coordinate their behavior to ensure that traffic never reaches the threshold. Since the bilateral is already very restrictive and likely bars service for routes that could support it, such a distortion on one of the few city-pairs with “competitive” flights greatly exacerbates the adverse consequences of the regime.
- The above discussion has centered on how restrictive bilateral agreements impede market **growth**. However, a well functioning market by definition can redirect capital from unproductive uses to superior ones. This means that it must also accommodate **shrinkage**. If a scarce authority has a “use it or lose it” provision, an airline may be reluctant to eliminate service even if a particular market is no longer profitable. It would permanently lose the authority. It therefore has an incentive to continue serving a money-losing market rather than reallocating resources to an unrestricted and profitable use. The airline crisis that followed the terrorist attacks on New York and Washington has highlighted the industry’s financial vulnerability. Restrictive bilaterals not only impede market entry; they also constrain market exit. They can exacerbate the consequences of any market shocks.

E. CONCLUSIONS

The bilateral agreements that govern international air commerce are a growing anachronism. The agreements are based on a small, fragile group of quasi-government entities playing a diplomatic and military role, with negligible commercial significance. The agreements, and the Chicago Convention framework are at variance with the development of commercial aviation at large, where airlines must maximize operating efficiencies, and shareholders demand an acceptable return on their investment. The bilateral agreements are also inconsistent with much of the current thinking on the importance of free trade, and the appropriate roles of government and for-profit private industry.

The bilateral agreements cannot be viewed only in a static sense, of allowing certain flights but forbidding others. Rather, the institutional machinery distorts the relationships between government regulators and airlines. It often results in very different patterns of airline competition, and gives one airline a strong influence on the actions of another. If the airline sector is inherently oligopolistic, such interdependencies have the capability of distorting competition, even in the absence of pervasive regulation of international markets.

The purpose of this Appendix has been to describe the system of bilateral agreements. As demonstrated by the case histories, no generalizations are possible. The Chicago Convention and the associated bilateral framework can support both very liberal and totally oppressive agreements. In some cases, the agreements pose a severe impediment to trade. In other markets, the bilateral agreements are virtually irrelevant; no airline wishes to serve the particular country-pair. The relationships between the airlines and the regulators vary between nations. They range from the airlines' *de facto* control of the negotiations, to a strict arm's length and sometimes adversarial association. These variations make the goal of this study, that of quantifying the economic value generated by liberalizing bilateral agreements for any arbitrary country-pair, particularly ambitious.

APPENDIX B: GLOSSARY OF TERMS

Bermuda Agreement

In 1946, the United States and the United Kingdom negotiated one of the first air service agreements under the Chicago Convention. The agreement, signed in Bermuda, included capacity and pricing controls. According to the standards of 2006, it is a restrictive structure. The so-called Bermuda I agreement has served as a prototype for many subsequent agreements. In 1977, the Bermuda II Agreement, again involving the United States and the United Kingdom, was similar to its predecessor in most respects, but included restrictions of multiple designation, and provisions for capacity and all-cargo services.

Bilateral Air Services Agreement

(See Appendix B, International Aviation Framework)

Catalytic Impacts

Catalytic impacts represent a fourth, and often difficult to measure, benefit to a particular economic activity. The continued existence of the activity could cause long term changes in the society's expectations. People observe the activity, assume its continued existence, and modify their behavior accordingly. They then pursue new interests which would not be possible in the absence of the original stimulus. For example, the presence of an airport with commercial air services may make the community more attractive as a location for a branch plant. Potential exporters could be offered low air freight rates to overseas destinations, which would make them newly competitive. Neither the new businesses nor the exporters need have any apparent relationship to commercial aviation, except as customers.

Most traditional economic impact analyses allude to catalytic effects, but are unable to quantify these benefits to any meaningful extent. Economic impact studies, which focus on direct/indirect/induced benefits, follow a static and timeless perspective. Something, usually the facility or service being studied, injects funds into an area from "outside." The region responds immediately with changes in expenditure, but the structure of expectations and the economic base remain unchanged. The catalytic impacts represent a dynamic adjustment, in which the underlying fabric of the region adjusts over time in response to the activity.

