Chapter 2

Airline Economic Context

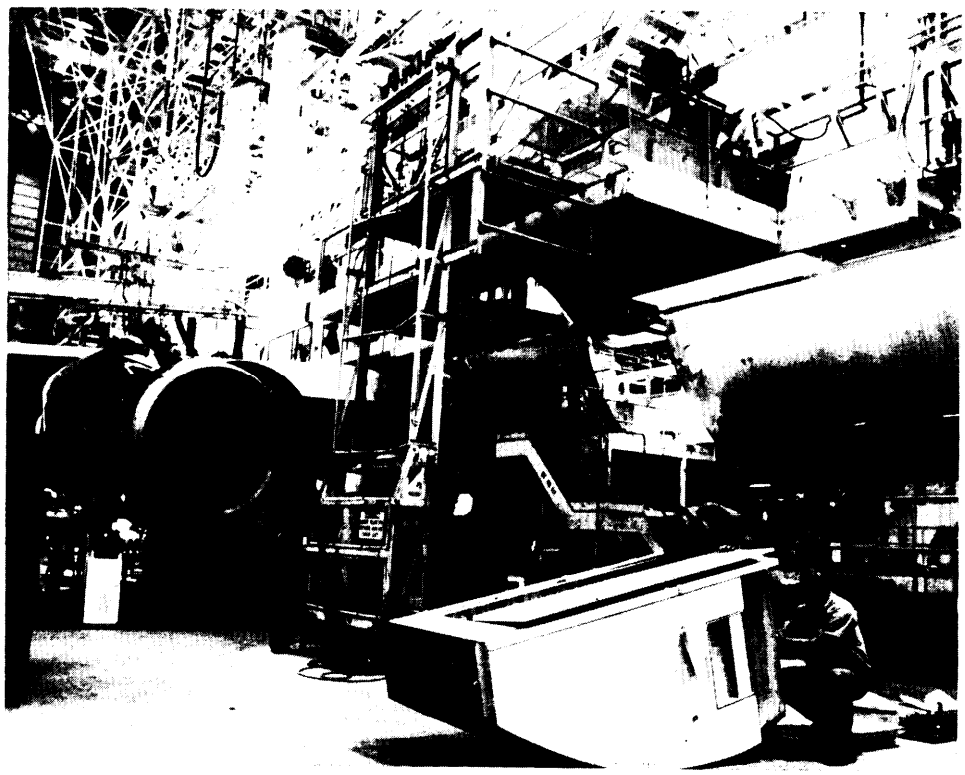

Photo credit: United Airlines

Discretionary maintenance is an economic decision,

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Chapter 2

Airline Economic Context

Over the last 10 years, many aspects of the commercial aviation industry have changed profoundly as carriers seized opportunities offered by economic deregulation. Airlines that once changed routes and fares infrequently now serve a wide array of markets, offering competitive fares and frequent flier awards to attract passengers. While the public enjoys lower fares and expanded service in some markets, concerns about airline safety focus on how airline managements balance maintaining safety procedures and controlling operating costs.

Prior to passage of the Airline Deregulation Act in 1978, the Civil Aeronautics Board (CAB) supervised the economic life of the industry, controlling entry of new airlines, establishing routes carriers could fly, and setting fares. CAB made such decisions after hearings and negotiations that often took months and even years to complete. During the hearing process, CAB members considered the economic effects of any requested change on the carrier, competitors in that market, airport operations, and the interests of the public. This comprehensive economic management ended when Congress dismantled CAB with the expectation that the public would benefit from a less regulated industry—one easier to enter and more responsive to price competition.

Understanding the current economic and institutional context of this complex industry, now disciplined primarily by market forces, is important background for evaluating safety issues and the Federal role. Thus, this chapter reviews the airline industry's growth and major structural and operational changes that have occurred since deregulation, explores public policies that affect the airline industry and safety issues, and concludes with the economic outlook for the industry.

COMMERCIAL AIR TRANSPORTATION–MAJOR CHANGES

Commercial air transportation includes flights by scheduled large jetliners, smaller commuter planes, and air taxis, as well as cargo and charter jet service. Each industry segment has substantially different safety and economic effects on the aviation system. Although subdivided differenty by the Federal Aviation Administration (FAA) and the Department of Transportation (DOT), the two broad categories of airlines of concern to this report are:

- 14 CFR Part 12 l—operations of aircraft with more than 30 seats or 7,500 payload-pounds;
- 14 CFR Part 13 5—operations of aircraft with 30 seats or fewer. [1]

Part 121 is usually associated with the major carriers and Part 135 with the commuter airlines.

OTA estimates that 450 million passengers traveled on all commercial flights in 1986, as shown in table 2-1. Large airlines operating under Part 121 carried 95 percent of the passengers and accounted for 99 percent of the revenue passenger-miles, Part 135 commuter airlines transported 4 percent of the passengers and air taxis only 1 percent. Figure 2-1 shows the trends in passenger levels for the scheduled industry segments for each year since 1975.

While passenger statistics are one good way to measure commercial aviation, other data are needed to assess its effects on the air traffic control (ATC) system. For example, commuter airlines and air taxis have a much greater impact on airports and air traffic than passenger data indicate, because small propeller-driven aircraft take up nearly as much air and runway space as wide-body jets. Therefore, data on aircraft departures are needed to ascertain the relative impact of each industry category on the national airspace system. Commercial air transportation operations (takeoffs and landings) at U.S. airports with FAA control towers have reached record levels each year since 1984, with commuters and air taxis accounting for one-third of those flights.[2] Because

[1] These definitions can be confusing; 14 CFR 241 and 14 CFR 298 (and the general public) apply the terms "commuter" or "regional" to scheduled operations of aircraft with 60 seats or fewer.

[2] Air traffic controllers, who record data on traffic operations, do not differentiate commuters from air taxis or Part 121 commuters from

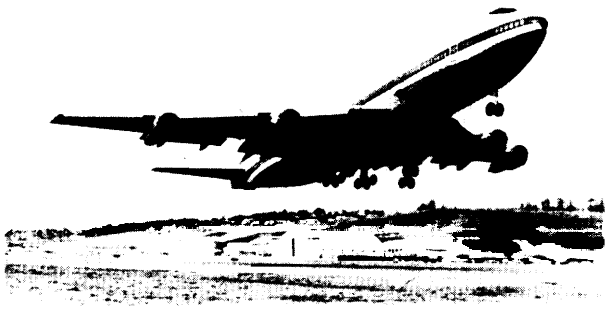


Photo credit: Boeing Commercial Airplane Co.

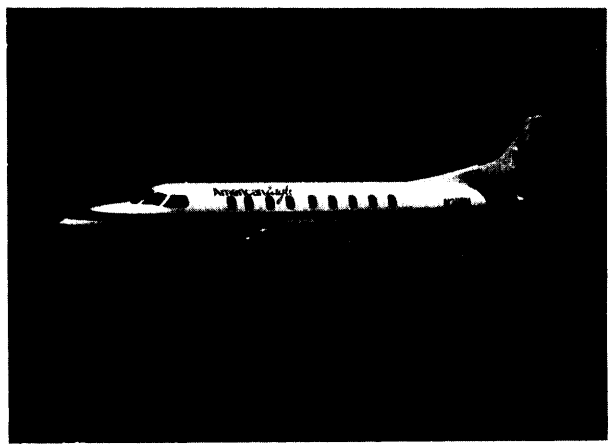


Photo credit.' Fairchild Aircraft Corp.

Carriers operating large jets (left) are governed by 14 CFR 121, while commuter airlines flying smaller aircraft often follow 14 CFR 135.

Table 2-1 .–Commercial Aviation Traffic Statistics, 1986

Industry category	Passengers en planed (millions)	Revenue passenger-miles (billions)	Aircraft departures (millions)	Aircraft flight hours (millions)
Part 121				
Scheduled 121	418.5	366.3	6.4	9.4
Nonscheduled 121	7.3	12.3	0.2	0.4
Part 135				
Scheduled 135 (commuters)	18.3[a]	2.5[a]	2.4	2.3[a]
Nonscheduled 135 (air taxis)	6.5[b]	1 .0[b]	2.5[b]	2.9
Total	450.6	382.1	11.5	15.0

[a]OTA estimate based on Regional Airline Association data.
[b]OTA estimate based on National Air Transportation Association and other air taxi data.

