Trends in the U.S. Airline Industry: 1990–2000*

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Abstract

This paper analyzes concentration and price changes in the U.S. airline industry throughout the 1990's. In general, we find that national measures of concentration remained relatively flat throughout the 1990's while overall airline prices fell significantly in real terms. These findings tend to suggest that concerns of increasing concentration and rising prices such as those in Brock (2000) are largely unfounded.

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1 Introduction

Few industries have received more attention from economists over the past decade than the U.S. airline industry. The bulk of recent studies have focused on specific regulatory or competitive changes such as the growth of international alliances (i.e. Brueckner 2000, Brueckner & Whalen 2000, Park & Zhang 2000), the impact of low fare carriers (i.e. Morrison 2001) or the potential use of market based mechanisms to reduce congestion at major airports (i.e. Brueckner 2002). In contrast, few recent articles have attempted to analyze or evaluate the industry's overall structure and performance throughout the 1990's.[1] One recent notable exception is Brock (2000), who finds substantial evidence of "escalating concentration" and rising *real* prices.

The purpose of this paper is to analyze changes in industry concentration and prices during the decade from 1990 to 2000. Unlike Brock (2000), we base our analysis on data reported to the U.S. Department of Transportation.[2] In general, we find that industry concentration has remained relatively flat throughout the 1990's. Moreover, while Brock (2000) finds evidence of increasing *real* prices for airline service industry-wide, our analysis indicates that nominal prices have in fact declined slightly since 1990, and thus, real prices have fallen substantially. Our analysis also indicates that real average fares have declined at every major hub airport since 1990.

The remainder of this paper is organized as follows. Section 2 analyzes changes in airline concentration at the industry, route, and airport levels. Section 3 analyzes changes in airline prices, both nationally, and for service to and from major airports. Section 4 provides brief concluding remarks.

2 Changes in Industry Concentration Since Deregulation

Our analysis begins by examining some basic measures of industry concentration since deregulation. Figure 1 illustrates the four firm (C4) and eight firm (C8) concentration ratios from 1978 through 2000.[3] As discussed by Evans & Kessides (1993*b*), concentration dropped in the years immediately following deregulation, but then rose steadily starting in the mid 1980's as the industry experienced a significant number of mergers. This increase in national concentration continued through the late 1980's and peaked in the early 1990's following the USAir-Piedmont merger completed in 1989,

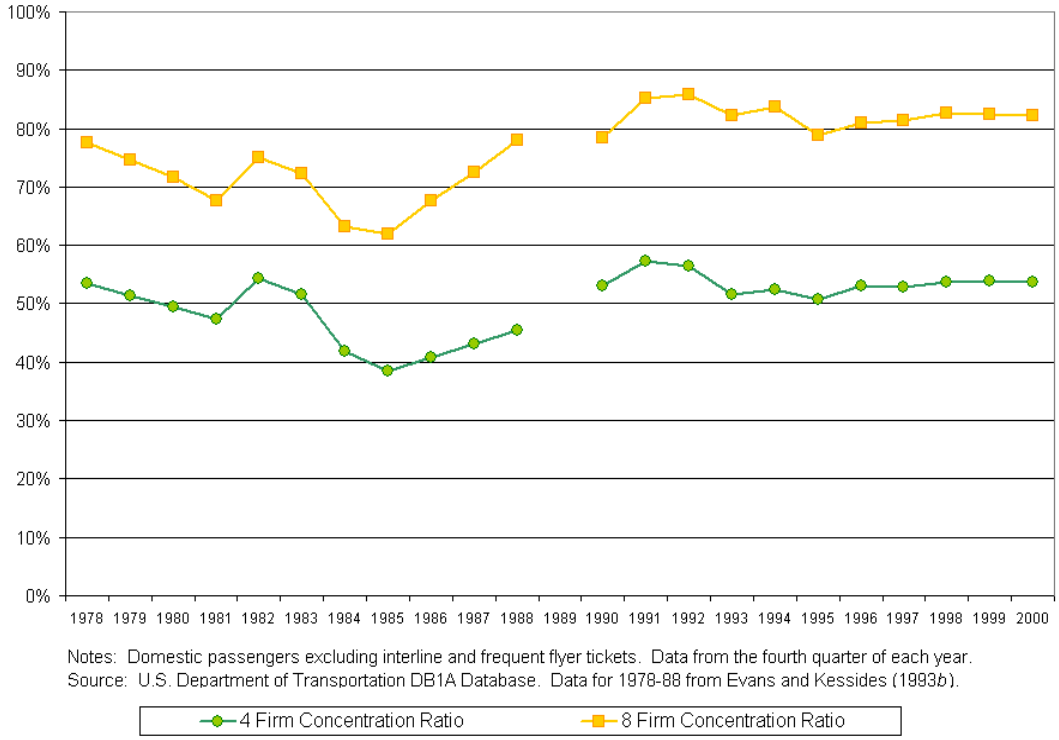
[1] A number of studies evaluated the structure, conduct and performance of the industry in the years directly following Deregulation. For example, Evans & Kessides (1993*b*) study a number of concentration and price metrics between 1978–1988, Borenstein (1992) provides an overview of the evolving market structure as well as other factors important in the marketing and distribution of airline tickets, and Morrison & Winston (1995) provide a detailed analysis of numerous aspects of the industry through 1993.

