United States General Accounting Office

GAO

# Report to Congressional Requesters


RELEASED

**RESTRICTED——Not to be released outside the General Accounting Office unless specifically approved by the Office of Congressional Relations.**

GAO/RCED-90-102

GAO

**United States**
**General Accounting Office**
**Washington, D.C. 20548**

**Resources, Community, and**
**Economic Development Division**

B-238198

July 11, 1990

The Honorable John C. Danforth
Ranking Minority Member
Committee on Commerce, Science,
and Transportation
United States Senate

The Honorable James L. Oberstar
Chairman, Subcommittee on Aviation
Committee on Public Works and
Transportation
House of Representatives

This report responds to your request that we examine the effects of increased concentration on air fares and service at major airports around the country. We examined fares and service levels at 15 airports where one or two airlines handle most of the enplaning passengers. We compared fare levels at the concentrated airports with fares at 38 relatively unconcentrated airports.

As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the Secretary of Transportation and to other interested parties.

This work was performed under the general direction of Kenneth M. Mead, Director for Transportation Issues. Mr. Mead can be reached at (202) 275-1000. Major contributors are listed in appendix III.

J. Dexter Peach
Assistant Comptroller General

# Executive Summary

## Purpose

Airline deregulation was predicated on the belief that the industry was fundamentally competitive and that competition would ensure low prices and good service. However, allegations of high fares and service reductions, especially in cities where one or two airlines handle most of the traffic, have triggered congressional concern about the state of competition in many air travel markets. The Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation and the Chairman of the Subcommittee on Aviation, House Committee on Public Works and Transportation, asked GAO to examine trends in airline fares and service.

GAO examined airline yields—the fare per passenger mile—at 53 of the 75 busiest airports in the nation. Fifteen of the 53 airports have relatively high levels of market concentration in that one or two airlines handle most of the enplanements. Yields at these concentrated airports were compared with those at the 38 remaining airports, where there was more competition. GAO also examined trends in departure frequencies and points served from the 15 concentrated airports.[1]

GAO testified on June 7, 1989, on its preliminary findings on changes in fares and service at concentrated airports between 1985 and 1988. This report extends the analysis and now includes fares paid by almost 45 million travelers between 1985 and the second quarter 1989. This report also compares GAO's results with those from studies by the Departments of Justice and Transportation and others.

This report on major airports is one of a series of GAO reviews on competition in the nation's airline industry. Complementary work analyzes fares at airports serving small and medium-sized communities and examines how changes in the airline industry have affected the ability of new firms to enter the industry or of existing carriers to enter new markets.

## Background

Over the past few years, a trend has developed toward the establishment of a dominant position by one or two airlines at a growing number of major airports. Airport dominance can result from an airline merger, or it might follow an airline's decision to set up a hub at the airport. A hub airport is one where an airline consolidates and interchanges traffic from many other points in its system. A carrier that gains dominance

[1]GAO considered an airport market concentrated if one airline handled 60 percent of the enplanements or if two airlines handled 85 percent.

over traffic at an airport can gain a significant advantage over its competitors on individual routes.

At the same time that the major airlines were beginning to establish dominant positions at a number of airports around the nation, they also developed new operating and marketing strategies that can make it difficult for new firms to enter the airline industry or for existing carriers to expand into markets controlled by other airlines. Increased market power can lead to higher prices or reduced service as airlines try to maximize their profits.

## Results in Brief

In June 1989 testimony, GAO reported that fares, on the average, rose more at the concentrated airports than at the airports where there was more competition and were about 27 percent higher than at the airports with more competition. Extending the analysis to include the first two quarters of 1989 showed that fares remained close to 27 percent higher. Fares charged by the dominant carriers tended to rise as their airport market shares increased. Recent analyses of fares at concentrated airports by Justice Department staff and others have also found that fares are higher at concentrated airports.

Service levels at the concentrated airports generally improved: there was more direct, or single plane, service to more places after the airport became concentrated. However, the number of routes where there was competition between carriers declined at most of the concentrated airports, and more routes were served by only one airline.

## Principal Findings

### Fares Have Risen

In 1988, airline yields for all carriers at the concentrated airports averaged about 27 percent higher than yields at the relatively unconcentrated airports. This difference persisted through the first two quarters of 1989. Yields were higher at the concentrated airports in 1985 as well, but the difference has widened as the dominant airlines have increased their share of the traffic at these airports. In 1988, the average yield earned by the dominant airlines at the concentrated airports was 20 cents per passenger mile, almost 38 percent higher than the average yield for all carriers at the unconcentrated airports.

The yields received by the dominant airlines are generally above the yields received by other carriers at the concentrated airports. GAO found that yields rose following the establishment of the dominant positions. These dominant positions were established by mergers of competing carriers, the establishment of hubs, and the extension of already dominant positions.

The airlines have offered a number of explanations for the higher yields at concentrated airports, including shorter average trips out of hub airports[2] and better quality service (i.e., more service to more points that does not require a change of planes). GAO examined these explanations and, after taking into account differences in average flight lengths, found that yields were still more than 20 percent higher at the concentrated airports.

## Service Levels Have Improved but Competition Has Declined

GAO examined several measures of the level of service at the 15 concentrated airports to see whether travelers at those cities received more or less service as airport dominance grew. The number of destinations served directly from concentrated airports, that is, with single plane service, increased 10 percent, and the number of daily departures increased 3 percent between May 1985 and May 1988. These increases are primarily comprised of large increases in service by the dominant carriers as they established or strengthened their hubs. At airports that were affected by mergers, the number of daily departures often declined. At the same time, competition has lessened at the concentrated airports. The number of destinations served directly by only one airline rose 25 percent, while the number of destinations served by four or more airlines fell 52 percent.

## Other Analyses Also Show Higher Fares at Concentrated Airports

A study comparing fares at hub and nonhub airports undertaken for the Air Transport Association (ATA) included 14 of the 15 concentrated airports in this study. While the ATA study did not address the question of how market concentration affects air fares in the same way as GAO, ATA's data showed that in 13 of the 14 concentrated hub airports GAO examined fares were above the industry average. The ATA study attributed the higher fares to factors other than concentration, including the public's willingness to pay for higher levels of service—i.e., more frequent, nonstop flights to more destinations.

[2]Shorter trips spread fixed costs over fewer miles and so fares per mile are generally higher for shorter flights than longer ones.

Analysts at the Justice Department recently examined airline fares at two airports that became concentrated following mergers of competing airlines and found that airline fares had risen significantly as a result of the mergers. Finally, the Department of Transportation recently published a multivolume study of competition in the airline industry. The study concluded that, while most air travelers had benefited under deregulation through more service and lower fares, there were "pockets of problems" including higher fares for passengers traveling to and from some highly concentrated airports. DOT concluded that no action was warranted at this time.

## Recommendations

GAO is not making any recommendations in this report. However, in testimony before the Congress, GAO outlined the pros and cons of various options that might be taken to promote competition in the airline industry (see app. II). GAO also is finalizing work on an econometric model that will help the Congress and the Department of Transportation decide what specific actions are most likely to promote competition and preserve the benefits of deregulation for the consumer. A report synthesizing all of GAO's work on competition in the airline industry, including appropriate recommendations and matters for congressional consideration, is planned for issuance early next year.

## Agency Comments

As agreed with the requesters, GAO did not obtain formal agency comments on this report. However, GAO has met with DOT officials and they concurred with the finding that fares are higher at concentrated airports.

# Contents

## Figures

## Abbreviations

| | |
|---|---|
| ATA | Air Transport Association |
| CAB | Civil Aeronautics Board |
| CPI | Consumer Price Index |
| CRS | Computerized Reservation System |
| DOJ | Department of Justice |
| DOT | Department of Transportation |
| GAO | General Accounting Office |
| HHI | Herfindahl-Hirschman Index |
| O&D | Origin and Destination |
| SH&E | Simat, Helliesen & Eichner, Inc. |
| TACOs | Travel agent commission overrides |
| TWA | Trans World Airlines |

# Introduction

For over 40 years the nation's airline industry was subject to economic regulation by the Civil Aeronautics Board. Many economists and airline industry experts believed that government control over fares and service was inappropriate for this industry, and in 1978 the Congress passed the Airline Deregulation Act (P.L. No. 95-504). Proponents of deregulation believed that the free market, not government regulation, should determine who should provide airline service and at what price. They believed that the airline industry was a naturally competitive one that should be treated like any other industry in which competition could be expected to flourish.

## The Airline Industry Under Deregulation

In the early years following deregulation, many new firms entered the industry and the existing carriers expanded their operations into new markets. Between 1978 and 1984, as the proponents of airline deregulation had forecast, service offerings expanded and competition intensified. While real (inflation-adjusted) fares rose due to sharp increases in fuel prices, they began to fall after 1981.[1] However, over time, many of the new entrants and some of the older carriers went out of business or merged with other airlines. After a series of bankruptcies and mergers between 1985 and 1988, the national air travel market became even more concentrated[2] than when the industry was regulated by the federal government. For example, in 1978 the five largest airlines controlled 69 percent of the nation's air travel market. Following the increase in competition the share of the five largest airlines fell to about 57 percent in 1985, but by late 1988 it had risen to 74 percent.[3]

Since deregulation, the airlines have reconfigured their operations into hub and spoke networks. Under a hub and spoke system, airlines bring many flights from "spoke" cities into a central "hub" airport, interchange the traffic, and send the flights back out to their final destinations. Airlines using hub and spoke operations maintain a large presence at each hub airport and often dominate traffic at the hub. Thus, while competition has increased on many airline routes, certain airports have experienced increases in concentration.

[1]Some proponents of deregulation held that because entry into airline markets was relatively easy, the threat of potential entry by would-be competitors would be sufficient to keep air fares low even in markets dominated by one airline. Airline markets were believed to be highly "contestable."

[2]Concentration is the degree to which sales in an industry or market are accounted for by a small number of firms.

[3]This is not necessarily the most important measure. Three airlines all competing over every route in the nation might well be better than five airlines each with a regional monopoly. Many routes remain highly competitive and the industry as a whole remains more competitive than before deregulation.

## Growing Concern About the Future of Airline Competition

For several reasons, including mergers and a dramatic increase in hub operations, many major airports around the nation are now dominated by one or two airlines. Once established, airline dominance might be relatively secure because it can be difficult for other airlines to establish or to significantly expand operations at airports where another carrier is already dominant. Marketing strategies, such as frequent flyer programs, airline-owned computerized reservation systems, and travel agent commission overrides[4] can be used to reinforce the dominance of the incumbent airline by keeping out potential competitors. In addition, physical constraints, such as inadequate gate space to accommodate new entrants and noise restrictions on the type of equipment that carriers can use to serve some airports, can also limit entry by potential competitors.

Concern is growing that the major airlines might be taking advantage of their positions at airports where they are dominant by charging higher fares for air travel out of those airports or by cutting back on service levels. Airport dominance, combined with other recent changes in the ways the major airlines provide and market their services, might have anti-competitive impacts and frustrate the goals of airline deregulation.

Such concern caused the Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation to ask us to examine fares and service at Lambert-St. Louis International Airport before and after the merger of Trans World Airlines (TWA) and Ozark Air Lines.[5] Both TWA and Ozark Air Lines used St. Louis as their primary hub airport. Before the merger, TWA handled about 56 percent of the enplanements at St. Louis, but after the merger TWA handled 82 percent.[6] We found that TWA's fares for flights out of St. Louis rose substantially following the merger in comparison with fare changes elsewhere. We also found that the number of carriers competing for traffic at St. Louis declined. More routes were served by only a single carrier, usually TWA, and far fewer routes were served by four or more carriers. Our fare

[4]Travel agent commission overrides are payments by airlines to agents above and beyond their normal commissions for increasing their bookings on a carrier's flights.

[5]Airline Competition: Fare and Service Changes at St. Louis Since the TWA-Ozark Merger (GAO/RCED-88-217BR, Sept. 1988).

[6]Enplanements are passenger boardings at the airport, and include both originating and connecting traffic.

findings for St. Louis were later confirmed in an analysis by the Department of Transportation (DOT).[7]

## Objectives, Scope, and Methodology

At the request of the Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation and the current Chairman of the Subcommittee on Aviation, House Committee on Public Works and Transportation, we extended our St. Louis analysis to include fares and service at 14 other concentrated airports around the nation (see following list).

### The 15 Concentrated Airports

Atlanta
Charlotte
Cincinnati
Dayton
Denver
Detroit
Greensboro/High Point/Winston-Salem
Memphis
Minneapolis/St. Paul
Nashville
Pittsburgh
Raleigh-Durham
St. Louis
Salt Lake City
Syracuse

Our objective was to determine whether

- fares at major airports where one or two carriers handled most of the traffic were above fares for travel at other major airports where there was more competition;
- dominant airlines charged higher fares than other carriers serving the airport; and
- service levels had changed at concentrated airports.

We focused on the period since concentration began to increase, roughly since 1985. We selected concentrated airports for analysis from among

[7]A Comparison of Air Fares and Services at St. Louis Before and After Trans World Airlines Acquired Ozark Airlines (sic), U.S. Department of Transportation, Office of Economics (DOT-P-37-89-3, Jan. 1989).

the 75 busiest on the basis of enplanements. Our criteria for deciding that an airport was concentrated were that one airline handled at least 60 percent of the passengers enplaning at that airport or two airlines handled at least 85 percent of the enplaning passengers. A total of 22 airports met the concentration criteria. We chose enplanement share as the criterion, but others are possible, including the proportion of originating passengers handled by one carrier. Airlines have a smaller proportion of originating traffic than enplanements at their hubs because of the relatively large volume of non-originating, connecting passengers. When we calculated enplanement shares, we grouped together airlines under common ownership, such as Eastern and Continental or Piedmont and USAir.

From the total number of concentrated airports, we excluded six airports that met the concentration criteria but were in metropolitan areas served by more than one major commercial airport. Therefore, airports in the New York City, Los Angeles, Chicago, Houston, Baltimore/Washington, San Francisco, and Dallas areas were not candidates even though airports in some of these cities met the concentration criteria. We eliminated airports in multi-airport cities because competition from carriers serving the other airport might offset, to some extent, the effects of concentration. We also excluded one concentrated airport because it was outside the 48 contiguous states.[8] All but one of the 15 airports we selected are hubs for one or more of the major airlines.[9] Some airports, such as Phoenix, are hubs, but are not concentrated by our criteria.

We contrasted trends in yields (the fare per passenger mile) on routes from the 15 concentrated airports with yields on routes from a comparison group of 38 relatively unconcentrated airports listed below.[10] The airports used for comparison are those in the top 75 airports in the 48 contiguous states that did not meet our definition of concentration and were not in multi-airport cities.[11] We also compared the yields received by the dominant airline at each concentrated airport with the yields

[8]Because of their unusual geographic characteristics, we excluded airports outside the 48 states from both the concentrated and comparison airports in our study.

[9]USAir, which acquired Piedmont Airlines, has assumed the dominant position at Greensboro, N.C., but does not operate a hub there.

[10]Passenger miles are the straight-line distances between the origin and destination, regardless of the route taken by the individual airlines.

[11]Some of the airports in our control group are hubs (e.g., Phoenix), but they are not concentrated by our definition.

earned by the other airlines serving the airport in order to further understand the effects of dominance.

We examined trends in airline yields from the first quarter 1985 through the second quarter 1989, the most recent quarter for which fare data were available at the time this study was completed. Our analysis covers fares paid by almost 45 million travelers between 1985 and the second quarter 1989.

## The 38 Unconcentrated Airports in the Comparison Group

Albuquerque
Austin
Birmingham
Boston
Buffalo
Cleveland
Columbus, OH
El Paso
Ft. Lauderdale
Ft. Myers
Hartford
Indianapolis
Jacksonville
Kansas City
Las Vegas
Little Rock
Louisville
Miami
Milwaukee
New Orleans
Norfolk/Virginia Beach
Oklahoma City
Omaha
Orlando
Philadelphia
Phoenix
Portland, OR
Reno
Richmond
Rochester, NY
Sacramento
San Antonio
San Diego

Seattle
Tampa
Tucson
Tulsa
West Palm Beach

Because we are concerned with fares paid by travelers from the cities served by a concentrated airport, all of the yields calculated in this analysis apply to traffic originating at such airports. To ensure that our analysis of trends in yields reflected changes in fares, as opposed to changes in the composition of the sample, we controlled for changes in the distribution of destinations and changes in the proportion of one-way and round-trip fares in the sample. For each combination of trip types (one-way or round-trip) and destination, we calculated the average yield for each quarter. We weighted the average yield for each combination according to the average amount of traffic for that combination over the 18 quarters.

In order to improve comparability between the concentrated airports and the comparison group, we examined a subset of 22 unconcentrated airports that excluded airports where average trip lengths were greater than 900 miles. Yields tend to be lower for longer flights because fares increase less than proportionately with mileage flown and, on average, the 38 airports in the comparison group had longer average trips than the 15 concentrated airports. In addition, we compared yields between the 15 concentrated and 38 unconcentrated airports for routes within each of several distance categories.

We used the Origin and Destination (O&D) Survey data collected quarterly by DOT in its 10 percent sample of airline tickets to make our yield comparisons. The airlines report detailed information on every tenth ticket to DOT and, after processing the data, DOT makes the data available for public use.[12]

[12]All large, certificated route air carriers and their code sharing partners are required to submit O&D Survey data. Thus, only the smallest of domestic airlines offering scheduled service are exempt.

Unfortunately, there are a variety of reporting errors in the O&D data. In particular, fares are occasionally misreported or miscoded.[13] As part of this study, we developed a new fare screen to eliminate fares that are too high or too low.[14] Our fare screen was developed by examining available fares in the Official Airline Guide and by discussing fares with industry experts. DOT is currently applying the high end of our fare screen to the latest submissions to identify any fares that are outside credible limits.[15] Table 1.1 contrasts our new fare screen with DOT's original screen. Based on an examination of listed fares, we developed a separate fare screen for each year.

**Table 1.1: Comparison of GAO and DOT/CAB Origin-Destination Data Fare Screens for 1988 Data**

| | DOT/CAB screen Exclude if yield is | | GAO screen Exclude if yield is | |
|---|---|---|---|---|
| Mileage category | less than cents/mile | greater than cents/mile | less than cents/mile | greater than cents/mile |
| 1-100 | 10.00 | 177.18 | 8 | 300 |
| 101-200 | 5.00 | 77.63 | 4 | 255 |
| 201-300 | 3.33 | 56.99 | 3 | 160 |
| 301-400 | 5 00 | 48.12 | 3 | 125 |
| 401-500 | 6.00 | 43.62 | 3 | 115 |
| 501-700 | 4.28 | 38.28 | 3 | 105 |
| 701-1000 | 5.00 | 32.93 | 3 | 80 |
| 1001-1300 | 4.61 | 29.67 | 3 | 65 |
| 1301-1600 | 5 00 | 27.75 | 3 | 55 |
| 1601-1900 | 4 30 | 26.40 | 3 | 50 |
| 1901-2200 | 4.54 | 25.34 | 3 | 40 |
| 2201-2500 | 4.40 | 24.63 | 3 | 40 |
| above 2500 | 4.28 | 23 51 | 3 | 40 |

To determine whether the differences in yields were statistically significant, we contrasted the average yield at each concentrated airport with

[13]For internal uses, DOT had adopted a fare screen developed by the Civil Aeronautics Board to eliminate fares that were obviously too high or too low. However, the screen had not been adjusted for many years. As a result, over time many valid fares were being excluded. The Board's fare screen was used to develop SUMDOM, an internal data base. The data made available to the public and to data vendors are Data Bank 1A, which does not screen out incorrect fares. Users can make their own adjustments. The criteria we developed more accurately screen the O&D Survey data.

[14]The unedited data sometimes have included recorded fares in the hundreds of thousands of dollars and as low as a few dollars when no such fares existed.

[15]DOT has elected to include very low reported fares, including the $0 fares paid by frequent flyers. Our focus is on fares actually paid by travelers, and so we exclude the $0 fares.

the average yield at the unconcentrated airports in 1988 and tested the difference between yields at the concentrated airports in 1985 and 1988 to see if they were significant. All the differences were statistically significant at the .001 level except for the difference between the yield at Detroit and the unconcentrated airports in 1988; that is, there is only 1 chance in 1000 that there is no difference in yields.

Other organizations, including DOT, also have recently attempted to measure whether fares are higher at airports where one or two carriers dominate the traffic or where the airlines operate their hubs. Some of these studies have been undertaken in response to our analysis. We have reviewed the assumptions and methodologies underlying these alternative approaches and, where possible, have attempted to reconcile these other findings with our own.

Increased market power can lead to reduced levels of service as well as higher fares. Airlines can increase profits by cutting back on the number of flights or replacing direct service with connecting service. To test whether service levels had declined at the 15 concentrated airports, we examined service level data for the month of May of each year between 1985 and 1988. We compared the number of cities that could be reached by direct service, the total number of daily flights to all places, and the amount of competition as measured by the number of markets served by one carrier, by two or three carriers, or by four or more carriers. We did not find that service levels were reduced as concentration increased, but we did find that there were fewer routes with four or more carriers and more routes served by only one airline.[16]

Finally, this report is part of a series of GAO reports on the state of competition in the airline industry. Prior studies examined how DOT fulfilled its role in overseeing airline mergers and what happened to airline fares and service at Lambert-St. Louis International Airport following the acquisition of Ozark Air Lines by TWA.[17] The present report extends the analysis of St. Louis to all of the large concentrated airports in the 48 contiguous states that are not in multi-airport cities.

[16]The source of these air service data was the automated version of the Official Airline Guide, which was purchased from an airline data vendor, I.P. Sharp, Inc.

[17]Airline Competition: DOT's Implementation of Airline Regulatory Authority (GAO/RCED-89-93, June 1989); Airline Competition: Fare and Service Changes at St. Louis Since the TWA-Ozark Merger (GAO/RCED-88-217BR, Sept. 1988).

The present study does not attempt to measure precisely how market concentration and the various factors that protect dominant positions have affected airlines fares. We are currently developing an econometric model of the airline industry that will establish the linkage between fares and market conditions. In addition, the present study is concerned only with relatively large airports. We are also preparing two studies of fare trends at airports serving small and medium-sized cities following deregulation and since the industry has become more concentrated.

Our review was conducted between September 1988 and November 1989. During that period we testified four times before the Congress on airline fares and service.[18]

[18]Factors Affecting Concentration in the Airline Industry (GAO/T-RCED-88-65, Sept. 1988); Air Fares and Service at Concentrated Airports (GAO/T-RCED-89-37, June 1989); Barriers to Competition in the Airline Industry (GAO/T-RCED-89-65, Sept. 20, 1989); and Barriers to Competition in the Airline Industry (GAO/T-RCED-89-66, Sept. 21, 1989).

# The Airline Industry Under Deregulation

After 40 years of regulation by the Civil Aeronautics Board (CAB), in 1978 the Congress enacted the Airline Deregulation Act, which phased out economic regulation of the industry. In the early years of deregulation, many new firms entered the airline industry and, as expected by many airline industry analysts, service offerings expanded and fares fell. However, many other changes in the airline industry since 1978, unforeseen by the proponents of deregulation, have had a significant impact on the competitive environment. Most of the established carriers adapted to the new environment and developed operating and marketing strategies that made it difficult for the new airlines to successfully compete—and many failed. A wave of mergers and consolidations in the mid-1980s reinforced the trend toward a more concentrated airline industry.

## CAB Regulation

In 1938, the Congress chose to regulate the airline industry because of concerns over safety, the airlines' financial health, and perceived inequities between airlines and other forms of transportation—since the other forms of transportation were regulated, while the airlines were not. Also, at the time economic regulation was imposed, many air carriers were near bankruptcy and service was unreliable. The Civil Aeronautics Act of 1938 (P.L. No. 75-706) created the Civil Aeronautics Authority (predecessor to CAB) and gave it authority over fares and market entry and exit similar in some ways to the Interstate Commerce Commission's authority over railroads and motor carriers.

CAB controlled who could enter the industry and determined which airlines could serve which individual city-pair markets. Airlines could neither add nor abandon routes without CAB approval. Furthermore, CAB refused to grant operating authority to any new trunk (major) airlines.[1] Over time, the number of trunk carriers declined from 16 in 1938 to 10 by 1974. However, no trunk airline was allowed to go out of business entirely; instead, failing carriers were merged with healthier ones.

CAB also tightly controlled fares. If a carrier wanted to raise or lower its fares, it had to file a tariff in advance with CAB. The Board could hold a hearing on the proposed fare change on its own initiative or upon the

[1]CAB classified the airlines by the type of service provided. Trunk airlines were those that had permanent operating rights between major population areas. Local service airlines were created in the 1940s when CAB certified 19 carriers to provide service between smaller population centers and major airports. At the time the industry was deregulated, the number of local service airlines had shrunk to 8. Two of the former local service airlines, USAir and Piedmont, later became major carriers.

complaint by any person. Competitors could oppose the change or use the required waiting period to file a matching tariff. CAB tried to set fares so that the airlines earned sufficient revenues to cover expenses and achieved a rate of return that CAB believed necessary for financial viability. By the mid-1970s, it was widely accepted that CAB regulation had not been successful. The airlines rarely earned CAB's target rates of return. Moreover, because the airlines were precluded by CAB from competing on the basis of fares, they often substituted service competition for price competition. This substitution increased airline operating costs. These higher costs could then be used to justify higher fares.[2]

Many economists argued that economic regulation of the airlines was inappropriate. The airline industry appeared to be inherently competitive and exhibited none of the characteristics of an industry that normally required regulation.[3] Evidence from unregulated intrastate air travel markets in California and Texas supported the argument that fares would fall, carriers could prosper, and safety could be maintained if the industry were deregulated.

## Competition Under Deregulation: the Early Years 1978-1984

The Airline Deregulation Act of 1978 phased out federal control over airline fares and routes. The Act allowed new airlines to form and made it easier for existing carriers to expand operations into new markets and abandon old ones. Economic theory suggested that, in the long run, deregulation would lead to increased competition. Greater competition would lead to lower fares, more service, and a wider variety of service offerings. More competition would also force airlines to become more efficient and reduce operating costs.

