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Six Long-Term Business and Economic Trends That Will Influence the Air Transportation Industry Through 2025

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Section 1

Introduction

The airline industry has been subjected to a number of shocks in recent years, ranging from an economic recession, the September 11, 2001 terrorist attacks, war in the Middle East, and the Severe Acute Respiratory Syndrome (SARS) epidemic, contributing to several airline bankruptcies and record losses for the industry. Recent descriptions of an industry in chaos result from an understandable focus on individual airlines in the near-term. While the effects on individual airlines (downsizing, bankruptcy) are dramatic and some of the contemplated changes discussed in this paper (foreign ownership, common aviation markets, virtual travel concierges) seem revolutionary, they are the continuation of trends that began over a quarter century ago and will likely continue for the next quarter century.

1.1 Scope

This white paper discusses six long-term business and economic trends expected to influence the United States airline industry through 2025. These trends focus mainly on transportation of passengers by air. Cargo and other aspects of the aviation industry are not the focus of this paper.

1.2 Six Trends

Dramatic changes in the airline industry have resulted from an "evolutionary process" characterized by a number of underlying, long-term business and economic trends. This paper examines the following six trends which continue to impact the airline industry:

1. Deregulation of air transportation
2. Increasing airline productivity
3. More passengers, lower fares
4. Expanded information sharing
5. Movement toward market-based allocations of capacity
6. Expanding role of small aircraft

These trends are often mutually reinforcing, and reflect the influence of broader, non-aviation trends which are impacting the economy at large. This paper explores the historical influence of these trends and identifies how they will affect various aspects of the airline industry, including major and regional airlines, passengers, the general aviation industry, air traffic management providers, and policy makers through 2025.

Section 2

Deregulation of Air Transportation

2.1 Domestic Deregulation of Airlines

The deregulation of domestic air transportation services, meaning the removal of governments from directly controlling the industry to a new role of implementing regulations to maintain competition, developed into a global trend after the United States (US) deregulated its domestic market in 1978.[1] The European Union (EU) created a single, deregulated domestic market in three packages from 1987−1993, and Japan has slowly deregulated airlines since 1986 with most changes being implemented in the late 1990s. Numerous smaller domestic markets outside the EU also initiated domestic deregulation programs in the 1980s and 1990s, including Canada (1988), Australia (1990), South Africa (1991), Mexico (1993), Argentina (1994), Turkey (1994), Thailand (1995), Kenya (1995), and Brazil (1996).[2]

While most examples of airline deregulation had a more gradual implementation than in the US, the effects have been broadly similar with the development of low-cost airlines and an increase in productivity across the entire domestic industry. In the US, deregulation freed airlines to develop large hub-and-spoke networks, computer reservation systems, yield management systems, and frequent flyer programs. Low-cost competitors, beginning with Southwest Airlines, were able to expand operations nationwide. In the EU, Ryanair and easyJet have applied similar low-cost models while the national flag carriers are being weaned off government subsidies that are restricted under EU regulations, and the European industry overall is becoming more efficient.[3]

Although most large domestic markets have already been deregulated, some significant markets such as India, Taiwan, and China are still in the process of implementing deregulation programs. Deregulation has also brought about a general trend toward the privatization of national flag carriers, a trend expected to continue as globalization increases the competitive pressures on the generally less efficient government subsidized airlines.

2.2 International Deregulation and Airline Globalization

At its origin, international deregulation is related to domestic deregulation. Though rights on most routes continue to be restricted by bilateral air service agreements,[4] US deregulation

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1 For a discussion of the regulatory economics of airline deregulation see (Viscusi, et al., 1995).

2 Year indicates the initiation of the deregulation program, not the completion (Williams, 2002).

3 For a review of state-owned airlines and their future prospects see (Doganis, 2001).

4 Currently rights to fly international routes are controlled by over 1500 bilateral air service agreements worldwide with the US party to over 70 (Yergin, et al., 2002).

removed the government granted international route monopolies of Pan American Airlines (Pan Am) and TransWorld Airlines (TWA) and increased the competition to operate international routes by introducing multiple airline designations into US bilateral agreements. Similar examples of domestic deregulation impacting international service include the creation of Virgin Atlantic in the United Kingdom (UK) to compete with British Airways and All Nippon Airways in Japan expanding to international operations to compete with Japan Air Lines.

Open Skies agreements further reduced the restrictions on international air service. Open Skies agreements are more liberal bilateral treaties that allow airlines of both countries to fly any route between the two countries. Cabotage is still prohibited and the treaties maintain the link between an airline's nationality and its right to fly international routes. Since signing the first Open Skies agreement with the Netherlands in 1992, the US has reached Open Skies agreements with 59 countries, further deregulating international air transportation, reducing the role of gateway cities, and increasing the number of international origin-destination (O-D) pairs (US State Department, 2002).

Alliances and antitrust exemptions initiated the next phase of international deregulation in 1993 with the Northwest-Royal Dutch Airlines (KLM) pairing. Under this regime, airlines which obtain approval from transportation and antitrust authorities in the relevant countries are able to coordinate fares and schedules to obtain some benefits of international consolidation without violating the restrictions on foreign ownership and cabotage.

Looking to the future, the next phase of the international deregulation and airline globalization will likely be a US-EU common aviation market. Pressure for continuing the evolution toward a normal, global industry has come from some international airlines in the US and the EU and from the European Commission.[5] There are three primary factors driving this trend.