[2] In particular, our analysis is based on the U.S. DOT's DB1A Database of Origin and Destination passengers. This dataset is a 10% sample of all passengers carried by U.S. Scheduled Carriers and is the data source most commonly relied upon by academic and non-academic economists studying the U.S. airline industry.

[3] Data based on domestic origin and destination (O&D) passengers, excluding interlining and non-revenue (i.e., frequent flyer) passengers. Source: U.S. DOT DB1A database. Data for 1978–1988 from Evans & Kessides (1993*b*).

Eastern Airline's bankruptcy in 1990 and the acquisition of Morris Air by Southwest Airlines in 1994. Two other observations from Figure 1 are noteworthy. First, the 2000 C4 of 53.6% is only two-tenths of a percent higher than where it stood at the dawn of deregulation in 1978. Moreover, based on revenue passenger miles (RPMs), the C4 peaked at 63.4% in 1992, declined steadily throughout the remainder of the 1990's, and was 54.9% in 2000, *lower* than its level in 1977.[4]

FIGURE 1: NATIONAL 4 AND 8 FIRM CONCENTRATION RATIOS, 1978–2000



Second, despite the fact that the passenger C4 has remained essentially flat for the past decade, the carriers comprising the C4 have changed over the decade. The most dramatic change has been the rapid growth of Southwest, which had the fifth largest national market share (7.1%) in 1990. Through the second quarter of 2001, Southwest's market share had risen to 15.7%, placing it slightly above Delta (15.1%) and making it the industry's largest carrier in terms of O&D passengers. Thus, despite some predictions in late 1991 suggesting that Southwest's very survival was in question (Evans & Kessides (1993*b*) for example, suggested that the survival of Southwest, America West, and Midwest Express were all in question after the sharp rise in fuel prices and the Iraqui invasion of Kuwait in 1990), it has become the largest airline both terms of O&D passengers and market capitalization. Indeed, Southwest's market capitalization exceeds that of all other

[4]Borenstein (1992) found that the C4 based on RPMs was 56.2% in 1977.

major U.S. airlines *combined*.[5]

Figure 2 presents two sets of Herfindahl indices (HHIs) from 1978–2000.[6] As demonstrated by the bottom series, the industry HHI has remained virtually flat in the 22 years since 1978. Average route concentration however (the top series), has declined substantially since 1978, and remained essentially flat throughout the 1990's.[7]

FIGURE 2: NATIONAL AND ROUTE HHI, 1978-2000

As noted by both Borenstein (1992) and Evans & Kessides (1993*b*), the decline in route concentration is largely the result of the hub-and-spoke systems which grew substantially following deregulation and allowed carriers to offer online service between a greater number of city-pairs. Thus, while Evans & Kessides (1993*b*) noted that 10,579 city-pair routes were linked by one-stop or direct online service in 1978, this number had risen to 21,568 by 1988. By 2000, this number had increased yet again, to 28,656.[8] Both Borenstein (1992) and Evans & Kessides (1993*b*) also note that a greater proportion of passengers are now required to make a connection. Thus, while

[5]On April 8, 2002 for example, Southwest's market capitalization was $14.17 billion. In contrast, the combined market capitalizations of American, United, Delta, US Airways, Northwest, Continental, Alaska, and America West on this date was $13.1 billion.