Deregulation's proponents believed that, in the absence of government regulation, airline competition would flourish. In those cases where only one airline served a particular market, the carrier would not be able to take advantage of its monopoly position because the principal form of capital in the airline industry (i.e., the airplanes) is highly mobile. Any

[2]In the mid-1970s, CAB adopted standards that made it more difficult for airlines to use such costs to justify fare increases.

[3]Industries in which competition is not expected to be feasible are sometimes called natural monopolies. An industry is a natural monopoly when the minimum average cost of production occurs at a rate of output generally sufficient to supply the entire market. If two firms split the market, each would be smaller than its optimally efficient size and each would have relatively high costs and an incentive to expand output. If both lower prices to sell more, price will generally fall faster than average cost because a large portion of production costs in these industries is fixed, and competition becomes ruinous. Ultimately, only one firm can survive in such a market. Virtually all public utilities are natural monopolies.

attempt by an airline with a monopoly in a particular market to raise fares and earn excessive profits would be short-lived because other carriers would quickly enter the market and, by their competition, drive down the fares. Because every airline understood how its potential competitors would behave, the threat of entry by potential competitors was believed to be sufficient to discipline prices even in markets where only one airline offered service.

The expectations of greater competition, more service, and lower fares were largely fulfilled during the first several years following airline deregulation. Between 1978 and 1984, the number of certificated airlines almost tripled, from 44 to 114. Although the former trunk airlines still dominated the industry, their share of the traffic contracted while the share of the smaller airlines, including the new entrants, increased. Not only were there more carriers, but there were more carriers in more markets. Routes served by two or more airlines increased by 55 percent between 1978 and 1984, while those served by only one airline fell almost 10 percent.

Fares also fell for most, although not for all, passengers. In constant dollars, the average fare fell 6 percent between 1978 and 1984 despite increases in airline operating costs that were higher than the general rate of inflation. By offering lower fares, new airlines forced the established carriers to offer substantial discounts. The proportion of travel made on discount fares increased from 39 percent in 1977 to 81 percent in 1984. Moreover, the discounts were deeper, increasing from 30 percent below full fare in 1977 to 51 percent below full fare in 1984. Fares, too, were more closely related to costs as carriers more fully incorporated the distance taper into their fares,[4] and thereby reduced many of the cross-subsidies that had prevailed under CAB regulation.[5]

On the other hand, the airline industry on the whole did not perform very well financially in the early years of deregulation. From 1979 through 1984, the trunk and local service airlines lost $4 billion. These

[4]CAB largely set fares on the basis of distance. However, many airline operating costs do not vary directly with distance but with the number of takeoffs and landings. Other costs are periodic and do not vary at all with the distance flown. As a result, longer distance flights have lower costs per seat mile than shorter distance flights. The CAB fare formula did not adequately account for the distance taper.

[5]The CAB fare formula subsidized travelers in short-distance, lightly traveled markets (who were charged a price that did not cover costs) at the expense of travelers in long-distance, heavily traveled markets (who were charged a fare exceeding costs).

losses can be traced to other factors as well as to deregulation.[6] Economic recessions in 1980 and 1981-82 decreased the demand for air travel. The air traffic controllers' strike and subsequent dismissal of much of the existing controller work force led to restrictions on the number of operations. Also, a 90 percent, constant-dollar increase in fuel costs between 1978 and 1981 led the airlines to raise fares. These fare increases, too, dampened traffic. Higher fares and negative economic growth combined to reduce traffic in 1980 and 1981. The industry had not experienced two successive years of negative traffic growth since World War II.

Nevertheless, deregulation also played a role in the poor financial performance of the airline industry during the early years of deregulation, as intense fare competition reduced airline profits. The trunk airlines were most affected as their highly profitable routes attracted competitors and fare wars broke out. After the recession, lower fares stimulated traffic increases. Similarly, deregulation stimulated productivity improvements, but operating costs rose faster than productivity growth. Passenger miles per employee for scheduled airlines rose by more than 28 percent between 1978 and 1984 while seat miles per employee grew 33 percent. At the same time operating expenses increased nearly 94 percent.

## Competition Since 1984: Changes in Marketing and Operating Practices

Airline deregulation, in combination with the dynamic environment in which it occurred, led to an industry shake-out and to a very different airline industry from what had prevailed under CAB regulation. Three major developments emerged:

- the surviving major airlines reconfigured their route systems from linear systems to hub and spoke networks;
- the major carriers adopted a number of marketing practices that made it more difficult for potential competitors to challenge them in markets where they were dominant; and
- many new entrants and some of the original trunk carriers went out of business or merged with stronger airlines.

[6]A number of studies have traced the early history of airline deregulation. Among the notable are Policies for the Deregulated Airline Industry, Congressional Budget Office (Washington, D.C.: July 1988); Deregulation: Increased Competition is Making Airlines More Efficient and Responsive to Consumers (GAO/RCED-86-26, Nov. 1985); The Deregulated Airline Industry: A Review of the Evidence, Federal Trade Commission (Washington, D.C.: Jan. 1988); Steven Morrison and Clifford Winston, The Economic Effects of Airline Deregulation, The Brookings Institution (Washington, D.C.: 1986).

## Establishment of Hub and Spoke Systems

Deregulation not only gave the airlines freedom over fares, it also allowed them to enter and exit routes without obtaining prior CAB approval. This new flexibility allowed the airlines to reconfigure their route systems into hub and spoke networks. Hub and spoke operations concentrate most of an airline's operations at one or a very few "hub" airports and connect virtually every other airport (spoke) in the carrier's system via nonstop service to the hub. The hubbing airline will schedule flights so as to bring in travelers from many spokes to the hub, transfer the passengers among planes, and send them off to their final destinations, all in a relatively short period of time. This whole process is repeated several times each day.

This system has produced substantial benefits for both the airlines and the traveling public. While there are not sufficient passengers in most airport-pair markets to justify multiple daily nonstop flights, by combining passengers bound for many different places and flying them to a hub where they can transfer to flights to their desired destinations, the airline can effectively offer numerous daily one-stop flights in many airport-pair markets. Hub operations make it easier for many travelers to secure flights departing and arriving at times that best match their preferred departure and arrival times.[7] Hub and spoke systems also allow the airlines to better use their airplanes.

However, hub and spoke systems require the hubbing airline to handle many simultaneous departures and arrivals several times a day. Because of its numerous departures and arrivals, the hubbing carrier will control many of the gates or concourses. The hubbing carrier may even have exclusive-use rights to its terminal. Given the overall limits on an airport's capacity to handle traffic and the size of the local originating air travel market, hubbing will often result in one carrier handling most of the enplanements at the airport where it has its hubbing operations.

Often an airport will expand its capacity in order to accommodate a carrier that decides to set up a hub there. The carrier and the airport will typically enter into a long-term lease agreement for space at the facility. The revenues from the lease payments will be used to underwrite the airport bonds sold to pay for the capacity expansion and thereby lower the cost of borrowing. As a quid pro quo, the airline may require the

[7]The difference between the traveler's preferred time and the scheduled time of departure is called "frequency delay." Travelers value minimizing delays of any type, so increased frequencies have a positive impact on traveler welfare.

airport to include a majority-in-interest clause in the lease agreement, giving the airline a large say in any future airport construction activities that would affect its lease payments.

By establishing a hub at a city, the airline can gain recognition as that city's airline. Since the hubbing airline offers so much service out of the airport, travelers living in the city served by that airline might think of it first when planning to fly. The airlines, however, have gone beyond relying simply on market identification for securing the local traffic base at the hub airport. They have also adopted a number of sophisticated marketing techniques that can deter new entrants from challenging the dominant carriers at their hubs.

## Frequent Flyer Programs

Frequent flyer programs were designed to create brand loyalty, and it appears that they have been successful. Frequent flyer programs factor prominently in determining a traveler's choice of airline. In our recent survey of 32 travel agents, three-fourths told us that their business travel customers choose their flights on the basis of their membership in frequent flyer programs more than half the time. Some frequent flyer programs are designed so that the awards increase in value as higher mileage thresholds are achieved. Because awards are paid only after thresholds are met, the traveler who has collected some, but not all, of the mileage needed to reach the desired award is unlikely to switch to another carrier. In addition, most of the major airlines' plans set deadlines for accumulating mileage to earn awards, so that a traveler can only reach the higher awards levels if mileage is earned quickly. Thus, members of frequent flyer programs will concentrate their air travel on a single carrier, and they will tend to prefer the carrier that flies to the most destinations and to the greatest variety of business and vacation destinations from the traveler's city of origin. The dominant carrier at the airport, especially if it is the hub carrier, will likely be the one that offers the greatest number and variety of destinations and, therefore, offers the best opportunity to earn and to benefit from frequent flyer awards.

Frequent flyer programs, therefore, can discourage potential competitors from challenging an incumbent airline at an airport where it is dominant. Airline passengers might not respond to the lower fares offered by a new entrant unless they are low enough to compensate for the loss of expected benefits from earning frequent flyer mileage. Indeed, because frequent flyers are often business travelers whose fares are paid by their employers, they lack incentive to switch to a new, low-fare

carrier and have considerable incentive to stay with the incumbent. With respect to frequent flyer programs, a recent DOT report concluded that frequent flyer programs stabilize and protect the existing market shares of incumbent airlines and make it more difficult for smaller air carriers to compete successfully in some markets.[8]

## Computerized Reservation Systems

More than 80 percent of all air travel today is booked through travel agents, and 95 percent of all travel agencies use at least one of the five airline-owned computerized reservation systems (CRSs) to book flights.[9] Initially, the airlines that marketed their systems to travel agents used the CRSs to gain an advantage over their competitors by biasing the computer screen display so that their flights would be listed first. CAB found this practice to be anti-competitive and prohibited it in 1984. Nevertheless, there is strong evidence that anti-competitive impacts continue.[10]

CRSs can continue to have anti-competitive impacts in two ways. First, although the systems no longer bias the screen displays to favor the flights of the CRS-owning airline, the CRS owners continue to get a disproportionate share of bookings from agents using their systems. Second, travel agents continue to favor the airline that owns the CRS the agent uses because the CRS-owning airline maintains supportive business relationships with its network of travel agent subscribers—the so-called "halo effect." These bookings for CRS owners are revenues lost to the airlines that do not own CRSs.

While available data do not allow us to identify the traffic and revenue impacts in different airport markets, the CRS-owning carriers attempt to sign up most of the agents in the area served by their hub airport. Thus,

[8]Airline Marketing Practices: Travel Agencies, Frequent-Flyer Programs, and Computer Reservation Systems, U.S. Department of Transportation, Secretary's Task Force on Competition in the U.S. Domestic Airline Industry (Washington, D.C.: Feb. 1990).

[9]The five CRSs are SABRE, owned by American Airlines, with a 43 percent share of revenues; Apollo, owned by a consortium of airlines but principally by United Airlines and USAir, with a 32 percent market share; PARS, owned by TWA and Northwest Airlines, with a 10 percent share; System One, owned by Texas Air Corp., with a market share of 10 percent; and DATAS II, owned by Delta Airlines, with a market share of 5 percent.

[10]In our 1986 report, Airline Competition: Impact of Computerized Reservation Systems (GAO/RCED-86-74, May 1986), we found that it was likely that anti-competitive impacts continued to be a problem, and we recommended that DOT study the issue. In May 1988, DOT issued its report, Study of Airline Computer Reservation Systems (DOT-P-37-88-2, May 1988), which, while presenting considerable evidence that CRS owners were earning excessive profits, drew no conclusions. In September 1988, we testified before the Subcommittee on Aviation, House Committee on Public Works and Transportation, on the DOT report and presented policy options for congressional consideration.

in St. Louis, where TWA has its hub, TWA's PARS system controls 77 percent of the CRS market; in Dallas, where American Airlines has a hub, its SABRE system has a 91 percent share; and in Denver, where United Airlines operates a hub, United's Apollo system has a 76 percent market share. An airline that sought to introduce competing service from these points would find that the local travel agents usually subscribe to the dominant airline's CRS and exhibit a preference for the flights of the CRS-owning dominant carrier.

Not only might potential new entrants find that the available market is smaller than expected because of the "halo effect," they might also find themselves at an added cost disadvantage because they must pay a booking fee to the CRS-owning airline for each seat booked by a travel agent. This amounts to an added sales cost of about $2.00 per seat for the airline seeking to expand into a market where most of the local travel agents subscribe to the CRS of the dominant carrier. Part of the booking fee pays for the service provided, but most analyses of this issue conclude that booking fees are substantially greater than the cost of providing the service. Airlines have no choice but to pay these fees to all the CRS-owning airlines or else forego access to much of the available air travel market.

In a recent analysis of booking fees, DOT found that the two largest systems, SABRE and Apollo, generate considerably more revenues from booking fees to their owners, American and United Airlines respectively, than those carriers paid out in booking fees to other CRS vendors. The other CRS-owning airlines either paid out in booking fees as much as their systems earned or they were net payers of booking fees. DOT also reviewed recent CRS vendor estimates of incremental revenues and concluded that incremental revenues in 1988 might have been as high as $2 to $3 billion. This is much higher than DOT's prior estimates.[11]

## Yield Management

Yield management is an attempt by the airlines to optimize the passenger mix on each flight departure in terms of those paying full fares, those paying discount fares, and those paying deep discount fares. The development of CRSs and the evolution of sophisticated computer systems allow the airlines to deal with large volumes of frequently changing data. The airlines can change their prices on a seat-by-seat basis as often as every 15 minutes. As a result, the airlines make

[11] Airline Marketing Practices: Travel Agencies, Frequent-Flyer Programs, and Computer Reservation Systems. See also Study of Airline Computer Reservation Systems.

thousands of fare changes each day. This flexibility also permits incumbents to make rapid price adjustments in response to potential competition from an entrant. Thus, an incumbent carrier, enjoying an established reputation and offering a wide variety of destinations, can lower prices quickly on routes where it is challenged, thereby frustrating an entrant's attempt to attract traffic by undercutting the incumbent's higher fares.

## Travel Agent Commission Overrides

The growing importance of travel agents has led airlines to develop incentive systems designed to increase their share of travel agent bookings. One such system, the travel agent commission override, is designed to reward the travel agent for bookings on an airline above and beyond those the agent would have made otherwise. The commission override is often based on all the traffic that the agent books on a particular airline. For example, if the agent normally books $100,000 worth of business each month on a particular carrier and earns a 10 percent commission, the airline might agree to pay a 13 percent commission on all bookings if the agent books at least $120,000 per month. Commission overrides generally apply to total agency sales, but they can be targeted at particular markets and particular flights. DOT concluded in its report on CRSs that commission overrides significantly increase the number of tickets an agent will book on a particular airline. A 1988 Louis Harris survey showed that 51 percent of agency locations reported that they "usually" (24 percent) or "sometimes" (27 percent) chose an air carrier in order to get override commissions.[12]

Overrides raise the marketing costs of all airlines that pay them, and all carriers have the option of paying override commissions. Nevertheless, for several reasons override commissions might be a more effective strategy for keeping out would-be competitors than for breaking into a market at an airport where another carrier is already dominant. The dominant carrier need only pay an override commission to the travel agents for increased bookings on flights that are threatened by a potential competitor. This might be a relatively small share of the dominant carrier's total traffic at the airport. The carrier attempting to establish competing service might pay the same absolute amount of override commissions to induce travel agents to steer passengers to its flights, but these commissions would comprise a proportion of the entrant's revenues from the service out of that airport much larger than that of the

[12]"1988 Louis Harris Survey," Travel Weekly, as cited in Airline Marketing Practices: Travel Agencies, Frequent-Flyer Programs, and Computer Reservation Systems, pp. 26-27.

dominant carrier. Potential entrants might ultimately conclude that it is not feasible to start serving this market.

## Other Barriers to Competition

Resources in the airline industry are proving to be less mobile than thought when the industry was first deregulated. In addition to the barriers to entry created by airline marketing practices and the control over facilities at some hub airports, entry is also restricted at some airports because of noise and congestion problems. At four of the busiest airports in the nation (O'Hare in Chicago, LaGuardia and JFK in New York, and National in Washington) the number of takeoff and landing slots have been limited since 1969 and the slots are controlled by the airlines that have operated at those airports historically. Some studies have found that fares are higher at slot-controlled airports.

Other airports restrict traffic and the type of equipment that can be flown in order to reduce the noise burden on the airport's neighbors. While noise restrictions are necessary, they also discourage new firms from entering the market. For example, in the past new carriers began operations with used aircraft. However, noise restrictions at many airports limit the use of older aircraft.[13] Thus, a new carrier may have to purchase relatively new airplanes if it wants to compete.

## Industry Mergers and Consolidation

The third major development that has affected competition in the airline industry in recent years has been the decline in the number of firms providing most domestic passenger service. Shortly after deregulation, intrastate carriers, such as Southwest Airlines and PSA (Pacific Southwest Airlines); charter carriers, like Capitol and World; and entirely new carriers, like People Express and America West, began interstate service. Because these carriers often had lower wage scales and offered fewer service amenities, they had significant cost advantages over the carriers formerly regulated by CAB, and were able to offer substantially lower fares. The market share of the new carriers increased while that of the trunks declined. The share of domestic traffic handled by the trunks fell from almost 90 percent prior to deregulation to 72 percent by 1985. By 1985, more than 20 new carriers had begun interstate service with jet airplanes.

[13]The Federal Aviation Administration designates aircraft as either Stage II or Stage III depending on how much noise they make. As of 1989, about 60 percent of the fleet was Stage II type planes. Even older, Stage I airplanes are no longer allowed to fly anywhere in the U.S. These stages are defined in Federal Aviation Regulation (FAR) Part 36, Sections 36.1 (f)(3) and (f)(5).

But, over time, the major airlines responded to the new competition by adopting the marketing strategies discussed above and by learning to selectively match the fares of the new entrants. Many of the new entrants and some of the former trunks went bankrupt or were merged with the larger firms. DOT ultimately approved all of the mergers it reviewed, including some mergers between carriers that shared a common hub airport. In other cases, both merging carriers served the same region of the nation. This merger activity reached a peak in 1986, when DOT approved 14 applications for acquisition, consolidation, or merger.[14] The reduced competition and the loss of potential competition caused by the mergers and bankruptcies aroused concern even among those who ardently supported deregulation.

Nevertheless, deregulation continues to provide significant benefits to the traveling public. While our work focuses on fare and service changes at airports where one or two airlines dominate the traffic, the vast majority of passengers now fly on routes served by at least two airlines; the majority of the nation's largest 200 airports are not concentrated; and airline fares, adjusted for inflation, on most routes remain below pre-deregulation levels. Economists at the Brookings Institution estimate that airline deregulation continues to generate $10 billion annually in savings to the traveling public.

The concern that has been raised centers on airports where one or two carriers dominate the traffic. Our analysis focuses on these so-called concentrated airports and compares fares and service levels at these airports with fares and service levels at airports that are not concentrated.

[14]The approvals led to seven mergers among airlines classified as "major" or "national" air carriers and six acquisitions of assets or of smaller carriers.

# Trends in Airline Fares at 15 Concentrated Airports

Airports where one or two carriers handle most of the enplaning traffic have higher fares than airports where the traffic is less concentrated. Moreover, the data show that fares tend to rise as concentration increases. While many factors can influence fare changes, the evidence that we have collected strongly suggests that fares and concentration at an airport are related. Fares are higher at concentrated airports than at relatively less concentrated ones, and the evidence suggests the gap is increasing.

## Yields Are Higher at Concentrated Airports

The average yield, or fare per passenger mile, at the 15 airports where one or two carriers handle most of the enplanements is higher than the average yield of the airlines at the 38 relatively unconcentrated airports that comprise our comparison group. Many of the 15 concentrated airports have been dominated by one or two carriers for some time, and the average yield at these concentrated airports exceeded the average yield at the unconcentrated airports throughout the 1985-1989 period. In 1988, the average yield at the concentrated airports was 27.2 percent higher than the average yield at the 38 comparison airports, but the entire 27.2 percent yield differential did not arise over the 1985-89 period. In 1985, the average yield at the concentrated airports was already 18.8 percent higher than the average at the 38 unconcentrated airports. Nevertheless, the gap has increased.[1]

In 1988, average yields for all carriers at 14 of the 15 concentrated airports were higher than the average yield earned by carriers serving the 38 unconcentrated airports. At 13 of the 15 concentrated airports, the yield of the dominant airline(s) was higher than the yield received by the other airlines serving these airports.[2] At three of the concentrated airports the yield received by the dominant airline was about 50 percent higher than the yield earned by the other carriers at the airport, and it was at least 15 percent higher at 10 of the airports. Moreover, the yields of the dominant airlines at the concentrated airports were consistently higher than those at the unconcentrated airports. Fare data for the first two quarters of 1989 indicate that these relationships are continuing. Table 3.1 shows yield data and market shares for the dominant carriers at each of the 15 concentrated airports in 1988.

[1]These results were obtained when the traffic and sample distributions were held constant. The change is even greater when shifts in traffic and the sample distribution are not taken into account. In that case, yields at the concentrated airports grow from being 17.8 percent higher in 1985 to 29.2 percent higher in 1988.

[2]Yields for American Airlines, the dominant carrier, at Raleigh-Durham are also higher if actual data, rather than weighted data, are used.

**Table 3.1: Airline Yields in 1988 at Concentrated Major Airports**

Yield in cents, Market shares in percentages

| Airport | Share of dominant carrier | Yield of dominant carrier | Yield of nondominant carriers | Yield of all carriers |
|---|---|---|---|---|
| Atlanta (Delta) | 58 | 25.9 | 17.4 | 23.7 |
| Atlanta (Texas Air) | 36 | 21.6 | 17.4 | 23.7 |
| Nashville (American) | 62 | 21.3 | 19.7 | 20.3 |
| Charlotte (USAir)[a] | 93 | 26.8 | 18.6 | 23.7 |
| Cincinnati (Delta) | 78 | 22.0 | 18.5 | 20.5 |
| Dayton (USAir)[a] | 79 | 20.7 | 20.1 | 20.4 |
| Denver (Texas Air) | 42 | 17.7 | 15.8 | 16.9 |
| Denver (United) | 45 | 16.6 | 15.8 | 16.9 |
| Detroit (Northwest)[b] | 59 | 16.4 | 12.9 | 14.3 |
| Greensboro (USAir)[a] | 64 | 26.2 | 20.4 | 23.5 |
| Memphis (Northwest) | 83 | 23.3 | 23.5 | 23.4 |
| Minneapolis (Northwest) | 78 | 17.1 | 14.9 | 16.4 |
| Pittsburgh (USAir)[a] | 87 | 19.8 | 14.3 | 17.6 |
| Raleigh-Durham (American) | 69 | 20.5 | 21.5 | 21.3 |
| Salt Lake City (Delta) | 80 | 21.6 | 14.5 | 18.3 |
| St. Louis (TWA) | 82 | 19.4 | 15.9 | 18.1 |
| Syracuse (USAir)[a] | 61 | 21.0 | 13.9 | 16.2 |
| All 15 airports[c] | | 20.0 | 16.0 | 18.5 |

[a]Because USAir's takeover of Piedmont was approved in October 1987, yields and enplanement shares for USAir include Piedmont data

[b]Northwest has had 60 percent or more of the enplanements at Detroit at other times between 1985 and 1989.

[c]In contrast, yields at the 38 unconcentrated airports in 1988 averaged 14 5 cents per passenger mile.

## Trends in Yields at the Concentrated Airports

On average, yields at the unconcentrated airports declined from 14.7 cents per passenger mile in the first quarter of 1985 to about 12.4 cents in the second quarter of 1986 and remained at about that level through the second quarter of 1987. After that, the average yield at the unconcentrated airports began to increase and reached 17.2 cents in the first quarter of 1989. The average yield at the unconcentrated airports declined to 16.4 cents in the second quarter 1989.

Between 1985 and mid-1986 the average yield at the concentrated airports also fell and then recovered. As was true for the unconcentrated airports, the average yield at the concentrated airports began to increase in the third quarter of 1987 and rose to 21.7 cents in the first

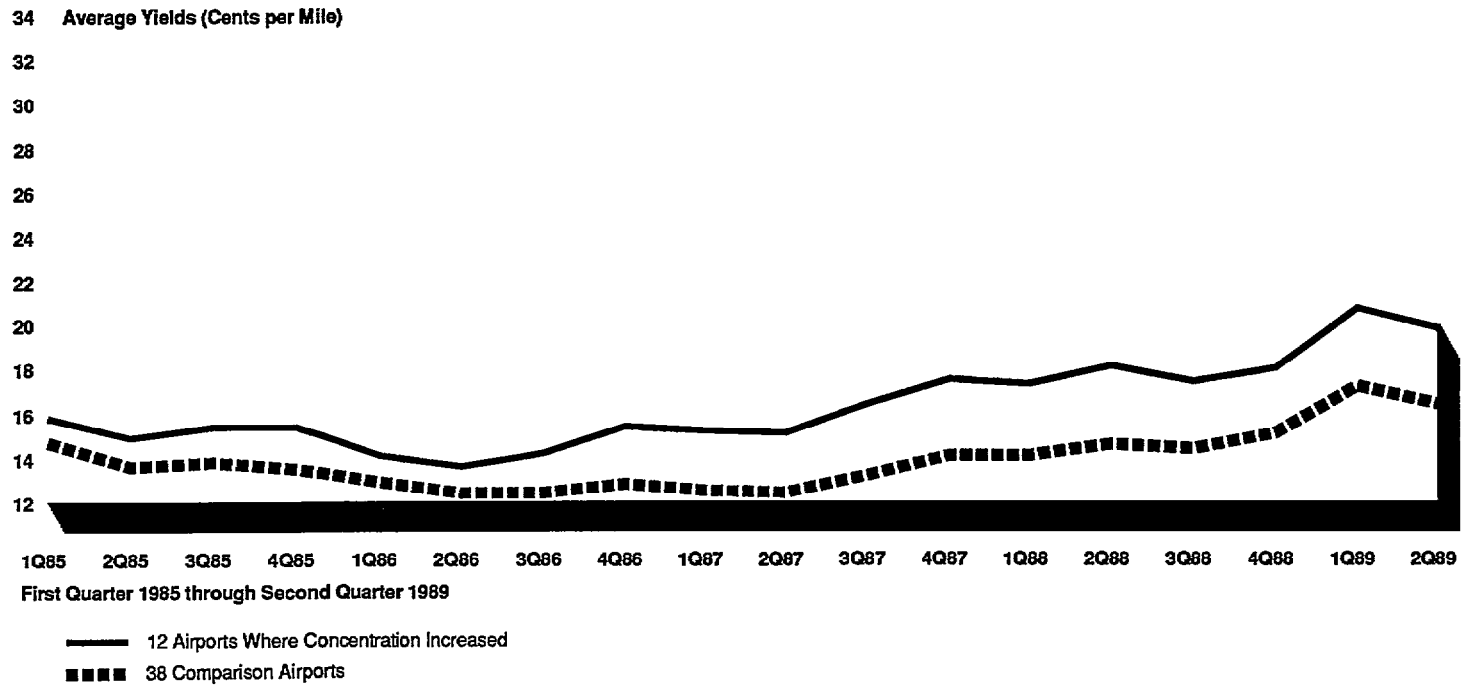
quarter of 1989. The average yield at the concentrated airports also fell in the second quarter 1989 when it averaged 20.5 cents per passenger mile. Despite the similarity in the yield trends at the two groups of airports, the difference in the average yield at concentrated and unconcentrated airports increased from 2.5 cents per passenger mile in the first quarter 1985 to 4.2 cents in the second quarter 1989.

