APPENDIX B

AIRLINE INDUSTRY OUTLOOK AND INFRASTRUCTURE NEEDS

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The worldwide airline industry has become accustomed to strong growth in both passenger and freight traffic throughout the jet era. Spurred by productivity gains from rapid technological advances in aircraft, navigation, and air traffic control, the cost of air travel has declined an average of 2.2 percent per year in real terms throughout the 1960 to 1990 period. The combination of falling real fares and increasing Gross Domestic Product has lead passenger airline traffic to grow at an average annual rate of 9.5 percent and scheduled freight traffic to grow at an average annual rate of 11.7 percent over the same period.

Growth, however, has not been uniform throughout this period. Figure B-1 shows the growth rates of passenger and freight traffic in each decade since 1960. The figure also contains the growth rates for the 1990 to 2001 period forecast by the International Civil Aviation Organization (ICAO)[1]. For both passenger and freight, the growth rate in each decade has been smaller than in the previous decade. Similarly, the forecast growth rates are smaller than those seen in the 1980s. Passenger-kilometers are forecast to grow at an average of 5 percent per year whereas they grew at an average of 5.7 percent in the 1980s. Similarly, freight tonne-kilometers are forecast to grow at 6.5 percent per year where they grew at 7.3 percent in the 1980s.

Part of the growth in passenger-kilometers throughout the 1960 to 1990 period has been because of increasing average trip length. Passenger trip length is expected to continue to increase in the 1990s, so that the number of passengers carried will not increase as much as passenger-kilometers. In considering infrastructure needs, the number of passengers carried is more likely than passenger-kilometers to indicate the need for terminal facilities. ICAO forecasts an increase in passengers carried of 4.0 percent, a drop from the 4.5 percent average rate of the 1980s. Similarly, the number of passengers per plane has increased throughout the 1960 to 1990 period, both because of a move to larger aircraft in the 1960s and 1970s and more recently because of an increase in average load factor in the 1980s. Average aircraft size is not expected to change much in the 1990s, but average load factors are expected to increase about 2 percentage points. Because of the increase in average passengers per aircraft, aircraft departures have not increased as fast as passenger kilometers in the past, nor are they expected to in the future. Aircraft departures are forecast to increase by an average of 2.0 percent per year in the 1990s, a drop from the average of 3. 1 percent per year in the 1980s.

Both the growth rates and the size of the airline market vary substantially by region of the world. Figure B-2 shows the growth rates for 1980-1990 and the forecast growth rates for 1990-2001 in the major regions of the world. These regional figures exclude airline activity in the former Soviet Union. The economic turmoil and political uncertainties in this region make airline forecasting an almost purely speculative activity.

Two strong patterns are evident in Figure B-2. First, just as overall worldwide growth is expected to slow, growth rates are forecast to decline in Latin America and the Caribbean, North America, the Middle East, and Europe. The largest rate declines are forecast for North America and Europe. Growth rates are expected to remain about the same in Asia/Pacific and Africa. Second, Asia/Pacific had by far the highest growth rate in 1980 to 1990 and is forecast to continue to have by far the highest growth rate in the next decade.

Growth rates, however, are only part of the story because the size of the airline markets across these regions. Focusing only on rates can make it easy to miss where the largest absolute growth in traffic will occur. Figure B-3 shows the passenger-kilometers in each region in the 1980 to 1990 period and those forecast for the 1990 to 2001 period. As might be expected from the sustained high growth rate, Asia/Pacific is expected to show a substantial increase in passenger traffic. However, because both North America and Europe are such large airline markets, they are expected to have substantial growth despite the declining growth rates. Indeed, the increase in passenger-kilometers in North America is forecast to be larger than the increase in Asia/Pacific. In examining infrastructure needs and potential shortages, both the absolute increase and the rate of increase need to be considered.