1. Dramatic growth in low-cost carriers in the US and EU have placed domestic competitive pressures on the large, incumbent airlines.
2. Further consolidation of airlines within the US is seen as a threat to consumers. Allowing foreign airlines to serve the US domestic market or allowing US airlines to merge with foreign airlines would reduce these consumer protection concerns by expanding the field of deregulated competition.
3. The current bilateral treaty system is a constraint on the consolidation of the national carriers within the EU. For example, in 2000, the proposed merger of British Airways and KLM was, in part, prevented by the US position that the resulting airline would no longer qualify as a Dutch airline under the US-Netherlands Open Skies

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5 **"**Let me be very explicit. It's time to lift the wraps on all investment restrictions. As for cabotage, I'm not afraid of it, and neither should anyone else be, so long as it is reciprocal" (Carty, 2002).

agreement (Yergin, et al., 2002).[6] Michel Ayral, Director, Air Transport, European Commission, stated that , "Today's spider's web of bilateral international agreements and their associated limits on ownership and control has prevented the airline industry from consolidating in the way other industries have" (Ayral 2002).

A common aviation market is not a new idea. The single aviation market in Europe, treated here as a domestic EU deregulation, was really the first major common aviation market, created by removing restrictions on foreign ownership, cabotage, route entry and exit, and the setting of fares across a set of countries. Given the historical precedents discussed earlier and the building pressure to solve many of the issues currently inhibited by the existing regulatory environment, some form of a US-EU common aviation market is likely in the next 10 years. Expansion of that market to include most other major air transportation countries is likely over the following 10 years.

Given the very similar experience in both the EU and US following deregulation of both markets, there is every reason to believe that a US-EU common aviation market will result in increased flight operations, substantially more passengers, and lower fares across the Atlantic (Moselle, et al., 2002).

2.3 Airport Deregulation

The generally successful deregulation of domestic and international airline markets is causing many governments to question existing ownership and regulatory relationships with airports and examine deregulation of those airports. Airport deregulation is motivated by many of the same factors influencing airline deregulation—improved efficiency, lower costs, and expanded service. The various forms of airport privatization and corporatization implemented in the EU (e.g., UK, Germany, Italy, Spain and Belgium), Australia, Central and South America represent the next phase of deregulation in air transportation. This trend has fostered the development of large international airport management corporations such as British Airports Authority (BAA) and Schiphol (Graham, 2001). Although the airport deregulation trend remains largely outside the US, formation of a US-EU common aviation markets will increase pressure to change the current regulations governing airport access within the US and the EU for three reasons.

1. First, a central idea of the common aviation market is the free movement of aircraft within the market and the ability to compete. Slot allocation committees in Europe and exclusive and preferential use gate agreements with airlines in the US stand in conflict with this goal.
2. Second, the control of airport access through slots or gates by airlines has been a major concern of antitrust authorities in the both the US and EU. This airline-airport

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6 For a detailed assessment of the potential of a US-EU common aviation market see (Moselle, et al., 2002).

relationship threatens to restrain the international airline consolidation that a common aviation market is expected to facilitate.

3. Third, the existing practice of significant control of airport capacity by airlines raises the possibility of most of the capacity of a large airport coming under the control of a foreign or multinational airline (i.e., after merging with a US airline holding exclusive gate agreements at a US airport or an EU airline holding significant grandfather rights at an EU airport). This control of local airport capacity by foreign carriers is unlikely to be accepted on either side of the Atlantic.

In this manner, the deregulation of domestic and international airline services will place increasing pressure on the current allocation systems for airport capacity, further motivating governments to re-examine their ownership and regulatory relationship with airports.

Section 3

Increasing Airline Productivity

Deregulation of the airline industry and the resulting increase in competition has lead to improvements in productivity over the past 25 years. This long term trend is expected to continue.

Productivity is the ratio of inputs (labor, capital, and purchased services) to outputs (units of product) and can be measured across many dimensions (Nesbitt, 2002). In the airline industry, the operating cost to fly one aircraft seat one mile is the standard definition of unit cost (cost per available seat mile - CASM). As shown in Figure 3-1, the CASM for US carriers has declined an average of 1 percent per year between 1977 and 2002 (USDOT, 1977–2002). This decline can be attributed to a combination of lower costs for input resources and improved efficiency in using resources, thus achieving higher productivity.

