

airports with Federal Aviation Administration (FAA) imposed capacity limits (Chicago's O'Hare, Washington's National, New York's LaGuardia, and Atlanta's Hartsfield) can slots be bought and sold. Entering airlines would find these resources much easier to acquire under a market or auction system.

In summary, the control of scarce airport resources that are vital to the success of any market entry (the gates and takeoff and landing slots) have been acquired by the incumbent airlines and, in particular, by the hub airline. This control enables the incumbent airlines to erect entry barriers, which make entry more difficult for its potential rivals. Barriers inhibit effective competition and enable the hub airline to use its increased market power to charge higher fares to the "to" passengers.

Conclusion and Policy Recommendations

The relationship between competition, concentration, and fares in the airline industry has been considered in light of the increased use of hub-and-spoke networks. "Through" passengers generally have more options and lower fares than "to" passengers. Fares to

and from airports with only one hub airline appear to be higher than the competitive level, largely as a result of entry barriers, although passengers in these markets are compensated somewhat by the better service on these routes (more flights overall, as well as more nonstop flights). Though few analysts have advocated returning to CAB-type economic regulation, some have questioned whether some type of action might be needed. If action is to be taken, it should be in accord with the specificity principle: attack the problem at its source.

In line with this precept, public policy should move toward lowering entry barriers. First, control of gate space and future airport expansion must rest more firmly in the control of airport managers and less in the hands of the incumbent airlines. Specifically, long-term leases should be avoided, and airlines that fail to utilize their gate space should lose it.⁶

Second, takeoff and landing slots should follow competitively determined peak load pricing at all airports. By charging higher takeoff and landing

fees at the busiest times, peak load pricing would allocate airport resources more fairly and would lower the entry barriers that have developed under the present system. An important additional benefit would be increased air safety and fewer traffic delays. Airport facilities would be more uniformly utilized over the course of the day (since fare-sensitive tourist passengers would switch to less costly off-peak flights), helping to smooth out the peak demands on the air traffic control system.

Moving in these two directions would significantly lower the barriers that currently exist for airlines that wish to enter or expand their operations at the hubs of their rivals. In turn, these actions would lessen the ability of the hub airline to charge higher fares to passengers whose origin or destination is a hub. Though it appears unlikely, even with these recommended changes in policy, that the promise of fully competitive markets will ever be met exactly in the airline industry, airline deregulation has yielded significant economic benefits to travelers, and pursuing these policies should preserve and extend the benefits.

5. See "Growing Giants: An Unexpected Result of Airline Decontrol Is Return to Monopolies," *The Wall Street Journal*, July 20, 1987, p. 1.

6. Efforts of some airlines to increase service to Cleveland have been forestalled by United's reluctance to free up gate space it no longer requires.

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, OH 44101

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ECONOMIC COMMENTARY

Competition, Concentration, and Fares in the U.S. Airline Industry

by Paul W. Bauer

The current performance of the U.S. airline industry with regard to safety, fares, and service has been a topic of widespread concern among policymakers and the public. One aspect of this concern is the relationship between competition, concentration, and air fares. Competition is required to achieve and preserve the full benefits of deregulation, particularly if fares are to be set as low as possible.

Traditional economic theory predicts that increases in concentration (as measured by the market shares of the largest firms in the industry) lead to increases in market power (the ability of firms to charge a price higher than would prevail in a competitive market). As a result of a wave of mergers in the airline industry over the last year, these measures of concentration have risen significantly, leading to a great deal of discussion about the negative implications for competition and fares. Unfortunately, much of this discussion suffers from an inadequate understanding of the nature of the hub-and-spoke networks that airlines formed after the Airline Deregulation Act of 1978.

This *Economic Commentary* seeks to assess the true state of competition and concentration in the airline industry. We first present the current measures of concentration at both the national and airport levels. Evidence suggests that some types of fares are set above the competitive level. However, the state of competition is not as bad as the measures of concentration indicate, because these measures fail to account for the effects of hub-and-spoke net-

Table 1 National Market Shares of the Largest U.S. Airlines¹

Airline	Market Share
Texas Air	20.1
Continental ²	10.5
Eastern	9.6
United	15.7
American	13.5
Delta ³	11.9
Northwest ⁴	9.4
TWA ⁵	8.1
Pan Am	5.7
USAir	3.0

1. Market shares are based on each carrier's percent of revenue passenger enplanements on a national basis.
2. Includes New York Air, People Express, and part of Frontier Airlines.
3. Includes Western's market share.
4. Includes figures for Republic, which was formed by the merger of North Central and Southern.
5. Includes Ozark's market share.

SOURCE: Data derived from "Texas Air's Hard Bargainer," *New York Times*, September 16, 1986.

works. The efficient operation of hub-and-spoke systems leads to higher concentration at the airport level, but not necessarily to higher fares.

We then examine the sources of market power airlines have as a result of entry barriers. Any barrier that makes it difficult for new firms to enter the market limits competition, leading

to higher fares. Adjustments in the way airports allocate resources among airlines would go a long way toward lowering entry barriers and increasing competition in markets with less-than-competitive fares.