Yields have risen nationwide since 1985, but they have risen more at the concentrated airports. Yields at the concentrated airports were 27.8 percent higher in the second quarter 1989 than they were in the second quarter of 1985. Yield increases at these airports ranged from 10 percent to 68 percent. Over the same period, yields at the unconcentrated airports rose 20.4 percent.[3]

Some of the concentrated airports have long been dominated by one or two airlines, and airlines serving those airports have achieved average yields above those earned by carriers at the unconcentrated airports throughout the period we examined. However, as concentration has increased the difference in yields has grown. Figure 3.1 contrasts yields at the 12 of the 15 airports where concentration has increased substantially since 1985 with yields at the 38 relatively unconcentrated airports.

[3]When comparing quarterly data, we use only the corresponding quarters of each year to avoid the problem of seasonal influences.

Figure 3.1: Average Yield for 12 Airports Where Concentration Increased




## Trends at Different Concentrated Airports

The 15 concentrated airports that we examined differed in how and when they became dominated, and the trends in fares reflect those differences. The 15 airports include several that became concentrated as the result of mergers, others that became concentrated since 1985 after an airline set up or expanded a hub, and others that were concentrated even before 1985. Two of the 15 are dominated by two carriers.[4] Yield trends at the 15 concentrated airports tend to track changes in concentration levels. Appendix I shows the trend in yields at each concentrated airport from the first quarter 1985 through the second quarter 1989.

### Airports Where Yields Rose Following Mergers

Five of the 15 airports we examined experienced large increases in concentration as a result of mergers. At two of these airports, single airline dominance was created by the mergers of two carriers hubbing at the

[4]These categories overlap for some of the airports. For example, we have classified Denver as an airport characterized by two hubbing carriers, but it also was affected by mergers.

airport. TWA's acquisition of Ozark Air Lines eliminated a hubbing competitor at St. Louis, and Northwest Airline's takeover of Republic Airlines eliminated a hubbing competitor at Minneapolis/St. Paul. Both these mergers were first proposed in early 1986 but were not wholly consummated until late 1986. It is not possible to set a precise date as to when the mergers were far enough along to affect competition and prices. Therefore, we contrast yields during 1985—the year preceding the merger—with yields in the years following the mergers. Table 3.2 shows market shares and yields for the dominant carriers at Minneapolis/St. Paul and St. Louis and includes yields for the 38 unconcentrated airports.

At Minneapolis/St. Paul, Northwest's average yields were 5.7 percent higher in 1987 than in 1985, but they were 13.9 percent above 1985 levels in 1988. The situation in St. Louis was similar. In 1987 TWA's yields were 5.1 percent higher than in 1985, and in 1988 they were about 11 percent higher. At the same time, yields at the 38 unconcentrated airports were actually 5.8 percent lower in 1987 than in 1985, and by 1988 they were 5.5 percent over 1985 levels. According to a recent study of fares and service at these two airports by analysts at the Department of Justice, the mergers led to higher fares at these airports.[5]

**Table 3.2: Annual Average Yields and Enplanement Shares of Dominant Carriers at Minneapolis/St. Paul and St. Louis Compared to Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents

| | Northwest[b] at Minneapolis/St. Paul | | TWA[b] at St. Louis | | |
|---|---|---|---|---|---|
| Year | Share | Yield | Share | Yield | Yield at the 38 airports |
| 1985 | 42 | 15.0 | 59 | 17.5 | 13.8 |
| 1986 | 52 | 14.2 | 61 | 15.7 | 12.6 |
| 1987 | 79 | 15.9 | 82 | 18.4 | 13.0 |
| 1988 | 78 | 17.1 | 82 | 19.4 | 14.5 |
| 1989[a] | 79 | 18.9 | 82 | 21.4 | 16.7 |

[a]The 1989 data are for first two quarters only.

[b]Enplanement shares are for Northwest and Republic (Minneapolis/St. Paul) and for TWA and Ozark (St Louis) in 1986 Northwest and TWA enplanement shares were 43 percent and 57 percent, respectively, during the first three quarters of 1986 Yield data are for Northwest and Republic and for TWA and Ozark in 1985 and 1986

Syracuse's Hancock International Airport also became concentrated as a result of mergers. Between 1977 and 1980, USAir had the largest share

[5]Gregory J. Werden, Andrew S. Joskow, and Richard L. Johnson, The Effects of Mergers on Economic Performance: Two Case Studies from the Airline Industry, Antitrust Division, U.S. Department of Justice (Washington, D.C.: n.d.).

of enplanements with about 38 percent of the market. In 1979, Empire Airlines was formed and established Syracuse as its hub. Although USAir continued to have the largest share of enplanements, by 1985, Empire and USAir each handled about 28 percent of the enplaning passengers at Syracuse. In 1986 Piedmont took over Empire, and in 1987 DOT approved the merger of USAir and Piedmont. In 1988, USAir had 61 percent of the enplanements at Syracuse.

Quarterly data on fares at Syracuse show that fares have risen more rapidly since USAir has taken over Piedmont. Although the USAir-Piedmont merger was first approved by DOT in late October 1987, the actual integration of the two airlines proceeded slowly. USAir's fares rose less rapidly at Syracuse during the first two quarters of 1988 than at the 38 unconcentrated airports. However, by the third quarter 1988 USAir's fares at Syracuse had begun to rise faster than fares at the 38 unconcentrated airports. Table 3.3 shows changes in yields for USAir-Piedmont at Syracuse and for the 38 unconcentrated airports.

**Table 3.3: USAir-Piedmont Fare Changes at Syracuse Compared to Changes in Fares at 38 Unconcentrated Airports**

| | Percentage change from same period in prior year | |
|---|---|---|
| Year and quarter | USAir at Syracuse[a] | 38 airports |
| 1988 I | - 1.5 | 12.9 |
| 1988 II | 13.8 | 17.5 |
| 1988 III | 11.7 | 9.3 |
| 1988 IV | 12.2 | 7.6 |
| 1989 I | 33.5 | 21.8 |
| 1989 II | 14.7 | 12.4 |

[a]Percentage changes based on USAir and Piedmont data

The recent study by Department of Justice analysts compared the effect of a merger on Detroit to the merger impacts at St. Louis and Minneapolis/St. Paul. The analysts expected little or no effect from the merger on Detroit fares because only one of the merging carriers operated a hub at Detroit Metropolitan Airport. They found that the merger caused almost no change in fares at Detroit. Our data show a similar result. We found that the fares of the dominant carrier at Detroit rose by about the same amount as fares at the unconcentrated airports during the 1985-89 period. Table 3.4 shows enplanement shares for Northwest-Republic and yield data for Northwest-Republic at Detroit and for the 38 unconcentrated airports.

**Table 3.4: Northwest-Republic Yields at Detroit Metropolitan Wayne County Airport and at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| Year | Northwest-Republic[b] | | Yield at the 38 airports | Difference in yields[c] |
|---|---|---|---|---|
| | Enplanement Share | Yield | | |
| 1985 | 44 | 15.9 | 13.8 | 15.9 |
| 1986 | 61 | 15.2 | 12.6 | 20.5 |
| 1987 | 60 | 15.6 | 13 0 | 20.1 |
| 1988 | 59 | 16.4 | 14.5 | 12.8 |
| 1989[a] | 64 | 19.3 | 16.7 | 16.0 |

[a]The 1989 data for first two quarters only.

[b]Enplanement share for Republic in 1985, Republic and Northwest in 1986 Yield data for Northwest and Republic in 1985 and 1986.

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data

Denver's Stapleton International Airport became concentrated when People Express, which had recently purchased Frontier, was acquired by Continental in late 1986. Denver and Atlanta, the only airports among the 15 to be dominated by two carriers, are discussed later in this chapter.

## Yields Increased Following the Establishment of Hub Operations

At airports where a carrier established a dominant position by setting up a hub during the period we examined, yields rose following the increase in concentration. American Airlines established a hub at Nashville in the first half of 1986 and at Raleigh-Durham in the middle of 1987. In both cases, American's yields increased following the establishment of hub operations. American's yields had been about 20 percent below those of other airlines serving Nashville and about 25 percent lower than others serving Raleigh-Durham in the year before the hubs were set up. After American became the dominant carrier, its yields rose much faster than those of the other carriers serving these airports. In the second quarter 1989 American's yields at Nashville were about 9 percent higher than those of other carriers and were only 3 percent below those of other carriers at Raleigh-Durham. Table 3.5 shows enplanement shares and yields for American at Raleigh-Durham and at Nashville and includes yield data for the 38 unconcentrated airports.

**Table 3.5: Annual Average Yields and Enplanement Shares of American Airlines at Nashville and Raleigh-Durham Compared to Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents

| | American at Raleigh-Durham | | American at Nashville | | |
|---|---|---|---|---|---|
| Year | Share | Yield | Share | Yield | Yield at the 38 airports |
| 1985 | 3 | 11.6 | 19 | 17.3 | 13.8 |
| 1986 | 4 | 13.7 | 45 | 17.6 | 12.6 |
| 1987 | 41 | 16.8 | 59 | 19.5 | 13.0 |
| 1988 | 69 | 20.5 | 62 | 21.3 | 14.5 |
| 1989[a] | 78 | 24 6 | 72 | 24.0 | 16.7 |

[a]The 1989 data are for first two quarters only

In establishing its hubs at Nashville and Raleigh-Durham, American greatly increased its number of short distance flights. Between the fourth quarter 1985 and the fourth quarter 1988, the share of American's traffic in the 0-500 mile category increased from less than 1 percent to 18 percent in Nashville. Between the fourth quarter 1986 and the fourth quarter 1988, the share of American's traffic in the 0-500 mile category grew from 9 percent to 20 percent in Raleigh-Durham. Since short distance flights have higher yields, the change in traffic mix most likely accounts for at least some of the observed increase in average yields.[6]

At Cincinnati, Delta Airlines had been the largest carrier in terms of enplanements for more than a decade, but did not dominate Cincinnati air travel until it doubled the number of flight operations in late 1986 and early 1987. Yields at Cincinnati for Delta increased about 14 percent in 1987 while yields at the comparison airports increased about 3 percent. At Cincinnati the fares of the nondominant carriers, while still lower than Delta's, have increased more than Delta's since 1987. Table 3.6 shows yield data and enplanement shares for Delta at Cincinnati and yields at the 38 unconcentrated airports.

[6]Yields are higher on short distance flights because cost per passenger mile are higher. Some airline costs do not vary with miles flown but with the number of takeoffs and landings or other factors than distance.

**Table 3.6: Delta Yields and Market Shares at Cincinnati Compared to Yields at 38 Comparison Airports**

Shares in percentages, Yields in cents

| Year | Delta Share | Delta Yield | Yield of other Cincinnati carriers | Yield at the 38 airports |
|---|---|---|---|---|
| 1985 | 48 | 18.8 | 15.7 | 13.8 |
| 1986 | 47 | 17.7 | 15.1 | 12.6 |
| 1987 | 72 | 20.2 | 16.2 | 13.0 |
| 1988 | 78 | 22.0 | 18.5 | 14.5 |
| 1989[a] | 83 | 24.9 | 21.7 | 16.7 |

[a]The 1989 data are for first two quarters only.

## Already Dominant Airlines Maintained Higher Yields

In most situations where airports have always been dominated by one carrier, yields increased as concentration increased. Charlotte/Douglas International Airport has long been a concentrated airport. Domination by Eastern Airlines in the 1970s and early 1980s was replaced by domination by Piedmont (now part of USAir) in 1982. Despite the fact that Charlotte has long been concentrated, USAir has extended its dominance so that Charlotte is the most concentrated airport of the 15 we examined. In 1985 Piedmont handled about three-fourths of the enplanements at Charlotte; by the first half of 1989, USAir-Piedmont handled more than 94 percent of the enplanements.

Yields have long been relatively high at Charlotte, but as USAir-Piedmont's share of enplanements increased, yields also increased. USAir-Piedmont's yields at Charlotte rose 32 percent as its share of enplanements increased 16 percentage points between 1985 and 1988. During the same period, the average yield at unconcentrated airports rose less than 6 percent. Table 3.7 shows yields and enplanement shares for USAir-Piedmont at Charlotte and yields at the 38 unconcentrated airports.

**Table 3.7: Yields and Enplanement Shares at Charlotte for USAir-Piedmont and Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| Year | USAir-Piedmont Enplanement share[b] | USAir-Piedmont Yield | Yield at the 38 airports | Difference in yields[c] |
|---|---|---|---|---|
| 1985 | 77 | 20 3 | 13 8 | 47.5 |
| 1986 | 81 | 21.2 | 12 6 | 68.2 |
| 1987 | 89 | 22.7 | 13 0 | 75.4 |
| 1988 | 93 | 26 8 | 14.5 | 85.0 |
| 1989[a] | 94 | 30.5 | 16.7 | 83.0 |

[a]The 1989 data for first two quarters only

[b]Enplanement share for Piedmont only in 1985-87

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data

Dayton, another Piedmont hub taken over by USAir, has been dominated by USAir-Piedmont throughout the 1985-89 period. The dominance has not been as dramatic as at Charlotte but, as at Charlotte, yields have risen and the gap between the dominant carrier's yields and the yields at unconcentrated airports has widened, as USAir has increased its dominant position. Dayton was one of the airports whose dominant carrier's yields were below those of the other carriers at the airport. Between 1985 and 1987 Piedmont's yields were around 4 percent lower than those of the other carriers serving Dayton. Since 1988, however, USAir's yields have been above those of the other carriers and in the first two quarters of 1989 have averaged more than 10 percent higher. Table 3.8 shows yields and enplanement shares for USAir-Piedmont at Dayton and yields at the 38 unconcentrated airports.

**Table 3.8: Yields and Enplanement Shares at Dayton for USAir-Piedmont and Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| Year | USAir-Piedmont Enplanement share[b] | USAir-Piedmont Yield | Yield at the 38 airports | Difference in yields[c] |
|---|---|---|---|---|
| 1985 | 66 | 17.2 | 13.8 | 25 0 |
| 1986 | 65 | 16 3 | 12.6 | 29.0 |
| 1987 | 71 | 17.6 | 13.0 | 35.8 |
| 1988 | 79 | 20.7 | 14.5 | 42.7 |
| 1989[a] | 80 | 23.2 | 16.7 | 39.5 |

[a]The 1989 data are for first two quarters only

[b]Enplanement share for Piedmont only in 1985-87.

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data.

Piedmont Triad International Airport, serving the Greensboro/High Point/Winston-Salem area, is unique among the concentrated airports we examined in that it is not a hub airport for the dominant carrier. Piedmont has had the largest presence at Greensboro over the entire period we reviewed. As was the case at Charlotte and Dayton, USAir-Piedmont's market share has grown at Greensboro, and yields have followed suit. Piedmont's market share was about 55 percent in 1985, and USAir has increased this to 64 percent by 1988. However, USAir-Piedmont's yields have risen much more rapidly. Table 3.9 shows yields and enplanement shares for USAir-Piedmont at Greensboro and yields at the 38 unconcentrated airports.

**Table 3.9: Yields and Enplanement Shares at Piedmont Triad International Airport for USAir-Piedmont and Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| Year | USAir-Piedmont Enplanement share[b] | USAir-Piedmont Yield | Yield at the 38 airports | Difference in yields[c] |
|---|---|---|---|---|
| 1985 | 55 | 17.5 | 13.8 | 27.0 |
| 1986 | 57 | 18.9 | 12.6 | 49.9 |
| 1987 | 56 | 20.8 | 13.0 | 60.3 |
| 1988 | 64 | 26.2 | 14.5 | 80.4 |
| 1989[a] | 66 | 31.2 | 16.7 | 87.5 |

[a]The 1989 data are for first two quarters only

[b]Enplanement share for Piedmont only in 1985-87.

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data

Memphis International Airport was a hub for Republic Airlines and is now a hub for Northwest Airlines. Since Northwest had no presence in Memphis before it acquired Republic, the merger, per se, did not affect competition at the Memphis airport. Until 1982 Delta had the largest share of enplanements at Memphis. In 1982 Republic became the dominant carrier, and since 1984 Delta's share of the traffic has plummeted. By 1988 Northwest had 83 percent of the market.

As is the case at most concentrated major airports, yields are higher at Memphis than they are at the 38 unconcentrated airports. However, changes in yields have lagged behind changes in the market share of the dominant carrier. In 1986 and 1987 concentration increased, but yields did not rise appreciably until 1988, when the growth in Northwest's enplanement share had stopped. In early 1989, yields rose only slightly. The gap between yields at Memphis and unconcentrated airports has narrowed, but carrier yields at Memphis are still almost 44 percent

above those at the 38 unconcentrated airports. Table 3.10 shows yields and enplanement shares for Northwest-Republic at Memphis and yields at the 38 unconcentrated airports.

**Table 3.10: Yields and Enplanement Shares at Memphis for Northwest-Republic and Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| Year | Northwest-Republic Enplanement share[b] | Northwest-Republic Yield | Yield at the 38 airports | Difference in yields[c] |
|---|---|---|---|---|
| 1985 | 64 | 21.2 | 13.8 | 54.3 |
| 1986 | 74 | 20.7 | 12.6 | 64.5 |
| 1987 | 85 | 21.7 | 13.0 | 67.8 |
| 1988 | 83 | 23.3 | 14.5 | 60.8 |
| 1989[a] | 82 | 23.9 | 16.7 | 43.7 |

[a]The 1989 data are for first two quarters only.

[b]Enplanement share for Republic only in 1985.

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data

Western Airlines had its hub at Salt Lake City before it was taken over by Delta in early 1987. Western's yields had declined from the third quarter 1985 through the second quarter 1986. Delta proposed its purchase of Western in the third quarter 1986. Since Delta took over the hub at Salt Lake in early 1987, yields have risen as Delta has increased the share of enplanements held by the dominant carrier. Table 3.11 shows yields and enplanement shares for Delta-Western at Salt Lake City and yields at the 38 unconcentrated airports.

**Table 3.11: Yields and Enplanement Shares at Salt Lake City for Delta-Western and Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| Year | Delta-Western Enplanement share[b] | Delta-Western Yield | Yield at the 38 airports | Difference in yields[c] |
|---|---|---|---|---|
| 1985 | 74 | 16 9 | 13.8 | 23.2 |
| 1986 | 74 | 16.1 | 12.6 | 27.4 |
| 1987 | 77 | 17.5 | 13.0 | 34.8 |
| 1988 | 80 | 21 6 | 14.5 | 49.2 |
| 1989[a] | 82 | 23.5 | 16.7 | 40.9 |

[a]The 1989 data are for first two quarters only.

[b]Enplanement share for Western only in 1985 and 1986.

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data

At Pittsburgh, where concentration levels were high and the dominant carrier's market share increased one to three percentage points each year, yields did not increase until the first half of 1989. Nevertheless, they remained substantially above yields at unconcentrated airports. At Pittsburgh, USAir has accounted for 80 percent or more of the enplanements during the entire period under review. Its yields declined somewhat in 1986 and 1987, but rose again in 1988 and by the first half of 1989 were still more than 40 percent above the yields earned at the 38 relatively unconcentrated airports. The decline may have reflected changes in the distribution of USAir's traffic. The proportion of passenger miles flown in the lowest distance/highest yield category (0-500 miles) fell from 43 percent to 31 percent between the fourth quarter 1985 and the fourth quarter 1988. Table 3.12 shows yields and enplanement shares for USAir-Piedmont at Pittsburgh and yields at the 38 unconcentrated airports.

**Table 3.12: Yields and Enplanement Shares at Pittsburgh for USAir-Piedmont and Yields at 38 Unconcentrated Airports**

Shares in percentages, Yields in cents, Yield differences in percentages

| | USAir-Piedmont | | | |
|---|---|---|---|---|
| Year | Enplanement share[b] | Yield | Yield at the 38 airports | Difference in yields[c] |
| 1985 | 80 | 20.8 | 13.8 | 51.4 |
| 1986 | 83 | 19.3 | 12.6 | 53.4 |
| 1987 | 84 | 18.7 | 13.0 | 44.2 |
| 1988 | 87 | 19.8 | 14.5 | 36.4 |
| 1989[a] | 89 | 23.4 | 16.7 | 40.4 |

[a]The 1989 data are for first two quarters only.

[b]Enplanement share for USAir only in 1985-87

[c]Percentage difference between dominant airline's yield and yield at the 38 unconcentrated airports was calculated prior to rounding of yield data.

## Cities With Two Dominant Airlines Provide an Additional Perspective

At the Atlanta and Denver airports two airlines dominated the traffic. At Atlanta, before the Eastern Airlines strike, Delta Airlines handled almost 60 percent of the enplaning passengers while more than one-third was handled by Eastern Airlines. Up until the time of the strike, the two-carrier concentration level was substantially unchanged, although Delta had increased its share somewhat relative to Eastern's. Yields at Atlanta fell between 1985 and 1987. However, yields rose in 1988 and yields for both Eastern and Delta rose sharply in the first quarter of 1989. In the second quarter of 1989, Delta's yield remained high, while Eastern's plummeted as a result of the machinists' strike. As at most of the other concentrated airports, yields at Atlanta for the

dominant carriers are substantially higher than yields at the unconcentrated airports. In addition, the yields for Delta, the carrier with the larger share of the enplanements at Atlanta, have been consistently higher than Eastern's yields. Table 3.13 shows yield data for Atlanta and for the 38 unconcentrated airports.

**Table 3.13: Yields at Atlanta for Delta and Eastern Airlines and Yields at 38 Unconcentrated Airports**

Yields in cents

| Year | Atlanta Yields | | | Yield at the 38 airports |
|---|---|---|---|---|
| | Delta | Eastern[b] | All Carriers | |
| 1985 | 24.0 | 20.6 | 22.1 | 13.8 |
| 1986 | 22.7 | 18.4 | 20.6 | 12.6 |
| 1987 | 21.8 | 17.9 | 19.9 | 13.0 |
| 1988 | 25.9 | 21.6 | 23.7 | 14.5 |
| 1989[a] | 29.3 | 22.4 | 26.4 | 16.7 |

[a]Data for 1989 are for first two quarters only

[b]Includes data for Continental and People Express

Both United Airlines and Continental Airlines operate hubs at Denver. Before the third quarter 1986, Frontier Airlines also enjoyed a major presence at Denver, and average yields at Denver ranged from 9 to 26 percent below the average for the comparison group. After Continental took over People Express and Frontier, yields at Denver increased. Prior to the third quarter of 1986, Denver was not a concentrated airport, and the average yield at Denver was lower than that for the 38 unconcentrated airports. This changed in 1987. Yields for both United and Continental rose rapidly, and Denver experienced an exceptionally large increase in yields during the first two quarters of 1989. For the first two quarters of 1989, Continental's yields were 33 percent higher than those at the unconcentrated airports while United's were almost 20 percent higher. For Denver's airport as a whole, yields were 23 percent higher than the yields at the unconcentrated airports during the first two quarters of 1989. Table 3.14 shows yield data for Denver and for the 38 unconcentrated airports.