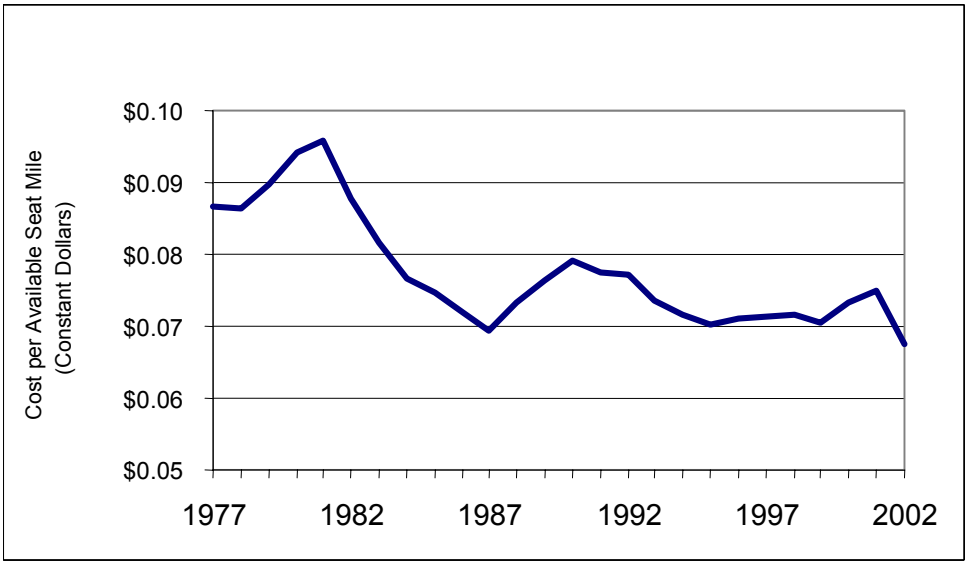

Figure 3-1. Historical US Airline Costs

Aircraft jet engines have become more fuel efficient, as the engine manufacturers responded to airlines' demands to reduce their exposure to changes in jet fuel prices—an airline's second largest operating expenditure after labor. Available seat miles (ASM) per gallon of jet fuel has increased 51 percent in the past 25 years, from 35 ASMs in 1977 to 53 ASMs in 2002 (USDOT, 1997-2002).

Changes in the way airlines distribute tickets has also significantly reduced airline unit costs. Historically, travel agents played an important role in the sale of airline tickets. Deregulation and the consequent increase in complexity of the fare structure created a role for travel agents as a supplier of information to passengers. In return, the airlines paid the travel agents a percentage commission for each ticket sold. By the early 1990s, travel agents share of bookings rose to 85 percent, and commissions rose to a peak of 11 percent (DeLong, 2002). Since the late 1990s, the internet has accounted for a greater and greater share of ticket purchases, displacing the role of the travel agent. Consequently, the airlines began reducing their commissions to travel agents and in March 2002 the six major airlines announced they were reducing base commissions to $0, for an estimated savings of $4.3 billion paid in 2000 (DeLong, 2002).

Electronic tickets are another tool airlines have used to improve efficiency. By 2002, e-tickets accounted for 51 percent of all domestic tickets issued. An average e-ticket cost saves an airline $5 compared to issuing a traditional ticket (Seymour, 2003). These savings are derived from the elimination of data entry and handling of the paper ticket, faster revenue processing, and easier direct sales.

The increasing market share of low cost carriers in the US has also helped drive down the average unit cost for the industry as a whole. In 2002, the CASM for low cost carriers was 29 percent lower than the CASM for traditional network carrier (7.6 cents versus 10.8 cents).[7] This lower cost is derived from many factors, including:

1. Single aircraft type (often new aircraft) which reduces operating and maintenance costs while increasing flexibility
2. Work forces focused on productivity
3. Very short aircraft ground times creating high aircraft utilization rates

As shown in Figure 3-2, the market share of low cost carriers in the US domestic market has increased steadily over the past 25 years reaching 20 percent in 2002.

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7 US DOT Form 41 data. Low cost carriers were defined as Southwest, Airtran, Frontier, and JetBlue. Network carriers were defined as United, American, Delta, Contintental, USAirways, and Northwest. CASM data represent system-wide costs for all US carriers.