SOURCE: Office of Technology Assessment based on Federal Aviation Administration and National Transportation Safety Board published data unless otherwise noted, as of January 19S8

general aviation (GA) activity has declined substantially, total traffic nationwide is still below the peak of 69 million operations reached in 1979. Although GA and military flights generate a large volume of traffic nationwide, they represent only a small portion of the operations at the largest and busiest airports-less than 6 percent at Chicago O'Hare and Atlanta Hartsfield, for example. The traffic growth at four post-deregulation hubs, shown in figure 2-2, illustrates how commercial airline traffic has increased rapidly and now dominates these airports, while GA has held steady or declined. (The small declines in 1987 airline traffic at Detroit and St. Louis are results of airline mergers, rather than travel reductions.)

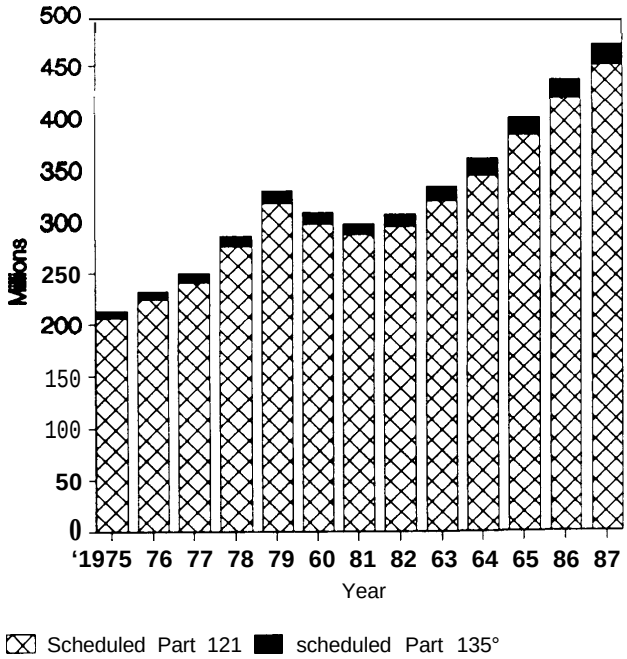
Since most commercial aircraft operate under instrument flight rules, en route radar operations have reached new peaks each year since 1984. Currently, commercial transport operations account for over 60 percent of the workload for en route traffic controllers. For further discussion of air traffic issues see chapters 5 and 7.

Growth in the Industry

The commercial airline industry has grown at an unprecedented rate since deregulation. Although growth has been sporadic, between 1979 and 1986

(continued from previous page)
Part 135 commuters. Additionally, since many air taxis are similar to general aviation aircraft, an air taxi operation probably will not be counted as such unless it is so indicated in the flight plan. Therefore, air taxi operations are most likely underestimated by these statistics.

Figure 2-1 .—Scheduled Airline Passengers



[a]Part 135 passenger counts estimated by the office of Technology Assessment,
NOTE: Nonscheduled 121 and 135 carriers increase the total by about 3 percent for recent years.
SOURCE: Office of Technology Assessment baaed on Federal Aviation Administration and National Transportation Safety Board data.

air travel measured by revenue passenger-miles on scheduled Part 121 flights expanded from 226.8 billion to 366.3 billion, a total of 62 percent. During the last decade, takeoffs and landings of commercial airlines including both Parts 121 and 135 flights have increased from 13 million to 19 million annually. Although the industry has recently consolidated dramatically, 119 new air carriers entered the market between 1978 and the end of 1986. Also, the number of commercial aircraft has increased substantially during the 1980s. As shown in figure 2-3, commercial carriers added 1,007 large jets to their fleets between 1980 and 1987 for a 42 percent increase and are expected to have a total of 3,528 in 1988. New orders indicate fleets will continue to expand in the next couple of years.

The country's economic boom between 1983 and 1987 was partially responsible for these robust growth figures; however, the absence of economic restraints also encouraged airlines to expand services and to become more competitive. Moreover, these factors set the stage for structural and operational changes in the airline industry.

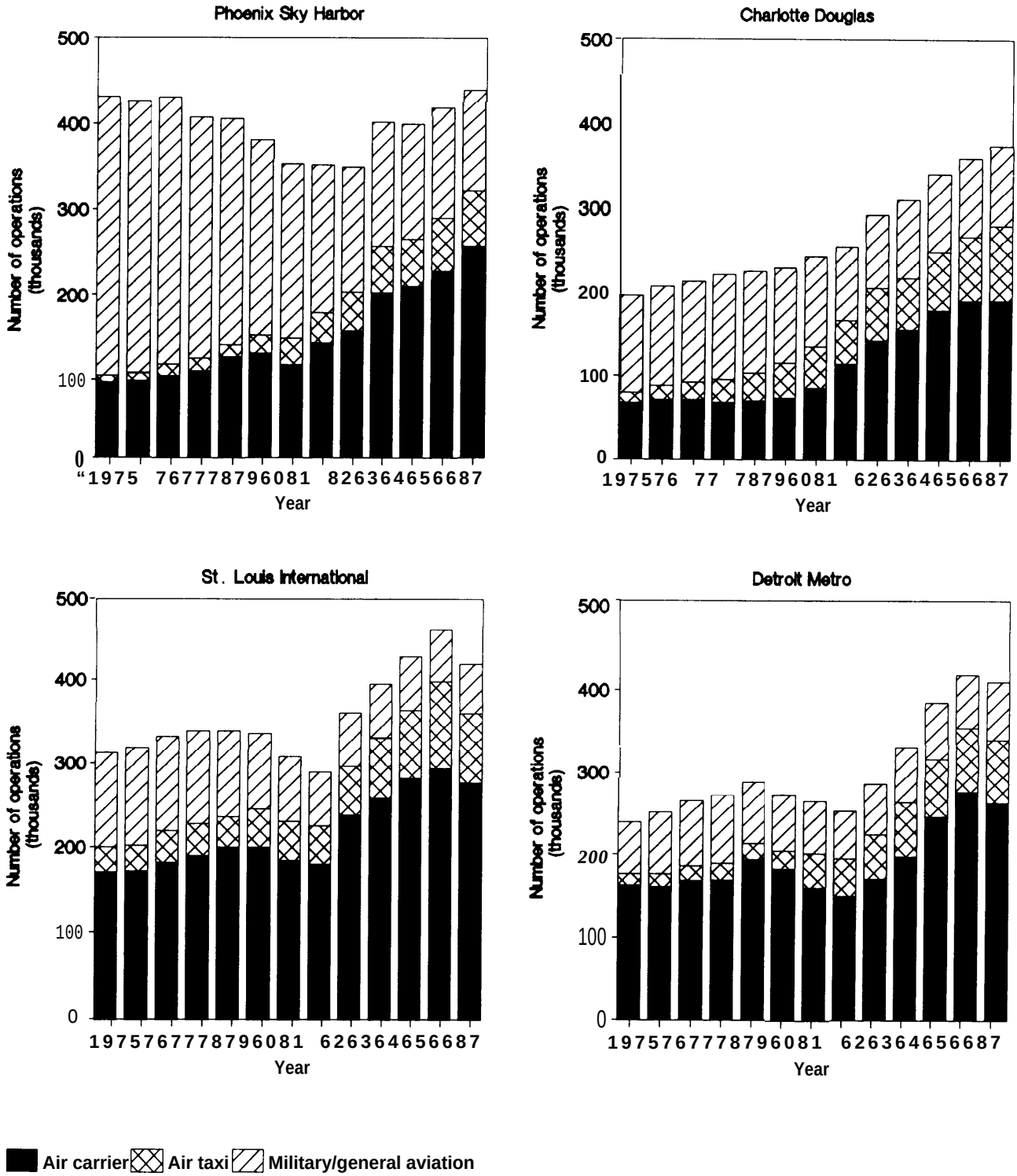
Consolidations

By 1987, the independent carrier, once the industry's principal structural unit, had almost disappeared, replaced by large financial organizations that control several airlines and/or affiliates and have broad ties to the national financial network. Nonetheless, ownership changes, reorganizations, failures, or threats of takeovers among U.S. airlines still occur occasionally. On the other hand, some industry characteristics have come full circle since deregulation, and many factors now exist that make it almost as difficult to enter the business today as it was prior to 1978, except in specialized market niches.