**Table 3.14: Yields at Denver for United and Continental and Yields at 38 Unconcentrated Airports**

Yields in cents

| Year | Denver Yields | | | Yield at the 38 Airports |
|---|---|---|---|---|
| | United | Continental[b] | All carriers | |
| 1985 | 12.0 | 11.9 | 12.2 | 13.8 |
| 1986 | 10.4 | 10.2 | 10.6 | 12.6 |
| 1987 | 14.2 | 15.8 | 14.8 | 13.0 |
| 1988 | 16.6 | 17.7 | 16.9 | 14.5 |
| 1989[a] | 19.9 | 22.2 | 20.4 | 16 7 |

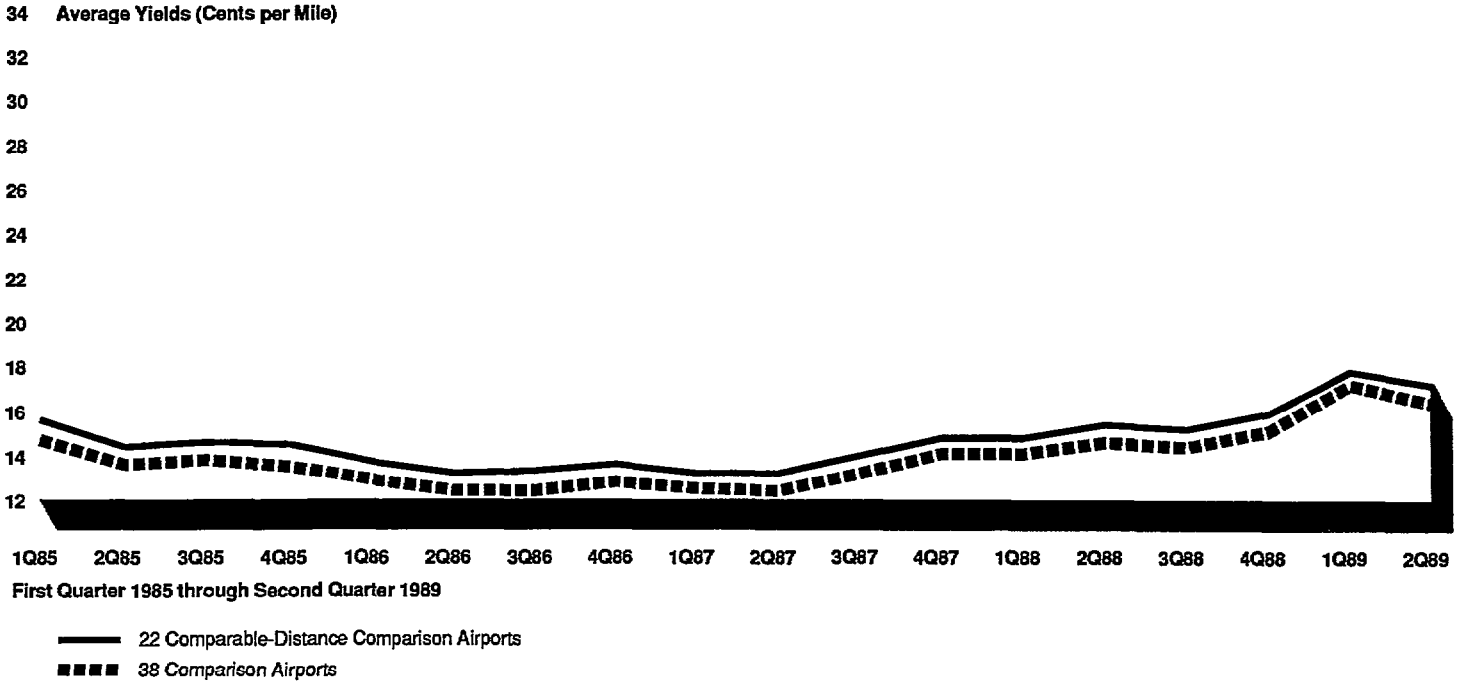
[a]Data for 1989 are for first two quarters only

[b]Includes data for Eastern, Frontier, and People Express.

## Several Other Factors Could Affect Yield Differences

In addition to concentration and market power, other factors could account for the differences in yields at the 15 concentrated and 38 relatively unconcentrated airports and the differences between the dominant carriers and the other airlines serving the concentrated airports. One factor that might account for the differences between the airports is length of haul. We compared yield changes at the 15 concentrated airports with yield changes at a subset of our comparison group of airports that excluded airports where average trip lengths were much longer than those of the concentrated airports. We excluded airports with longer average trip distances (greater than 900 miles) because yields are generally lower for longer trips. When we compared the 15 airports to this smaller comparison group of 22 airports, the difference in yields narrowed, although the trends remained the same (see fig. 3.2).

**Figure 3.2: Average Yield for 22 and 38 Comparison Airports**




Contrasting yields at the 15 concentrated airports with yields at the subset of 22 unconcentrated airports having comparable average trip distances shows that yields at the concentrated airports were 21 percent higher in 1988. This difference is 6.2 percentage points smaller than the difference we observed between the 15 concentrated and the larger group of 38 unconcentrated airports. Table 3.15 shows that, as was the case with the 38 airports, the difference in yields between the 15 concentrated and the 22 unconcentrated airports has widened over time.

**Table 3.15: Differences in Yields at 15 Concentrated Airports and 22 Unconcentrated Airports**

Yields in cents, Yield differences in percentages

| Year | Yield at 15 concentrated airports | Yield at 22 unconcentrated airports | Difference in yields[b] |
|---|---|---|---|
| 1985 | 16.3 | 14.6 | 11.7 |
| 1986 | 15.2 | 13.4 | 13.7 |
| 1987 | 16.4 | 13.7 | 19.8 |
| 1988 | 18.5 | 15.3 | 21.0 |
| 1989[a] | 21.0 | 17.4 | 20.7 |

[a]The 1989 data are for first two quarters only

[b]Percentage difference between yield at the 15 concentrated airports and yield at the 22 unconcentrated airports was calculated prior to rounding of yield data

In preparing the testimony on fares at concentrated airports that we presented before the Senate Committee on Commerce, Science, and Transportation in June 1989, we interviewed officials with all of the major airlines except United, whose officials declined to meet with us. According to some of these industry spokespersons, yields could be higher at the concentrated than at the unconcentrated airports because traffic out of the concentrated hub airports was more often nonstop or direct, while traffic out of the unconcentrated airports often had to be routed through hubs. The industry spokespersons claimed that nonstop or direct service is more desirable and could command higher fares than connecting service. While we did not control for this directly, we did compare the average number of coupons per traveler out of the concentrated airports with the average number at the unconcentrated airports. For the fourth quarter 1988, the average number of coupons was 2.26 for the concentrated airports and 2.28 for the unconcentrated airports. This comparison suggests that the type of service was not materially different for the two groups of airports.

Regarding the difference between the dominant airline and the other airlines at the concentrated airports, the dominant carrier probably provides nonstop or direct service more often than other airlines at the concentrated airport, which may be providing connecting service through other hubs. In addition, dominant airlines may command a higher proportion of higher yield, short haul traffic at the hubs. According to our data on direct service, the dominant carriers earn somewhat lower yields on average than the other carriers serving the concentrated airports. However, considerable variation among the 15 airports makes it difficult to draw any firm conclusions about yield differences between the dominant and nondominant airlines for different types of service.

While we did not adjust our data for the proportion of traffic carried by the dominant and nondominant carriers when we calculated the average yield, we did break down the yield data into mileage blocks using 500 mile increments. We found that for the shortest distance category (0-500 miles) the dominant airlines' yields at the concentrated airports were consistently higher than the yields for trips of a similar distance out of the comparison airports. In addition, at 11 of the 15 airports the yields on the short haul flights of the dominant airline were higher than those of the other airlines serving the concentrated airport. In the longest mileage category, these differences persisted, suggesting that even though the dominant airlines may have a higher proportion of the short haul traffic, their higher share does not account for all of the difference in average yield.

## Sensitivity Analysis

In preparing this study, we had to choose which fares to include, which factors to control, and how to treat anomalies in data and reporting. We believe that our assumptions and adjustments give the most accurate picture possible of fare levels and trends, but it is important to know the effect of these assumptions on the results. Therefore, we attempted to determine how each assumption or adjustment affected the outcome by relaxing each assumption and recalculating the difference between fares at the concentrated and unconcentrated airports. We undertook the sensitivity analysis for 1988 annual data to test how assumptions affected our finding that fares were about 27 percent higher at concentrated airports.

### Weighted Data

Because we were interested in trends in fares at concentrated airports over time as well as differences between concentrated and unconcentrated airports, we weighted the fare data to take into account changes in the distribution of traveler destinations, changes in the proportions of one-way and round-trip tickets in the sample, and changes in the proportions of trips taken on the dominant and nondominant carriers. We wanted changes in yields to reflect fare changes and not changes in the trips taken. Therefore, for each combination of fare type (one-way or round-trip), type of carrier (dominant or nondominant) and destination, we calculated the average yield for each quarter. We weighted the average yield for each combination according to the average amount of traffic for that combination over the 18 quarters. For example, if one-way trips from Denver to Chicago on United Airlines averaged 0.1 percent of all trips on United over the 18 quarters, we weighted the results for each quarter so that the proportion was always the same.

While this weighting is appropriate for analyzing changes over time, DOT officials have criticized its use in comparing fare levels at different groups of airports at the same time. Unweighted, actual data might give different results. Therefore, we re-estimated 1988 fares at concentrated and unconcentrated airports without applying the weights. We found a slight increase in the difference. With unweighted data, fares were 29 percent higher at the concentrated airports. This result might be expected, since we had observed that the difference was growing over time. Adjusting for changes in traffic distribution had somewhat dampened the gap in the latter years. The following adjustments use the actual, unadjusted data for 1988.

## Alaska Airlines

Because of reporting problems, Alaska Airlines was excluded from the database. Alaska had reported fares many times greater than those actually charged. To avoid biasing the results at those airports where Alaska offered a significant amount of service, we excluded the carrier from our analysis entirely. Alaska Airlines has since rectified the problem, and fare data for recent periods are more accurate. We re-estimated 1988 yields including Alaska Airlines, but the effect was small. The difference in yields, using unweighted data, between concentrated and unconcentrated airports including Alaska Airlines was 28.6 percent.

## Interline Fares

Because we were interested not only in average fares at concentrated airports but also in the fares of the carriers that dominated those airports, we eliminated from our database trips that required the traveler to change airlines. By doing so we avoided the difficulty of trying to apportion the fare between the carriers. Interline trips are becoming less common but still comprise a measurable segment of total air travel, and including them gives a more complete picture. Since certain economies are associated with on-line connections, the a priori assumption would be that interline fares are higher. Recalculating yields including interline trips did produce slightly higher yields, but the yields were higher at both concentrated and unconcentrated airports. After including interline tickets, yields at the concentrated airports were 30 percent higher than at unconcentrated ones.

## Multiple Coupon Trips

Our database was restricted to trips involving only two coupons in each direction. This restriction admits into the database only direct flights and those with one change of plane in each direction. With this restriction the database captured most of the traffic, but excluded some

trips—especially those where the final destination was a small city. Fares might be expected to be lower for trips requiring multiple plane changes. We expanded our database to included three coupons in each direction, that is, flights requiring two plane changes in each direction, but again found little change in the size of the yields and the difference between yields at concentrated and unconcentrated airports. As expected, yields were slightly lower, but concentrated and unconcentrated airports were equally affected.

## Low End Fare Screens

We excluded from our data set fares that were either obviously too high or too low based on a review of listed fares, including $0 and nominal fares paid by frequent flyers. Our interest was in examining fares actually paid for individual trips. Some analysts, however, may include $0 fares because they believe that free travel earned in frequent flyer programs should be included in calculating the average fare for travel out of an airport. We re-estimated yields without screening out fares that were too low and, as might be expected, yields fell. Yields were about 6 percent lower at both the concentrated and the unconcentrated airports, and there was a small change in the difference. Yields at the concentrated airports were still 27.6 percent above those at the unconcentrated airports.

The results from relaxing each of the various assumptions discussed above appear in table 3.16.

**Table 3.16: Sensitivity Analysis of Assumptions Employed to Calculate Yields at Concentrated and Unconcentrated Airports**

Yields in cents, Yield differences in percentages

| Assumption | Average yield | | Difference in yields[a] |
|---|---|---|---|
| | Concentrated | Unconcentrated | |
| All assumptions in place | 18 5 | 14 5 | 27.2 |
| Unweighted data | 18 2 | 14 1 | 29.2 |
| Alaska Airlines included | 18.2 | 14 1 | 28.6 |
| Interline fares included | 19.0 | 14.6 | 30.0 |
| Three coupon trips included | 18 1 | 14.0 | 29.4 |
| No low end yield screen | 17 0 | 13.3 | 27.6 |

[a]Differences in yields were calculated prior to rounding of yield data

# Other Recent Analyses of Fares at Concentrated Airports

Over the past year several studies have examined fares at concentrated airports and at airports where the major carriers have set up their hubs.[1] Some of these analyses were undertaken in response to findings we reported in testimony before the Congress.[2] According to the results reported in Chapter 3, fares are significantly higher at major airports where one or two carriers dominate the traffic than at airports where enplaning passengers are distributed more widely among different carriers.

The issues that we address in this report have also been examined by industry and other government agencies. The Air Transport Association recently commissioned a study of fares and service at hub airports. DOT has examined fare and service changes at St. Louis following the TWA-Ozark merger and has recently completed a study of fares at its own sample of concentrated airports. Finally, analysts at the Justice Department have recently assessed the relationship between fares and concentration at three airports that became concentrated following the merger of hubbing carriers.[3]

## The DOT St. Louis Study

We reported in September 1988 that average fares had risen for travel out of St. Louis following the merger of TWA and Ozark Air Lines.[4] We also testified on our findings at hearings before the Senate Committee on Commerce, Science, and Transportation.[5] DOT also testified at those hearings, and the Department was asked to prepare a response to our finding that, following the merger of TWA and Ozark Airlines (a merger DOT approved over the objections of the Justice Department), fares for St. Louis travel had risen and competition at St. Louis had declined.

DOT issued its report in January 1989, and the Department took issue with our findings on several grounds. First, DOT claimed our analysis

[1] 1Some of these studies try to explain why air fares might be higher at concentrated airports by estimating an econometric model. We are also in the process of estimating a model of airline pricing behavior that will focus on how the various barriers to airline market entry affect airline fares.

[2] DOT report on fare and service changes at St. Louis (DOT-P-37-89-3); Hub Operations: An Analysis of Airline Hub and Spoke Systems Since Deregulation, prepared for the Air Transport Association by Simat, Helliesen & Eichner, Inc. (May 1989). In addition, DOT recently issued a series of reports by the Secretary's Task Force on Competition in the U.S. Domestic Airline Industry that includes a study of fares at most of the concentrated airports in this study.

[3] Werden, Joskow, and Johnson.

[4] GAO report on fare and service changes at St. Louis (GAO/RCED-88-217BR).

[5] Factors Affecting Concentration (GAO/T-RCED-88-65).

was based on faulty data. The data that DOT had provided us contained a fare filter that was out-of-date and led to the exclusion of many valid fares. In fact, we first identified the fare-filter problem and brought it to the attention of DOT. We created a new fare filter which DOT later adopted. DOT was also critical of the periods we chose to compare, the first three quarters of 1986 and 1987, and noted (as we had in our report) that fares were especially low in 1986, making the fare increases in 1987 seem larger than if some other base period were chosen. Finally, based on the expected effect of the merger on market power and, therefore, on fare changes, we had separated the routes out of St. Louis into four categories: (1) markets where TWA and Ozark were the only carriers offering nonstop service prior to the merger, (2) markets in which TWA, Ozark, and at least one other carrier offered nonstop service, (3) markets where only TWA or Ozark offered nonstop service, and (4) markets that received nonstop service only from TWA or Ozark and at least one other carrier. We expected the largest increase in fares to occur in markets where TWA and Ozark had been the only carriers providing nonstop service prior to the merger, since the merger would lead to a monopoly on these routes. Our results were inconclusive. The fare increase we reported was relatively small in those markets where the merger produced a monopoly and was largest in markets where TWA and Ozark competed along with other carriers. DOT cited this unexpected result as further evidence that our analysis was flawed.

DOT re-estimated the fare changes at St. Louis using a much less restrictive constraint on allowable yields. DOT examined fares for the same 67 routes that we analyzed and employed the same division based on competitive market categories. DOT used the first half of 1985 as the base period and examined the trend in fares through the first half of 1988.

DOT found that TWA's fares in 1987 were 10 percent above those in 1985 and 20 percent over those in 1986. The increase reported by DOT, therefore, is even larger than the 13 to 18 percent increase we reported. DOT also found that TWA's fare increases were greater than the rise in either the airline component of the Consumer Price Index (CPI) or the overall CPI. DOT reported that average fares rose an additional 11 percent in the first half of 1988, while, at the same time, the airline component of the CPI was unchanged and the overall CPI rose 4 percent. Between the first half of 1985 and the first half of 1988, DOT found that TWA's fares for these 67 nonstop markets rose 22.7 percent, more than twice the increase in either measure of inflation.

DOT attributed the relatively large increase in TWA's fares out of St. Louis to demand factors. Between 1985 and 1988, St. Louis origin and destination traffic increased by an average of 6.9 percent annually whereas, nationwide air travel grew 3.3 percent over the same period. In examining why TWA's fares might have risen, DOT presented data on TWA's system-wide operating costs. But, between March 1985 and June 1988, TWA's operating costs per available seat mile fell 16 percent from 8.82 cents to 7.41 cents. DOT did not comment on why the fare increase out of St. Louis coincided with this sizable reduction in operating costs.

DOT also presented evidence on fare changes at other concentrated hub airports to demonstrate that TWA's increases were not atypical (see table 4.1). However, these data reinforce our point that fares have increased at airports where concentration has increased. Only Pittsburgh, which was concentrated throughout the 1985-88 period, and Atlanta, a two-carrier hub that was also concentrated throughout the period we examined, did not show a substantial increase. These results are fully consistent with the data we presented in Chapter 3.

DOT found that fares were relatively unchanged in the 38 city pair markets where TWA and Ozark did not compete before the merger, but like GAO, DOT noted that fares rose most in those markets where TWA and Ozark offered nonstop service along with other airlines, not in those markets where TWA gained a monopoly after absorbing Ozark. Based on this circumstance, DOT found no basis for concluding that the merger had significantly affected fares.

**Table 4.1: Comparison of Round-Trip Fare Changes by Carriers Dominating Hubs[a]**

| Hub | Carrier | Percent fare change 1985-88 |
|---|---|---|
| Atlanta | Delta | +5 |
| Charlotte | Piedmont | +34 |
| Cincinnati | Delta | +25 |
| Detroit | Northwest | +27 |
| Minneapolis | Northwest | +21 |
| Pittsburgh | USAir | −6 |
| Raleigh | American | +35 |
| St. Louis | TWA | +22 |
| Salt Lake City | Delta | +26 |

[a]Source: DOT report on fare and service changes at St Louis (DOT-P-37-89-3).

However, our anomalous result occurred because we included the New York City-St. Louis route among those in which TWA and Ozark competed

with other carriers. However, the only other carrier in this case was People Express, an airline that went out of business during the period covered by our study. Thus, this route could have been classified with those where the merger resulted in a monopoly. Because fare increases on this route were larger than on any of the other 67 we examined (39 percent) and because it is such a heavily traveled route, transferring it to the post-merger monopoly category eliminates most of the anomaly in our results. With the New York City-St. Louis route included with the post-merger monopoly group, fare increases were largest in those markets where TWA and Ozark competed, and fares rose by roughly the same amount on those routes regardless of whether or not other carriers also served the route. DOT also included the New York City-St. Louis route among those in which TWA and Ozark competed with other carriers. Since DOT found the anomaly to be smaller than we estimated, including St. Louis-New York with the other monopoly routes would have likely yielded the expected result—fares rose most in markets where the merger created a monopoly.

Anomalies notwithstanding, DOT's results, as do ours, show unequivocally that fares rose most in those markets where TWA and Ozark competed before the merger. According to DOT's data, comparing the first half of 1985 with the same period in 1988 reveals that fares rose 17.7 percent on routes where the merger created a monopoly (excluding New York) and 39 percent on routes where TWA and Ozark competed along with other airlines. On routes where they did not compete before the merger, fares rose by only 1.0 to 1.5 percent. Among the factors that might be mitigating fare increases out of St. Louis is competition from a low fare competitor, Southwest Airlines. DOT's data showed that fares rose least on routes where Southwest competed.

## The Simat, Helliesen & Eichner Study for the Air Transport Association

The results of the Simat, Helliesen & Eichner (SH&E) study, undertaken for the Air Transport Association, were presented to the Senate Committee on Commerce, Science, and Transportation on the same day that we testified before the Committee on our preliminary findings on air fares at concentrated airports. The SH&E study examines changes in air fares and service at 30 hub and 30 nonhub airports since 1980 and attempts to show that fares are not generally higher at hub airports and that where they are higher it is the result of better service and other factors.

Following the testimony presented at the hearing, the Ranking Minority Member asked us to undertake an assessment of SH&E's findings. We

reviewed the SH&E report and submitted our findings for the hearing record. We found that SH&E's data were consistent with our finding that fares are higher at airports where one or two carriers handle most of the enplanements. With respect to the causes of the fare differences, however, we found that SH&E's analysis contained some serious methodological problems and, therefore, cannot be used to disprove the hypothesis that fares and airport dominance are related.

While we compared fares at concentrated airports with fares at unconcentrated airports, SH&E contrasted fares at 30 hub airports with fares at 30 nonhub airports. Although many hubs are dominated by one or two carriers, others are not. Some of the unconcentrated airports making up our comparison group are hub airports for some of the smaller airlines. We do not believe that hubs, per se, are the issue. Indeed, we recognize that hub and spoke networks have given many travelers greater choice in how to make their trips. More alternatives mean more competition and can lead to lower fares for those traveling through hubs.

By choosing to examine whether fares are higher at hub airports, SH&E grouped airports where the hubbing airline has significant market power with airports where the hubbing carrier wields much less market power. Several of the hub airports that SH&E included in its analysis are not ones where one would expect fares to be above average. Some of these hub airports are not highly concentrated—that is, they are not dominated by the hubbing airline. Other hubs included by SH&E are located in cities with more than one airport. In multi-airport cities, competition from carriers operating out of other airport(s) could offset some of the advantages a dominant carrier might have at the concentrated airport. For example, SH&E included Dallas Love Field as a hub airport. Love Field qualifies as concentrated since Southwest Airlines handles 100 percent of the enplaning passengers there. However, Southwest's ability to exploit its monopoly position at Love Field is limited by competition from carriers serving Dallas/Ft. Worth International Airport. We excluded from our analysis airports in multi-airport cities because airport dominance will be less important if alternative air service is available from a nearby airport.

SH&E's data show that fares were above average at 21 hub airports and below average at 9 other hub airports. However, the hub airports where fares were lower are all either located in multi-airport cities or are not concentrated. When airports in multi-airport cities (Dallas Love Field,

Houston Hobby, Detroit Metropolitan Wayne County,[6] and Chicago Midway) and unconcentrated hub airports (Las Vegas, Kansas City, Milwaukee, Orlando, and Phoenix)—are excluded, SH&E's data show that average fares were higher than the industry average at all of the concentrated hub airports.

Six of the hubs that, according to SH&E, have fares below the national average were those of smaller carriers (Southwest at Dallas/Love Field and Houston/Hobby, America West at Las Vegas and Phoenix, Braniff at Kansas City,[7] and Midway at Chicago/Midway). These carriers either dominated traffic at the smaller airport in a multi-airport city (Southwest and Midway) or did not dominate traffic at their hubs.

Even if these carriers did dominate an airport, they might not be able to exercise the same kind of market power as the larger dominant airlines because they lack the ability to erect effectively the same entry barriers as the larger airlines. For example, the frequent flyer programs of the smaller carriers are not as attractive as those offered by the majors because the smaller carriers do not fly to as many places. The less extensive route systems of the smaller carriers limit the traveler's ability to earn free travel and offer limited opportunities for spending the bonuses. Once the distinction between hubs and concentrated market power is made, we find that SH&E's data are consistent with our finding that air fares are higher at concentrated airports.

SH&E presented the results of an econometric model and claimed its results show that airport dominance is not a significant factor in explaining the variation in air fares. However, our review of SH&E's model indicated that it contained serious methodological problems that invalidated its results.

SH&E employed multiple regression analysis to estimate how air fares (as measured by a fare index) are affected by airport dominance (as measured by the Herfindahl-Hirschman Index, or HHI[8] ) and other factors.

[6]Detroit was also included in our analysis, but it has become a multi-airport city since Southwest Airlines commenced operations out of Detroit City Airport in July 1988.

[7]Braniff has since declared bankruptcy.

[8]The HHI is the sum of the squares of the market shares of the firms in the market. Thus, the highest possible HHI is 10,000 when one firm controls 100 percent of the market (100 X 100 = 10,000). This measure assigns a higher value to the situation where one firm dominates a market than to cases where the firms have relatively equal shares. For example, the HHI for a market where three firms held 80, 10, and 10 percent shares would be 6,600, while a 40, 30, and 30 percent distribution would produce an HHI of 3,400.

Multiple regression analysis attempts to explain the variation in a dependent variable (in this case air fares) by correlating it with the variation in the independent variables (in this case service levels, concentration factors, load factor, et al.) that are thought to explain the behavior of the dependent variable. SH&E found that the relationship between air fares and airport dominance (the HHI) was not statistically significant when the influence of other factors, especially service quality, was taken into account. However, the model developed by SH&E suffered from a serious methodological problem: the independent, or explanatory, variables were not independent of each other.

If the independent variables in an econometric model are not truly independent but are instead highly correlated with each other, then the regression model is unable to separate the individual effects and, therefore, to elicit much confidence in the results. In general, whenever two or more closely related explanatory factors are in the regression model, the results will not show clearly which of them has the most significant impact on the dependent variable. Statisticians call this condition multicollinearity, and when it exists, the measures of statistical significance are biased toward concluding nonsignificance. SH&E justified excluding the variable measuring airport concentration on the finding that it was statistically insignificant.

SH&E argued that high fares are caused not by high airport concentration levels, but by other factors, such as high levels of service quality. High levels of service are costly to produce, and people are willing to pay more for this service. SH&E included several variables that were supposed to be proxies for service quality, but these variables were all highly correlated with each other and with the variable representing concentration.

In addition to multicollinearity, we identified several other problems with SH&E's analysis. These included problems with variable measurement, database development, and the treatment of airlines that are owned in common.

By not taking into account multi-airport cities in its analysis, SH&E's variable representing concentration and market power was poorly measured. For example, Dallas/Love Field has the highest HHI, a perfect 10,000, but Southwest Airlines' market power is limited by competition from carriers serving the larger Dallas airport. By assigning a high value for the concentration variable to observations where concentration will

have little impact, the SH&E model undercut the variable's explanatory power.

As we did, SH&E used DOT's Data Bank 1A in its analysis. When using Data Bank 1A, it is necessary to edit the fare data to exclude erroneously recorded fares that are obviously too high or too low. In preparing our analysis, we developed a new edit procedure, which DOT has endorsed and which at least one airline data vendor has adopted. SH&E, probably unaware that we had developed this new screen, applied instead a fare screen that excluded only fares over $2 per mile and $0 fares. Our fare screen, based on published fare data, recognizes the distance taper in airline fares. A comparison between our fare screen and SH&E's suggests that SH&E's screen allows many fares into the database that are too high, especially for longer distances, while it excludes some valid short distance fares (see table 4.2).