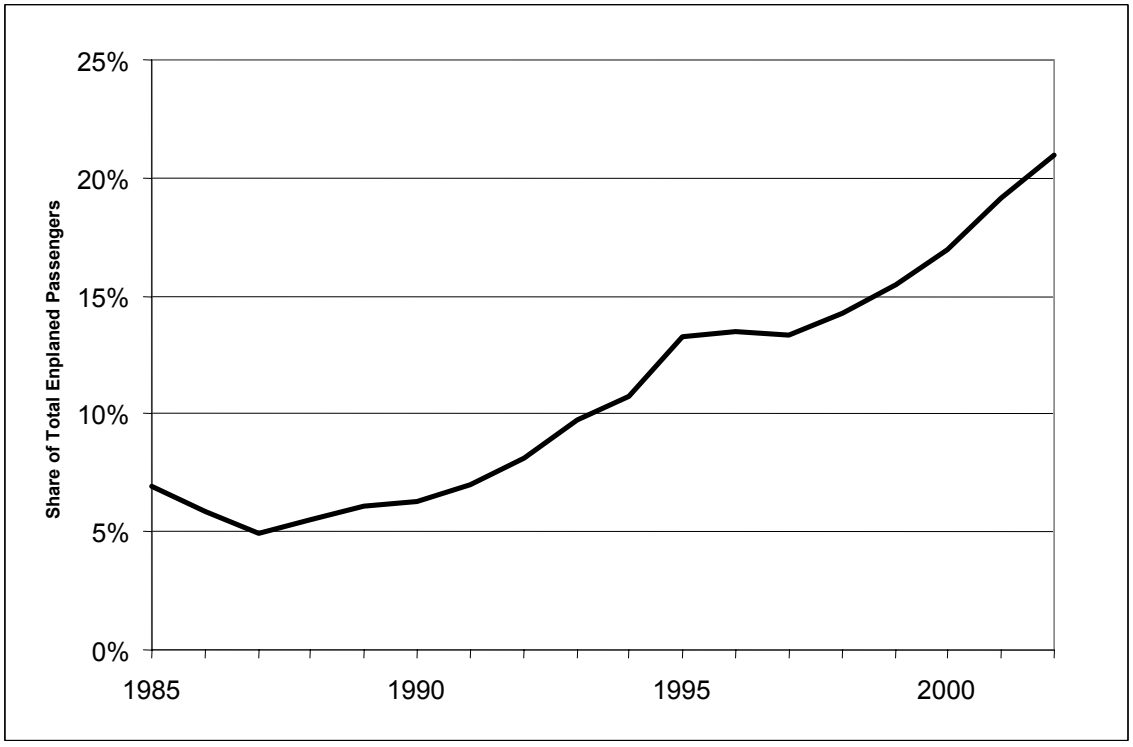

Figure 3-2. Low Cost Carrier Market Share

The long-term trend in productivity improvements is expected to continue as competitive market pressures force airlines to reduce costs and improve efficiency. The competition from domestic low cost carriers, the increasing likelihood of foreign competition as international trade and ownership barriers are relaxed, and the development of new cost saving technologies will ensure a continued focus on productivity improvements over the next 25 years.

In the near-term, airline labor costs will decrease at the network carriers as their recently renegotiated labor agreements are implemented. For example, United has reduced annual labor costs by $2.5 billion, while American has cut annual labor expenses by $1.8 billion. Although labor rates may increase moderately over the longer term, continued competitive pressure from the low-cost carriers make it unlikely that labor costs will "snap-back" to previous levels even when the current agreements expire.

Low-cost carriers will continue to gain market share on the traditional network carriers, as they "connect the dots" of their route networks. Airline analyst Edmund S. Greenslet predicts low-cost carriers will carry 40 percent of all domestic passengers by 2020 (Greenslet, 2002). Continued growth is planned by JetBlue, which has placed orders and

options for Airbus A320 and Embraer 190 aircraft. JetBlue's fleet could grow as high as 290 aircraft by 2011 (JetBlue, 2003). AirTran, another low cost carrier has placed an order for 100 Boeing 737-700/800 aircraft. AirTran's fleet could be as high as 156 aircraft by 2008 (AirTran, 2003).

The airline industry will also continue to deploy technology to reduce operating costs. Self-service check-in kiosks are playing a larger role, with Northwest Airlines stating that 50.5 percent of eligible passengers utilize self service check-in through either the internet or a self-service check-in kiosk (Northwest, 2003).

The next generation of aircraft and jet engines will allow airlines to continue to improve productivity. The Airbus A380, which will carry 555 passengers in a three-class configuration, will continue the trend of larger aircraft and the resulting economies of scale. According to Airbus, the A380 will operate at a CASM 15-20 percent lower than the Boeing 747 (Sweetman, 2003a). After an extensive survey of airline customer needs and requirements, Boeing rejected a previous focus on increased speed (in the form of the Sonic Cruiser), and instead has made an explicit decision to focus their new aircraft development efforts on improved efficiency with the 7E7. According to Boeing, the 7E7 will operate at 10 percent lower costs than the benchmark A330-200. These efficiencies will be gained by a combination of fuel burn savings, reduced weight, and advanced aerodynamics (Thomas, 2003).

Section 4

More Passengers, Lower Fares

Deregulation and the resulting productivity improvements have lead to a steady decline in passenger fares and significant increases in passenger demand. In the US, from 1978−1998, real fares declined over 30 percent in domestic markets and 43 percent in international markets. Over the same time period, there was a 35 percent increase in air carrier operations (Federal Aviation Administration). These effects were not concentrated in the years immediately following deregulation as average fares, adjusted for inflation, continued to decline through the 1990s (Transportation Research Board, 1999).

The following figures illustrate the relationship between fares and passenger demand (Roberts, et al., 2002). Figure 4-1 shows the shift in the Baltimore−Washington International Airport (BWI)−Newark International Airport (EWR) market between 1992 and 2001. Over that 9-year period, the average fare increased 43 percent, causing passenger demand to decrease 29 percent. In contrast, Figure 4-2 shows the shift in the BWI−Albany, NY (ALB) market for the same 9-year period. The entry of Southwest Airlines in the BWI−ALB market decreased the average fare 61 percent, causing passenger demand to increase 641 percent.