[6]The HHI is computed by summing the squared market share of all U.S. carriers.

[7]Source: U.S. DOT DB1A Database. Data for 1978–1988 from Evans & Kessides (1993*b*). Route HHI is weighted by the total number of O&D passengers traveling on each route.

[8]These figures represent the number of routes where passengers in the DB1A database purchased itineraries, and thus, may understate the actual number of online city-pair routes available. Note: city-pair figures 2000 based on

80% of all passengers flew without a change of plane in 1978, this proportion had fallen to 68% by 1988 and stood at 64.25% in 2000.[9]

One of the most salient characteristics of the U.S. airline industry during the 1990's was the growth of numerous low fare and niche carriers (see, for example, U.S. DOT (1996)). Table 1 summarizes the number of the top 1,000 airport-pairs served by large U.S. carriers.[10]

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the following city/airport groupings: New York (LGA, JFK, EWR), San Francisco (SFO, OAK, SJC), Washington, D.C. (IAD, DCA, BWI), Los Angeles (LAX, BUR, ONT, LGB, SNA) and Chicago (ORD, MDW).

[9]Data from 1978 and 1988 from Evans & Kessides (1993*b*). One must be careful when interpreting these figures however, since the denominator (total passengers) includes those passengers traveling on the growing number of new online connecting routes which only became possible as a result of the expansion of hub-and-spoke systems following deregulation.

[10]The top 1,000 airport-pair routes accounted for roughly 71% of total O&D passengers in 2000.

Table 1: Number of Top 1,000 Airport Pair Routes Served by Carrier

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Large Network Carriers											
American	667	662	686	612	616	517	516	502	511	531	551
Continental	455	535	540	508	536	484	454	443	437	426	423
Delta	624	651	663	633	669	662	696	668	671	696	679
Northwest	412	451	413	396	423	429	412	426	438	439	430
TWA†	303	342	369	350	371	351	322	343	335	331	372
United	515	547	537	452	500	492	514	484	507	542	591
US Airways	520	508	471	458	473	409	407	416	397	412	452
Low Fare, Niche, and Other Carriers											
Southwest	140	158	178	186	263	268	328	328	324	359	377
America West	179	220	226	212	218	229	253	236	244	253	269
AirTran**					4	16	19	16	93	95	107
ATA	3	4	7	18	30	36	30	37	56	65	86
Frontier					3	19	25	37	45	53	80
Midway*	169	92			8	38	29	39	43	51	65
Alaska	48	41	39	50	44	45	47	44	41	45	42
Vanguard					2	12	25	17	17	22	30
Sun Country*										24	29
Spirit			2	6	9	9	4	6	12	21	26
Midwest Express	16	15	12	14	21	20	23	21	23	25	24
National										12	23
JetBlue											13
Carriers Acquired During 1990's											
Morris Air				37	17						
ValuJet**				8	50	110	35	55			
Reno Air			14	33	36	36	54	68	43		
Carriers Declaring Bankruptcy During 1990's											
Eastern	329										
Carnival		3	8	11	17	14	18	15			
Braniff	5	6	12	45	65						
Kiwi			4	9	14	12	3	16	9		
Western Pacific						20	37	49			

Notes: Includes carriers with at least 1% of total route passengers and carriers serving 15 or more of the top 1000 routes during at least one year in the sample period. Data from the fourth quarter of each year. *Declared bankruptcy in 2001. †Acquired by American in 2001. **Operations combined in 1997.
Source: DOT DB1A Database, 1990-2000.

As shown in Table 1, the number of routes served by the large network carriers remained relatively constant during the 1990's, while low fare and niche carriers such as Southwest, AirTran, ATA and Frontier grew substantially. There were also three significant mergers and acquisitions during the 1990's. The acquisition of Morris Air by Southwest was completed in 1994, adding twenty-one aircraft, seven new cities and 30% more capacity to Southwest's network.[11] The merger of AirTran and ValuJet in 1997 was effectively a rebranding of ValuJet following the highly publicized crash

[11]Southwest transitioned Morris Air service in Portland, Seattle, Spokane, Orange County, Salt Lake City, Boise, and Tucson, and discontinued Morris Air service in Eugene, Fresno, Palm Springs, Laughin, Colorado Springs, Denver, and Anchorage. Source: Southwest Airlines 1994 Annual Report.

of ValuJet flight 592 in May of 1996. Finally, American's acquisition of Reno Air, completed in 1998, increased American's presence along the West Coast. In addition to the three significant mergers during the 1990's, there were also a number of bankruptcies, most notably, that of Eastern Airlines in 1990.