**Table 4.2: Comparison of GAO and SH&E Origin-Destination Data Fare Screens**

| | SH&E screen Exclude if yield is | | GAO screen Exclude if yield is | |
|---|---|---|---|---|
| Mileage category | equal to cents/mile | greater than cents/mile | less than cents/mile | greater than cents/mile |
| 1- 100 | 0 | 200 | 8 | 300 |
| 101- 200 | 0 | 200 | 4 | 255 |
| 201- 300 | 0 | 200 | 3 | 160 |
| 301- 400 | 0 | 200 | 3 | 125 |
| 401- 500 | 0 | 200 | 3 | 115 |
| 501- 700 | 0 | 200 | 3 | 105 |
| 701-1,000 | 0 | 200 | 3 | 80 |
| 1,001-1,300 | 0 | 200 | 3 | 65 |
| 1,301-1,600 | 0 | 200 | 3 | 55 |
| 1,601-1,900 | 0 | 200 | 3 | 50 |
| 1,901-2,200 | 0 | 200 | 3 | 40 |
| 2,201-2,500 | 0 | 200 | 3 | 40 |
| above 2,500 | 0 | 200 | 3 | 40 |

Finally, we treated as a single carrier airlines that were jointly owned. We reasoned that if one airline was owned by another, it would not be expected to compete with the parent. SH&E treated jointly owned airlines as different carriers. This was a problem in cities such as Syracuse where USAir and Piedmont, which were jointly owned and in the process of being merged, each had a large market share. Classifying an airport such as Syracuse as more competitive than it actually is tends to

bias the results. If concentration is a factor explaining airline fares, then misrepresenting competitive conditions will produce misleading results.

## Study by Justice Department Analysts

Analysts at the Antitrust Division of the Justice Department (DOJ) have recently completed an examination of the effects on fares and service of two airline mergers (approved by DOT but opposed by Justice)—TWA's acquisition of Ozark Air Lines and Northwest's acquisition of Republic Airlines. Justice's analysts attempted to measure the impact of the mergers on fares and service at St. Louis, Minneapolis/St. Paul, and Detroit.

The Justice Department analysts attempted to isolate the effect of the merger, taking into account other factors such as costs, the presence of potential entrants, and other variables.[9] The DOJ analysts do not compare yields at the concentrated airports to yields at other airports, but rather attempt to predict how much higher (or lower) yields are due to the mergers.

The DOJ analysts found that the Northwest-Republic merger affected fares at Minneapolis/St. Paul by roughly the amounts DOJ had predicted when it opposed the merger. According to the DOJ analysts, fares at Minneapolis/St. Paul, where Northwest and Republic both operated hubs and had a number of overlapping routes, were 5.6 percent higher because of the merger. The DOJ analysts found this to be a significant increase. On long distance routes (more than 1000 miles) where Northwest and Republic competed before the merger, yields were 7.5 percent higher. On long distance routes where they were potential competitors, yields were estimated to be 7.6 percent higher because of the merger. On shorter distance routes the impact of the merger on fares was smaller but still pronounced. Yields on routes out of Minneapolis/St. Paul where they did not compete directly rose only 2.9 percent. At Detroit, on the other hand, only Republic operated a hub before the merger, and fares did not rise following the merger but in fact fell slightly, by 0.8 percent.

The TWA-Ozark merger also produced an effect at St. Louis similar to that predicted by DOJ when it opposed that merger. Although the overall

[9]The Justice Department analysts employed regression analysis to estimate predictive equations that both forecast and backcast yields on routes out of the dominated airports. The forecasting equation predicts what yields would have been in the period after the mergers had they not occurred. The backcasting equation predicts what yields would have been before the mergers had they already occurred. The predictions are combined to form a single estimate of the effect of the mergers on yields of a particular city-pair market.

estimated impact on airline yields was relatively small—an increase of 1.5 percent—yields did increase significantly—about 4.5 percent—on routes where TWA and Ozark competed directly or where they were at least potential competitors. Fares fell on other routes, causing the overall effect to be small.

While, in many ways, DOJ's approach differs from the approach we followed, its findings are consistent with, and supportive of, the ones presented here. Yields are higher at concentrated airports and increased concentration leads to higher fares.

## DOT Task Force on Competition Study

DOT recently published the results of a 9-month study of the state of competition in the nation's airline industry. DOT's results are consistent with those from most other analyses in that the Department concludes that, on balance, deregulation is working. Air fares are lower, service levels have increased, and greater numbers of people can afford to fly. However, DOT also found "pockets of problems," including higher fares at concentrated air traffic hubs.[10]

DOT focused on air traffic hubs and defined a hub to be concentrated if one carrier had more than 75 percent of the enplanements. Under this criterion, eight hubs were judged to be concentrated—Charlotte, Cincinnati, Dayton, Memphis, Minneapolis/St. Paul, Pittsburgh, St. Louis, and Salt Lake City. DOT also identified 8 two-carrier concentrated hubs—Atlanta, Chicago, Dallas, Denver, El Paso, Houston, Nashville, and Raleigh-Durham. Thus, DOT's analysis includes 12 of the 15 concentrated airports we examined.[11]

DOT's approach differed from ours in a number of respects. The task force compared yields at the concentrated hubs to the industry average, rather than a control group of less concentrated hubs. DOT calculated a fare premium, adjusted for distance and density factors, for concentrated single-carrier hubs, concentrated two-carrier hubs, and monopoly routes. DOT also calculated the fare premium for the 15 concentrated airports used in our analysis (see table 4.3).

[10]Air traffic hubs are communities, rather than airports, accounting for a certain percentage of the nation's travel. For example, the Chicago hub is served by O'Hare and Midway airports.

[11]Because we excluded airports in multi-airport cities, each of these twelve airports accounted for all traffic at the hub it served.

**Table 4.3: DOT-Calculated Fare Premiums on Monopoly Routes and at Concentrated Airports in 1988**

| Market type | Average fare premium | Percent premium |
|---|---|---|
| Monopoly Routes | $16.59 | 14.0% |
| 8 Concentrated Hubs (Single carrier) | $22.30 | 18.7% |
| 8 Concentrated Hubs (Two carriers) | $10.42 | 8.9% |
| 15 GAO Concentrated Hubs | $21.44 | 18.4% |

DOT calculated fare premiums for both single-carrier and two-carrier concentrated hubs and compared the 1988 premium with that of 1984. The single-carrier concentrated hubs show the largest premiums. On average, two-carrier concentrated hubs show premiums about half as great. However, Atlanta, which is a two-carrier hub, has the largest premium of any concentrated hub (see table 4.4).

**Table 4.4: DOT-Calculated Fare Premiums at Concentrated Hubs, 1984 and 1988**

Premiums in percentage, Shares in percentage

| | 1988 | | 1984 | |
|---|---|---|---|---|
| Hub | Premium | Dominant carrier enplanement share | Premium | Dominant carrier enplanement share |
| Single Carrier. | | | | |
| Charlotte | 27.1 | 90 | 22.7 | 75 |
| Cincinnati | 34.1 | 78 | 29.5 | 56 |
| Dayton | 17.3 | 75 | 10.2 | 63 |
| Memphis | 28.8 | 86 | 28.1 | 47 |
| Minneapolis/St.Paul | 19.7 | 78 | 12.0 | 48 |
| Pittsburgh | 10.4 | 86 | 16.3 | 77 |
| St. Louis | 17.8 | 82 | 16.4 | 58 |
| Salt Lake City | 16.7 | 80 | 9.9 | 71 |
| Two Carrier: | | | | |
| Atlanta | 40 2 | 93 | 38.8 | 93 |
| Chicago | −1.2 | 72 | 27.5 | 68 |
| Dallas | 18.5 | 79 | 9.8 | 68 |
| Denver | −5.4 | 85 | −6.0 | 65 |
| El Paso | −18 0 | 73 | −30.5 | 82 |
| Houston | 6.7 | 76 | −9.0 | 51 |
| Nashville | 10.3 | 71 | 17.4 | 38 |
| Raleigh-Durham | 9.6 | 80 | 11.9 | 52 |

DOT found that average fares were greater in most distance and density categories for single-carrier concentrated hubs, and that the most significant premiums were in markets of more than 100 passengers per day and for distances ranging between 250 and 1000 miles. Passengers traveling in these distance- and density-market categories paid 71 percent of the total 1988 premiums at the 8 single-carrier concentrated hubs. In fact, fares in dense markets at the concentrated hubs were frequently higher than fares in less dense markets even for the same distance categories. This is the reverse of what normally happens in the airline industry. Scale economies and competition usually result in lower fares in densely traveled markets.

The DOT task force report further buttresses the finding that fares are higher at concentrated airports. Moreover, the study contains considerable information on airline operating and marketing practices that limit market entry and protect dominant, incumbent positions. Yet, the study does not explore any policy options that DOT or the Congress might consider to address the limits to competition.[12] DOT's recently released National Transportation Plan calls for increased spending to expand the capacity of the aviation system.[13] Yet, the concentrated airports that are experiencing higher fares are not all capacity constrained, and the barriers to market entry identified in Chapter 2 will not be eliminated by building more runways and new terminals.

[12]For a discussion of the pros and cons of various policy options, see app. II, which contains an excerpt from Barriers to Competition (GAO/T-RCED-89-65). See also Competition in the Airline Computerized Reservation System Industry (GAO/T-RCED-88-62, Sept. 1988) and Effects of Airline Entry Barriers on Fares (GAO/T-RCED-90-62, April 1990). Copies of these publications can be obtained by writing or calling GAO (see information on the inside of back cover of this report).

[13]Moving America: New Directions, New Opportunities, U.S. Department of Transportation (Washington, D.C.: Feb. 1990).

# Changes in Air Passenger Service at 15 Concentrated Airports

In addition to raising concerns over higher fares, airport dominance by one or two airlines has prompted concern that service levels could decline at concentrated airports. Increased market power, combined with effective barriers to new entry, could cause reduced service levels at the concentrated airports as the dominant carriers discover they have less need to respond to competitive pressures by offering high levels of service.

The term "service levels" can be used to mean either the quantity of service available or the quality of service delivered. The quality of service delivered includes such things as the quality of in-flight meals, the friendliness of ticketing and on-board personnel, the percentage of late flights, and the amount of lost baggage. We did not examine trends in these qualitative attributes of air travel. Some, such as the quality of the food served, are simply too subjective, while for others, such as on-time performance, the data were either unavailable for appropriate time periods or did not allow meaningful comparisons.

Instead, we examined trends in the quantity of service available. Specifically, we examined trends in the number of routes served directly, the number of flights, and the number of airlines competing for traffic on routes out of the concentrated airports. Direct service includes both nonstop service to destinations and service with stops but not requiring the passenger to change planes.

To assess changes in service levels at concentrated airports, we compared service level data for the month of May from 1985 through 1988. We compared the number of cities that could be reached by direct service, the total number of daily flights to all places, and the amount of competition as measured by the number of markets served by one carrier, by two or three carriers, or by four or more carriers.

The service data for carriers operating out of the 15 concentrated airports between May 1985 and May 1988 show an overall increase in the amount of service offered and in the number of places that can be reached by direct air service. However, at most of the airports affected by mergers, the number of daily flights decreased. In addition, the amount of competition declined on many routes out of the 15 concentrated airports. More routes were served by only one carrier and fewer could be considered highly competitive. We considered routes highly competitive if four or more carriers provided direct service.

## Number of Destinations Served Directly

The number of destinations that can be reached by direct air service from the 15 concentrated airports increased at 10 of the airports, declined at 3 of the airports, and remained about the same at the other 2 (changed less than 5 percent). Overall, the number of places served directly increased 10 percent, but there was considerable variation among the 15 airports. The improvement was most pronounced at airports where the airlines established or built up hubs during this period. At airports in Charlotte, Cincinnati, Detroit, Memphis, Nashville, Raleigh-Durham, and Syracuse hubs were established or built up between 1985 and 1988, and all except those in Charlotte and Detroit registered large increases in the number of destinations that could be reached with direct air service. Table 5.1 shows data on the number of routes with direct service at the 15 concentrated airports.

**Table 5.1: Number of U.S. Destinations With Direct Service From 15 Concentrated Airports During Month of May 1985-88**

| Concentrated airport | 1985 | 1986 | 1987 | 1988 | Percentage change 1985-88 |
|---|---|---|---|---|---|
| Atlanta | 152 | 151 | 143 | 150 | −1 |
| Charlotte | 85 | 88 | 94 | 91 | 7 |
| Cincinnati | 74 | 82 | 89 | 102 | 38 |
| Dayton | 50 | 69 | 63 | 60 | 20 |
| Denver | 158 | 158 | 151 | 147 | −7 |
| Detroit | 121 | 117 | 121 | 125 | 3 |
| Greensboro | 53 | 46 | 45 | 48 | −9 |
| Memphis | 92 | 97 | 101 | 106 | 15 |
| Minneapolis/St Paul | 123 | 133 | 124 | 134 | 9 |
| Nashville | 62 | 81 | 85 | 80 | 29 |
| Pittsburgh | 114 | 111 | 116 | 128 | 12 |
| Raleigh-Durham | 55 | 54 | 59 | 85 | 55 |
| Salt Lake City | 86 | 84 | 91 | 102 | 19 |
| St. Louis | 136 | 132 | 131 | 126 | −7 |
| Syracuse | 51 | 57 | 62 | 69 | 35 |
| **Total** | **1412** | **1460** | **1475** | **1553** | **10** |

[a]Percentage changes rounded to nearest whole number

Source I P Sharp, Inc

Raleigh-Durham experienced the largest increase. Because American Airlines established its hub there, the number of cities served directly from Raleigh-Durham increased from 55 in May 1985 to 85 in May 1988, a 55 percent increase. Of the airports where hubs were set up or expanded during this period, Detroit and Charlotte registered the

smallest improvements, with increases of just 3 percent and 7 percent, respectively, in the number of destinations served directly.

Greensboro, the only concentrated airport that we examined which was not a hub airport, experienced the largest relative reduction in the number of places served directly—a 9 percent decline—while Denver, a two-carrier hub, experienced the largest absolute reduction in the number of places served directly—11 fewer destinations could be reached without changing planes in 1988 than in 1985. Also 10 fewer places were served directly from St. Louis in 1988 than in 1985.

## Number of Daily Departures

The number of daily flights at the 15 concentrated airports increased 3 percent between May 1985 and May 1988, but 7 of the 15 concentrated airports experienced a decline in the average number of daily flights. Departures out of Raleigh-Durham more than doubled while the number of flights from Nashville and Dayton increased more than 50 percent. On the other hand, the number of daily flights out of Denver fell 20 percent, while flights out of Minneapolis/St.Paul, Detroit, and Memphis—airports affected by the Northwest-Republic merger—fell between 10 and 16 percent.

With respect to the number of flights offered, the patterns for the dominant and the nondominant firms differed. Daily departures offered by the dominant carriers grew 50 percent, and the proportion of total departures accounted for by the dominant firms grew by 46 percent. Conversely, the number of daily departures out of these 15 airports by the nondominant carriers fell almost 50 percent. Table 5.2 provides flight frequency data for the 15 concentrated airports.

**Table 5.2: Number of Daily Flights to U.S. Destinations From 15 Concentrated Airports During the Month of May 1985-88**

| Concentrated airport | Number of daily flights | | | | Percentage change 1985-88[b] |
|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | |
| Atlanta | 1162 | 1215 | 1193 | 1207 | 4 |
| Nashville | 170 | 258 | 292 | 269 | 58 |
| Charlotte | 409 | 434 | 402 | 466 | 14 |
| Cincinnati | 284 | 264 | 340 | 405 | 43 |
| Dayton | 138 | 209 | 207 | 215 | 56 |
| Denver | 900 | 887 | 805 | 718 | −20 |
| Detroit | 635 | 648 | 572 | 569 | −10 |
| Greensboro | 128 | 110 | 111 | 108 | −16 |
| Memphis | 413 | 404 | 375 | 346 | −16 |
| Minneapolis | 563 | 615 | 507 | 506 | −10 |
| Pittsburgh | 512 | 520 | 523 | 559 | 9 |
| Raleigh-Durham | 142 | 154 | 160 | 286 | 101 |
| Salt Lake City | 299 | 292 | 323 | 341 | 14 |
| St. Louis | 646 | 699 | 608 | 605 | −6 |
| Syracuse | 175 | 162 | 177 | 169 | −3 |
| **Total[a]** | **6578** | **6872** | **6595** | **6769** | **3** |

Note: Daily flight data calculated from monthly data and rounded to nearest whole numbers

[a]Columns may not add to totals due to rounding

[b]Percentage changes rounded to nearest whole number

Source: I.P Sharp, Inc.

## Degree of Competition

As the data on service levels suggest, the dominant carriers at the concentrated airports have increased their dominance over the past few years. As a result, on many routes out of the 15 concentrated airports the air traveler's ability to choose among airlines has narrowed. Although there was an overall increase of 10 percent in the number of domestic destinations served directly from the 15 concentrated airports between 1985 and 1988, there was a 25 percent increase in the number of domestic destinations from the 15 concentrated airports that were served directly by only one carrier. Of the 15 concentrated airports we examined, 13 experienced an increase in the number of monopoly routes. One of the two exceptions was Atlanta, where concentration did not change greatly over the 1985-88 period. Atlanta is a hub for two carriers, Delta and Eastern Airlines. However, since the Eastern Airlines strike and subsequent bankruptcy, Eastern has substantially reduced its operations out of Atlanta. Therefore, the one airport that did not experience an increase in one-carrier routes between 1985 and 1988 has seen a

substantial decline in the activity of the principal competitor. Table 5.3 provides data on the number of routes where there has been a monopoly on direct service.

**Table 5.3: Number of U.S. Destinations to Which Only One Airline Flew Directly From 15 Concentrated Airports in Month of May 1985-88**

| Concentrated airport | 1985 | 1986 | 1987 | 1988 | Percentage change 1985-88[a] |
|---|---|---|---|---|---|
| Atlanta | 70 | 58 | 55 | 60 | −14 |
| Nashville | 40 | 51 | 49 | 50 | 25 |
| Charlotte | 46 | 52 | 72 | 74 | 61 |
| Cincinnati | 43 | 47 | 53 | 66 | 53 |
| Dayton | 36 | 43 | 41 | 42 | 17 |
| Denver | 62 | 65 | 65 | 74 | 19 |
| Detroit | 59 | 51 | 67 | 65 | 10 |
| Greensboro | 39 | 33 | 33 | 38 | −3 |
| Memphis | 51 | 61 | 75 | 86 | 69 |
| Minneapolis | 64 | 66 | 84 | 88 | 38 |
| Pittsburgh | 81 | 78 | 89 | 90 | 11 |
| Raleigh-Durham | 39 | 33 | 39 | 50 | 28 |
| Salt Lake City | 52 | 56 | 64 | 72 | 38 |
| St. Louis | 80 | 69 | 87 | 84 | 5 |
| Syracuse | 28 | 38 | 39 | 46 | 64 |
| **Total** | **790** | **801** | **912** | **985** | **25** |

[a]Percentage changes rounded to nearest whole numbers

Source: I.P. Sharp, Inc.

In some cases, the increase in the number of direct routes served by a single carrier may simply reflect added service by an airline at its hub and, as such, represents a net improvement in service offerings and traveler welfare. One carrier offering direct service is better than no direct service at all. However, at nine of the concentrated airports, the increase in the number of direct routes served by only one carrier is greater than the increase in the number of routes with direct service. If more routes are served by one carrier, and there is no corresponding increase in the total number of routes served directly, then it follows that fewer routes are served by two or more carriers. For example, at Charlotte there were 6 more routes with direct service in May 1988 than in May 1985. However, the number of direct routes served by only one airline grew by 28, from 46 to 74 routes.

For the 15 concentrated airports as a group, no change occurred in the number of routes served by 2 or 3 airlines between 1985 and 1988, since

**Table 5.5: Number of U.S. Destinations to Which Four or More Airlines Flew Directly From 15 Concentrated Airports in Month of May 1985-88**

| Concentrated airport | 1985 | 1986 | 1987 | 1988 | Percentage change 1985-88[a] |
|---|---|---|---|---|---|
| Atlanta | 8 | 14 | 4 | 9 | 13 |
| Nashville | 1 | 7 | 4 | 2 | 100 |
| Charlotte | 5 | 4 | 0 | 1 | −80 |
| Cincinnati | 4 | 1 | 1 | 1 | −75 |
| Dayton | 1 | 3 | 3 | 0 | −100 |
| Denver | 23 | 27 | 9 | 12 | −48 |
| Detroit | 23 | 27 | 9 | 14 | −39 |
| Greensboro | 3 | 2 | 2 | 0 | −100 |
| Memphis | 8 | 6 | 1 | 0 | −100 |
| Minneapolis | 12 | 12 | 6 | 4 | −67 |
| Pittsburgh | 1 | 3 | 3 | 3 | 200 |
| Raleigh-Durham | 2 | 1 | 1 | 1 | −50 |
| Salt Lake City | 3 | 3 | 2 | 2 | −33 |
| St. Louis | 10 | 12 | 2 | 2 | −80 |
| Syracuse | 2 | 0 | 0 | 0 | −100 |
| **Total** | **106** | **122** | **47** | **51** | **−52** |

[a]Percentage changes rounded to nearest whole numbers.

Source: I.P. Sharp, Inc.

## Other Analyses of Service Changes at Concentrated Airports

Other studies examining air fares also have examined trends in service levels at concentrated airports. The approaches taken and the performance measures examined are usually different from ours, and so the results of these other analyses are not strictly comparable. None of the studies we reviewed contradicts our results.

### DOT St. Louis Study

The Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation asked DOT to respond to our findings on fare and service changes reported in our September 1988 testimony before the Committee.[1] Our analysis of service changes at Lambert-St. Louis International Airport following the TWA-Ozark merger compared service levels in June 1986 with those prevailing in June 1987. We found that TWA had increased the number of places served directly or with nonstop service from St. Louis. In 1987, TWA provided direct service to six more cities and offered nonstop service to four more cities than TWA and

[1]Factors Affecting Concentration (GAO/T-RCED-88-65); GAO report on fare and service changes at St. Louis (GAO/RCED-88-217BR).

increases at some were offset by reductions at others. However, no clear patterns emerged among gainers or losers. Table 5.4 provides data on the number of routes where two or three carriers provide direct service.

**Table 5.4: Number of U.S. Destinations to Which Two or Three Airlines Flew Directly From 15 Concentrated Airports in Month of May 1985-88**

| Concentrated airport | 1985 | 1986 | 1987 | 1988 | Percentage change 1985-88 |
|---|---|---|---|---|---|
| Atlanta | 74 | 79 | 84 | 81 | 9 |
| Nashville | 21 | 23 | 32 | 28 | 33 |
| Charlotte | 34 | 32 | 22 | 16 | −53 |
| Cincinnati | 27 | 34 | 35 | 35 | 30 |
| Dayton | 13 | 23 | 19 | 18 | 38 |
| Denver | 73 | 66 | 77 | 61 | −16 |
| Detroit | 39 | 39 | 45 | 46 | 18 |
| Greensboro | 11 | 11 | 10 | 10 | −9 |
| Memphis | 33 | 30 | 25 | 20 | −39 |
| Minneapolis | 47 | 55 | 34 | 42 | −11 |
| Pittsburgh | 32 | 30 | 24 | 35 | 9 |
| Raleigh-Durham | 14 | 20 | 19 | 34 | 143 |
| Salt Lake City | 31 | 25 | 25 | 28 | −10 |
| St. Louis | 46 | 51 | 42 | 40 | −13 |
| Syracuse | 21 | 19 | 23 | 23 | 10 |
| **Total** | **516** | **537** | **516** | **517** | **0** |

[a]Percentage changes rounded to nearest whole numbers

Source: I.P. Sharp, Inc.

On the other hand, the number of routes served by 4 or more carriers fell 52 percent. Although there are fewer routes in this category than in the single-carrier and two- or three-carrier categories, the results are the least ambiguous. In May 1988, four airports had no routes where 4 or more carriers competed, and most of the others registered dramatic reductions. The three airports where the number of routes served by 4 or more carriers increased gained only 4 such routes while the other 12 airports lost 59 routes served by 4 or more carriers. Table 5.5 provides data on the number of routes with direct service by at least 4 carriers.

other carriers, 10 continued to receive competitive nonstop service in 1988. The exception was New York where People Express ceased providing service after it was taken over by Texas Air. TWA reduced weekly flights in these markets by almost 15 percent while all carriers reduced flights about 11 percent. Some of TWA's service reductions were offset by the expanded operations of other airlines.

In 36 markets where either TWA or Ozark provided the only nonstop service before the merger, TWA continued to serve all but two following the merger. TWA provided a total of 850 nonstop flights each week in 1988, while TWA and Ozark together provided 760 flights per week in 1986. In addition, DOT found two markets that were no longer monopolized, Phoenix and Cincinnati. Finally, in the 5 markets where either TWA or Ozark competed with others before the merger, DOT reported that TWA had increased nonstop service by 29 percent while the other carriers serving these markets had reduced service by 19 percent.

The primary difference between DOT's analysis of the merger impacts at St. Louis and our study is that we did not report changes in the number of flights. DOT recorded a 7 percent decline in nonstop departures between 1986 and 1988. Although we did not present them in either our testimony or our subsequent report, we did collect data on the number of departures. Our data showed a 6 percent decline between 1985 and 1988. With respect to the merging carriers, DOT found that departures declined 8 percent between 1986 and 1988. Our data show a 6 percent decline over that period. However, TWA's departures in 1988 were 19 percent higher than TWA and Ozark's combined in 1985.

## Study by Justice Department Staff

The recent study by Justice Department staff also noted reductions in the volume of competitive service at some of the concentrated airports.[2] The Justice study examined changes in the number of departures, available seats, and the number of cities receiving nonstop service out of two airports where a merger eliminated a major competitor, St. Louis and Minneapolis/St.Paul. Justice had opposed the TWA-Ozark and the Northwest-Republic mergers, both of which eliminated a major competitor at these airports. This study also examined Detroit, a hub airport for only one of the merging partners, Republic.

The approach in our analysis of the available service data differs in many ways from that of the Justice study. These differences largely

[2]Werden, Joskow, and Johnson.