Current Levels of Concentration

As a result of a wave of mergers in 1986, the U.S. airline industry went from domination by 12 carriers to domination by eight carriers. Table 1 presents the current market shares of the eight largest airlines, based on revenue passenger enplanements. Texas Air, which controls both Continental and Eastern, has become the largest airline, pushing United and American into second and third places.

At the national level, concentration of this magnitude probably should not cause undue concern.¹ In addition, all eight of these airlines have established or are constructing national route networks, which could very well make the industry dominated by eight airlines more competitive than the one dominated by 12. The trend toward mergers, especially over the last year, bears watching, however.

At the local level, most individual airports have concentration levels higher than the national levels, but still below the level that would be required for monopoly pricing. Collusive pricing in a tight oligopoly always remains a concern; but airline profits of late have not been excessive.

Table 2 presents the market shares of the largest airlines (in all cases airlines with a hub at the airport) serving

Paul W. Bauer is an economist at the Federal Reserve Bank of Cleveland. The author thanks Mary Deily and Gary Whalen for helpful comments and Paula Loboda for extensive research assistance.

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1. A widely applied rule of thumb comes from U.S. Circuit Court Judge Learned Hand: "... [a market share over ninety percent] is enough to constitute a monopoly; it is doubtful whether sixty ... percent would be enough; and certainly

thirty-three percent is not," in William Breit and Kenneth G. Elzinga, *The Antitrust Casebook: Milestones in Economic Regulation*, New York: CBS College Publishing, 1982, p. 117.

Table 2 Market Shares of the Largest U.S. Airlines at Selected Airports¹

Airport	Airline	Enplanements	
		1978	1985
Chicago (O'Hare)	United	33.1	41.8
	American	18.6	30.3
Atlanta (Hartsfield)	Delta	50.1	52.3
	Eastern	38.6	41.5
Dallas-Fort Worth	Braniff	33.7	—
	American	29.8	61.1
	Delta	16.6	23.8
Los Angeles International	United	27.8	16.2
	Western ²	16.9	14.1
	American	16.4	12.6
Denver	United	32.0	35.8
	Frontier ³	19.9	25.4
	Continental	19.3	22.5
St. Louis	TWA	39.4	57.1
	Ozark ⁴	20.6	27.2
Pittsburgh	Allegheny	46.7	79.8
Minneapolis	Northwest	31.7	42.5
	North Central ⁵	21.4	36.7
Houston	Continental	19.0	57.6
Detroit	American	21.7	60.8
	Delta	21.4	13.2

1. Market shares are based on each carrier's proportion of revenue passenger enplanements at each airport.

2. Delta has since acquired Western.

3. Frontier has since sold a significant portion of its assets to United; Continental purchased the remaining assets.

4. TWA has since merged with Ozark.

5. Northwest has since acquired North Central.

6. Republic, which was formed by the combination of North Central and Southern, has since merged with Northwest.

SOURCE: Federal Aviation Administration.

some selected large airports for 1978 and 1985. The airports are ranked by traffic: the first four are the largest in the country, and the second six are selected large airports with at least one hub airline. The market shares of the largest carriers at an airport have increased since deregulation, particularly at the last six airports. For the four largest airports, the market shares of the airlines are larger than their

respective national market shares, but only American's position in Dallas-Fort Worth even begins to approach a monopoly level. At the last five airports, however, the market shares of the hub airlines are quite high.

Note that the high levels of concentration occur at airports that have only one hub airline. The largest airports, with two or more hub carriers, and the smaller airports, with no hub airlines, do not tend to have the high levels of concen-

tration found at these intermediate-size airports. This suggests that the high levels of concentration observed at these single-carrier hubs are somehow connected with the hub activity. The next section explores this possibility.

Function and Effects of Hub-and-Spoke Networks

The switch to hub-and-spoke networks after deregulation has been the most important single innovation in the airline industry in the last 10 years. Before deregulation, airlines served the routes that the Civil Aeronautics Board (CAB) allocated to them. The CAB did not assign these routes solely on the basis of achieving economic efficiency, and a patchwork route network evolved (see figure 1).

The CAB frequently assigned profitable new routes to financially weak carriers in an effort to help shore them up. Under deregulation, the airlines were given the freedom to select their own routes, and most of them moved toward setting up hub-and-spoke networks, such as the one depicted in figure 2.

Flights commence at the spoke cities, where passengers, no matter what their final destination, board flights for the hub city. Passengers going to various destinations are on board, so the load factor (the proportion of the seats on the plane that are filled) is higher, and the flights from the spoke to the hub can depart more frequently. At the hub city, passengers make connections to their final destinations. All of the people going to these various destinations have been collected at the hub, so the flights from the hub to the spoke cities have higher load factors and can leave more frequently.

In order for the hub to be successful, the flights into and out of the hub must be coordinated. The incoming flights must land at about the same time and must pull into gates that are close enough together so that passengers can easily make their connections. The flights must then depart as quickly as possible to keep travel times down. This cycle repeats itself several times throughout the day. Thus, the hub airline must have access to enough gates and takeoff

and landing slots to handle its traffic, especially at peak travel times in the early morning and evening.