2.1 Changes in Airport Concentration

Some observers have suggested that airport concentration has reached "monopoly" or "tight oligopoly" levels at many of the nation's largest airports. Brock (2000) for example, cites data showing that many hub carriers have market shares of between 70% and 90% at their respective hubs. These figures are widely recognized to be misleading since they count flow passengers (i.e., those who are making a connection). Virtually all economists agree however, that the relevant set of passengers to consider when computing airport market shares are origin and destination (O&D) passengers (i.e., those who either begin or end their journey at the airport).[12] Table 2 below lists the largest 50 airports, ranked in descending order of market share of the largest carrier. Unlike Brock (2000), who finds "market shares" of 70% or more for each of the ten "most monopolized U.S. airports," Table 2 demonstrates that among the 50 largest U.S. airports, the only ones where a single carrier has greater than a 70% share of O&D passengers are Dallas-Love Field and Houston-Hobby. Indeed, excluding Houston-Hobby (which generates very little flow traffic) the market share figures cited in Brock's (2000) *Table IV* are overstated by an average of 23.6 percentage points.[13]

[12]Indeed, in his Summary Judgement ruling in favor of American Airlines in *U.S. vs. AMR Corporation* (Case No. 99-1180-JTM), Judge Thomas Marten noted that "the cited evidence looks at all DFW passenger, including those merely passing through the airport. As a result, it directly overstates the market share of American, which operates at DFW as a hub."

[13]The market share figures of the largest carrier cited in Table IV of Brock (2000) are: Cincinnati (94.1%), Charlotte (92.3%), Pittsburgh (89.4%), Minneapolis (84.5%), Houston Hobby (80.8%), Detroit (80.4%), Houston Intercontinental (78.6%), Memphis (78.5%), Salt Lake City (76.8%) and St. Louis (71.0%). Also noteworthy is the fact that Cincinnati and Memphis are not even among the largest 50 U.S. airports, based on O&D passengers.

Table 2: Largest 50 O&D Generating Airports, Ordered by Market Share of Largest Carrier (2000)

	Airport	Largest Carrier	Largest Carrier O&D Passenger Share	Airport Rank (O&D Passengers)
1.	Dallas Love Field (DAL)	Southwest	90.6%	48
2.	Houston Hobby (HOU)	Southwest	79.6%	42
3.	Oakland (OAK)	Southwest	67.0%	28
4.	Pittsburgh (PIT)	US Airways	66.7%	43
5.	Charlotte (CLT)	US Airways	66.5%	50
6.	Houston Intercontinental (IAH)	Continental	64.2%	25
7.	Atlanta (ATL)	Delta	61.2%	2
8.	Minneapolis (MSP)	Northwest	60.9%	16
9.	Detroit (DTW)	Northwest	55.9%	15
10.	Dallas Ft. Worth (DFW)	American	54.7%	9
11.	Newark (EWR)	Continental	52.8%	10
12.	Sacramento (SMF)	Southwest	51.6%	37
13.	Ontario (ONT)	Southwest	51.0%	46
14.	Philadelphia (PHL)	US Airways	50.3%	20
15.	Salt Lake City (SLC)	Delta	49.8%	32
16.	San Juan, PR (SJU)	American	49.5%	49
17.	Denver (DEN)	United	49.3%	13
18.	St. Louis (STL)	TWA	48.1%	26
19.	Cleveland (CLE)	Continental	45.7%	35
20.	San Francisco (SFO)	United	43.9%	7
21.	Chicago Midway (MDW)	Southwest	43.6%	22
22.	Chicago O'Hare (ORD)	United	43.3%	3
23.	Nashville (BNA)	Southwest	40.0%	40
24.	Miami (MIA)	American	37.6%	33
25.	San Antonio (SAT)	Southwest	36.8%	47
26.	Austin (AUS)	Southwest	36.5%	44
27.	Washington Dulles (IAD)	United	36.4%	31
28.	San Diego (SAN)	Southwest	36.4%	18
29.	San Jose (SJC)	Southwest	36.3%	24
30.	Seattle (SEA)	Alaska	33.9%	12
31.	Baltimore (BWI)	Southwest	33.1%	14
32.	Honolulu (HNL)	Aloha	32.8%	23
33.	Las Vegas (LAS)	Southwest	32.6%	4
34.	Washington National (DCA)	US Airways	32.5%	21
35.	Phoenix (PHX)	Southwest	32.4%	8
36.	Orlando (MCO)	Delta	30.7%	5
37.	Portland (PDX)	Alaska	29.9%	27
38.	New Orleans (MSY)	Southwest	29.7%	34
39.	Fort Lauderdale (FLL)	Delta	27.6%	19
40.	New York LaGuardia (LGA)	Delta	27.2%	6
41.	Kansas City (MCI)	Southwest	26.7%	29
42.	Boston (BOS)	Delta	26.3%	11
43.	New York Kennedy (JFK)	American	26.2%	30
44.	Hartford (BDL)	US Airways	25.8%	41
45.	Los Angeles (LAX)	United	23.8%	1
46.	Orange County (SNA)	American	22.9%	38
47.	Tampa (TPA)	US Airways	21.5%	17
48.	Columbus (CMH)	Delta	19.3%	45
49.	Raleigh-Durham (RDU)	Midway	18.6%	36
50.	Indianapolis (IND)	US Airways	14.3%	39