Code Sharing

Code sharing allows two or more airlines to market their services as a single entity. One airline can then sell tickets to points it does not actually serve, and contract with other "friendly" carriers to operate routes on its behalf. For example, U.S. Airways has a code sharing agreement with Chautauqua Airlines that allows it to sell T.F. Green-Elmira, N.Y., transportation on a single ticket and under a through fare. A passenger will fly by U.S. Airways to Philadelphia, and connect to a Chautauqua Airlines flight to Elmira. The service on the latter segment is branded to match the U.S. Airways product as closely as possible.

The passenger might travel to Washington Dulles on Air Wisconsin, thence to Copenhagen on SAS, and continuing to Berlin on Lufthansa all under the "UA" code.

Computer Reservations Systems

Computer reservations systems (CRSs) are the intermediary between the consumer and supplier, often operated by a travel agent to construct itineraries in response to passenger requests. They follow a series of algorithms to rank the competing routings, price, etc., and display them to the prospective passenger. The algorithms place a strong weight on connections that do not require an enroute change of airline. They weight the two-digit codes for the airlines operating each segment to determine if the routing involves only one airline. Where code sharing occurs, each flight bears several airline codes. For example, the Washington-Copenhagen leg will bear the code of its own operator SAS ("SK"), United ("UA") and Lufthansa ("LH").

Deregulation

The Airline Deregulation Act in the U.S. took effect in 1978. It abolished all governmental controls on market entry and pricing. Under the previous regime, airlines were prohibited from serving any market unless specifically allowed to do so by the Civil Aeronautics Board (CAB), a federal agency. Prices were strictly controlled. No new airlines could be established, unless they served purely intrastate routes (where federal jurisdiction did not apply) or operated very small aircraft. Unprofitable carriers were strengthened by favorable route awards. Federal regulation resulted in an industry where carriers competed on "frills" (e.g. in-flight service, crew uniforms) and scheduling rather than on price. Regulation spawned a paternalistic corporate culture and employee expectations for high incomes and job security.

Direct Impacts

The "Direct Impacts" arise immediately from the conduct of those entities performing the activity in question. The business operating an activity whose impact is being measured will have persons on its payroll and will purchase goods and services from suppliers. Both components are immediately attributable to that business in a full legal and accounting sense. The expenditures occur on-site, and the items purchased are clearly and immediately related to the core business. For an airport, the "direct impacts" would include the activities of airlines, the airport itself, forwarders, ground handling agents and other firms whose principal business involves commercial aviation. A "direct impact" could include purchases of fuel for deicing aircraft by a handling agency.

Enplaned-Deplaned Traffic

Traffic that gets on board at a given point, and exits the aircraft at the destination point is and enplaning and deplaning passenger traffic. This is in contrast to an on-board passenger that may have been on the flight when it arrived and will continue on the same flight as the enplaning passenger. The latter would be called a through, rather than an enplaning passenger.

Freedoms of the Air

The Chicago Convention of 1944 provided the framework for today's system of bilateral Air Service Agreements (ASAs). The convention identified the five freedoms of the air that defined the terms for future negotiations of air traffic rights.

First freedom rights or "the right of innocent passage," is the right to fly over the other contracting party's territory.

Second freedom rights provide for the airline(s) of one contracting party to stop in the territory of the other contracting part, for technical reasons only. No traffic is allowed to enplane or deplane.

Third & Fourth freedom rights allow the carriers of two contracting parties (countries) to carry traffic between the two countries.

Fifth freedom rights allow the carriers of one contracting party to carry traffic destined for a point intermediate, or beyond the territory of the other contracting party. In either case, the service must originate within the territory of the contracting parties.

Sixth freedom traffic is that traffic which originates behind the gateway of one of the contracting parties, and is destined for the territory of the other contracting party. For example, hub carriers in Europe often carry traffic from points in the Middle East or Gulf States to a hub in Europe for the sole purpose of moving that traffic from its origin to another destination in Europe or North America. The practice is common, often creates contentiousness, and is not covered by bilateral agreements.

Seventh freedom rights allow the carriers of one contracting party to carry traffic between two countries without any connection to the home country. Seventh freedom operations often take place among global all-cargo air carriers and are very infrequent in passenger operations.

Full-Time Equivalent Position

A quantity of employment corresponding to a full-time position. One full-time employee or two half-time employees would account for one Full-Time Equivalent position.

Gross Domestic Product

The "Gross Domestic Product" ("GDP") measures the total value of goods and services produced in a country during a specific period of time. It includes exports and dividends paid to foreigners, but excludes imports and dividends or interest received from outside the entity. The GDP will therefore not necessarily agree with the total value of consumption. The GDP is the most common measure of the level of economic activity within a particular area.