The hub-and-spoke networks offer three advantages to the airlines and to passengers.² First, they enable an airline to offer more frequent service, resulting in more passengers having flights closer to their preferred departure times. Second, the travel time for the average traveler has decreased. Passengers beginning at a hub will usually be able to find a nonstop flight, while those at the spoke cities will usually have to endure no more than a one-stop flight. Flights with three or more intermediate stops, which were quite common under CAB regulation, have been eliminated for the most part. Last, the average load factors (the percentage of seats sold on an average flight) have increased, lowering the per-passenger costs to the airlines and thus enabling them to lower fares.

The presence of a hub airline at an airport more than doubles the airport's traffic, other things being equal.³ Put another way, more than half of the passengers at the airport will be there only as a result of the hub activity. Most of these passengers will be "through" passengers—travelers flying from one spoke city to another by flying through the hub. "To" passengers, on the other hand, are travelers who are beginning or ending their trip at the hub airport. Thus, much of the increase in concentration is endogenous and driven by the hub activity, which is the most efficient way of serving the markets.

The implication is that the market share for an airline at one of its hubs is a biased measure of its market power. First, by initiating hub service, the hub airline increases both its number of flights and the total number of flights at the airport. This results in the hub airline's market share increasing, even if the other airlines maintain the same level of service.

Second, if an airline has an 80 percent market share at its hub airport, and if most of the "through" passengers fly on the hub airline (which is very likely), then the hub airline will have close to a 100 percent market share of the "through" passengers, but

less than a 60 percent market share of the "to" passengers. This, in turn, might lead one to expect higher "through" fares than "to" fares, after adjusting for any cost differences.

Butler and Huston (1987) found exactly the opposite when they compared the fares charged on "to" and "through" routes using St. Louis as a hub.⁴ By comparing the sum of the two legs of the "to" routes that formed the "through" routes, they found that fares on "to" routes were 47 percent to 57 percent higher than on "through" routes.

This points out an additional problem with using airport market shares as a measure of market power: the market share for the "through" passengers has been calculated improperly. These passengers do not have to fly through a particular hub and, hence, with a particular airline. For example, in flying from Cleveland to New Orleans, there are no nonstop flights. One can fly TWA through St. Louis, United through Chicago, Delta through Atlanta, or Northwest through Memphis. While any one of these airlines has a high market share of the "through" passengers at its respective hub, the correct definition for this market is clearly broader. Using broader market definitions would reduce the measure of concentration in the "through" markets, bringing it closer to the national concentration levels.

Given the findings of Butler and Huston and the various route choices available to the "through" passengers, there seems to be little cause for concern about the fares charged to most "through" passengers. The investigation can now be more narrowly focused on the sources of market power in the "to" markets.

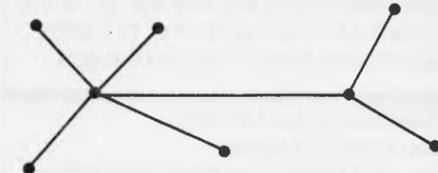
Sources of Market Power in the "To" Markets

The ability of airlines with hubs to charge higher fares to "to" passengers than to "through" passengers can be readily explained by the traditional industrial-organization notion of entry barriers. Entry barriers allow incumbent firms to inhibit other firms from entering their markets. The current method of allocating airport resources gives incumbent airlines, in particular hub airlines, significant control over entry into their markets by other airlines.

Figure 1 Typical Route Network Before Deregulation



Figure 2 Typical Hub-and-Spoke Network



The two most important resources are gate space and takeoff and landing slots. Airport operators in the past have worried about financing airport expansions and locking airlines into providing service to the airport. For these reasons they have been very eager to sign long-term leases with the airlines, especially with the hub airlines, which lease large numbers of gates. With these long-term leases, airlines can make it difficult for new carriers to enter the market or for existing carriers to expand service.

Although an airline that wishes to commence or expand service may be able to help finance the construction of new gates (though often the existing carrier can forestall even this, as these expansions generally have to connect with the main terminal), this path is both risky and expensive. It creates fixed capital that may be difficult to divest if the entry proves unsuccessful.⁵

The allocation of takeoff and landing slots can also be a source of entry barriers. At most airports, slots are allocated administratively. Only at the four

2. See Elizabeth E. Bailey, David R. Graham, and David P. Kaplan, *Deregulating the Airlines*, Cambridge, MA: The MIT Press, 1985; and Steven Morrison and Clifford Winston, *The Economic Effects of Airline Deregulation*, Washington, D.C.: Brookings Institution, 1986.

3. See Paul W. Bauer, "Determinants and Effects of Airline Hubbing," Federal Reserve Bank of Cleveland *Working Paper* (forthcoming).

4. See Richard V. Butler and John H. Huston, "Actual Competition, Potential Competition, and the Impact of Airline Mergers on Fares," Paper presented at the Western Economic Association meetings, Vancouver, B.C., July 1987.