Ozark combined before the merger. On the other hand, other carriers serving St. Louis reduced the number of points served directly from 83 in 1986 to 66 in 1987. They also reduced by seven the number of places served nonstop. Our analysis also showed that there was a decline in competition on routes out of St. Louis. Table 5.6 provides DOT data on the competitive status of direct service routes out of St. Louis.

**Table 5.6: Competition Among Carriers Providing Direct Service From St.Louis**

| | Number of routes served | | |
|---|---|---|---|
| | June | | |
| Number of carriers | 1986 | 1987 | Percentage change |
| Four or more carriers | 15 | 7 | −53 |
| Three or more carriers | 30 | 16 | −47 |
| Two or more carriers | 64 | 36 | −44 |
| One carrier | 60 | 85 | 42 |
| **Total routes with direct service** | **124** | **121** | **−2** |

The report prepared by DOT, at the request of the Ranking Minority Member of the Senate Committee on Commerce, Science, and Transportation, reexamined the question of service changes at St. Louis. Rather than focus on the periods immediately preceding and following the merger, DOT compared service levels in June 1986 with those prevailing in June 1988. DOT also examined nonstop rather than direct service. DOT reported almost no change in the number of cities receiving nonstop jet service from St. Louis. Some cities lost nonstop jet service from St. Louis, but others were added. Table 5.7 summarizes DOT's findings on service changes.

**Table 5.7: Service Changes at St. Louis for Large Jet Carriers (Domestic) June 1986 vs. June 1988**

| | Weekly departures | | Weekly seats | |
|---|---|---|---|---|
| | June | | June | |
| Carrier | 1986 | 1988 | 1986 | 1988 |
| TWA/Ozark | 2541 | 2331 | 347,160 | 316,886 |
| Other Carriers | 579 | 574 | 68,690 | 69,852 |
| **Total** | **3120** | **2905** | **415,850** | **386,738** |

According to DOT, some carriers, especially Southwest Airlines, increased service out of St. Louis since the merger. DOT also analyzed service changes using the same categories of market competition we devised to analyze fares. In the 18 markets where TWA and Ozark were the only carriers providing nonstop jet service before the merger, TWA reduced service in 16 markets and offered 26 percent fewer weekly flights in 1988. In the 11 markets where TWA and Ozark competed along with

# Conclusions

There is general agreement that the increased competition spawned by deregulation has led to an overall reduction in real airline fares, that is, fares adjusted for inflation. However, it is also true that fares have fallen more in some markets than in others and, in some markets, fares probably are higher today than they would have been had the industry continued to be regulated.

Under regulation, airline fares did not accurately reflect the differences in the costs of serving different markets. As a rule, passengers flying on heavily traveled, long-distance routes paid fares higher than those necessary to cover costs, and their fares subsidized passengers in lightly traveled, short-distance markets. Deregulation permitted the airlines to set fares without obtaining prior government approval and has allowed the airlines to rationalize the fare structure and make the pricing of air travel more economically efficient. Rationalizing air fares by eliminating or reducing the previous subsidies has meant that, in general, fares are now relatively higher in short distance markets than in long distance ones than they were under CAB regulation.

It is also true that airline fares are higher today in both real and nominal terms than they were in 1986, the peak of the recent wave of mergers involving some of the nation's largest airlines. Many airline industry analysts believe that fares in 1986 were too low and were not consistent, in the long run, with a financially healthy industry. These analysts claim that fares had to rise if firms in the industry were to earn adequate rates of return. While air fares have risen since 1986, real fares are still well below 1979 levels.

Thus, in some markets, higher fares might be consistent with improved economic efficiency, and higher fares industry-wide than those prevailing in 1986 may be necessary if carriers are going to earn sufficient revenues to buy new planes and provide investors an adequate return on their investments. Congressional concern over higher fares has centered on fare increases that reflect growing market power, not with those that reflect cost differences.

Our review focused on trends in fares and service at 15 airports around the nation dominated by one or two carriers. We found that the yields earned by the dominant airlines at these concentrated airports were consistently higher than yields at a comparison group of unconcentrated airports, and that at most of the concentrated airports the yields received by the dominant carriers were considerably higher than the yields earned by the other airlines serving those airports. According to

relate to the different purposes of the studies. Nevertheless, despite the dissimilarities of purpose and approach, common threads link the conclusions. Justice found a large increase in the number of cities receiving nonstop service from Minneapolis and a somewhat smaller increase out of Detroit following the Northwest-Republic merger. Justice found no increase at St. Louis while we recorded an increase. Table 5.8 shows our service data using nonstop, instead of direct operations.

**Table 5.8: Number of Nonstop Destinations From 15 Concentrated Airports During Month of May 1985-1988**

| Concentrated Airport | 1985 | 1986 | 1987 | 1988 | Percentage change 1985-1988 |
|---|---|---|---|---|---|
| Atlanta | 118 | 115 | 117 | 114 | −3 |
| Nashville | 28 | 48 | 52 | 49 | 75 |
| Charlotte | 61 | 64 | 69 | 76 | 25 |
| Cincinnati | 44 | 42 | 56 | 66 | 50 |
| Dayton | 37 | 42 | 40 | 40 | 8 |
| Denver | 102 | 105 | 108 | 108 | 6 |
| Detroit | 63 | 69 | 75 | 75 | 19 |
| Greensboro | 22 | 21 | 20 | 19 | −14 |
| Memphis | 61 | 69 | 82 | 83 | 36 |
| Minneapolis | 71 | 79 | 89 | 90 | 27 |
| Pittsburgh | 88 | 91 | 92 | 96 | 9 |
| Raleigh-Durham | 30 | 28 | 26 | 52 | 73 |
| Salt Lake City | 49 | 55 | 63 | 64 | 31 |
| St. Louis | 87 | 91 | 99 | 100 | 15 |
| Syracuse | 25 | 24 | 28 | 29 | 16 |
| **Total** | **886** | **943** | **1016** | **1061** | **20** |

Percentage changes rounded to nearest whole numbers.

Source: I.P. Sharp, Inc

Our analysis focuses on concentrated airports and how concentration in certain markets might lead to higher fares and to the erosion of the benefits of deregulation. In a related study, we are examining which changes in airline operating and marketing practices have resulted in barriers to entry and how such barriers might be reduced or eliminated. We are concerned that, if airline markets become highly concentrated, then the benefits of deregulation to the traveling public might be reduced.

We do not believe that our results or the results of other studies show that airline deregulation has failed. Although the analyses we reviewed concur that fares are higher when there is less competition, the conclusion we draw from these analyses is that competition must be strengthened and that barriers to successful competition be reduced. Thus, the issue before the Congress should not be whether the airline industry needs to be reregulated but rather what steps can be taken to revitalize competition in markets where competition has been reduced.

the most recent period for which data were available, the gap between yields at concentrated and unconcentrated airports is widening. In addition, yields increased as concentration increased even at airports that were already highly concentrated. Controlling for differences in average length of haul at unconcentrated airports did not appreciably alter our finding that yields were higher at concentrated airports.

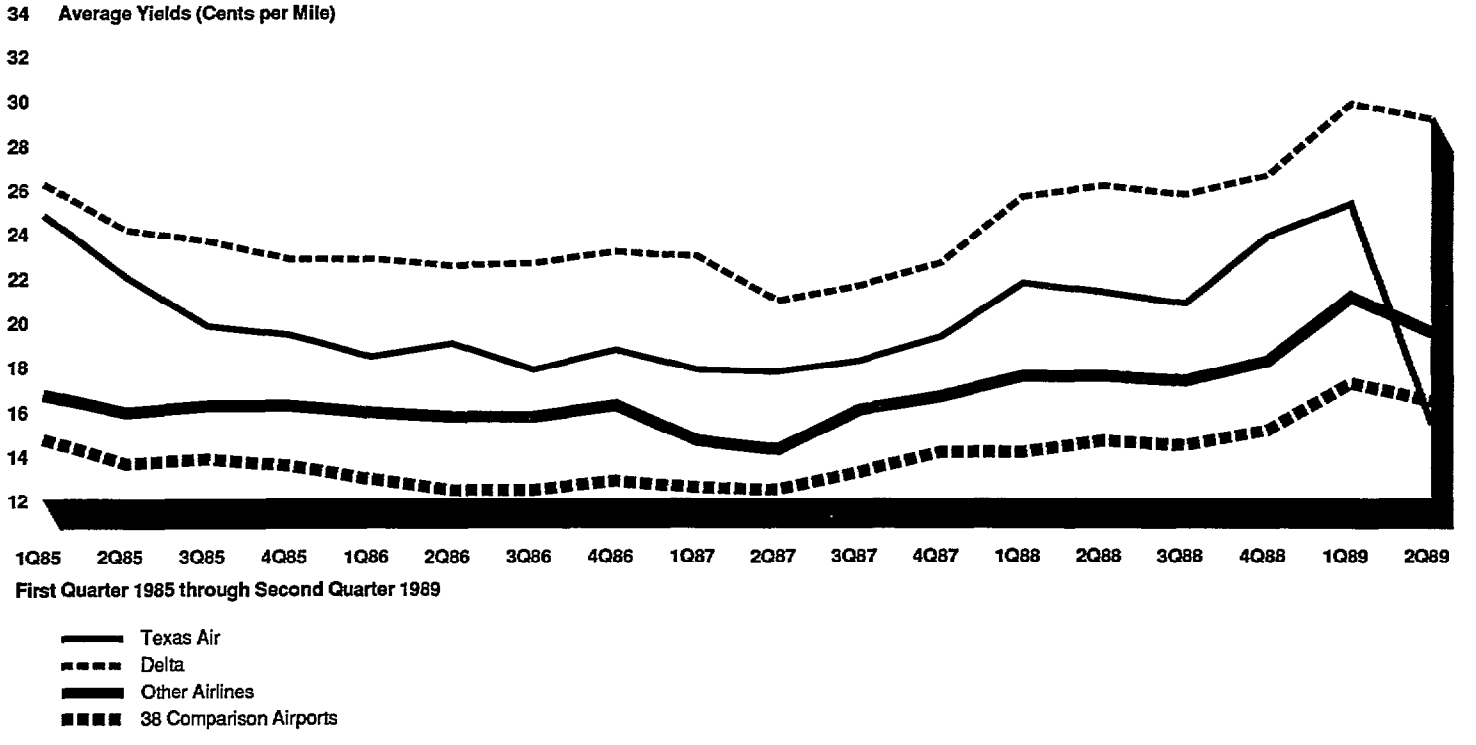
The issue of airline dominance and higher fares has been addressed in several other studies over the past 2 years. In some cases, these studies were undertaken in response to our analyses and were designed to counter our finding that fares are higher at concentrated airports. These alternative analyses generally do not contradict our finding that fares are higher at airports where one or two carriers handle most of the enplaning passengers, and whatever differences exist between the results reported by these other studies and our finding can usually be traced to differences in the evaluative methodologies. Some of these other studies attempt to attribute the fare difference to higher service levels, but the one econometric analysis attempting to make this case suffered from serious methodological problems and cannot be relied on to dispute the hypothesis that fares are higher at concentrated airports because of the market power of the dominant airlines.

With respect to service offerings, we found some increases in the number of places served and in the number of daily flights, but in most cases the increases were on the part of the dominant carrier, offset by reduced offerings from nondominant carriers. In addition, many travelers have less choice among airlines as more routes out of the concentrated airports are being served by only a single airline, usually the dominant carrier.

Overall, deregulation has led to lower airline fares for most travelers, and the establishment of hubs has allowed the airlines to realize important operating efficiencies. While more passengers travel on competitive routes than was the case prior to deregulation, growing concentration, especially at hub airports, has led to fewer competitors on many routes. Over the past few years, numerous mergers and bankruptcies have reduced the number of airlines providing the vast majority of U.S. air passenger service. The mergers and bankruptcies that led to increased concentration cannot be easily undone. At the same time, changes in airline marketing and operating practices make it more difficult for new airlines to enter the industry or for existing carriers to expand into markets where another carrier already dominates the traffic.

# Trends in Fares at Each of the 15 Concentrated Airports

**Figure I.1: Atlanta** (Hartsfield Atlanta International Airport)




Note: Texas Air includes yield data for Eastern, Continental, and People Express.

**Figure I.3: Cincinnati** (Greater Cincinnati International Airport)

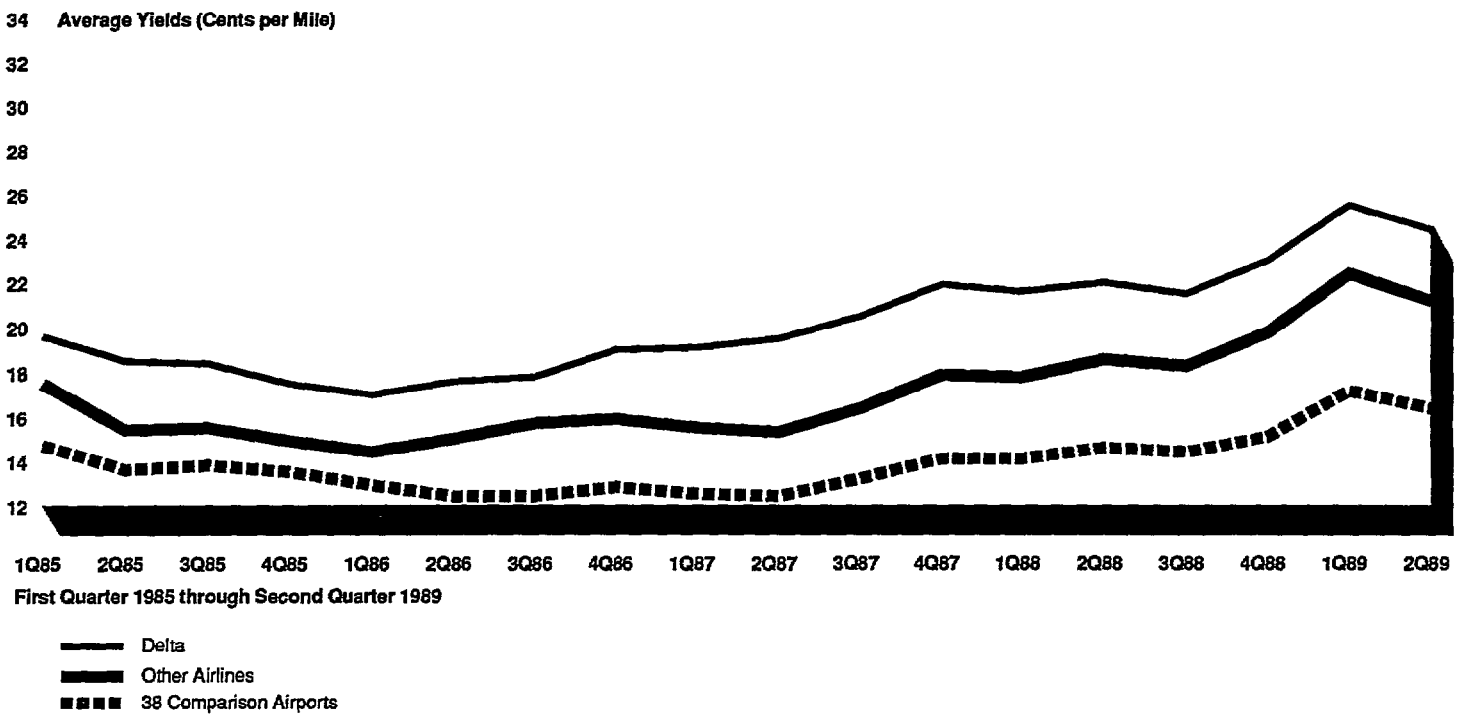
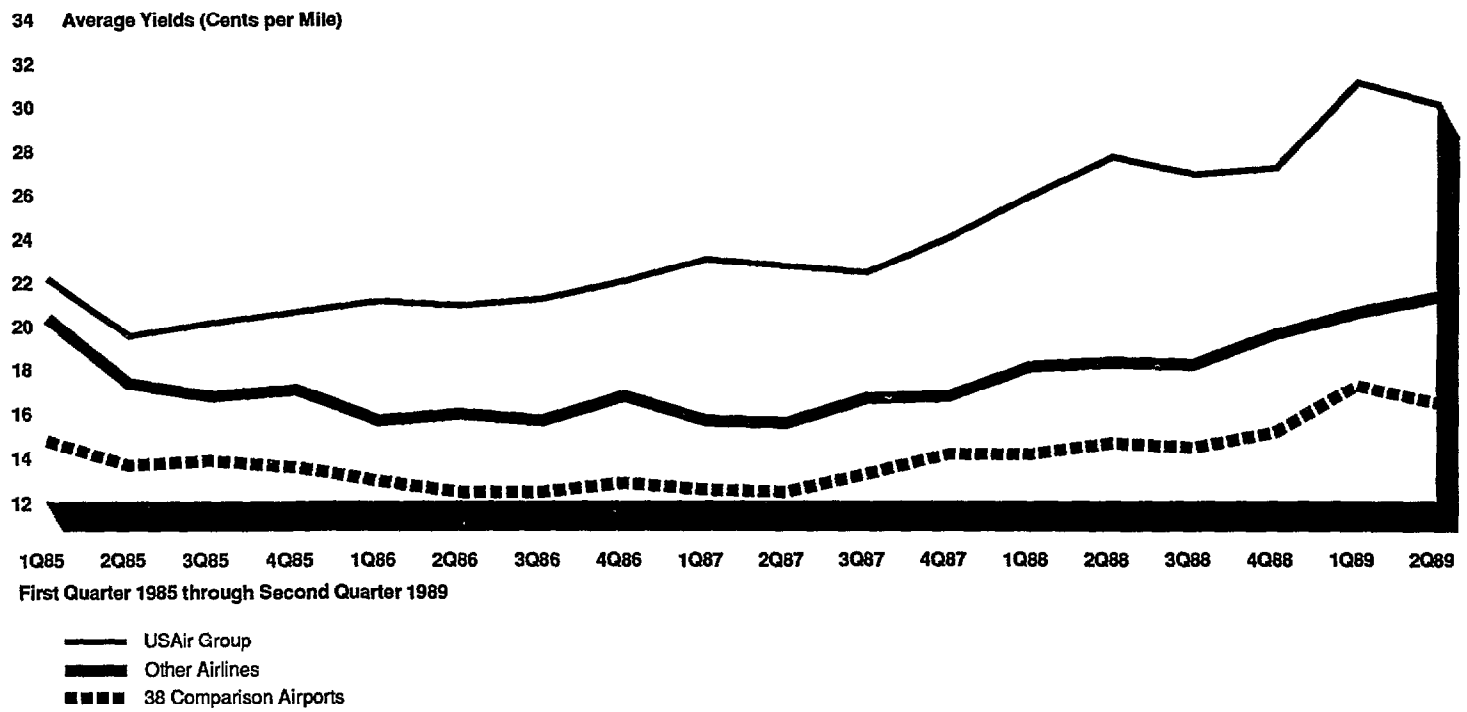
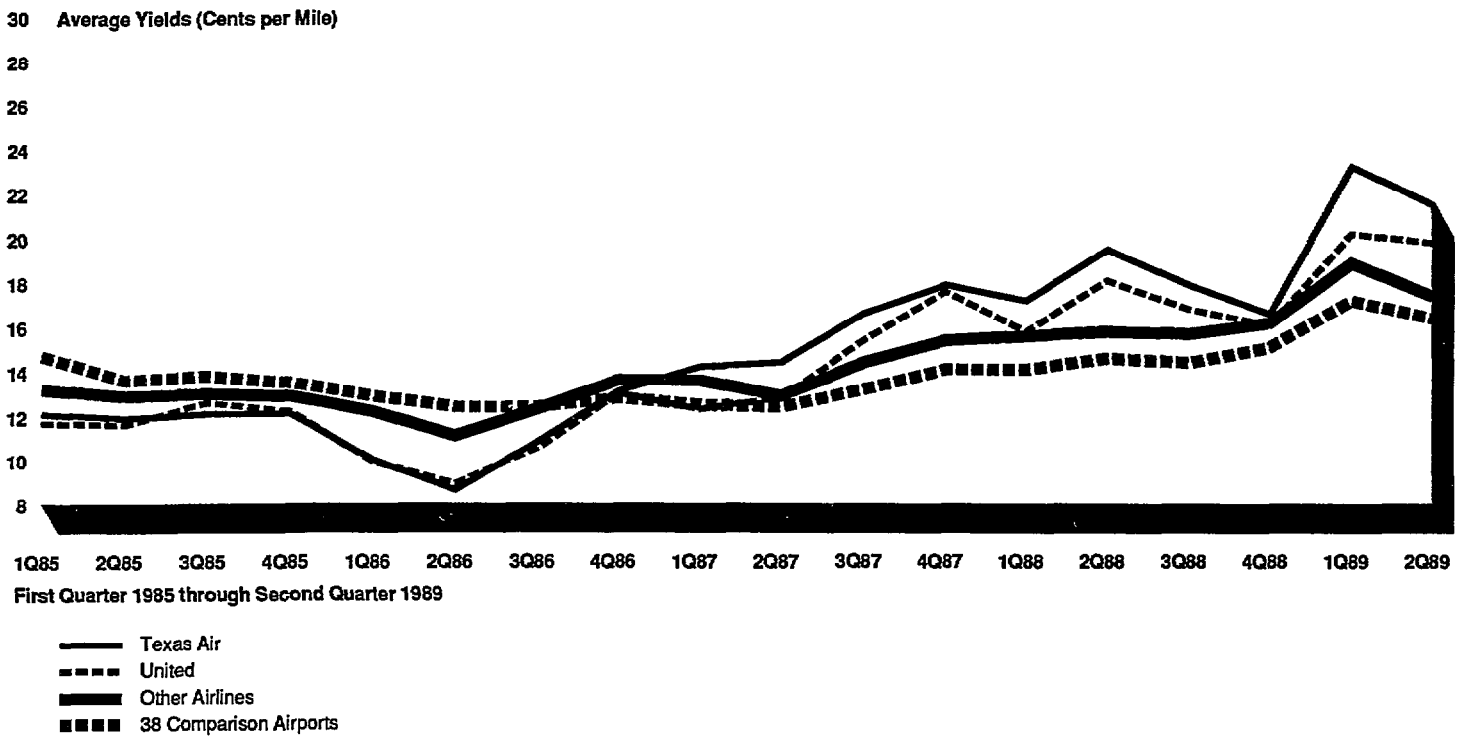


**Figure I.2: Charlotte** (Charlotte/Douglas International Airport)



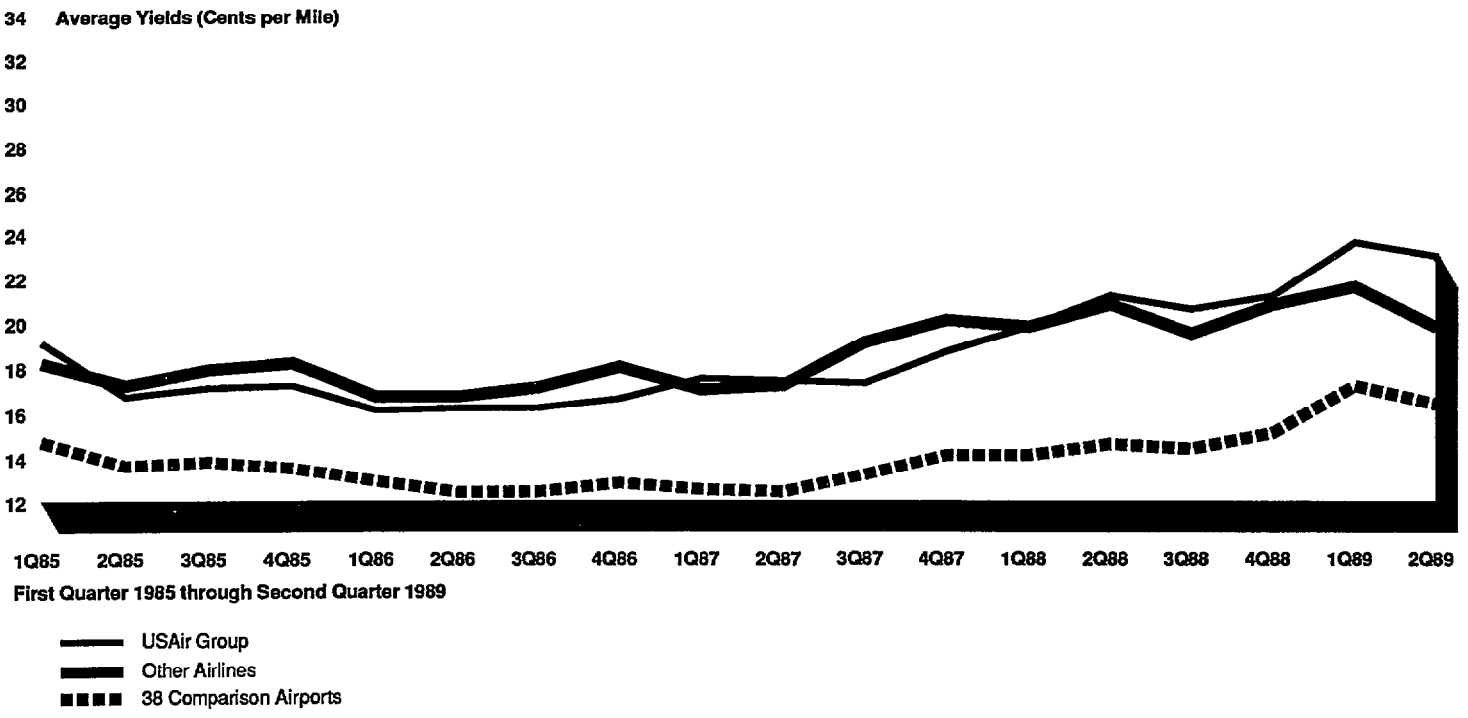

Note: USAir Group includes Piedmont and USAir yield data.