Throughout the world, in every region, international traffic is expected to grow faster than domestic traffic. Worldwide domestic traffic is forecast to grow at 4.0 percent per year whereas international passenger traffic is forecast to grow at 6.0 percent. Similarly, worldwide domestic cargo traffic is forecast to grow at 3.6 per year

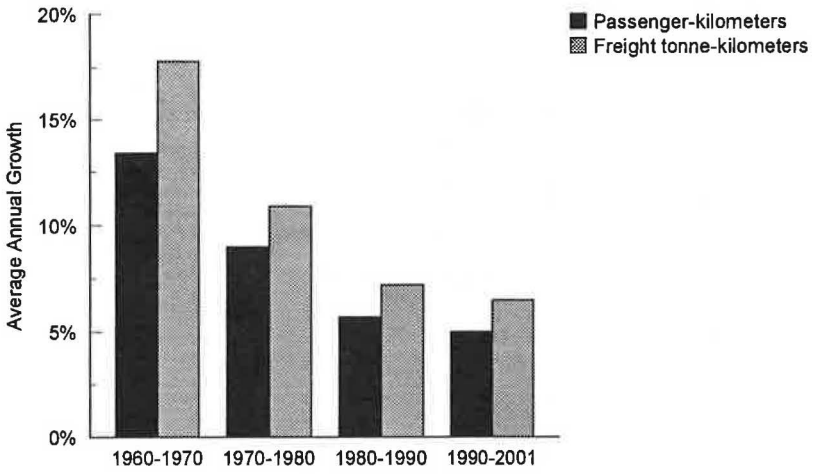

FIGURE B1 Worldwide growth of passenger and freight traffic.

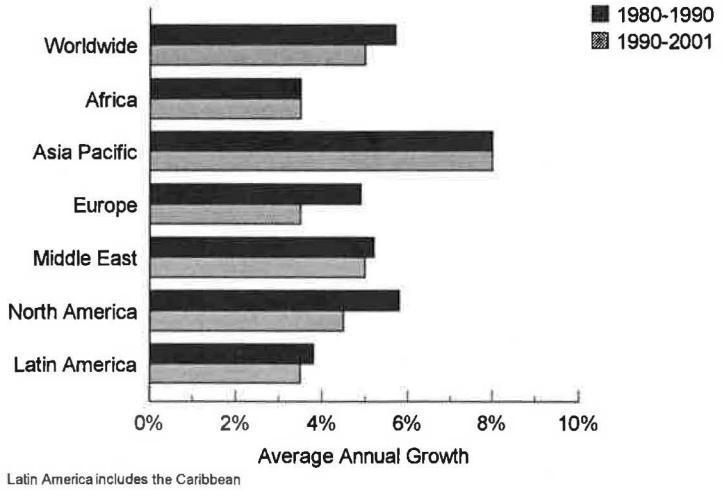

FIGURE B2 Average annual growth in scheduled traffic.

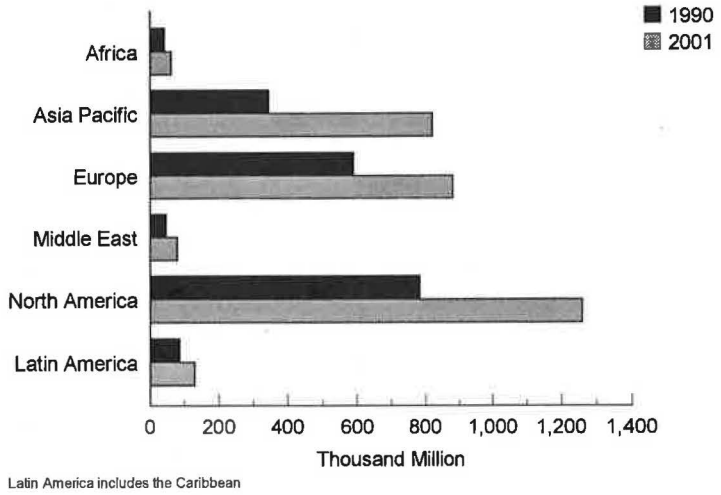

FIGURE B3 Passenger-kilometers, actual and forecast.