Notes: Domestic Origin and Destination revenue passengers, excluding interlining passengers.
Source: U.S. DOT DB1A Database.

It is also important to note that the market share figures in Table 2 tend to overstate the degree of concentration–and consequently, understate the degree of competition for local passengers–in cities with multiple airports. To account for cities served by multiple airports, Table 3 aggregates airports in the New York, Houston, Dallas, Washington D.C., Chicago, San Francisco, and Los Angeles metropolitan areas. Of these cities, Dallas and Houston are the most concentrated, with American holding a 42.9% share of O&D passengers in Dallas and Continental holding a 40.3% share in Houston. In each of the other five large metropolitan areas however, no single carrier's market share of O&D passengers is greater than 30%.

Table 3: Largest 50 O&D Generating Airport Regions (2000)

	Airport Region	Largest Carrier	Largest Carrier O&D Passenger Share
1.	Los Angeles (LAX, ONT, BUR, SNA, LGB)	Southwest	27.0%
2.	New York City (JFK, LGA, EWR)	Continental	21.9%
3.	San Francisco (SFO, OAK, SJC)	United	27.8%
4.	Chicago (ORD, MDW)	United	29.6%
5.	Washington, D.C. (DCA, BWI, IAD)	US Airways	26.6%
6.	Atlanta (ATL)	Delta	61.2%
7.	Las Vegas (LAS)	Southwest	32.6%
8.	Dallas (DAL, DFW)	American	42.9%
9.	Orlando (MCO)	Delta	30.7%
10.	Phoenix (PHX)	Southwest	32.4%
11.	Boston (BOS)	Delta	26.3%
12.	Seattle (SEA)	Alaska	33.9%
13.	Houston (HOU, IAH)	Continental	40.3%
14.	Denver (DEN)	United	49.3%
15.	Detroit (DTW)	Northwest	55.9%
16.	Minneapolis (MSP)	Northwest	60.9%
17.	Tampa (TPA)	US Airways	21.5%
18.	San Diego (SAN)	Southwest	36.4%
19.	Fort Lauderdale (FLL)	Delta	27.6%
20.	Philadelphia (PHL)	US Airways	50.3%
21.	Honolulu (HNL)	Aloha	32.8%
22.	St. Louis (STL)	TWA	48.1%
23.	Portland (PDX)	Alaska	29.9%
24.	Kansas City (MCI)	Southwest	26.7%
25.	Salt Lake City (SLC)	Delta	49.8%
26.	Miami (MIA)	American	37.6%
27.	New Orleans (MSY)	Southwest	29.7%
28.	Cleveland (CLE)	Continental	45.7%
29.	Raleigh-Durham (RDU)	Midway	18.6%
30.	Sacramento (SMF)	Southwest	51.6%
31.	Indianapolis (IND)	US Airways	14.3%
32.	Nashville (BNA)	Southwest	40.0%
33.	Hartford (BDL)	US Airways	25.8%
34.	Pittsburgh (PIT)	US Airways	66.7%
35.	Austin (AUS)	Southwest	36.5%
36.	Columbus (CMH)	Delta	19.3%
37.	San Antonio (SAT)	Southwest	36.8%
38.	San Juan, PR (SJU)	American	49.5%
39.	Charlotte (CLT)	US Airways	66.5%
40.	West Palm Beach (PBI)	Delta	36.0%
41.	Albuquerque (ABQ)	Southwest	46.4%
42.	Providence (PVD)	Southwest	32.1%
43.	Milwaukee (MKE)	Midwest Express	29.1%
44.	Cincinnati (CVG)	Delta	74.0%
45.	Jacksonville (JAX)	Delta	29.8%
46.	Reno (RNO)	Southwest	43.6%
47.	Maui (OGG)	Aloha	40.5%
48.	Fort Myers (RSW)	Delta	29.3%
49.	Buffalo (BUF)	US Airways	34.2%
50.	Memphis (MEM)	Northwest	47.0%