**Figure I.5: Denver** (Stapleton International Airport)



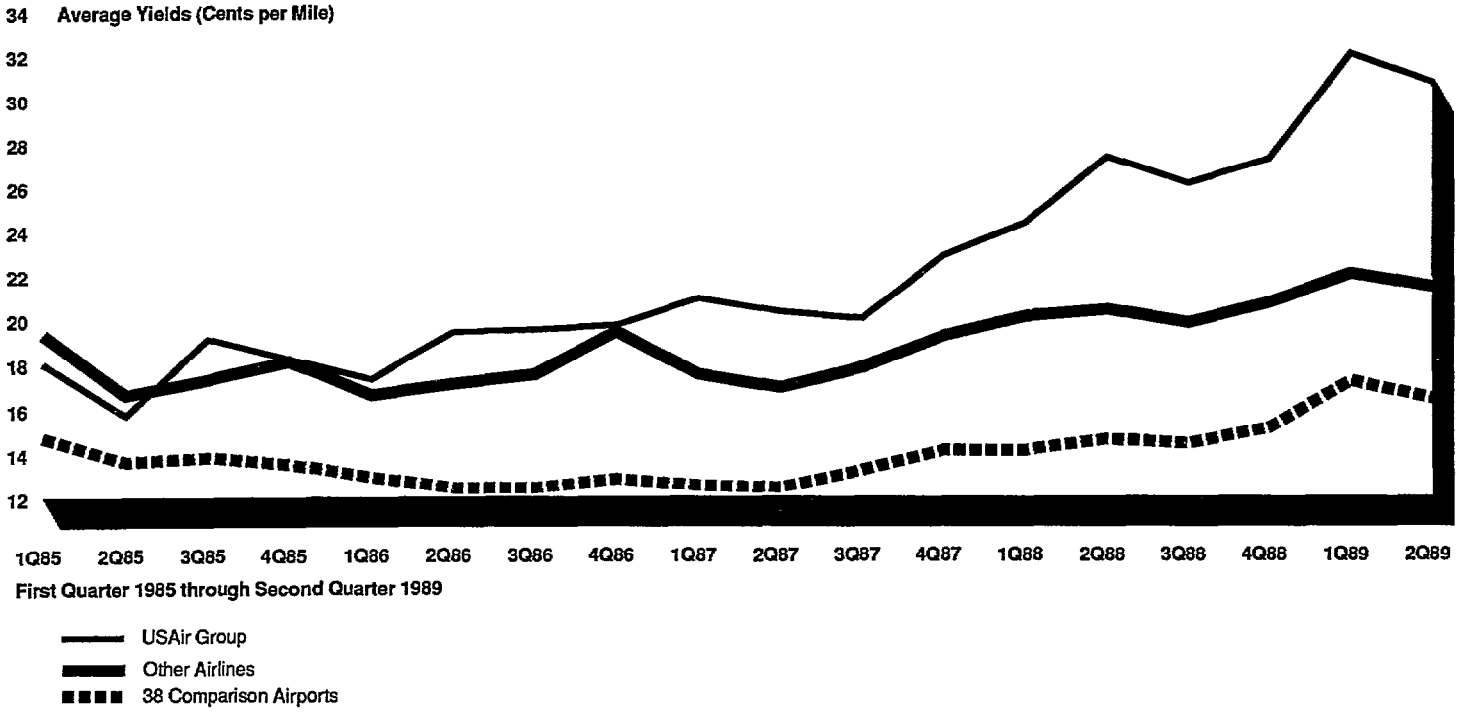

Note: Texas Air includes yield data for Continental, Eastern, Frontier, and People Express.

**Figure I.4: Dayton** (Dayton International Airport)



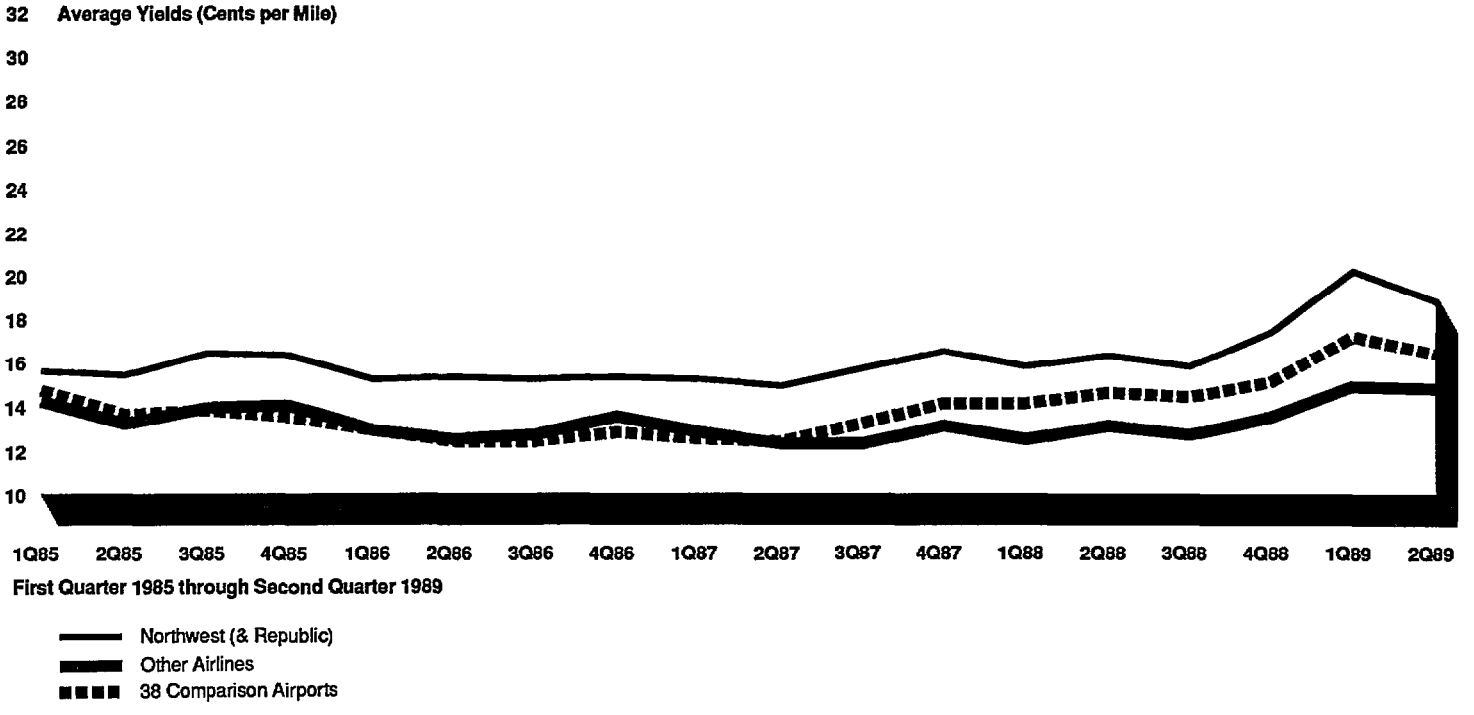

Note: USAir Group includes Piedmont and USAir yield data.

**Figure I.7: Greensboro/High Point/Winston-Salem** (Piedmont Triad International Airport)



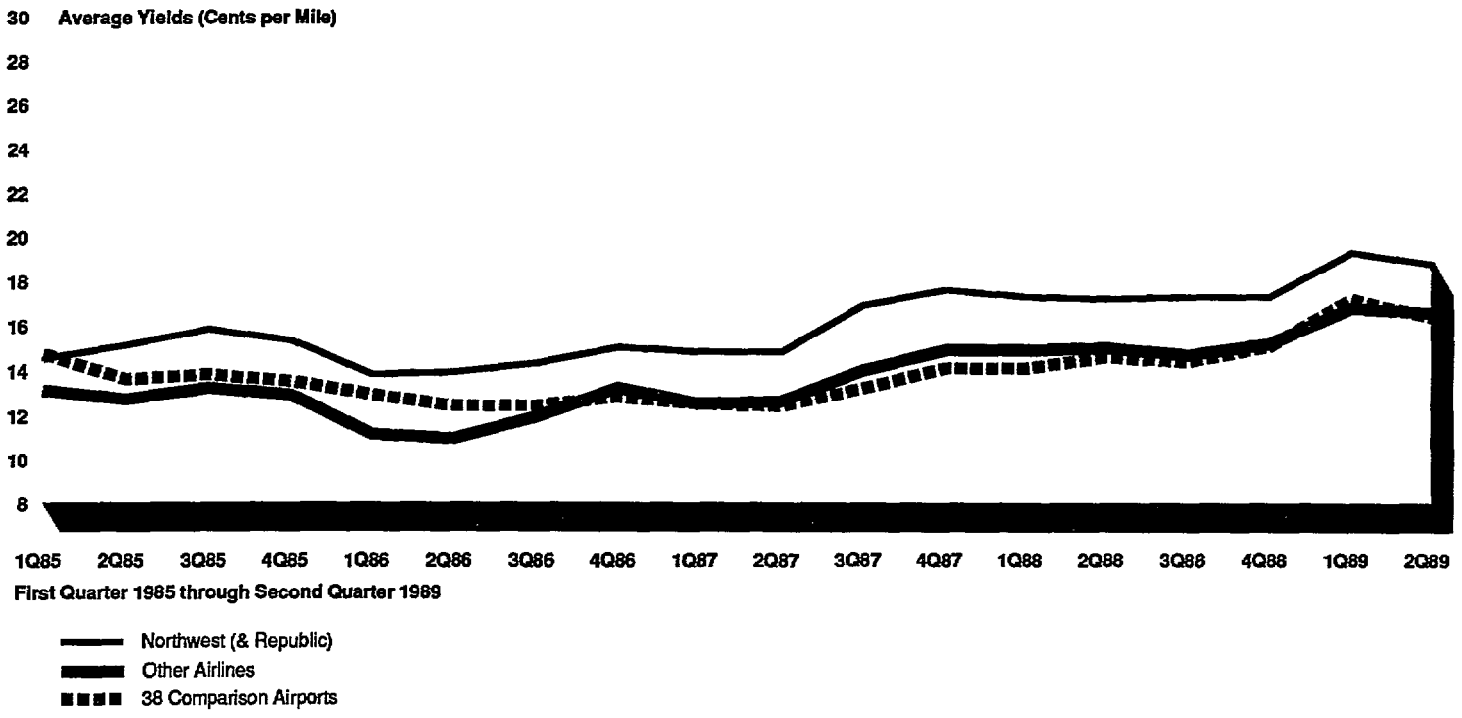

Note: USAir Group includes Piedmont and USAir yield data.

**Figure I.6: Detroit** (Detroit Metropolitan Wayne County Airport)



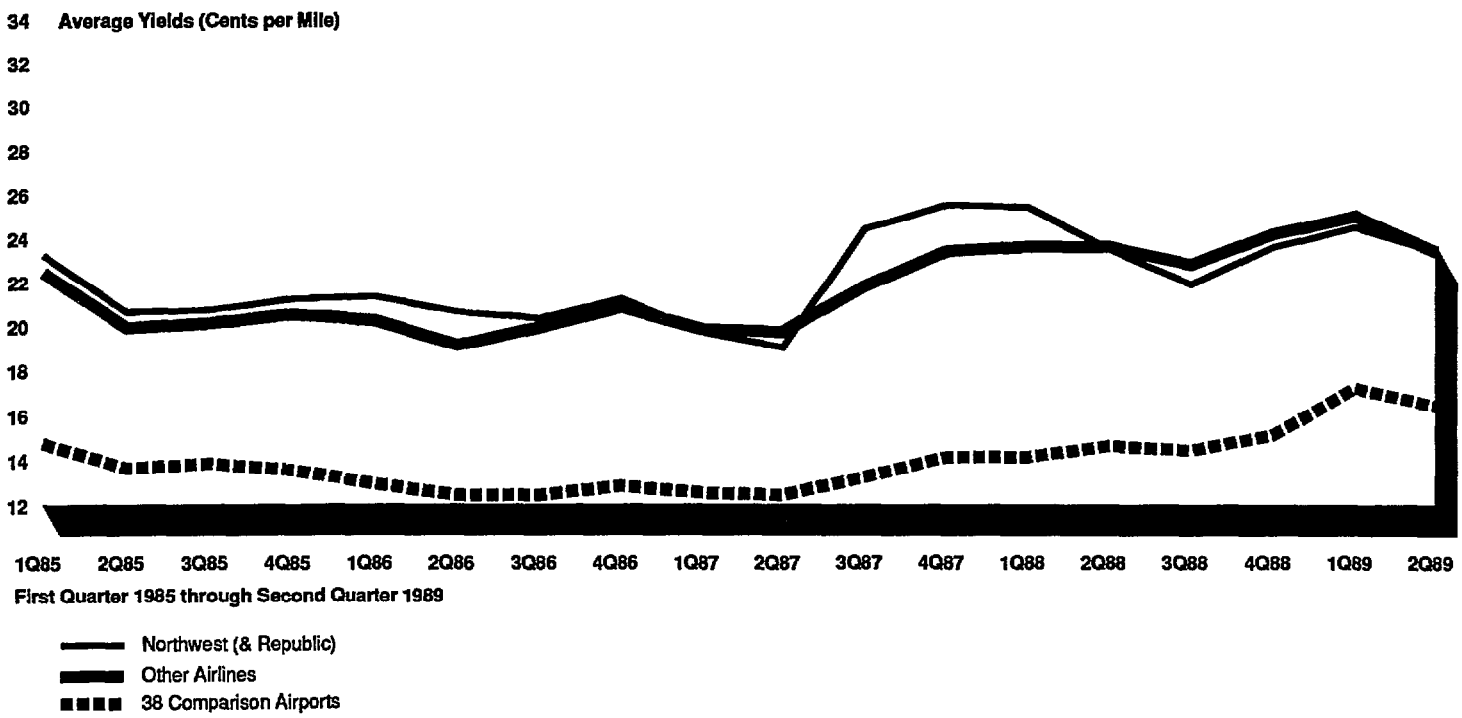

Note: Northwest includes both Northwest and Republic yield data prior to their merger in late 1986.

**Figure I.9: Minneapolis/St. Paul** (Minneapolis/St. Paul International Airport)




Note: Northwest includes both Northwest and Republic yield data prior to their merger in late 1986.

**Figure I.8: Memphis** (Memphis International Airport)




Note: Northwest includes both Northwest and Republic yield data prior to their merger in late 1986.

**Figure I.10: Nashville** (Nashville Metropolitan Airport)

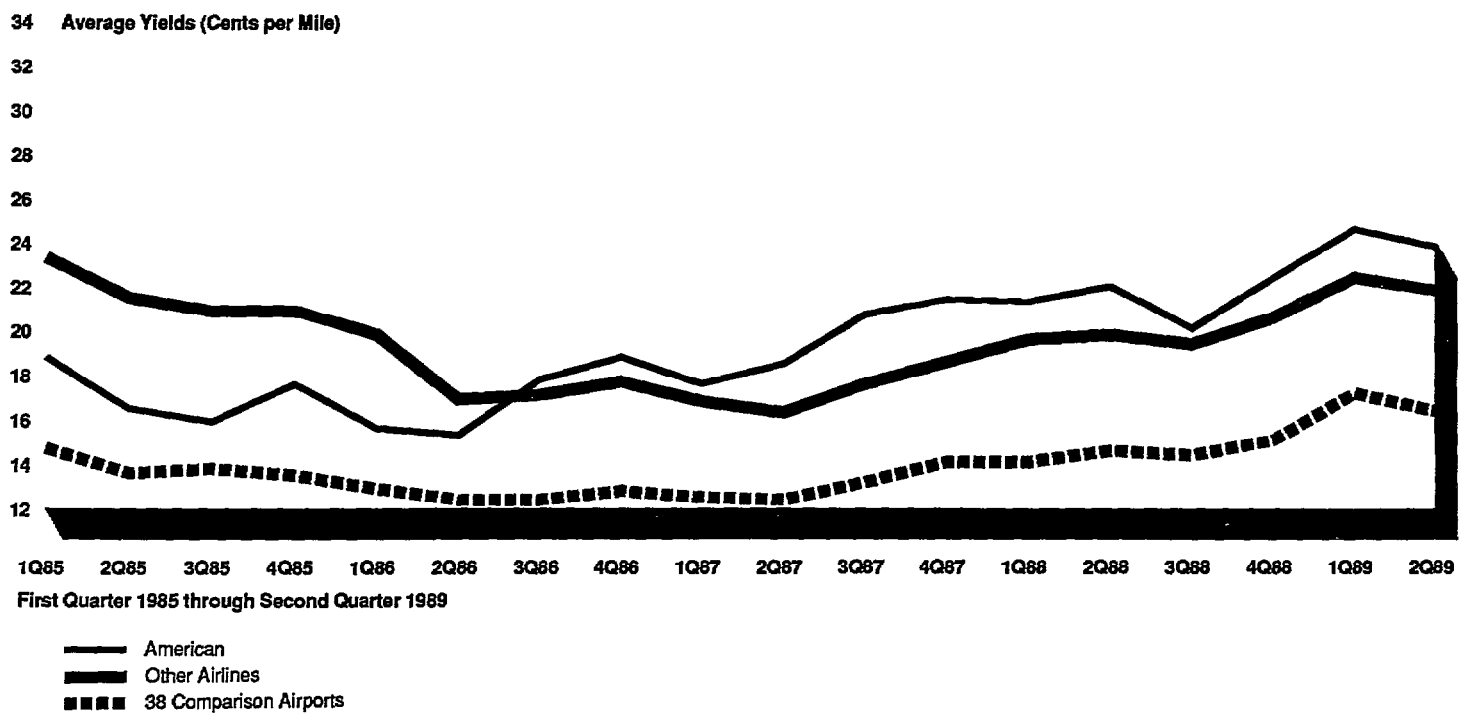
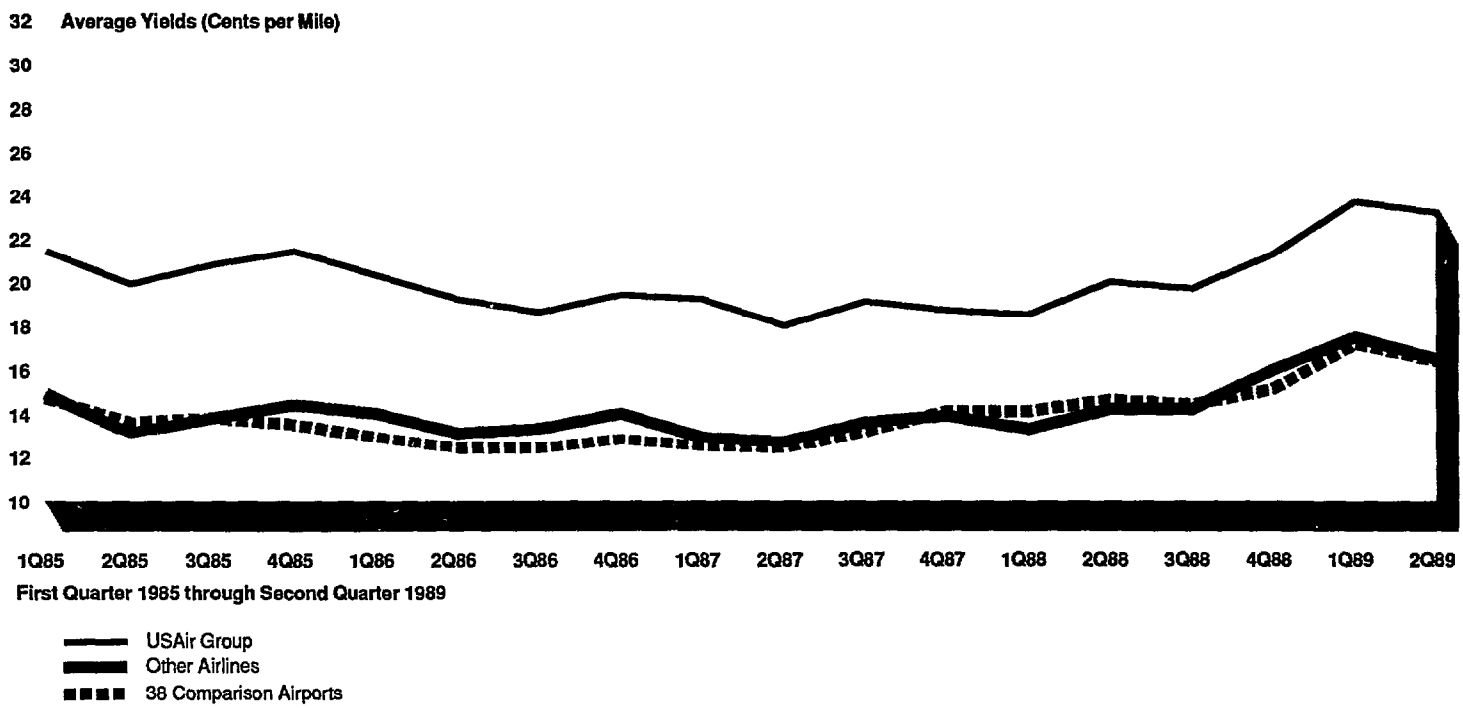


**Figure I.11: Pittsburgh** (Greater Pittsburgh International Airport)




Note: USAir Group includes Piedmont and USAir yield data.