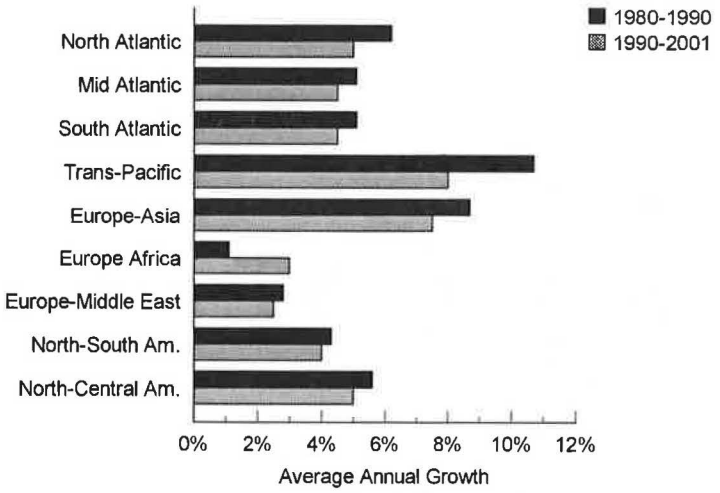

FIGURE B4 Average annual growth in international scheduled service.

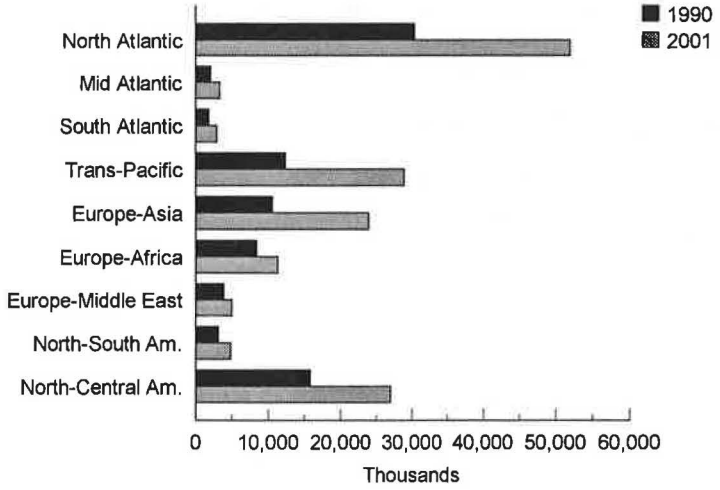

FIGURE B5 Passengers carried in international scheduled service.

percent while international cargo traffic is forecast to grow at 7.5 percent.

Growth rates in passenger service vary across the major international markets. Figure B-4 shows the average annual growth rates in nine major international market areas for the 1980s and the forecast for the 1990s. As is evident in the figure, growth rates are forecast to decline in each of these areas except one, the market between Europe and Africa. However, as Figure B-5 shows, a declining growth rate is still growth and total traffic is expect to grow in all nine markets. Indeed, the North Atlantic market which is often regarded as a "mature" market is forecast to have the largest increase in traffic growth of any major market. The Trans-Pacific market is forecast to have the next highest growth followed by Europe-Asia, and North America-Central America. Growth increases in the remaining markets are all forecast to be much smaller in absolute terms than these four large markets.

These forecast growth patterns, should they actually occur, would mean important shifts in the relative sizes of markets in different regions of the world. As can be seen in Figure B-6, North America would remain the largest market in the world, but its share of world traffic world decline. Similarly, Europe's share of world traffic, which already declined between 1980 and 1990 is forecast to decline further. Asia/Pacific, on the other hand, is forecast to continue to increase its share of world traffic. Indeed, its increase coupled with Europe's decline would leave Asia/Pacific almost as large as Europe by 2001, a dramatic change from their relative shares in 1980.