The size and strength of an economy, as measured by the GDP, is an important determinant of many sectoral variables throughout an economy, including air traffic. It

was therefore considered an “independent variable” for the Air Route Model; a factor that can vary freely and autonomously, and which will be reflected in the “dependent” variables of air traffic. In reality, many economic quantities influence traffic personal income, wealth, corporate profits, imports, exports, etc. Those variables are so closely associated with the GDP that the estimation algorithms cannot disentangle their separate influences.

Indirect Impacts

The “Indirect Impacts” involve the supply chain of the businesses or entities conducting the primary activity. The airlines at an airport may purchase goods or services, such as stationery and office supplies, from a local business. The items purchased can be used for many purposes besides commercial aviation, and would usually occur off-site. The materials support the primary aviation activity, although they could be used for many purposes.

Induced Impacts

Many persons and businesses will receive revenues and income from the direct and indirect expenditures. They will spend a portion of these gains on goods and services. The recipients of these expenditures will, in turn, spend a portion of them as well. The process will continue indefinitely, with each successive round of spending smaller than the one preceding it. The sum of these expenditures will be a multiple of the original injection of funds from the direct and indirect expenditures. The process through which the successive impacts ultimately exceed the original stimulus is termed the “multiplier effect.” For example, airline employees may spend a portion of their incomes at a furniture store. The employees of this store will spend some of the additional wages at a restaurant. The furniture store and the restaurant have no business relationship with the airport, but still benefit by its presence.

Integrator

The “Integrators” or “integrated cargo carriers” include companies such as FedEx, United Parcel Service and DHL. They perform all steps of the shipping process in-house pickup and delivery, tracing, marketing/sales development, intercity transportation, insurance, customs brokerage, etc. This is in contrast to the commercial airlines, which use many outside specialists to perform each of these functions.

Legacy Carriers

The “legacy” airlines include American, Continental, Delta, Northwest, U.S. Airways and United. They were established in the 1930's to carry air mail on government contract. Until 1978, they operated under the strict control of the Civil Aeronautics Board. They inherited the cost structure, management practices and employee expectations of a regulated industry. The legacy airlines operate large hub-and-spoke networks, which offer one-stop connecting service between a large number of even light-volume city pairs. While their virtually everywhere-to-everywhere networks offer major revenue advantages, the operational complexity add to costs. The legacy carriers have encountered challenges cutting their costs so as to be able to compete with the low cost carriers. The solution has often been to restructure under the protection of chapter 11 of the bankruptcy code.

Low Cost Carriers (LCCs)

The Low Cost Carriers (LCCs) include Southwest Airlines, AirTran, Spirit Airlines, Frontier Airlines and jetBlue. These airlines came into being and grew outside of the protective umbrella of the Civil Aeronautics Board (CAB), and therefore did not inherit the cost structure and inefficiencies that were embedded in the LNCs. Southwest began by serving only intra-Texas markets. Since it operated solely within Texas, it was not subject to federal jurisdiction. It expanded to interstate routes once the United States deregulated interstate aviation in 1978. The other LCCs are among many airlines that started operations after 1978; most others have failed.

While the network and fleet strategies of the different LCCs vary, all share a tight focus on costs. All operate a simplified network, a fleet of one or two aircraft types, work rules that permit high productivity and a basic product (limited inflight service, no through ticketing with other airlines, a small number of fares for a specific trip, etc.). Within these limits, the services do vary some operate hub and spoke services; others offer business class, etc.

As air travel becomes an increasingly homogeneous and price-sensitive commodity, the low fare airlines have grown at the expense of the legacy airlines. The legacy carriers have been increasingly forced to lower their costs, and emulate many of the attributes of the LCCs to survive.

Memorandum of Understanding (MOU)

Two nations with an effective Air Service Agreement may wish to make incremental modifications to the regime. Such changes could include allowing additional capacity, resolving an ongoing dispute, clarifying any ambiguities or definitions, or clarifying items that had been left "to be agreed" in the original negotiations. A total renegotiation of the agreement could be procedurally difficult for either party, or both nations might be satisfied with the overall framework. Under such circumstances, the countries would agree to retain the original agreement but amend it as necessary. The results of the negotiations would be summarized in a Memorandum of Understanding, Record of Consultations, Exchange of Notes or similar mechanisms. Although the parties agree to retain the original agreement, the negotiations can be very complicated and important.