**Figure I.12: Raleigh-Durham** (Raleigh-Durham Airport)

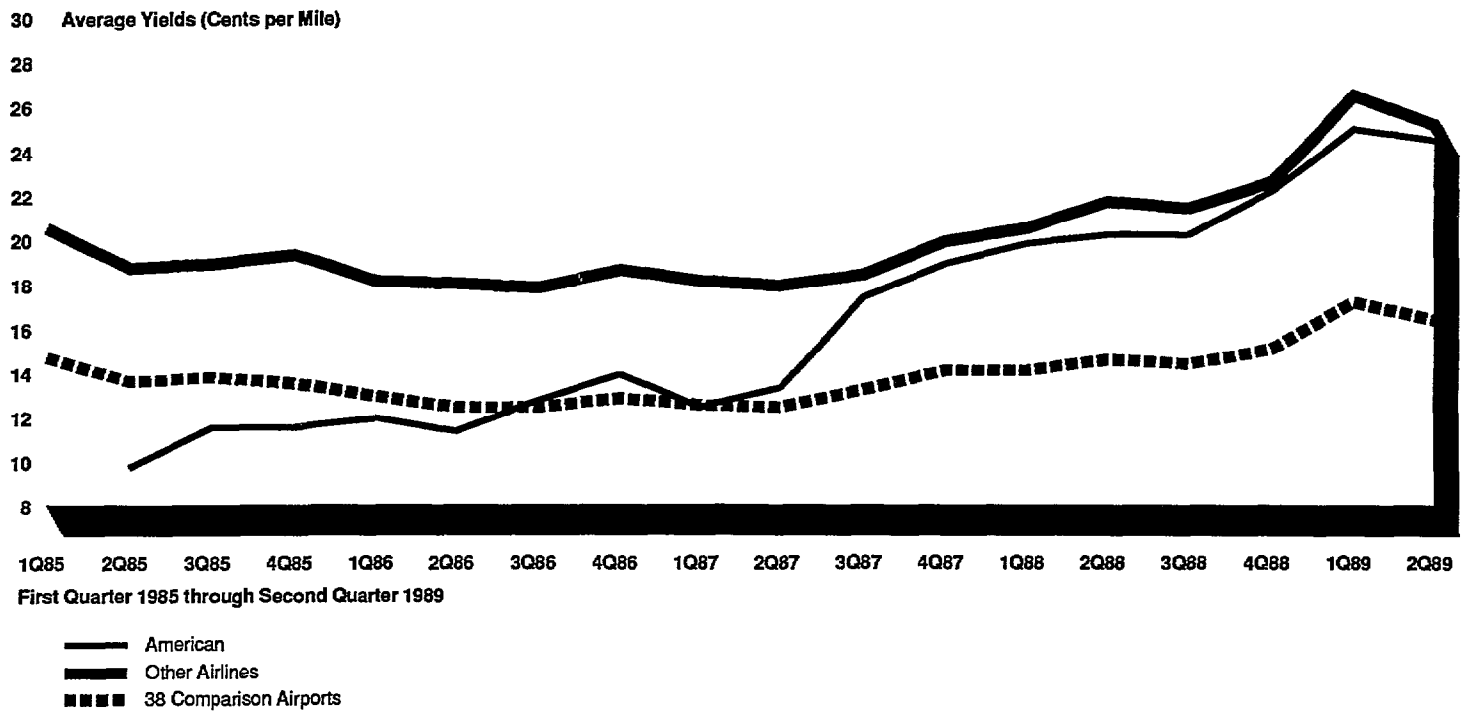
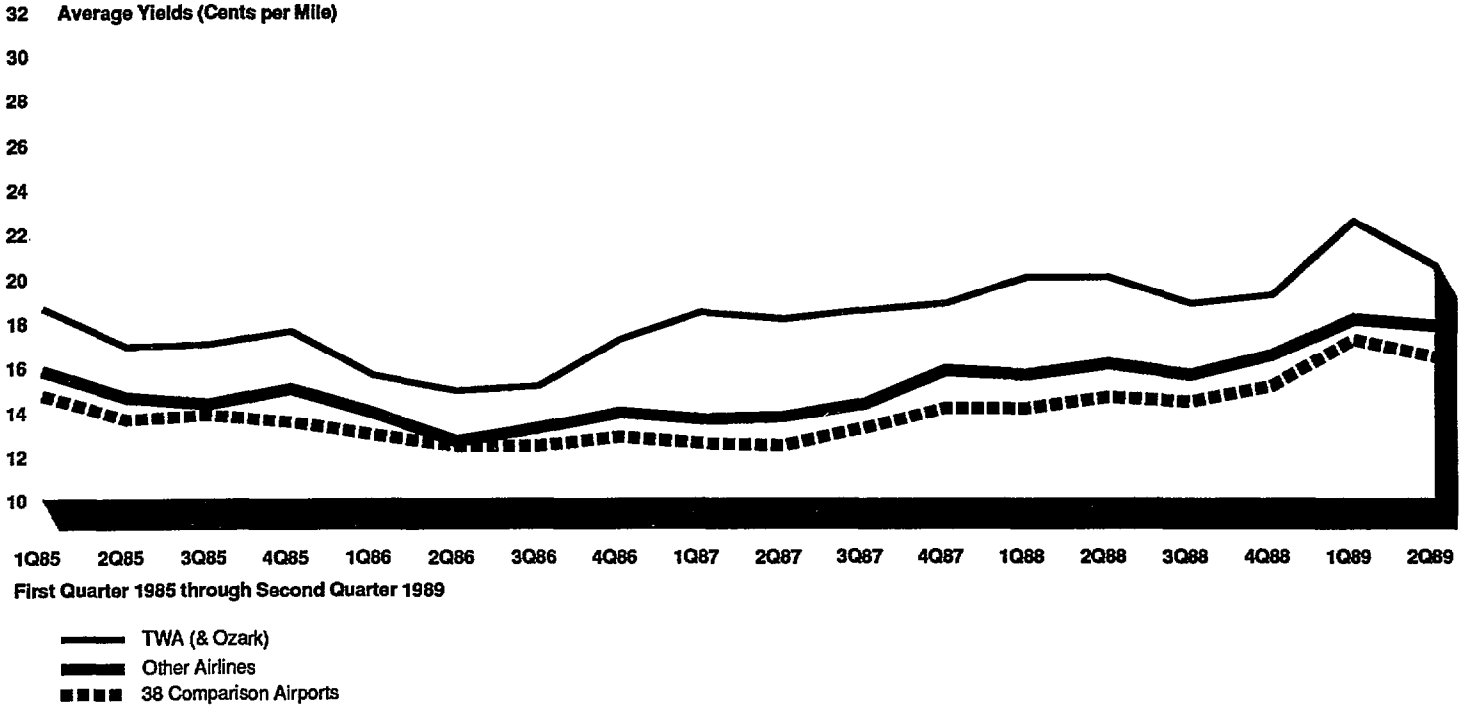
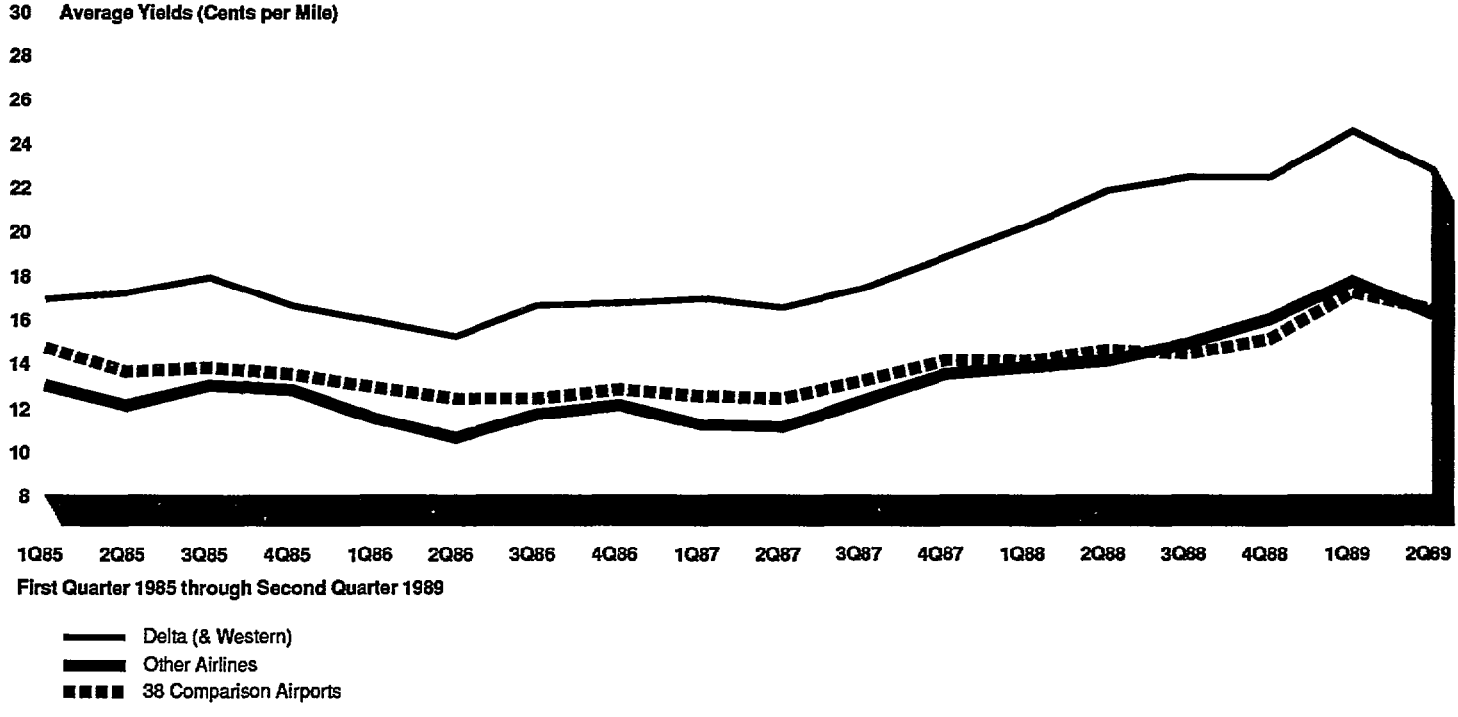


**Figure I.13: St. Louis** (Lambert-St. Louis International Airport)



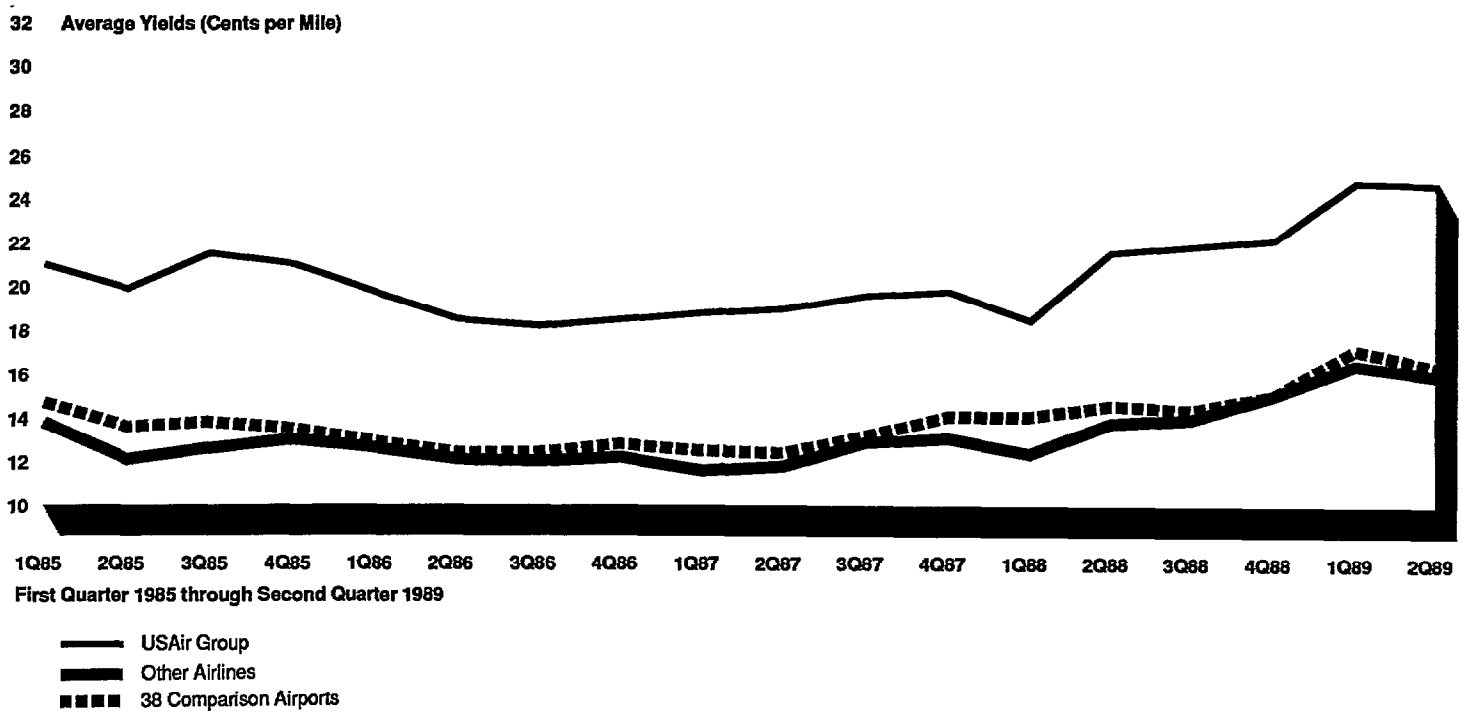

Note: TWA includes both TWA and Ozark yield data prior to their merger in late 1986.

**Figure I.14: Salt Lake City** (Salt Lake City International Airport)



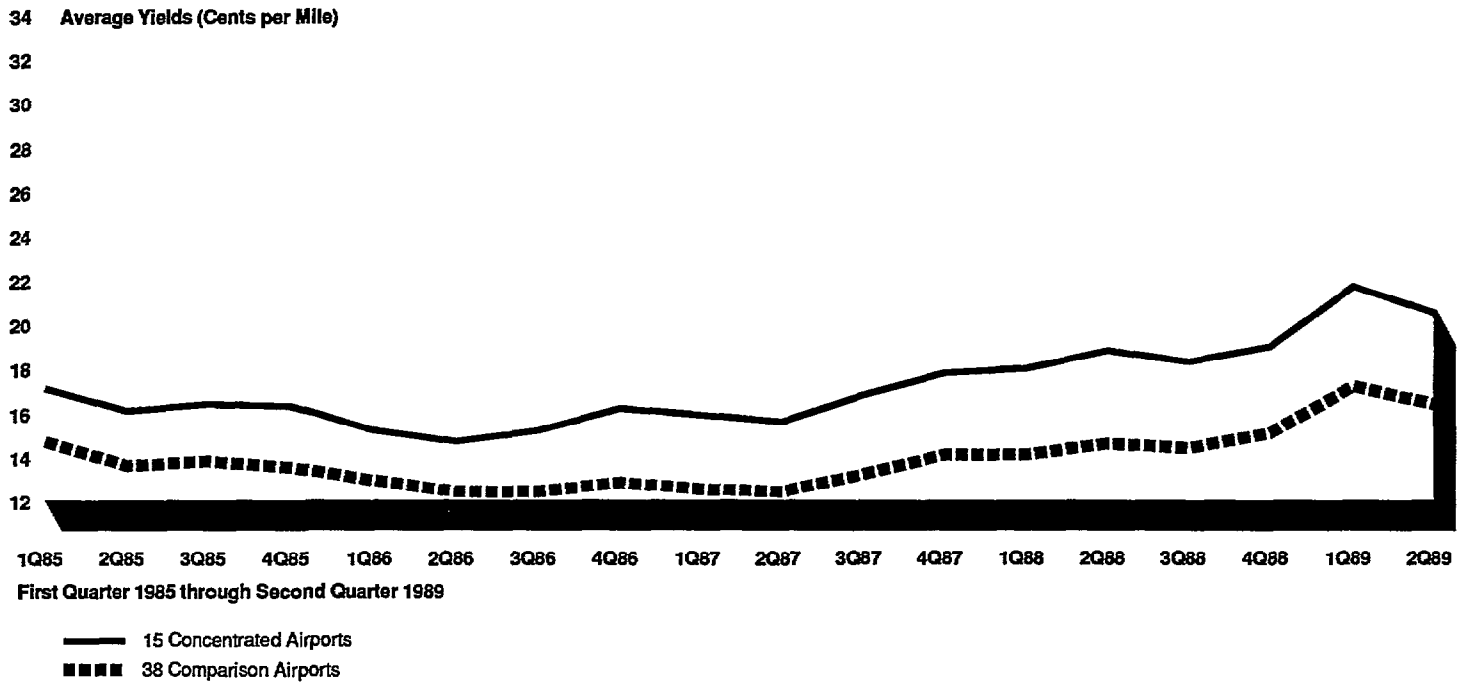

Note: Delta includes both Delta and Western yield data prior to their merger in early 1987.

**Figure I.15: Syracuse** (Hancock International Airport)




Note: USAir Group includes yield data for Piedmont, USAir, and Empire.

**Figure I.16: Average Yield for the 15 Concentrated Airports**



# Policy Options Discussed in GAO Testimony on Barriers to Competition in the Airline Industry

We discussed policy options in our testimony before the Subcommittee on Aviation, Senate Committee on Commerce, Science, and Transportation, on September 20, 1989. The discussion of policy options is reprinted below. The full written statement, Barriers to Competition in the Airline Industry (GAO/T-RCED-89-65), can be obtained at the address printed on the inside of the back cover of this report.

The data we have gathered on potential barriers to entry in the airline industry indicate that some features of airline markets are likely to discourage entry. Slot controls, gate leases, and, at a few airports, noise restrictions are likely to restrict access to the essential facilities needed to establish competing service. While we do not have definite estimates yet from our econometric model of the impacts of these restrictions, we believe they are likely to restrict entry and inhibit competition.

The effects of some of the airline marketing strategies are less clear. CRSs, as we indicated in our testimony last year, appear to have a clear anticompetitive effect, and we have urged DOT to consider possible remedies. Frequent flyer plans appear to present a clear potential for disadvantaging entrants. However, because of the lack of data on levels of use of these plans, it may not be possible even with the results of our econometric model to estimate these plans' effects. TACOs appear to offer a less compelling basis for disadvantaging entrants. We do have some data on TACOs, however, that may be able to show their effect on fares. Code-sharing may have some anticompetitive effects, but also appears to offer some consumer advantages that may offset these effects.

We recognize that the Committee is considering taking action to minimize the possible anticompetitive effects of the practices we have discussed. During the course of our work, we have identified various policy options. Though not an exhaustive list, our preliminary evaluation suggests that they can provide a framework for analysis and deliberation. All of these options involve important policy considerations and require a careful weighing of costs and benefits and an assessment of trade-offs.

## Gate Access

Airport facilities are essentially local responsibilities, yet most operate under federal restrictions imposed by the Airport and Airway Improvement Act of 1982. This act requires that airports receiving federal grants be public use facilities, available for all to use on an equal basis. One policy option would be to extend additional federal restrictions on new leases so as to reduce the long-term control that leasing airlines acquire over the airport's facilities. Airlines need some assurance of access to an airport's gates to justify their investment in providing service. However, it might be possible to provide this assurance without giving the airline the broad control over a gate that an exclusive-use lease provides. A preferential-use gate, for example, gives the leasing airline access to the gate whenever it needs it, while still making the gate available to others when it is unused. Several airports have acted to regain control over their facilities, either by requiring short-term or preferential leases or, as Omaha and Grand Rapids have done, by not renewing majority-in-interest clauses.

Another policy option would be to reduce the federal restrictions that make the airports dependent on the airlines as a source of revenue. The Airport Development

Acceleration Act of 1973, for example, prohibits the airports from imposing any direct passenger facility charges on the passengers using the airport. The airports argue that this act, by preventing the airports from charging the passengers directly, forces them to rely on the airlines as a source of revenue, thus giving the airlines more bargaining power in lease negotiations. Airlines believe that it is appropriate for them to control airport expansion, and also have been concerned that municipal authorities would use revenues from passenger facility charges for non-airline purposes. However, the 1982 Airport and Airway Improvement Act requires airport operators to provide the Secretary of Transportation with assurances that all local revenues will be expended for airport purposes as a precondition for obtaining federal airport grants. Passenger facility charges could help solve the funding problems that have prevented airport expansion and reduce the airports' need to seek majority-in-interest clauses.

## Noise Restrictions

A small number of airports have particularly stringent noise restrictions that, while not imposed by airlines, can be a substantial entry barrier. While all parties agree on the desirability of reducing airport noise, they disagree on the questions of the pace and strategy for doing so. These contentious issues have often set local and national interests at odds, and it is not clear how far federal efforts to impose national noise policies should go. Some airports (such as Boston and Denver) have adopted noise rules that have waivers to ease entry while still achieving the desired level of noise reduction. Further exploration of noise control strategies might identify other approaches that would allow airports to control noise while minimizing adverse impacts on competition.

## Slot Restrictions

In our view, the buy/sell rule for airport slots has been ineffective at encouraging entry into slot-controlled markets. Our analysis of FAA's data indicates that no new entrants have been able to establish service by buying slots; that the number of slots sold has steadily declined; and that the slot market is increasingly becoming a short-term leasing market, in which major carriers that have accumulated excess slots lease out rather than sell the ones they do not need. The leasing market, while permitted in FAA's original formulation of the market, appears to have been considered the exception. It is now the exception that is becoming the rule. Several outside studies have found that the presence of slot controls increases airline fares significantly.[1]

By allowing a public right—the right to use the nation's airspace—to be treated in some respects as a private asset that is not generally available on the open market, the present operation of the buy/sell rule not only restricts competition at the four slot-controlled airports, but can impede competition throughout the northeastern and midwestern United States. These airports are a critical part of any air traffic

[1]See, for example, David R. Graham, Daniel P. Kaplan, and David S. Sibley, "Efficiency and Competition in the Airline Industry," Bell Journal of Economics, vol. 14, No. 1 (Spring 1983), pp. 135-136; Elizabeth E. Bailey, David R. Graham, and Daniel P. Kaplan, Deregulating the Airlines (Cambridge: MIT Press, 1985); Gregory D. Call and Theodore E. Keeler, "Airline Deregulation, Fares and Market Behavior: Some Empirical Evidence," in Andrew F. Daughety (ed.), Analytical Studies in Transport Economics (Cambridge: Cambridge University Press, 1985), pp. 221-247; and Stephen A. Morrison and Clifford Winston, "Empirical Implications and Tests of the Contestability Hypothesis," Journal of Law and Economics, vol. 30 (April 1987), pp. 61-62.

network in the northeastern or midwestern parts of the United States. It is difficult for any carrier to become an effective competitor in these heavily populated parts of the country without access to these four airports. The short-run access to slots that leasing permits is a risky basis on which to invest in a long-term service commitment (e.g., by leasing gates and investing in advertising).

We believe that something should be done to open up the slot market so that permanent entry becomes easier at slot-controlled airports. We are particularly concerned about proposals to extend slot restrictions as currently structured to other congested airports. One solution to this problem would be for the FAA to lease slots to the airlines rather than allow them to retain the control of slots that were given to them for nothing. Leasing would have the advantage both of generating revenue for the federal government and of opening up the slot market to new entrants. It would be essential, in establishing such a market, to recognize that airlines need to have assured access to slots for a long enough period to make reasonable investments in serving routes from that airport. It would be equally important, however, to ensure that the leases ran for a limited period of time so as to prevent the slots from becoming the de facto property of the leasing airlines (as gates have become at airports that have long-term gate leases). Lease terms could be staggered so that leases would be long enough to assure continuity of service while ensuring that some leases would come up for renewal each year, giving entrants an opportunity each year to bid on airport capacity.

An alternative would be for DOT, under the provisions of the current buy/sell rule, periodically to withdraw a portion of the slots and reallocate them by lottery. Incumbent carriers would have the opportunity to buy the slots back from the winners of the lottery, but at least new entrants would have an opportunity to secure slots, either through the lottery itself, or by bidding on slots sold by lottery winners.

## Computerized Reservation Systems

In our testimony last year on CRSs, we discussed a number of policy options, ranging from divestiture of airline-owned CRSs to non-airline owners to modifications in vendor contracts with travel agents. We continue to believe that further action is warranted to remedy the anticompetitive features of the CRS industry. As we emphasized in our earlier testimony, action in one area, such as reducing or eliminating booking fees, could create problems in another area, such as increases in CRS subscription fees to travel agents. Consequently, travel agents' bargaining power with CRS vendors would have to be increased by modifying restrictive contract provisions, e.g., length of contract terms and minimum use clauses. While DOT is making further investigations into the competitive impact of CRSs, it has not acted to open any regulatory proceedings, as we recommended it do last fall. It is especially important that DOT begin to act since its CRS rules will sunset at the end of 1990.

## Other Airline Marketing Practices

The three other airline marketing practices that we have discussed—frequent flyer plans, TACOs, and code-sharing—have effects that are more difficult to measure. Frequent flyer plans have proven to be extremely popular promotional tools, but they have the potential to reduce competition in markets where a single carrier has a dominant market share. Frequent flyer plans offer a literal free ride to their participants, but these free trips are

paid for in the form of higher fares for the average traveler and possibly also in the form of excessive business travel. DOT, in its Information Directive of June 14, 1989, has requested information on frequent flyer plans which may help to resolve the question of their impact on competition. Travel agent commission overrides, overbooking privileges, and other volume incentives clearly have some effect on the pattern of airline bookings. They increase the cost of marketing tickets and thus may pose an entry barrier to entrants with less access to capital than established airlines have. Code-sharing agreements offer some advantages to airline passengers, while also probably having some anticompetitive effects.

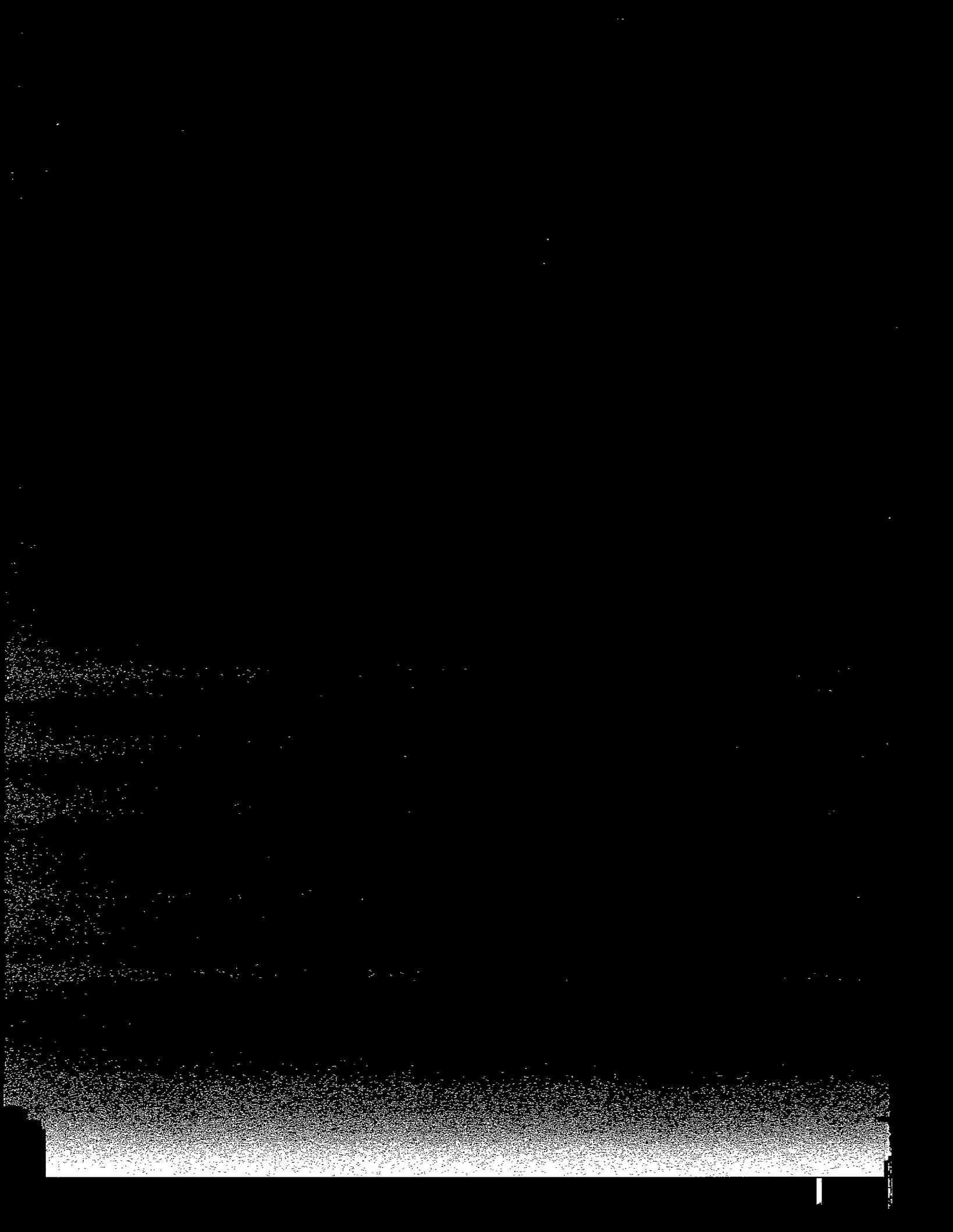
All these practices are subject to regulation by DOT under its authority to regulate anticompetitive practices in the airline industry. Should anticompetitive effects of these practices be demonstrated, they could be either prohibited or modified in some way so as to reduce any anticompetitive impact. The popularity of frequent flyer plans may make action to reduce their anticompetitive effect unpalatable. For example, one modification short of outright prohibition would be to require that mileage be transferable from one plan to another or from one passenger to another. While this would reduce the potential anticompetitive effects because passengers could earn valuable miles on any airline, such a requirement could make the plans so unattractive to the airlines that they would withdraw them.

If TACOs were prohibited, airlines might well resort to other kinds of volume incentives. If code-sharing agreements were prohibited, airlines would probably just buy out their code-sharing partners or develop commuter subsidiaries internally, as several airlines have already done. An important part of the success of code-sharing has been the preference that code-shared flights are allowed in CRSs, where code-shared flights are generally listed ahead of interline flights. It would be possible to prohibit CRSs from listing code-shared and on-line connections ahead of interline connections, as the European CRS rules propose, but this would make it more difficult for travel agents to find code-shared flights for passengers who prefer code-shared connections.

# Major Contributors to This Report

## Resources, Community, and Economic Development Division, Washington, D.C.

James D. Noel, Assistant Director
Francis P. Mulvey, Assistant Director
Kim F. Coffman, Evaluator-in-Charge
Thomas F. Noone, Senior Systems Analyst
Sandra J. Weiss, Senior Social Science Analyst
John C. Johnson, Staff Evaluator



United States
General Accounting Office
Washington, D.C. 20548

First-Class Mail
Postage & Fees Paid
GAO