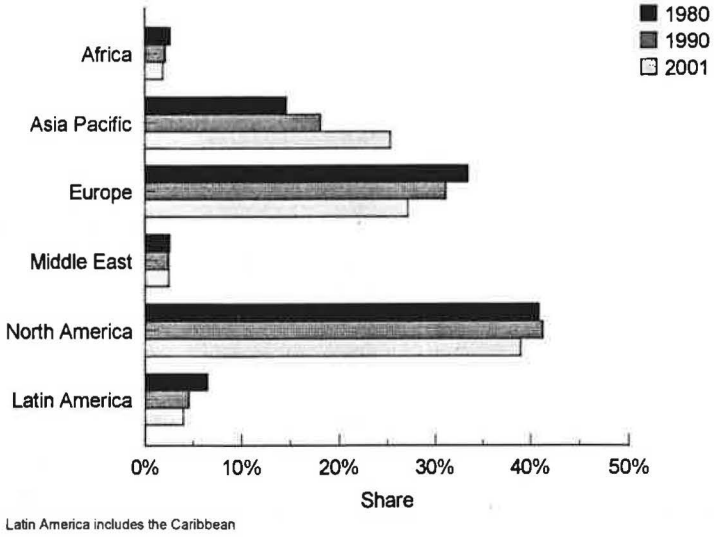

FIGURE B6 Regional share of total traffic.

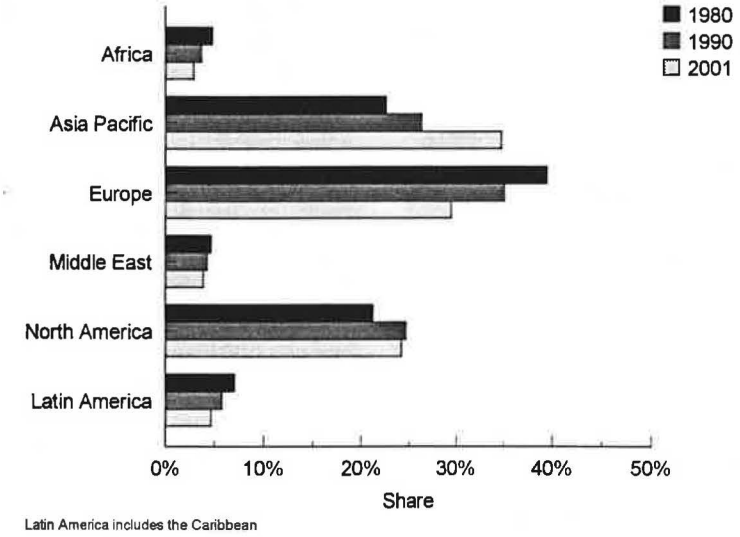

FIGURE B7 Regional share of international traffic.

The regional shares of international traffic are forecast to change even more sharply, as can be seen in Figure B-7. In 1980, Europe was the dominant region with Asia/Pacific and North America about the same size. By 200 1, Europe's steady decline coupled with Asia/Pacific's steady increase result in Asia/Pacific becoming the dominant region for international traffic.

These forecasts for both domestic and international passenger and freight traffic share a common assumption that may call their accuracy Into question. Throughout the growth of commercial aviation, infrastructure in the form of airport and air traffic control capacity has generally been provided in sufficient amounts to allow growth to proceed with few if any restrictions. True, during the past decade there have been a small but growing number of instances of capacity shortages, but by and large, they have not been so severe as to constrain growth on a regional basis. Rather, the airlines have been able to adjust with larger aircraft and altered route patterns so that the effects have been largely to alter development patterns within a region slightly. Because the forecasts for the coming decade are based on the experiences of the past three decades, an explicit assumption in the forecasts is that airport and air traffic control capacity will continue not to be a constraint to growth at the regional level.

There are at least two reasons why this may not be a good assumption and why capacity shortages could begin to constrain growth in the coming decade. The first reason is the interaction between capacity constraints and competition policy. The second is the changing nature of environmental impacts on aviation.