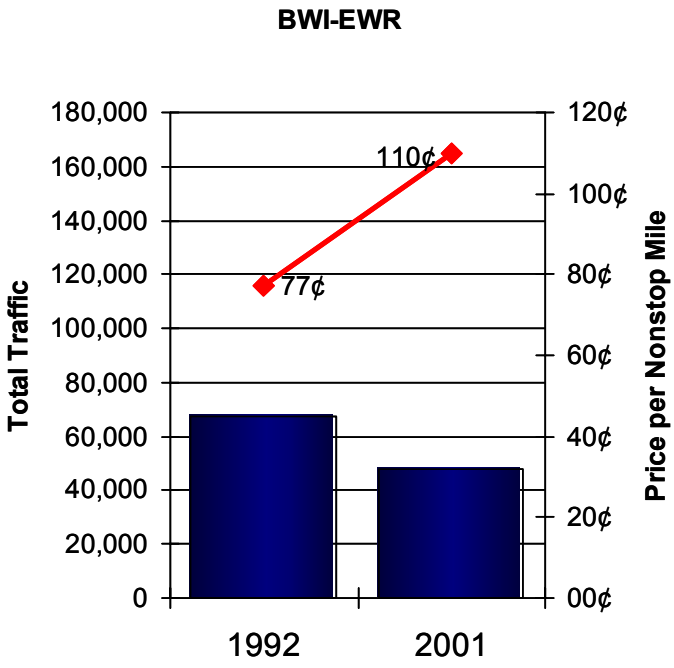

Figure 4-1. Traffic and Fare Trends in the BWI-EWR Market

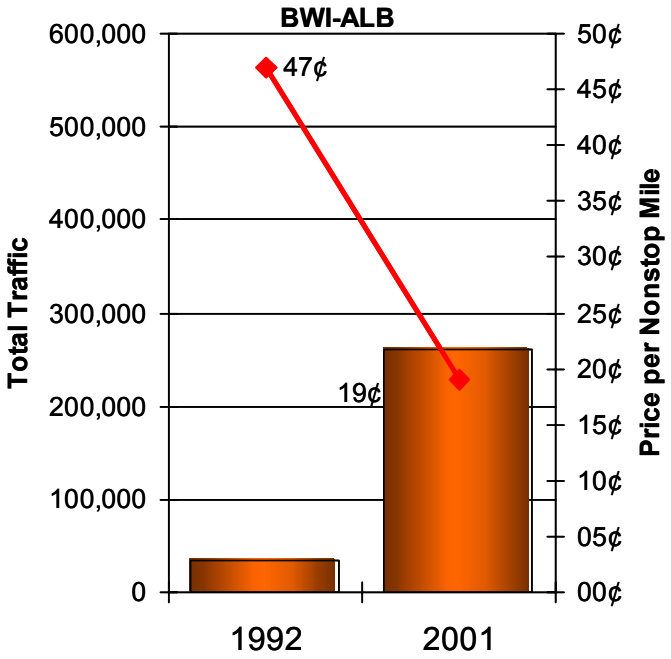

Figure 4-2. Traffic and Fare Trends in the BWI-ALB Market

Similar effects are observed with deregulation in other regions. The impact on fares in Europe since the creation of the single aviation market and the explosive growth of Ryanair and easyJet is widely documented. Other examples include Brazil, Canada and South Africa, where low-cost airlines have also developed after deregulation, lowering average fares (Williams, 2002).

International deregulation has also reduced fares and generated more passengers. According the United States Department of Transportation (US DOT), Open Skies agreements and alliances nearly doubled the rate of growth of transatlantic passenger traffic from the early to the late 1990s with an increase in the number of international O-D pairs served and a 14 percent reduction in fares from 1996−1998. The competitive pressures of the alliances even caused fare reductions on service between the US and the four European countries (Britain, Spain, Greece and Ireland) with which the US still operates on more restrictive bilateral air service agreements. Open Skies agreements combined with airline alliances are also credited with expanding the scope of air travel. The US DOT study of transatlantic alliances concluded that, "Significantly, the traffic growth and price reductions, in a vast majority of instances, are even more positive to small historically underserved cities in Europe than to larger European cities. Most of these cities are not hub cities or even large

cities, attesting to the ability of global networks to better serve small markets" (USDOT, 2000 and Yergin et al., 2002).

While changes in population and income have an impact on the demand for air transportation, it is the structural changes of deregulation (domestic and international) that have driven growth in the demand for air transportation, especially when examining particular regions or airports. The growth in operations at airports such as Fort Lauderdale, Long Beach, Chicago-Midway, Providence and Baltimore-Washington has little to do with changes in local population or income. Instead, these dramatic increases in traffic result from reductions in air fares. These reductions originated with airline deregulation. The distribution of traffic between particular airports in a metropolitan region and the growth in secondary airport traffic is related to current airport regulations, capacity allocation rules, congestion, and airport-airline gate and terminal use agreements that raise barriers to entry at some airports.

In the future, the spread of deregulated markets will likely introduce the benefits identified in the North Atlantic market to other regions. Over the next quarter century continued international aviation and airport deregulation, combined with airline productivity improvements, will drive continued reductions in fares and increases in passengers.

Section 5

Expanded Information Sharing

The information revolution has impacted the aviation industry as it has many other parts of the economy. The ability of passengers, airlines, and air traffic control providers to generate and share information has increased in the past 25 years and is expected to accelerate in the next 25 years (Kurweil, 1999).

From the passengers' perspectives, the role of the internet in allowing customers to directly and conveniently compare fares and routing options has revolutionized the industry. The first sale of a ticket online was by Alaska Airlines in 1995 (DeLong, 2002). Since then, the growth of internet ticket sales has been dramatic, increasing from 4 percent in 1999 to 20 percent by 2002 (Grantham, 2002). In the case of low cost airlines, the share of internet sales is even greater, with Southwest completing more than 50 percent online (Air Transport World, 2003) and JetBlue achieving 70 percent online sales (Flint, 2003).

The airlines and the Federal Aviation Administration (FAA) have jointly taken advantage of the information revolution by developing the Collaborative Decision Making (CDM) process for Traffic Flow Management (TFM). CDM brings together airlines, government, and private industry in an effort to improve air traffic management through information exchange and data sharing.[8] Collaborative Decision Making Network (CDMNet) allows for real time exchange between the FAA and the airlines of a wide variety of data, including flight plans, weather conditions, airport demand and capacity, and active reroutes. The Ground Delay Program (GDP), Collaborative Convective Forecast Product (CCFP), and the Diversion Recovery Page (DRP) are just a few examples of the TFM tools developed through the CDM process.