Despite the large numbers of new carriers entering business in the early 1980s, rapid consolidation has occurred in the aviation industry during the last 3 years. The recent mergers and takeovers apparently conclude the decade-long debate about how deregulation would affect the structure of the industry and support those who forecast a consolidated industry with many trappings of an oligopoly. (Oligopoly is an economic term meaning there are only a few producers of a product, and little or no differentiation exists among products or price.)

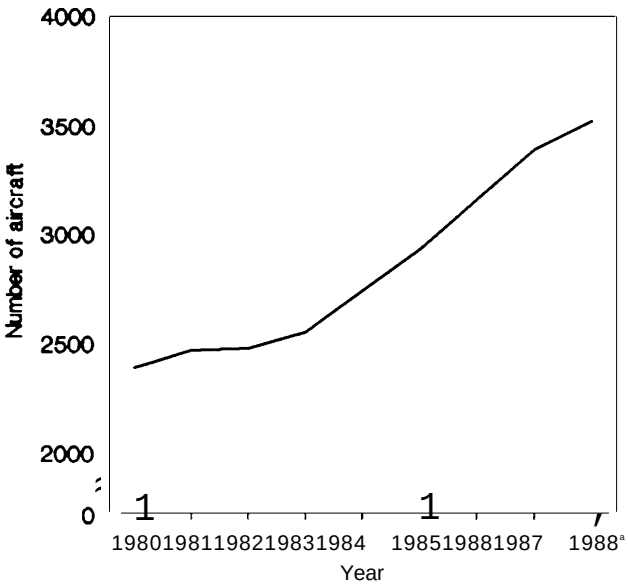
All the larger passenger air carriers that existed in 1985 have been involved in some sort of a consolidation; three mergers involving major and national carriers occurred in 1985, eight in 1986, and one in 1987. The recent slowdown in the frantic activity of the last 3 years is a result primarily of the small number of remaining merger candidates. Fewer firms control more of the industry's traffic now than in 1978, when the industry's eight largest firms enjoyed 81.5 percent of industry's traffic. By 1984, the percentage of passengers carried by the eight largest firms had dropped to 76.3 percent, and many industry analysts were convinced that the major airlines were losing some of their market power and that new carriers would play a growin$_g$ role. However, by 1986, the industry had concentrated as a result of mergers and acquisitions, and the top eight carriers controlled 88.4 percent of the market (see figure 2-4). By the end of 1987, the eight largest airlines had increased their market share to over 92

Figure 2-2.–Air Traffic Activity at Selected Hubs



SOURCE: Office of Technology Assessment based on Federal Aviation Administration data.

Figure 2-3.—Large Aircraft in Commercial Service



[a]Forecast.

SOURCE: Office of Technology Assessment based on Federal Aviation Administration forecasts, fiscal years 1986-1997.

percent, not including the traffic carried by regional affiliates.

To reach this degree of concentration, airlines reorganized through mergers or acquisitions. In the case of Texas Air, the holding company acquired two airlines—Eastern and Continental—which it operates as semi-independent units under its corporate umbrella. One of these units, Continental, has absorbed Frontier, People Express, and New York Air through mergers and acquisition. AMR, the American Airlines parent organization, owns the airline and several smaller carriers, and also operates Sabre, a computerized reservation system, as a separate subsidiary. Holding companies do not always manage similar or related companies, frequently selecting their subsidiaries as much for profitability as comparability. The significance of the holding company structure lies in the dual responsibility the airline management has for its operations as well as to the economic goals of the parent organization.

Aircraft Acquisition

Two trends in aircraft acquisition signal major operating changes for the industry. First, changes in the tax laws have made leasing equipment a more attractive option for airlines.[3] Firms such as Delta and Northwest, which have in the past owned most of their own aircraft, now lease some of their fleets. If growth in leasing activity continues, a large part of the domestic fleet could be the property of leasing companies and aircraft manufacturers. This more flexible arrangement reduces the carriers' long-term capital commitments and limits financial risk, an advantage if the industry experiences an economic downturn and finds itself with excess planes. Leasing equipment also changes the way some airlines manage maintenance (for further information, see chapter 5).

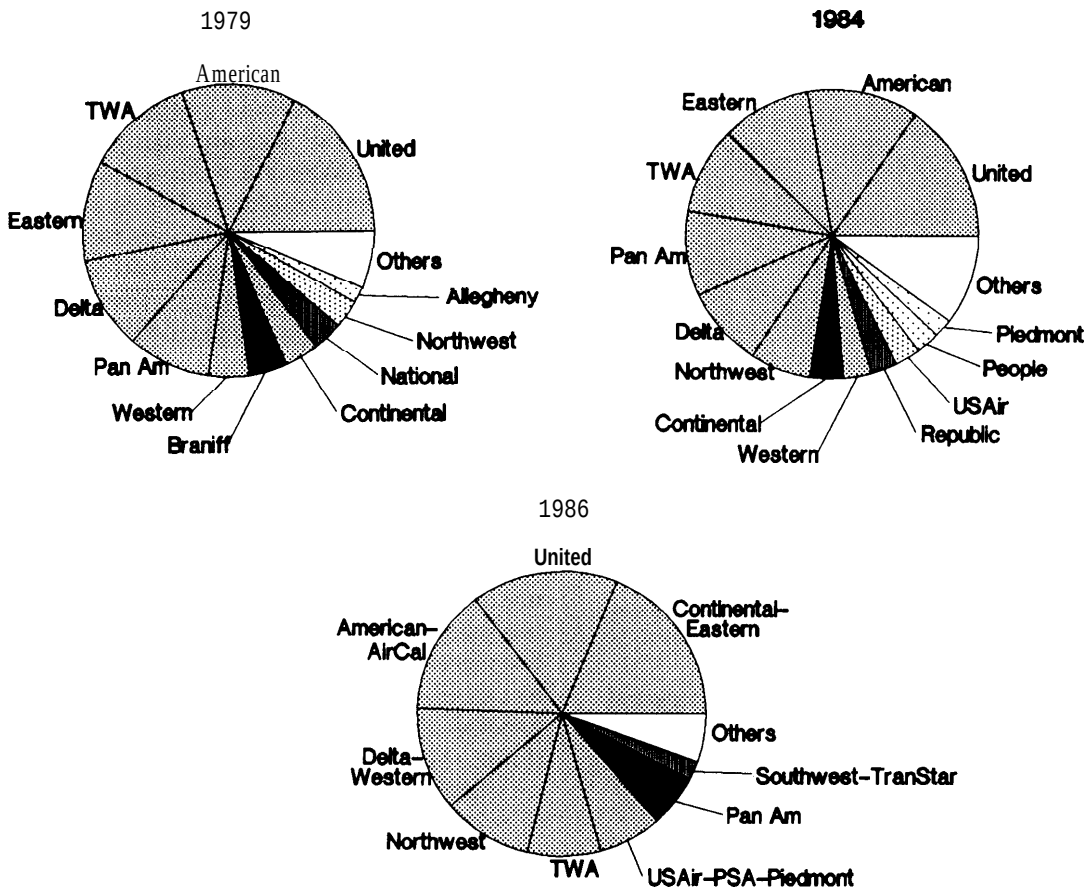
Second, competition for sales among the world's three major commercial transport manufacturers, Boeing, McDonnell Douglas, and Airbus, is fierce, and as a result they are willing to make favorable deals for carriers. American has negotiated an order split between Boeing and Airbus in which the manufacturers are leasing the equipment with generous renewal and cancellation provisions. Northwest has placed a major order with Airbus with the right to cancel any part of it on an annual basis without penalty. Also, manufacturers are including additional training and equipment maintenance service traditionally performed by carriers as part of lease or purchase deals. The long-term effects on safety of the manufacturers' willingness to offer service, training, and creative financing to make sales are not entirely clear, but in the short run it ensures new orders and an increase in available aircraft to the major carriers.