Open Skies

An "Open Skies" air service agreement creates a very liberal market between the two signatory nations. It allows any number of airlines from either nation unlimited rights to fly between any city-pair involving the two countries. The airlines can, moreover, carry revenue traffic to and from any third countries, subject to appropriate provisions in the other agreements. An open skies agreement has no restrictions on capacity or code sharing. Fares proposed by any airline of either country prevail unless both nations oppose them. The open skies agreement is often viewed as the ideal form of liberalization because it encourages the full play of market forces.



The Economic Impact of Air Service Liberalization

Most such agreements do not allow “cabotage” rights, in which one airline of the signatory nation could carry wholly domestic traffic of the other country. Some countries such as the United States view an open skies agreement as a prerequisite for antitrust immunity. The number of nations embracing the concept of open skies has grown rapidly, but most recognize such agreements as pure a waypoint on the route to a truly international and multinational industry.

Origin-Destination Traffic

Traffic that is originating its trip in a given city, and is destined for a second city on the flight. This is what is referred to as true Origin-Destination traffic (O&D) as opposed to the traffic on-board the same flight, much of which might be destined for a city beyond the first stop of the flight, or have originated at a city behind the origin of the flight.

R-Square

An econometric or regression model expresses one series of data in terms of one or more other series. For example, it may express T.F. Green’s traffic to Florida in terms of average fares for the route, airline capacity, Rhode Island population, average incomes or other variables. It is very useful to examine the historical values of the traffic, and compare them to the projections provided by the model. In some years, the model may over-estimate traffic; in other years, it may predict too few passengers. It will never provide an exact fit. However, some models provide a closer fit than others.

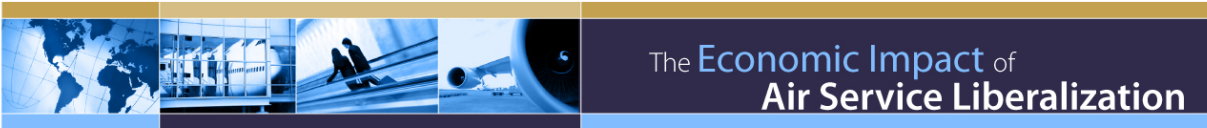
The r-square measures how well a particular model explains the given series of data. A value close to one shows that its predictions are very close to the actual values; a value close to zero indicates that the model does not explain the series very well.

The r-square refers only to the ability of the model to explain the data actually used to estimate the model. It does not necessarily show that the model is suitable for forecasting. The r-square is only one measure of the quality of a model. Of much greater importance, the model should provide valid and intuitively sensible predictions about how changes in one variable will cause changes in another. A model that suggests that air traffic will grow if GDP falls and fares rise should be swiftly rejected whatever the value of its r-square.

The r-square is a simple and easily visualized measure that often substitutes for genuine analysis. In many situations, there is so much random “noise” that the variables are inherently difficult to predict. The r-square could be very low even in a fully valid model. However, it is always possible to develop a totally invalid model with a high r-square.

Regression (or Econometric) Model

A regression model uses a simple linear equation to express one variable in terms of one or more other variables. It uses various criteria to estimate the terms of the equation to yield the best “fit.” For example, a regression model could express passenger traffic from Boston to Florida in terms of the number of daily nonstop seats and the average fare. In this example, the number of seats and the fare are considered as being given, and the traffic is then determined through its relationship to the two variables. The prediction is



usually imperfect; some random event such as a hurricane in Florida, temporary deep-discount fares to a competing destination or a recession may cause the model to under- or over-predict. There are many measures to judge the quality of a model.

If future values of the seat capacity and fare are known, this model will provide forecasts. The forecasts will only be valid if the relationships between the variables that are estimated from past data remain valid in the future. For example, a future change in competitive market fares could change the future Boston-Florida results in some systematic manner. This problem can be avoided by choosing the correct variables in the equations.

Yield

"Yield" is an aggregate average measure of the cost of air travel. It consists of the total revenues divided by the sum of the miles traveled by every paying passenger. The units of the measure are dollars per revenue passenger-mile. The measure is sometimes used in combination with the "fare." The fare is the dollars paid per passenger. Fares for a long distance journey are usually higher than for a shorter trip. However, the fare usually rises at a lower proportional rate than the increased distance. The yield on a long distance market is therefore usually lower than for a short distance city-pair, even if the fares are higher.



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