The next 25 years are likely to see an acceleration of this trend, as computing power becomes cheaper and information becomes more ubiquitous. The Gartner Group, a nationally respected technology evaluation firm, predicts the era of spontaneous computing, characterized by access to data anytime and anywhere, will begin around 2007. Gartner further predicts that spontaneous computing will be based on low cost and universally available wireless capabilities and enhanced by speech-based interfaces and real-time information delivery at the point it is needed (Fenn, et al., 1999).

The increased ability to share information will have a wide impact on the aviation industry of the future. The volume of information will transform today's online travel agencies into travel "navigators" who package complete door-to-door travel experiences tailored to the individual needs of each traveler. During a trip, travelers will increasingly view their navigator as an on-call concierge, responsible for notifying them of changes to their itinerary

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8 CDM website: http://www.metronaviation.com/cdm/whatscdm.html

or travel conditions. These systems will monitor a passenger's travel progress, rebooking flights, hotels, rental cars, and even restaurant reservations automatically in response to unexpected delays or detours during a trip.[9]

Increasingly sophisticated software and hardware will be combined with productivity-enhancing measures by airlines that simplify operations (e.g., reduction of aircraft equipment types). Navigators will be able to strike deals with carriers to purchase transportation capacity for resale to consumers and schedule flights according to prevailing passenger demand on ever-decreasing notice.

In addition, the improved information sharing of the future will enable non-scheduled air transportation providers access to a wider range of passenger demand. Navigators will match traveler demand with a broader portfolio of service providers than exist today, including scheduled airlines, charter operators, air taxis, passenger rail, and personal ground transportation. This supply will be expanded by the increasing ease and lower costs of connecting to and transacting with suppliers. The cost of providing these "matchmaking" services will continue to fall as computational power and network capabilities increase and information and transactional standards develop, increasingly making these services available to a broader range of travelers.[10]

Air Traffic Management (ATM) providers will play an increasingly important role by generating much of the information required for their customers (airlines, passengers) to make decisions in real-time. The greater availability and accuracy of information will also allow the ATM providers to react to changes in the National Airspace System (NAS) with more targeted and timely decisions, thus reducing the "cycle time" between problem identification and resolution.

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9 For a discussion of how the economics of information will impact business strategy see (Evans, et al., 2000).

10 The Open Travel Alliance is an example of an effort to streamline transaction processing. http://www.opentravel.org/index.cfm

Section 6

Movement Toward Market-Based Allocations of Capacity

The trend toward more market-based allocations of resources began in the US with airline deregulation in 1978 which eliminated government control of fares. Deregulation allowed airlines to set fares and allocate seats to passengers through markets. Deregulation also freed airlines to enter and exit city-pair routes based on the business interests of the airline, producing a more market-based allocation of air service to city pairs.

In the US, the deregulated airlines' focus on productivity improvements, and the increasing capability to share operational information in real-time, enabled new methods of allocating scarce airport and en route capacity. Through the CDM process, the airlines and the FAA have created a limited market for airport capacity on a real-time, day of flight basis. The FAA sets capacity through GDPs and each airline then adjusts and prioritizes its flights based on its private information. The recent introduction of the slot credit substitution process extends this concept by further increasing the range of possible slot trades among airlines. The goal of the CDM program is the same as all market-based allocation systems—to increase efficiency.

Deregulation of airports has also led to the development of more market-based allocations of capacity in air transportation. Peak period pricing has been instituted in a number of airports worldwide (including London Heathrow) in response to the higher demand for airport capacity at certain times of day, though slot controls and other administrative mechanisms continue to be the primary mechanism for allocating capacity (International Air Transport Association, 2003). Airport privatizations in the UK and Australia have raised questions of airport congestion, funding, and independence from government control, prompting research into the market-based allocation of airport capacity to make more efficient use of existing infrastructure and more efficient investment in future infrastructure.[11]

Allocation of en route airspace is also evolving toward the possibility of market-based allocations of capacity in Europe. Fees for en route service have long existed in Europe where the primary constraint is en route airspace rather than airport capacity, as in the US. ATM privatizations, such as those in Canada and the UK, have continued the development of

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[11] The appeal of markets and the allocation of capacity to highest valued use is centered on efficiency. In the short-run, market allocations make better use of existing capacity. In the long-run, markets produce price signals that are essential to efficient investment decisions and markets generate revenue for those investments. When well designed and regulated, markets reduce barriers to entry and exit and promote competition and its associated benefits for consumers. At the same time, markets can be used to more efficiently achieve a wide range of social goals, for example, limiting pollution or assuring air service to small communities. See (Rassenti et al., 1982 and DotEcon, Ltd., 2001 and Estache, et al., 2000).

en route fees for ATM services. Although these are not open markets for en route capacity, the monitoring of en route use and the charging of fees is a step in that direction.

As clearly stated in the Transportation Research Board's (TRB) Congressionally requested study, *Entry and Competition in the U.S. Airline Industry*,

> *... pricing the use of airways and airports is the most suitable approach for rationalizing these operations, and probably the only long-term solution to ensuring efficient use and supply of vital infrastructure. ... Without pricing to induce supply and manage demand, airport and airway capacity will remain poorly allocated and increasingly rationed through inefficient administrative procedures, queuing, and delays* (Transportation Research Board, 1999).