Regional Airlines

Spurred by deregulation, many small regional airlines entered the market in the early 1980s. Simultaneously, major airlines sought to extend their high density markets by increasingly dominating their hubs and sloughing off less profitable routes. Their actions encouraged regional airlines to provide service linking small cities and providing connections to hub airports. Because regional carriers use smaller aircraft and require less ground-based infrastructure, they can often operate such routes more profitably than the majors and provide a needed service.

[3] Joan M. Feldman, "Airlines Learn To Cope With Tax Reform," *Air Transport World,* May 1987, p. 42.

Figure 2-4.—industry Market Share: Revenue Passenger-Miles



SOURCE: 1979: Market share based on revenue passenger-miles (RPMs) of U.S. airlines performing scheduled service (228.8 million) as reported in Air Transport Association, "Air Transport 1979," June 1, 1979, pp. 20-21; 1984: Market share based on RPMs of U.S. airlines (296.3) million as reported In *Aviation Daily*, "Industry Market Share," Feb. 5, 1988, p. 200 (reverse); 1986: Market share based on RPMs of US. airlines (360.7 million) as reported in *Aviation Da//y,* "Industry Market Share," Jan. 30, 1987, p. 150 (reverse).

As illustrated in table 2-2, the major increase in revenue passenger-miles for regional carriers occurred between 1978 and 1984; growth since 1984 has been relatively flat, increasing only 1 percent between 1985 and 1986. Also the number of regional carriers has dropped from a high of 250 in 1981 to the current level of approximately 150.[4]

[4]U.S. Department of Transportation, Federal Aviation Administration, Planning Analysis Division, *FAA Aviation Forecasts, Fiscal Years 1987-1998* (Washington, DC: U.S. Government Printing Office, 1987), p. *50.*

Table 2.2.—Regional Airline Revenue Passenger-Miles

Year	Revenue passenger-miles (in billions)
1978	**1.36**
1979	**1.72**
1980	1.92
1981	**2.09**
1962	**2.61**
1983	**3.24**
1984	**4.17**
1985	**4.41**
1986	**4.47**

SOURCE: Office of Technology Assessment based on 1987 Regional Airline Association data.

The recent low growth in traffic and the attrition among regionals can be explained in part by the absorption by the majors of regional carriers through acquisition or affiliations. Although some regionals, such as Ransome, have been acquired by major carriers, the more pervasive trend has been for the regional to establish an affiliation with a major carrier and feed traffic to its hub airports. As an affiliate, the regional is dependent on the major for marketing—usually sharing the major's code on published airline schedules and in computer reservation systems. The dependency is accentuated if the major also provides an affiliate with aircraft maintenance, fuel, and other essential services. Some majors try to raise the safety standards of regional affiliates by requiring an upgrading of operational standards as well as training and maintenance policies and procedures. While such arrangements are highly desirable for the major, enabling it to extend its market without appreciable capital expenditure, many regionals are dependent on their major carrier and fail if they lose their affiliation. Moreover, some localities have complained that regional airlines are more interested in satisfying the major carrier than in providing for community needs.

Lack of airport access is another factor contributing to the recent decline of regional carriers. Congestion at their hub airports has prevented some regionals from maintaining the on-time schedules needed to retain customers.[5] Furthermore, plans are in the works at some busy airports to reduce the number of regional flights served, as part of efforts to use runway capacity more efficiently.

As regional carriers find competition increasing for access to hub airports, the safety standards of local airports that serve small (Part 135) aircraft are being questioned. Currently, airports receiving their only scheduled service from Part 135 carriers are not eligible for certification under the FAA Certification Program. Certification requires airports to meet minimum standards for equipment and operations and to develop procedures to minimize loss of life and property in the event of an accident. A recent General Accounting Office study recommends that certification be required for all airports that receive regularly scheduled service, regardless of the aircraft size.[6]

[5] OTA confidential airline survey.

Shift Away From Open Entry

A major argument in favor of deregulation was that CAB oversight had discouraged the entry of new firms into the industry and had created a government-regulated oligopoly. Yet of the 119 carriers that entered the industry between 1978 and 1986, only 35 were still operating at the end of 1986.[7]

The demise in 1986 of People Express, the model for carriers formed in the early 1980s, signaled the end of open entry in practical terms. Like some other new entrants, People Express had counted on an expanding market to finance the major maintenance needed after 2 to 3 years of operation. Head to head competition from established carriers in cities like Buffalo prevented buildup of capital, and for this and a host of other reasons, People's management was forced to seek a buyer to avoid bankruptcy, So many individual and institutional investors lost money on People and other new entries, and so few of the young firms still operating have provided attractive returns on investments, that Wall Street capital markets for new entrants are now essentially closed.[8]

Furthermore, would-be entrants now find many principal airline markets effectively closed. Existing hub operations cover most logical transfer points that also produce significant local traffic, and few opportunities remain to establish hubs at underutilized airports in major cities, as Midway did in Chicago. New entrants are further discouraged by the dominance of one or two carriers at hub airports as shown in table 2-3. The carriers that dominate in these hubs are fiercely protective and will-

[6] U.S. Congress, General Accounting Office, *Aviation Safety—Commuter Airports Should Participate in the Airport Certification Program,* GAO/RCED-88-41 (Washington, DC: U.S. Government Printing Office, November 1987), p. 9.

[7] Frank A. Spencer and Frank H. Cassell, Northwestern University Transportation Center, "Eight Years of U.S. Airline Deregulation: Management and Labor Adaptations; Re-emergence of Oligopoly,') unpublished manuscript, January 1987, p. 37.

[8] Julius Maldutis, Solomon Brothers, unpublished manuscript of address at the Aero Club of Washington, DC, June 23, 1987.

Table 2-3.–Percentage of Passengers Enplaned by Airlines at Selected U.S. Airports

Airport	Air carrier(s)	Passenger percentage
Atlanta	Delta, Eastern	**93.7**
Charlotte	Piedmont	**81.2**
Chicago O'Hare	United, American	**72.6**
Dallas/Ft. Worth[a]	American, Delta	**85.9**
Denver[a]	United, Continental	**86.9**
Memphis[a]	Northwest	**74.6**
Minneapolis	Northwest	**79.9**
Pittsburgh	USAir	**82.5**
St. Louis	TWA	**82.9**

apercentage includes totals attributed to merger and consolidation Partners.

SOURCE: Aviation *Daily*, "U.S. Carrier Market Share at Leading U.S. Airports," June 3, 19S7, p. 353 reverse-360 reverse.

ing to cut fares for as long as it takes to prevent a new carrier from establishing itself.

Furthermore, obtaining gate and terminal space is expensive, even where it is available; in many airports, the best gates and terminal counter spaces are leased on a long-term basis by major carriers. At capacity controlled airports, the cost of slots forms another deterrent–at Washington National and New York LaGuardia, slot costs are being quoted at $1 million each.[9]

Finally, aircraft procurement expense is a formidable hurdle facing a new carrier. Most of the new entrants during the early 1980s acquired their fleets when prices for new and used aircraft were depressed because of the recession. Today, used aircraft in good condition draw premium prices, and new jets cost well over $20 million.

International Ties

The U.S. airline industry is increasingly linked to the international market, and it is reasonable to expect that marketing and other financial ties between the United States and other countries will grow over the next few years.[10] Some U.S. airlines have found that low labor costs in some foreign air hubs make deploying some major maintenance abroad extremely cost-effective. At least two countries, Sweden and Canada, have proposed that cabotage restrictions between their nations and the United States be dropped. (Cabotage refers to the practice of preventing foreign carriers from flying U.S. passengers to more than one domestic destination on a single trip. For example, a Swiss flight from Zurich cannot fly to New York, pick up passengers and continue to Cleveland. It could, however, drop off New York passengers and then fly, half full of remaining passengers, to Cleveland, if it had bilateral permission to do so.) So far the United States has rejected these overtures, contending that the United States has more to lose than to gain by offering complete freedom of entry. However, future innovative marketing arrangements between carriers may modify arrangements between international carriers. Moreover, foreign airlines may participate directly in the U.S. industry through investment. Ansett Transportation Industries, Ltd., one of Australia's three major airlines, recently announced a plan to purchase 20 percent of American West Airlines stock—the largest percentage holding by any foreign airline in a U.S. domestic carrier. (Up to a 25 percent interest by foreign investors is allowed by U.S. law.) As part of the deal, Ansett will have one representative on the American West board, can establish links with its existing U.S. freight forwarding service, and will gain expertise in deregulation for when Australia deregulates its airlines.[11]

[9] *Aviation Daily,* "American West Asks FAA To Reallocate Slots at National, LaGuardia," July 2, 1987, p. 10.