The typical posture of airline managements has been to support additions to aviation infrastructure capacity. After all, if the infrastructure does not grow, neither can the airline industry. Indeed, in the United States at least, complaints from airline managers about infrastructure capacity shortages have been common. Airline support, however, depends on both cost and competitive factors. To the extent that airport additions are becoming more costly, airline support for these additions may decline. Widespread and severe airline losses have eroded the carriers capacity to absorb additional infrastructure costs. To the extent these costs are passed through to passengers, the resulting fare increases could erode passenger traffic, again hurting carrier profits.

Even if airline profits recover and airport capacity costs are kept low, carriers may still oppose specific capacity additions. A capacity shortage makes new entry of a new carrier into a market more difficult and thus can confer an advantage to the incumbent. Slot sales at capacity-constrained airports give some idea of the economic rents earned by the holders of those slots. Were capacity
added to these airports, these rents would be dissipated. Thus an incumbent carrier at an airport must consider only the cost of the capacity addition and the new traffic that might be carried
were the constraints lifted, but also the loss of rents from the existing capacity shortages. It may often be the case that airport expansion favors those who want to enter markets at that airport at the expense of the incumbent carriers. Incumbent carriers frequently have considerable influence over airport expansion decisions, either formally through contractual or lease arrangements such as Majority in Interest clauses, informally through long standing relationships, or when both the airport and the principal incumbent carrier are both partially or wholly owned by the same government. In an increasingly competitive airline market, grandfather rights can be an important competitive weapon that the airlines will be reluctant to see weakened.

Even where there is agreement about the need for airport expansion, the changing nature of aviation environmental considerations may increase the cost of expansion, hinder it, or even prevent it. For years, the aviation community has considered noise to be the primary, indeed typically the only, environmental problem. Noise considerations have reduced airport capacity in some locations by curtailing the hours the airport can operate or by curtailing the use of certain runways even when the airport was open. Noise considerations have also increased airport costs in the absence of expansion by forcing airports to buy nearby land that is affected by airport noise. Indeed, land acquisition and real estate expertise are increasingly important skills needed by airport management. Noise will continue to be a major problem at an increasing number of airports, particularly as runway additions are considered.

Recently, air emissions have been added to noise as an environmental problem confronting aviation. Ground-level emissions from surface transport to and from the airport and from aircraft ground operations are already a problem at some airports in metropolitan areas with high air pollution levels -- the so-called "non-attainment" areas in the United States. As the major industrial polluters and coal-fired electric power plants clean up their emissions, airport-related emissions are likely to command increasing attention from environmental officials and the public. A second potential emission problem is high-altitude emissions from aircraft. Growing concern about ozone destruction and global warming has lead to increased attention to the possible contribution of aircraft emissions to these problems.

Still more recently, water pollution from airport operations, notably runoff from aircraft and runway deicing, has become the target of new regulations and increased environmental concern. It is hardly surprising that aviation is an increasing focus for environmental concerns, if anything, it is surprising that it has taken so long. For example, for years Chicago's O'Hare airport has put the equivalent of over 1,000,000 gallons of untreated pure ethylene glycol into a single river each year. O'Hare is by no means alone in this problem. How many industrial factories could get away with that sort of a waste stream for this long? Clearly aviation is no longer immune to the full range of environmental concerns and will have to face the environmental consequences of its actions just as other industries have for years. As with other industries, preventing or mitigating environmental damage will add to the cost of operations and to the cost of constructing new facilities.

For aviation, the change from considering only noise to facing a full range of environmental concerns will be dramatic. Virtually all of the industry's experience with environmental concerns has been with noise, which is essentially a local issue. A small number of people who live close to the airport are affected by noise. In addition, while these people may be hurt by airport noise, the city in which they live benefits from the airport's activities so that the communities involved face tradeoffs in attempts to alter or curtail airport activities. With the array of environmental concerns broadening, the arenas in which these new battles will be fought could be much different. Airports will increasingly face opposition from national or international environmental groups who are better organized with considerable

experience in such battles and with more resources and more talented advocates than has typically been the case with noise local battles.