However, such strong statements from the TRB committee should not be interpreted as a call for completely free markets. Instead, markets should be viewed as a tool that can provide information on the value users place on access, create incentives that promote efficient use and investment, and still be regulated to incorporate a government's social goals, such as essential air service, as efficiently as possible.[12]

In the future, the continued development of information systems will facilitate virtual exchanges and global coordination, enabling NAS users to react to new information (changes in weather, aircraft demand, etc.) in real-time. Airlines with a continued focus on efficiency improvements are likely to favor the market allocation of en route and airport capacity since it increases the airlines' options, creating opportunities for gains in some situations and the reduction of losses in others. From the perspective of ATM providers, markets create new options for reducing the capacity losses caused by disruptions in the NAS and for reducing congestion in a way that promotes more efficient uses. By 2025, with the anticipated progress in domestic, international and airport deregulation, and the transition of air transportation to a normal, multinational industry, it is reasonable to expect that the trend of more market-based allocations of capacity will have made significant progress.

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12 The techniques for testing market designs in the laboratory have advanced rapidly in the field of experimental economics in the past two decades. Many government agencies have utilized these techniques to refine market designs before they are implemented. For an example, see (Rassenti, et al., 2002).

Section 7

Expanded Role of Small Aircraft

Historical trends and emerging demand drivers suggest that small aircraft transportation is poised for long-term growth through 2025, driven primarily by a recent resurgence in business jet aviation. This increase is expected to occur as passengers substitute increasingly viable, small aircraft alternatives for scheduled, commercial service. However, the same economic forces acting to increase small aircraft activity will also serve to bound unconstrained growth in this sector.

The general aviation market contracted through much of the 1980s and early 1990s. Experts largely attribute the drop to high costs associated with manufacturer liability issues, as well economic downturns and lifestyle changes that reduced public interest in flying (GAO, 2001). A resurgence of small jet aircraft in the general aviation fleet beginning in the mid-1990s was caused by expanded economic prosperity, improvements in the quality of small aircraft, and passage of the General Aviation Revitalization Act, which eased liability concerns. However, another key factor in the growth of small jet aircraft was the development of fractional ownership, under which individuals or companies purchase a share of an aircraft for its occasional use, thus significantly lowering the cost for would-be aircraft owners. As shown in Figure 7-1, the number of fractional shares has increased dramatically since 1985, and totaled 5,827 in 2002. In 2002, aircraft for use in fractional programs accounted for an estimated 45 percent of the business jet order backlog (Aviation Week, 2002).

In the future, the number of small jet aircraft is expected to continue to expand as new manufacturers enter the market and new technologies continue to reduce aircraft prices. For example, with a projected acquisition cost under $1 million, the six-seat Eclipse 500 twin-engine jet will sell for one-quarter of the price of a comparable new business jet. Due to enter service in 2006, Eclipse Aviation has orders for more than 2,000, including 1,600 destined for “air taxi and air limousine operators” (Sweetman, 2003b). Although the specific business model is not yet clear, the improved information sharing trends discussed earlier should facilitate further development of an on-line market where aircraft operators respond to passenger or navigator requests in real-time.

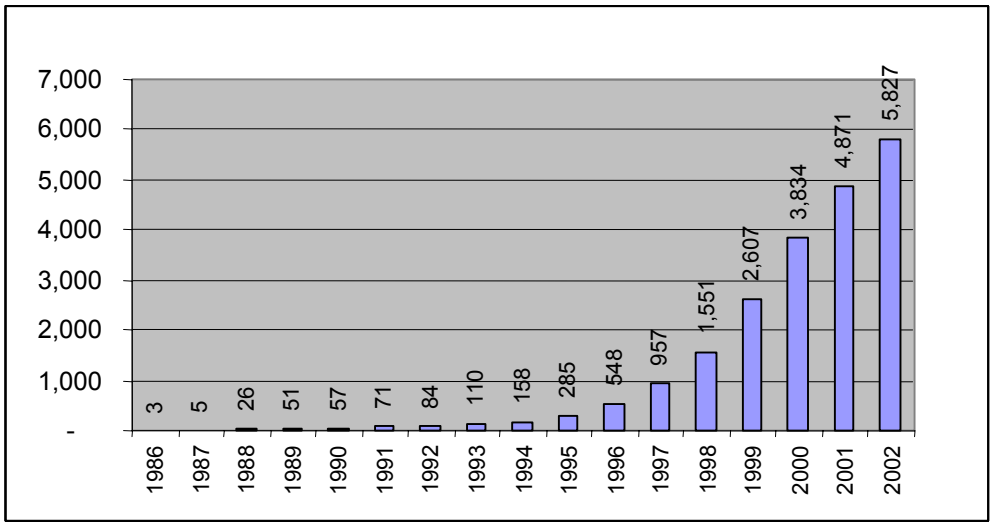

Figure 7-1. Total Number of Fractional Shares, 1986−2002

However, the role and growth potential of small aircraft in the future will also be limited by some of the trends discussed earlier. Globalization and productivity improvements will continue to decrease the cost of scheduled airline travel and information sharing will increase the flexibility available to passengers on scheduled carriers, reducing the relative appeal of small aircraft alternatives. Given that most people still live in and travel between major metropolitan areas, the trend toward more efficient market-based allocations of en route and airport capacity in these congested markets will constrain most competing uses of small aircraft.[13]

13 For a further critique of the personal small aircraft concept, see (Transportation Research Board, 2002).

Section 8

Conclusions

Despite the turbulence in aviation today, the world's air transportation system is on a stable, long-term path. The six trends discussed above significantly influenced aviation in the past and will have considerable implications in the future. In this final section, potential scenarios describing the impact of these trends from several different perspectives (passengers, airlines, and airports, ATM providers and regulatory policy makers) are presented.