[10] *Aviation Daily*, "Analyst predicts Worldwide Airline Integration," Mar. 18, 1987, p. 403.

[11] Michael A. Dornheim, "Ansett's Stock Purchase Will Place Foreign Stake in American West at 20 Percent," *Aviation Week and Space Technology,* July 20, 1987, p. 41.

OPERATIONAL CHANGES

Now that the marketplace determines profits, airlines have moved aggressively to expand market share and to hold down costs. The annual increases in air travel have been achieved by price competition, expanding service into new markets, and adjusting service to meet consumer demands. To con-

trol costs, managements have reduced staff and instituted a variety of tight cost management methods.

Hub and Spoke Service

Airlines have tried to maximize passenger seats filled by eliminating unprofitable routes and concentrating on lucrative high-density routes serving large- and medium-sized airports. The hub system establishes a number of routes connected to a central hub airport where passengers are collected from feeder flights, transferred to other flights on the same line, and are then carried to their ultimate destination. The traffic pattern at a hub airport consists of closely spaced banks of arrivals and departures. Passengers land at the airport and transfer to another flight within 40 to 50 minutes. Although Delta used Atlanta as a hub long before deregulation, most of the other majors adopted this pattern during the 1980s, because it permits service between more origin and destination points. Moreover, passengers can be retained by the airline for longer distances, raising the average revenue per passenger. In most cases, carriers choose a busy airport as a hub, so they can offer passengers a wide variety of possible connections as well as capitalize on already heavy origin and destination traffic. About three-quarters of the passengers at Atlanta and one-half at Chicago, Denver, and Dallas-Fort Worth arrive merely to change planes for other destinations.

While the shift of the major airlines from point-to-point service to hub and spoke has been a sound marketing tactic, it has forced adjustments in personnel and procedures that have substantial costs. Although hubbing allows carriers to centralize major maintenance facilities and inventory, aircraft often require servicing at a spoke where the carrier does not have repair capability. Contract arrangements may be made with another carrier for maintenance, or parts and repair crew may be flown in—at considerable expense.

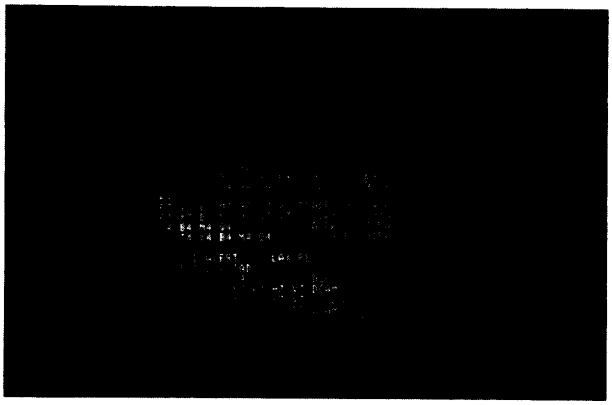
Because hub and spoke operations rely on tightly scheduled arrivals and departures, congestion and delay can occur during peak hours, especially at airports such as Chicago and Atlanta, that serve as hubs for several major airlines. Moreover, the slots at these airports are one half-hour time periods. To maintain their position on computerized reservation systems, airlines tend to cluster arrivals and departures in the first 10 minutes of their slots, intensifying demands on an already full ATC system. Bad weather, requiring instrument flight rules, can make delays much worse. The additional costs attributable to congestion and delay such as fuel, missed connections, and customer dissatisfaction have caused some airlines to establish hubs at less busy airports, as Piedmont has done at Baltimore-Washington International. The largest carriers have established additional hubs at less busy airports, as American has at Raleigh-Durham.

Code-sharing

Code-sharing is a term that refers to two airlines, usually a major and a regional carrier, that share the same identification codes on airline schedules. By code-sharing with a regional airline, a major airline can advertise flights to a much larger market area and expand its market at relatively low cost. Prior to 1984, code-sharing existed only on the USAir-affiliated Allegheny Commuter service, but by the first half of 1987, the principal regional airlines were all code-sharing partners with a major airline. Code-sharing agreements vary widely and may include marketing and other tie-ins between the regional and major airlines, such as discount bulk fuel purchasing and terminal counter and gate sharing. Some of these agreements further lock in code-sharing affiliates by providing training, pooled aircraft purchasing, and other types of services that the regional could undertake only at much higher costs. While code-sharing arrangements can be mutually beneficial to both partners, the interdependence is often one-sided; the major is far less dependent on the smaller carrier than vice versa.

Computerized Reservation Systems (CRS)

CRSs are computerized systems that display airline schedules and prices for use by agents in making reservations. They are potent marketing tools, since approximately 90 percent of all reservations made by U.S. travel agents are made through these systems. Although five such systems are currently owned and operated by major airlines, American's



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Sabre and United's Apollo account for 70 percent of the market use. CRSs have been expanded to make other types of reservations, such as hotel and rental cars. Fees from sales made using the systems are sources of substantial revenue and profits for their owners,

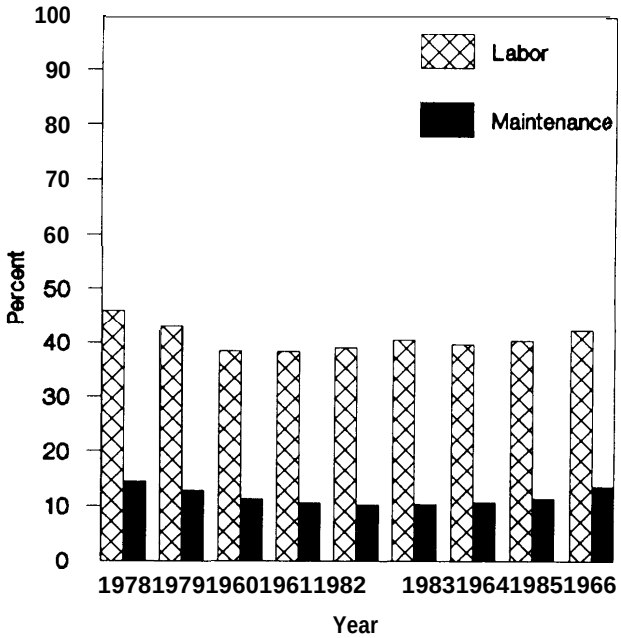
Since CRS is programmed to select flights based on published schedules, airlines find tremendous economic advantages in developing schedules that show flights to major cities arriving and departing during the early morning and evening peak hours. For example, to compete for lucrative business travel, airlines bunch arrival times at major airports at 8:30 or 9:30 a.m., in time for morning meetings. DOT's action to require airlines to report on-time performance was designed in part to prevent airlines from underestimating their actual flying time to gain a more favorable position on the CRS.

Controlling Costs

To maintain competitive fares and still make a profit, every airline has made intense efforts to reduce and control operating costs for labor, fuel, maintenance, commissions, and other services. Gone is the era when fares were controlled by CAB, and cost increases could be passed on to the consumer without the threat of losing business to another carrier.

Labor Costs.–Labor is the industry's largest operating expense, representing 42.6 percent of total expenses in 1986 (see figure 2-5), down from the 1978

Figure 2-5.—Expense Indicators of Major Airlines, 1978-1986: Labor and Maintenance



SOURCE: Office of Technology Assessment based on Congressional Research Service data.

peak of 46.1 percent. (The 1981 low in labor's share of total costs reflects increased fuel prices rather than significant reductions in labor costs.) Each airline devotes a different portion of costs to labor. In 1986, for example, Continental expended 22.8 percent of operating expenses for labor, while among the other majors, only Northwest at 28.4 percent spent less than 31 percent of total expenditures on labor. [12] Continental achieved its low labor cost partially as a result of its bankruptcy filing in 1983, which enabled it to nullify its existing union contracts. Setting an example soon followed by most major carriers, American initiated a two-tier pay structure in 1983 which paid new employees significantly less than existing employees. The strategy held labor costs down, but was very unpopular with employees, and has been significantly modified. After its merger with Republic in 1987, Northwest refused to raise pay levels for former Republic employees to equal those of Northwest personnel, creating a two-tier pay scale that was a persistent irritant. Other airlines undergoing financial difficulties have

[12] *Aviation Daily,* "Major and National Carriers Labor Expenses," July 15, 1987, p. 77 reverse.

negotiated employee pay cuts, generally the most contentious issue in airline negotiations and acceptable to employees only when failure or bankruptcy seem likely alternatives. Finally, airlines have reduced or eliminated positions, Several have eliminated meteorology and safety sections, others now rely on manufacturers for engineering expertise that used to be a part of the airline's operations.