Notes: Domestic Origin and Destination revenue passengers, excluding interlining passengers.
Source: U.S. DOT DB1A Database.

3 Changes in Average Airfares at Hubs: 1990-2000

No aspect of U.S. airline industry performance has generated more controversy over the past decade than the prices charged for service to and from hub airports. This topic, known as the "hub premium" debate, stems from the belief held by many travelers that increasing concentration at hub airports has created entry barriers at hubs, which allow hub carriers to charge supra-competitive fares for flights to and from these airports. Numerous government studies (i.e. U.S. GAO 1999, U.S. GAO 1990, U.S. DOT 1990) have found that average fares at concentrated hub airports tend to be higher–in some cases substantially–than fares at non-hub airports. One recent study (U.S. DOT 2001) has gone so far as to refer to hubs as "pockets of pain."

It has been well-established, however, that a simple comparison of average fares across airports fails to account for a number of important factors which are known to influence average fares, such as average distance, route density, the proportion of business versus leisure passengers, and the proportion of travelers flying non-stop (see Morrison & Winston (1995) or Transportation Research Board (1999) for example). Although a number of studies such as Borenstein (1989), Evans & Kessides (1993*a*) and Berry, Carnall & Spiller (1996) have attempted to control for some of these factors, a recent survey of "hub premium" studies conducted by the Department of Transportation's Volpe Center (U.S. DOT 2000, page 2) found that:

> ..none of these studies, however, has successfully isolated or controlled for differences in airlines' costs or in passengers' willingness to pay for different service levels. As a result, the extent to which airlines are able to use "market power" to maintain high fares for trips to and from their hub airports remains controversial.

Recently, much of the hub premium debate has centered around "passenger mix," or the proportion of business versus leisure travelers. Although it is widely acknowledged that routes to and from hubs generate a higher proportion of business travelers who tend to pay higher fares for more flexible unrestricted tickets, no published study to date has fully quantified the effect of traffic mix on hub fares.[14]

We begin our analysis of changes in hub air fares by first reporting the changes in hub concentration over the past decade. Table 4 summarizes the HHIs at each of the large network hubs, as well as at airports where Southwest Airlines had a greater than 50% share of O&D passengers in 2000. Table 4 indicates that concentration increased at twelve of the nineteen hub airports in our sample, and declined at the other seven. The hub with the largest increase in HHI was Cincinnati, followed by Newark, Philadelphia and Cleveland. In percentage terms, concentration

[14]Gordon & Jenkins (2000) have analyzed the impact of fare mix on Northwest's system using proprietary data from Northwest and Lee & Luengo Prado (2002) study the impact of fare mix for the six largest network airlines.

was up sharply at Miami, as result of Eastern Airlines' bankruptcy in 1990, however, since 1992, concentration at Miami has declined and remains the lowest of any major hub airport.