Over the next quarter century, each trend may advance at a different rate with some trends slowed for a period of years, but then experiencing rapid change while others may be continually changing and adapting. For example, technological difficulties may slow implementation of ubiquitous mobile computing, and even once these hurdles are overcome it could take years for full benefits of this technology to be realized. Consequently, it is unlikely any of the scenarios accurately represent a complete and perfect vision for one particular moment in time (2025). Rather, each scenario represents one possible vision of how advances in government policy, technology, and business models may interact in the future. So what will the aviation world of 2025 look like? Here are some potential scenarios.

8.1 Passengers

Passengers begin their trip planning by accessing a trip navigator which sifts through a wide range of possibilities to craft and present those that match each individual's preferences. The portfolio of travel options includes seamless multi-modal combinations (car to train to business jet to taxi). During a trip, passengers increasingly view their navigator as an on-call concierge, responsible for notifying them of changes to their itinerary or travel conditions and presenting useful alternatives. Unexpected air delays are increasingly rare, however, as expanded information sharing reduces the level of uncertainty while market-based solutions increase NAS efficiency and reduce congestion.

8.2 Airlines

The term "airline" has come to describe a wide range of air transport providers. Multinational, "DaimlerChrysler"-type airlines have emerged from substantial transatlantic consolidation and offer a wide range of services to thousands of destinations. Incorporating passenger demand information into their operations, airlines dynamically reschedule flights each day, optimizing aircraft utilization and improving productivity. Indeed, the entire concept of "schedule" has been redefined, as the boundaries between traditional air carriers and on-demand services have blurred as navigators seek to provide travelers with what they want, not simply what is available.

Low cost transoceanic carriers have developed as deregulation of airports and markets continues. The lower fares stimulate significant increases in passenger demand.

True on-demand air taxi-type services are a viable business model as information technology facilitates real time matching of service provider supply with traveler demand. However, the relatively high operating cost of this service, in comparison to falling airfares, still limits its appeal primarily to a small segment of time-sensitive business travelers.

8.3 Airports

Increasingly, airports have pricing control over their capacity within the antitrust and other market regulations imposed by national governments and international agreements. Significant over-scheduling of airport infrastructure no longer occurs in these locations. Price signals provide information to guide investment, and fees for service have replaced most government airport improvement program-type funding along with the privatization or corporatization of most large airports.

8.4 ATM Providers and Government Policy Makers

The ATM system still has the central role of ensuring the safety of air transportation. However, more market-based allocation rules have dramatically increased the flexibility and the range of options available to airlines and other users to make improvements to their individual situations. In this way, the CDM processes of 2003 have evolved into continuous markets that operate within the limitations set by the ATM system, thus further reducing the efficiency losses caused by weather disruptions. The ATM system is now largely a global, harmonized system allowing multinational airlines to move airframes worldwide with minimal equipage and pilot training issues. Government and private ATM operators are funded primarily through the collection of fees for services rather than indirect taxation of passengers and airlines. ATM operators are important providers of information (instantaneous airport capacity, traffic flow management actions and strategies, current position, and estimated time of arrival) to the other participants in the air transportation system

In the US-EU common aviation market, airlines and other users secure rights for a full flight itinerary through a market-based system that allows airlines to plan operations months in advance and make changes shortly before and even after departure. Through these markets, governments impose constraints on the allocation of capacity to achieve social policy goals (such as service to small communities and essential air service) in a way that minimizes the total loss in overall system efficiency.

As with other global industries, air transportation regulations and disputes are increasingly covered by the General Agreement on Tariffs and Trade (GATT), North American Free Trade Agreement (NAFTA), World Trade Organization (WTO) and other international trade

regimes from which it was absent in 2003.[14] Through these regimes and the administrative structures of the various common aviation markets worldwide, countries have developed and implemented a wide range of international safety and certification standards for airlines and other aircraft operators.

[14] A notable exception is the Asia Pacific Economic Cooperation (APEC) forum. APEC currently includes a multinational aviation agreement of which the US is a member.

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Glossary

ALB	Albany County Airport, Albany, NY
APEC	Asia Pacific Economic Cooperation
ASM	Available Seat Miles
ATM	Air Traffic Management
BAA	British Airports Authority
BWI	Baltimore-Washington International Airport
CASM	Cost per Available Seat Miles
CCFP	Collaborative Convective Forecast Product
CDM	Collaborative Decision Making
CDMNet	Collaborative Decision Making Network
DRP	Diversion Recovery Page
EU	European Union
EWR	Newark International Airport
FAA	Federal Aviation Administration
GATT	General Agreement on Tariffs and Trade
GDP	Ground Delay Program
KLM	Royal Dutch Airlines
NAFTA	North American Free Trade Agreement
NAS	National Airspace System
O-D	Origin-Destination
Pan Am	Pan American Airlines
SARS	Severe Acute Respiratory Syndrome
TFM	Traffic Flow Management
TRB	Transportation Research Board
TWA	Trans World Airlines
UK	United Kingdom
US DOT	United States Department of Transportation
US	United States
WTO	World Trade Organization