Some airline holding companies have established nonunion subsidiaries that provide the same service at a lower cost than the carrier's union employees. This strategy, known as "double-breasting," was initiated by New York Air and is considered reprehensible by organized labor. Attempts to form subsidiaries through the transfer of existing union workers to new firms have met with fierce resistance from the affected unions. As the need has grown for skilled pilots and ground personnel, management has had to back off from severe wage and benefit inequities.

Maintenance Costs.–Industry data reported to DOT show that maintenance expenditures dropped from a high of 14.5 percent of operating expenses in 1978 to a low of 10.3 percent in 1982, a period of high fuel costs, and then rose to 13.7 percent in 1986. Airline maintenance spending, which includes refurbishing and remodeling aircraft as well as routine equipment maintenance, usually rises with industry profits that make available discretionary funds. In hard times, airlines undertake only the maintenance necessary to meet FAA standards. Since individual airlines allocate costs differently, conclusions about the safety impacts of maintenance expenditure fluctuations are very problematic. For further discussion see chapter 5.

Fuel Costs.–Fuel has been the most volatile cost for the industry, swinging between a high of 33.9 percent of operating costs in 1980 to a low of 19.6 percent in 1986. The industry has little control over fuel costs since it must generally pay prevailing prices.

Commissions.–Airlines have increased expenditures for travel agent commissions, and almost 11 percent of total 1986 operating expenses were commission payments, up from 5.5 percent in 1978. However, this shift occurred because airlines now rely on travel agents, aided by CRSs, to capture business. Indeed, CRS programs are so effective that many airlines have been able to reduce drastically their ticket sales forces.

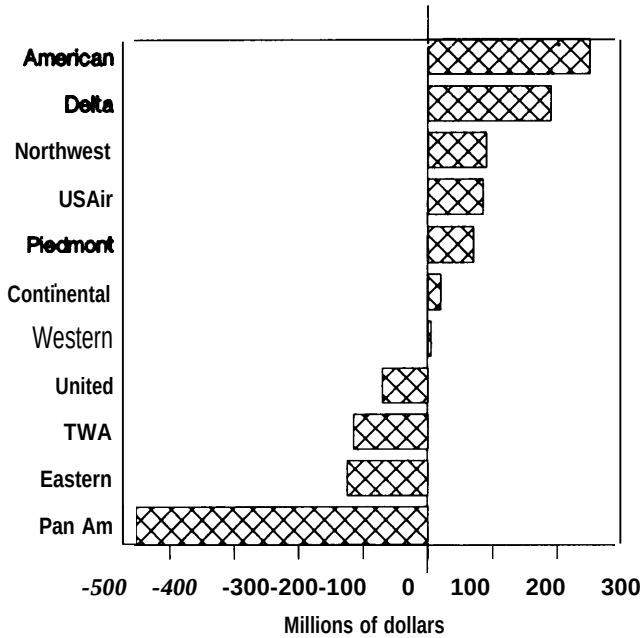
PROFIT AND DEBT TRENDS

The last decade has contained both the industry's most profitable and least profitable years, not surprising given the extent of change within the airline industry. However, in a noteworthy departure from conditions during the regulated era, the profits and losses associated with these cycles have not been evenly distributed among the major carriers. Even in good years for the industry, certain firms have not fared well. In 1986, considered a profitable year for the industry overall, the vast majority of the net profits were concentrated in about half of the major firms (see figure 2-6). While all airlines have cut costs, some have been more successful than others in making money in a rapidly changing environment, and consistently, a few firms—American, Delta, Piedmont, USAir, and Northwest–have been more profitable than their competitors.

The leveling off and decline in interest rates has helped the industry reduce the impact of a large debt burden, which stood at $15 billion at the end of 1986.[13] However, the debt issue may be an industry time bomb. Some firms are earning enough to service large debt, while others are able to service their debt only by refinancing or taking other steps to reduce the burden. The debt load, like net and operating profits, is not evenly distributed among firms in the industry. For example, Texas Air carries the industry's largest debt, $4.7 billion, followed by AMR with $2.4 billion, TWA with $1.9 billion and Delta with $1 billion.[14] Although debt is not now a pressing problem, an economic slump could push marginally successful carriers into dangerous financial situations.

[13] *Aviation Daily*, "Intelligence," May 4, 1987, p. 185. Industry figure does not include Piedmont.
[14] Ibid.

Figure 2-6.–Net Profits of Major Airlines, 1986



SOURCE: Office of Technology Assessment based on Congressional Research Service data.

POLICY ISSUES RELATED TO INDUSTRY CHANGES

The numerous operating changes and economic considerations discussed in this chapter present difficult issues for public policy makers. Among the most compelling are the problems of allocating limited airport capacity in a safe, efficient, and equitable manner and the effect of mergers, reorganizations, and cutbacks on employee performance.

Airport Capacity

The majority of airports are small or regional facilities that have adequate capacity, and even at the busiest airports, demand exceeds capacity only at some times of day. However, because the demand exceeds the runway and gate capacity of the busiest hub airports at peak hours, congestion and delays frequently occur even in good weather, and are especially troublesome in bad weather. At those airports where capacity is an issue, every method of meeting demand has significant operational, economic, and safety implications.

During 1987, the number of delays reached record levels at certain airports and on some airlines, inconveniencing travelers throughout the system. Especially hard hit have been some commuter airlines that tend to lose customers under circumstances of hub congestion, since, except for early morning departures, they cannot maintain an on-time schedule.[15] The industry blamed the limitations of the ATC system, while FAA countered that while delay is often weather related, carriers' hub operations and CRS scheduling competition contributed to delay problems. (See box 2-A.) Passengers reacted with an all-time high in complaints. The causal relationship between congestion and airline safety is subtle and complex, and ground and airspace congestion place pressure on the ATC system, pilots, and aircraft equipment to operate with special regard for safety, even though delays may result.

[15] OTA confidential airline survey.

Box 2-A.–Airport Scheduling Meetings

The Office of the Secretary of Transportation (OST) and airlines hold meetings when the number of delays due to overscheduling or other factors becomes unacceptably high. The high-density rule of 1968[1] limited operations at five heavily used airports, Kennedy, O'Hare, LaGuardia, Washington National, and Newark. Industry-government scheduling committees were formed at each of the airports to meet regularly and resolve problems. In the early 1980s, the scheduling process began to break down, with numerous resulting delays, and the Department of Transportation (DOT) issued a rule to allocate slots and permit their sale at Kennedy, LaGuardia, O'Hare, and Washington National.[2] Currently DOT now conducts scheduling meetings involving the Federal Aviation Administration (FAA), OST, and airline representatives when delays at these or other airports become a major problem, although such meetings are not held on a regular basis. The first meeting was held in November 1984 (the "Crystal City meetings") and the second in the spring of 1987 to address the peak hour problems at Newark, Philadelphia, Dallas-Fort Worth, O'Hare, and Atlanta. Another set of meetings was held in late 1987 to prepare for a 6-month runway closure due to a major repair at Los Angeles.

Three causes create schedule peaks: hubbing operations; customer demand–although this is hard to isolate, and demand peaks may spread over 2 hours; and, probably most important, the computer reservation system. Travel agents sell tickets according to the list of flights that appears on the computer screen. The listing gives priority to flights with times nearest the requested time. Customers tend to request flights on the hour, so most lists first show flights near the beginning of the hour. Flights farther away from the hour may not even appear on the first screen or even the third at the busiest airports. Customers select the first flight on the list more often than any other flight, and select flights on the first screen more often than flights on later screens. Therefore, flights scheduled near the beginning of an hour have a marketing advantage over other flights. Even the four airports with regulated slots ate subject to the peaking problem, because slot durations are at least 30 minutes, and airlines with slots can and do bunch flights on the hour.