Taking another lesson from other industries, airports may also increasingly find themselves in battles where the "tool" used to fight the battle is not the real issue at all. With the Telico dam in Tennessee, the snail darter was not really the issue and with lumbering in Oregon, the spotted owl is not really the issue. In these and many other cases, the goal is to stop a particular project or activity, and laws like the Endangered Species Act are simply the tool judged most effective to achieve that goal. This is an important distinction because it means that resolving the stated issue will not necessarily clear the way for continued operation or a new project. Resolving the stated issue may simply mean that a new and different issue will emerge to take its place.

Confronting national environmental problems will also require a different sort of proactive behavior. Many airports now realize that waiting until a project is proposed to work on noise issues and develop good community relations is far too late. Similarly, with national or international environmental regulation, waiting until the laws are passed to see the potential impacts for aviation is too late. As many other industries have learned, it is far more effective to monitor and help shape environmental laws and regulations as they are being developed than to try to reverse or change them after they begin to take effect. Increasingly, aviation will simply be included in laws and regulations developed for a broad array of industries, as was the case with the stormwater runoff regulations that now govern runoff of deicing fluid in the United States. The danger is that rules which seem reasonable for other industries may have unforeseen adverse consequences for aviation. Unless aviation interests are represented in the rulemaking process, such situations may not be discovered until considerable unnecessary damage has been done, at which point change may be extremely difficult.

The airline industry may also be facing a different world in the future because of an emerging fundamental change in its underlying economics. Throughout its history, the industry has had strong productivity growth because of dramatic technological improvements in aircraft and navigational aids. While aircraft and navigational aids continue to improve and grow more sophisticated, there seems little likelihood of further technological changes so dramatic as to lower the cost of air travel substantially. Indeed, whereas the price of air travel has fallen steadily in the past three decades (with the exception of a couple of brief periods where fuel prices increased dramatically), the ICAO forecasts call for an average increase of 0.5 percent per year in real yields during the 1990 to 2001 period. Capacity constraints and increased environmental costs could increase the price of air travel even more.

For an industry to come to the end of a long period of failing costs as productivity gains gradually slow while regulatory and other costs increase is not a phenomenon unique to the airline industry. Other industries that have gone through such a transition have found it difficult and disruptive. One example is the U.S. electric power industry. Throughout most of its history this industry had failing costs as productivity improved and economies of scale in electricity generation were exploited. By the late 1960s most of these gains had been achieved and n the early 1970s, the combination of slow productivity growth, rising oil costs, and emerging environmental regulations lead to a reversal of the falling cost trend and the onset of a period of rising electricity costs. The electric power industry was slow to realize what had happened,
underestimated the effect of rising electricity prices on consumer demand, overestimated future demand for electricity, and found itself with too much generating capacity on line and under construction. Moreover, utilities found that the new capacity they were bringing on line was higher cost capacity than the plants they were replacing. The result was near chaos in the industry and a rash of financial problems and project cancellations. Business strategies that had proven successful when costs were falling, proved disastrous when costs were rising. To be sure the airline industry is different from the electric utility industry in many important ways. Nevertheless, the conditions that caused such problems for electric utilities appear to be coming to the airline industry and, indeed, may already be here. While these conditions will not likely pose the same problems for airlines they posed for utilities, it is almost certain that these changing conditions will cause the airlines problems that they have not yet had to face.

In sum, the airline industry faces the coming decade with the expectation of continued strong growth, but growth at a slower rate than in the past. To realize that growth, the industry will have to overcome potential infrastructure constraints where the consensus to add capacity may be increasingly difficult to achieve, to face a full range of environmental problems, and adapt to a new underlying economic environment where strong productivity growth from technological progress can no longer be counted on to lower the cost of air travel.

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[1] International Civil Aviation Organization, *Outlook for Air Transport to the Year 2001*, ICAO Circular 237-AT/96, Montreal, Canada, 1992