DOT relies on FAA technical expertise to judge airport capacity. Capacity is an extremely complex issue depending on weather, runway configurations, and noise restrictions. Airlines resent limits on scheduling and sometimes dispute FAA procedures and capacity estimates, maintaining that air traffic control procedures need to be improved, holding patterns better used, and separation standards reduced. They also would like to see more airports and runways constructed.

FAA conducts the meetings, and, despite these airline complaints, tries to view the situation from the air traffic control standpoint, warning the airlines that flow control will hold flights on the ground if overscheduling persists. OST is present at the meetings to guarantee anti-trust immunity by ensuring that no deals are cut between carriers, and to represent the consumer viewpoint on the importance of maintaining schedules and avoiding delays. In practice, OST has found it necessary to enforce its policy objectives through investigations and delay reporting rules. While investigations are still ongoing, in 1987 OST did achieve some of its objectives—airlines have signed agreements to adjust their schedules at four airports that chronically had late flights. Schedules at these far airports improved, although Atlanta remains a problem because a major airline with a hub there would not agree to many changes in its schedule.

A similar meeting was held in Los Angeles to determine how to cope with the impending closure of one runway for repair. After considerable deliberation, both major airline users agreed to reduce their schedules for Los Angeles during the period of major work. Although participation in the meetings and implementation of agreed upon changes are completely voluntary,[3] one anonymous observer has likened them to auctions where no one wants to bid.

[1] 33 Federal Register 17896 (Dec. 3, 1968).
[2] 50 Federal Register 52180 (Dec. 20, 1985).
[3] Cynthia Burbank, U.S. Department of Transportation, Office of the Secretary, personal communication, Dec. 4, 1987.

FAA innovations, such as the reconfiguration of airways under the East Coast Plan, are proof that improved management can increase capacity in parts of the system. However, actions to alleviate one problem often create another. In the case of the East Coast Plan, changes to ease delays for traffic between New York and Washington adversely affected Philadelphia. Physical improvements in airport facilities, such as additional runways, may be a partial solution to the capacity problem, but difficult issues re-

lated to noise and land use control preclude substantial relief in the near future. Technology can increase the capacity of airports to a limited extent by allowing fuller, more efficient use of existing facilities; actions for improvements are discussed in chapter 7.

Demand Management

One approach to controlling congestion and delay is by managing demand; tactics include limiting access by restricting certain types of aircraft, pricing policies, and quotas or slot control. Prohibitions such as those based on size work best in situations where there is an alternative airport to which restricted carriers can be diverted. To forbid some portion of the traffic to use an airport without an available alternative is likely to be considered a restriction of interstate commerce or discriminatory practice.

Officials of the Massachusetts Port Authority (Massport) have recently proposed a plan for revising landing and terminal fees at Logan Airport that would raise use charges for small aircraft to more nearly equal those paid by large carriers and would eventually add a premium to charges for peak hour operations. The plan, to be implemented July 1, 1988, raises the base minimum landing fee from $25 to $88 and reduces the landed weight charge from $1.31 per 1,000 lb. to $.47.'[6] In effect, the plan increases charges for aircraft with 30 seats and fewer while substantially reducing charges for large passenger jets. Massport estimates that while the pricing plan will reduce Logan operations by only 5 percent, it will cut delays up to 80 percent, because the reduction of small, slower GA or commuter flights can improve runway capacity. Similar aircraft can be more uniformly and efficiently spaced on approach and departure, thereby smoothing out irregularities in the traffic stream, a prime cause of delay.

Representatives for GA and regional airlines protested that the Massport plan is discriminatory, and Massport has exempted from the proposed fee changes regional airline flights from 14 New England communities that have "Essential Air Service" to Logan. The Regional Airline Association claims the plan will reduce or eliminate air service to most of the other 30 cities served by regional airlines operating in and out of Logan. Whether FAA has the authority to make a decision on the discriminatory nature of the plan under Federal laws and regulations is likely to be tested in the courts. Regardless of the outcome, the concept of restricting traffic through pricing is one many advocate. Port Authority of New York officials are considering a large increase in the minimum peak hours fees for the three airports they manage: Newark, Kennedy, and LaGuardia.

Quotas and Slot Sales.–Setting a quota on the number of slots available at an airport is another controversial approach to controlling airport demand. Limits on the number of operations or slots per hour are based on the capacity of the ATC system, the airport runways, and sometimes local sensitivities to noise. Slots at most airports are allocated through negotiations with a scheduling committee consisting of the airlines, the air traffic controllers, the airport management, and DOT. For example, at Washington National, where 60 slots are available per hour, 37 are allocated to air carriers, 11 to commuters, and 12 to GA aircraft. The system allows some flexibility for accommodating more flights in good weather.

Slot sales are an experiment, initiated by DOT, to allocate airport access through bidding. By auctioning slots, DOT provides access to those users willing to pay the highest price. Some economists argue that if airport access must be limited, it should be treated as a scarce resource and priced accordingly.

Critics claim the current slot sale process gives an advantage to the airlines already operating at the airport and denies access to competitors, providing the existing users with virtual monopolies and a financial windfall. The airlines that control the slots contend that the system is fair; since they took the risk necessary to develop the market, they should be rewarded by retaining the slots. Contrary to DOT's expectations, the slot sale plan has not fostered an active market; available slots are scarce and expensive, with 30 minute slots at Washington National and LaGuardia recently selling for over $1 million each.

Restrictions on aircraft by size or type and any form of a quota system used to achieve greater air-

[16] *Aviation Week & Space Technology*, "Massport Passes First Phase of Fee Increases at Logan," Mar. 21, 1988, p. 75.

port efficiency raise important equity issues. Whose access is restricted and why? Is the commuter airline denied access to the nearest hub airport because of its small size or lack of funds to buy a slot? Will smaller communities lose air service entirely because, shut out of hub airports, the commuter airlines that serve them cannot stay in business? Will the airlines increase peak hour fares if airports charge premium fees at peak hours, or will the increased costs be spread among all the airline users to maintain competitive pricing for popular travel times? Experience to date with slot sales raises questions about how fairly market allocation of scarce resources like airport access can work.

Effects of Consolidations on Employees

Since 1985, all the major airlines have been involved in some sort of consolidation, creating uncertainty, stress, and dislocation for many employees. Long-term employees accustomed to a secure, regulated environment have been particularly affected. The exact extent to which airline employee performance has been affected by stress related to mergers and takeovers is beyond the scope of this report. However, research indicates that reorganization is always stressful and often debilitating to employees and destructive to company morale. Airline employees have had to deal with wage cuts, relocations, and the threat of job loss. Once confident employees see career paths stymied and disturbing changes in operating practices and the corporate culture.

Psychologically, most employees of companies in the process of management changes go through a series of stages, called the "merger syndrome." After initial denial of the inevitability of change, they approach the consolidation with fear and anxiety, feelings that are replaced by anger and distrust if the merger does not go well. '7 In the last stages, employees leave or adapt through a combination of accommodation and resignation. Even in situations of "friendly" mergers, employees become absorbed and preoccupied with the reorganization. Job performance lags, and attention turns to preparing resumes and talk about personal plans.[18] Some employees suffer from physical symptoms of insomnia, excessive nervousness, and decreased attention span.

Stress and anxiety can be exacerbated by the way the reorganization is managed. Usually, the preliminary negotiations between merging firms are held in secret, giving rise to negative rumors and feelings of helplessness among employees. When the content of the talks is disclosed, information usually centers on the legal and corporate financial matters—not the human concerns preoccupying the employees. Press reports often highlight the problems associated with the consolidation, and accurate answers to questions about the merger are difficult to obtain. In most cases, the details that concern employees have to be worked out in the months after the sale or merger.

Once the merger begins, the problems become more complex, and the most important contributor to company discord and stress is the clash in corporate cultures. Employees and management focus on the differences in the way the two companies operate. Competition develops over whose practices will become the new company policy, and hostility pits executives against each other.[19] The major airlines include several examples of reorganizations that have been as acrimonious and as stressful as any in other industries,20 as well as mergers that have been relatively harmonious.

Federal Labor Policy Changes

During the 40 year stewardship of CAB, airline employees were cushioned from the stressful changes associated with mergers and other forms of consolidation. CAB routinely conditioned its approval of mergers and acquisitions upon carrier acceptance of a standard set of labor protective provisions (LPP). LPPs addressed the concerns that cause the most anxiety, such as displacement, dismissal, relocation allowances, severance pay, and benefits continuation. Also, LPPs established rules for the integration of seniority lists, work rule practices, and, most significant, wage schedules. While CAB did not have explicit authority to impose LPPs, courts held that

[17] M.L. Marks and P.H. Mirvis, "The Merger Syndrome," *Psychology Today,* October 1986, p. 38.

[18] ibid.
[19] ibid., p. 41.
[20] OTA confidential airline survey.

it was within CAB's purview to impose them as part of its public interest test.[21]

Upon assuming CAB's functions in 1985, DOT restricted use of LPPs in light of the government's more limited role in the airline industry. The current policy requires LPPs only when special circumstances prevent the establishment of fair wages and equitable working conditions or if a strike arising from a reorganization would cause a threat to the entire air transportation system. Since adopting these criteria, DOT has not required acceptance of LPPs as a condition for merger approval, arguing that airline employees should be protected from the adverse effects of mergers through collective bargaining negotiations.[22] However, critics point out that this stringent standard virtually precludes LPPs, and that labor agreements cannot adequately protect workers because the contracts may not survive the merger or acquisition process. Defenders of DOT policy maintain that LPPs distort the market system, adding costs that could delay or preclude some reorganizations. They view attempts to require LPPs as steps toward re-regulation of the industry.

[21] Linda LeGrande, Congressional Research Service, "Airline Mergers and Labor Protective Provisions," issue brief 87179, updated periodically.

[22] Ibid.

PUBLIC POLICIES AFFECTING AIRLINE OPERATIONS

In addition to deregulation, other public policies have had profound impacts on airline operations and safety programs. The President's decision to fire the striking air traffic controllers in 1981 and cutbacks in the FAA inspection work force necessitated by budget cuts in domestic programs represent policy decisions that affected the aviation safety system. Local government decisions restricting airport traffic and airport development for noise control and other reasons stem from the conflict between local goals to provide adequate, safe airport service and to minimize environmental problems.

Air Traffic Controller Strike in 1981

In August 1981, President Reagan fired the 11,345 air traffic controllers who went out on an illegal strike, illustrating how an executive decision made for national labor policy reasons can profoundly affect a vital safety system. The impact of the firing on labor management relations nationwide was profound, setting the tone for widespread reductions in union wages and benefits in many industries. However, the firing of the controllers compounded existing ATC system problems stemming from obsolete equipment and the increases in airline operations at the busiest airports. FAA had not estimated accurately the increase in the demand for service nor foreseen the impact that the shift to hub and spoke operations would have on its work force and system efficiency.

While FAA began rebuilding its work force immediately after the strike, the loss of two-thirds of its 16,000 controller cadre seriously affected its ability to handle traffic. The ATC system operated at about 80 percent of the pre-strike traffic level with a work force of about 9,000. To handle growing airport traffic with a reduced staff, FAA took steps to spread the work load so that individual controllers would not be overwhelmed by high volume peaks in traffic. It established a system of slot allocations and a reservation system to limit GA access to the ATC system. A system of centralized traffic management, "flow control," was implemented to help reduce airborne delays and keep the demand even and within system capacity. Aircraft separation was increased from 3 miles to 5 miles in the airport area, and from 5 miles to about 30 miles in en route travel, and FAA made extensive use of controller overtime. Some of these actions are still in effect today.

Federal Budget Cutbacks and FAA Inspection Program

While the airline industry was growing at an unprecedented rate, budget constraints forced government-wide cuts in Federal spending. In 1979, approximately 645 inspectors were assigned to 178 air carriers. To comply with national budget goals, the administration cut the inspector work force by 12 percent in 1982 and 1983, a time when the number of airlines grew over threefold. The inspector cut-

back had a particularly severe impact on routine safety inspection programs because staffing priority went to conducting new certification inspections. Moreover, FAA was particularly vulnerable to staff cuts, because it lacked staffing standards to justify the number of inspectors needed, and the number of FAA inspectors fell from 3.6 per airline in 1979 to 1.4 in 1983.

The agency began to rebuild the inspector work force in 1984, hiring enough additional inspectors to offset attrition and to restore the work force to the 1981 level. Currently, the inspector work force is above 1981 levels, but is less experienced. Inspector training is of uneven quality, and the cost of living in major metropolitan areas makes attracting high quality personnel difficult, according to FAA regional officials.

Environmental Concerns

As air traffic has increased, so has citizen concern over environmental issues, including those related to airport development and use. (See chapter 3 for a discussion of the institutional relationships of airports to local governments.) By far the most contentious environmental issue is the impact of airport noise on residential neighborhoods. Because the public is very sensitive to noise and increasingly vocal about its concerns, noise is probably the most powerful constraint on airport operations and construction of new facilities.

Although the use of quieter jets can reduce the level of citizen outrage, the issue of airport noise has a permanent place in the public agenda. Local politicians can attest that the mere mention of increases in airport noise can excite constituents into protest action like few other issues. The noise problem is particularly troublesome for busy, metropolitan airports that gradually have been surrounded by development. Operations at most airports have increased in recent years, and some flight paths have been changed, magnifying the noise problem substantially for residential neighborhoods.

To reduce their liability for nuisance and damage claims from noise or at the mandate of local government, airport authorities have instituted noise abatement programs. Among the most effective, but expensive, approaches is the purchase by the airport of surrounding residential property, as the Los Angeles Airport has done. Other techniques more frequently used include restricting aircraft flight paths (which must be done carefully, with safety concerns in mind), the volume of traffic, or the hours of operations based on acceptable noise standards. Some facilities are experimenting with a noise budget, a plan in which the airport is limited to generating a maximum daily decibel total. Airport management can allocate the noise as it sees fit, raising intergovernmental jurisdictional issues and potentially shifting the noise problem to other communities.

The proliferation of local noise ordinances and standards also raises equity concerns. Such regulations could restrict airport access to propeller aircraft or those airlines financially able to purchase quieter jets.

CONCLUSIONS

Currently the airline industry has achieved one of the key characteristics of an “oligopoly; through hub control, the power of CRS booking, and code-sharing arrangements, a small number of major carriers dominate the market. This fact, which runs counter to the policy objectives of deregulation, has associated tradeoffs for public safety policies. First, the industry climate is likely to be more stable, and although the drive for profits will continue, the intense pressure to cut costs across-the-board may be less, Second, large airlines can be expected to have the resources and management capability to standardize equipment, institute uniform operational procedures and promote policies within their operation that may enhance safety. When a major absorbs a regional carrier it sometimes upgrades the smaller carrier’s policies and procedures. The goal of one expansion-oriented major airline is to standardize its regional carriers so that they all follow the same procedures, use the same training methods and eventually fly the same type aircraft, thereby developing a work force of pilots and mechanics trained and

experienced in the same aircraft.[23] Finally, having only one dominant airline at an airport could reduce congestion and stress on the ATC system. Lacking intense competition for prime takeoff and landing times, a single carrier has the flexibility to schedule flights to maximize efficiency rather than for a competitive position.

However, nothing guarantees that any safety advantages will be realized; furthermore, gains in stability must be balanced against equity considerations and the goals of public convenience, open entry, and price competition. Unless action is taken to intervene, it is likely that the airline industry will continue to drift toward increased concentration, fewer new entrants, and less price competition. Factors contributing to this trend include noise control or demand management restrictions imposed on the ATC system and airport use, or by constraints that make competition difficult for new firms or for existing firms offering new services. **OTA** concludes that Federal decisions that impose ATC or other restrictions for safety reasons may have severe economic consequences for airlines in financial straits. Such decisions thus require careful consideration and active public debate.

[23] OTA primary research.