Table 4: Herfindahl Index At Major Hub Airports: 1990-2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Δ HHI 90–2000
American Hub Airports												
DFW	.389	.381	.414	.413	.358	.375	.405	.392	.385	.362	.338	-.051
MIA	.133	.173	.223	.217	.195	.180	.201	.185	.209	.191	.202	.068
ORD	.288	.296	.302	.312	.299	.297	.295	.299	.314	.312	.298	.011
Continental Hub Airports												
CLE	.167	.173	.163	.163	.204	.216	.215	.215	.244	.241	.255	.088
EWR	.216	.222	.214	.224	.260	.260	.261	.273	.320	.333	.310	.094
IAH	.372	.384	.378	.393	.411	.395	.420	.424	.457	.439	.431	.059
Delta Hub Airports												
ATL	.345	.500	.447	.417	.336	.271	.361	.408	.432	.416	.402	.057
CVG	.412	.416	.379	.394	.477	.364	.370	.420	.522	.455	.558	.146
SLC	.429	.401	.374	.312	.301	.278	.300	.314	.338	.310	.308	-.121
Northwest Hub Airports												
DTW	.273	.297	.330	.340	.330	.353	.380	.383	.320	.347	.335	.062
MEM	.317	.322	.327	.324	.314	.324	.330	.329	.279	.283	.296	-.022
MSP	.406	.415	.431	.455	.456	.464	.478	.447	.390	.411	.391	-.015
United Hub Airports												
DEN	.244	.244	.264	.261	.282	.278	.300	.312	.354	.328	.278	.034
IAD	.348	.371	.317	.273	.238	.208	.200	.200	.189	.205	.204	-.144
ORD	.288	.296	.302	.312	.299	.297	.295	.299	.314	.312	.298	.011
SFO	.172	.208	.206	.209	.218	.243	.261	.264	.285	.259	.224	.052
US Airways Hub Airports												
CLT	.514	.556	.532	.521	.590	.510	.477	.428	.495	.467	.464	-.050
PHL	.196	.230	.245	.269	.278	.255	.272	.311	.325	.295	.286	.090
PIT	.496	.527	.472	.478	.551	.491	.475	.519	.489	.477	.461	-.035
Airports Where Southwest Has a Greater than 50% Share of O&D Passengers												
DAL	1.000	1.000	1.000	.998	.988	.999	1.000	1.000	.945	.873	.824	-.176
HOU	.481	.526	.515	.571	.611	.616	.644	.618	.606	.643	.644	.164
OAK	.191	.288	.375	.387	.448	.435	.444	.470	.492	.499	.474	.283
ONT	.151	.173	.196	.245	.281	.282	.285	.281	.291	.297	.297	.146
SMF	.195	.177	.193	.234	.286	.290	.290	.301	.309	.309	.312	.117

Notes: All domestic Origin and Destination revenue passengers excluding interline passengers.
Source: U.S. DOT DB1A Database.

Table 5 summarizes changes in the average price per mile paid for air service to and from the major U.S. hub airports, in addition to the four airports where Southwest Airlines is the largest carrier. In computing price per mile, we use the non-stop distance between the origin and

destination, since passengers are not expected to be willing to pay more for circuitous routings.[15] We caution the reader against comparing the average prices in Table 5 *across* airports, since these figures do not adjust for factors specific to each airport such as average route distance or density, both of which impact the cost of providing service, and thus, also impact average prices. However, Table 5 can provide some insight into how prices have changed throughout the 1990's, both nationally, and at particular hub airports. In general, Table 5 shows that the nominal price per mile charged for air service declined, on average, 0.1% per year from 1990 to 2000. In contrast, general consumer prices, as measured by the CPI, increased on average 2.8% a year during the 1990's. Thus, in real terms, and in stark contrast to the data presented by Brock (2000), the majority of passengers are paying significantly less for air travel today than they were in 1990.

It is also important to note that 2000 was a record year (in terms of revenues and passenger enplanements) for the U.S. airline industry, primarily due to the strength of the U.S. economy generally, which in turn resulted in strong demand by high yielding business travelers. Thus, we see that overall, nominal prices in 2000 were relatively high compared to prices throughout the latter half of the 1990's. In contrast, average fares for the first half of 2001 (the latest two quarters for which the DOT data are unaffected by the events of September 11th) declined substantially along with the weakening economic conditions. For example, the average passenger weighted price per mile (across all U.S. airports) paid in the first six months of 2001 was 17.9 cents, compared to the 18.7 cents for the same period in 2000, a decline of 4.2%.

Examining the price changes at hubs also indicates that at no hub airport did average prices increase faster than inflation. In short, real prices declined at every hub airport between 1990 and 2000. The most significant changes in prices paid occured at Miami, which was primarily the result of the change in competitive landscape following Eastern Airlines' bankruptcy. The average nominal price per mile also rose significantly at Washington's Dulles airport, a United hub. Note however, that Table 6 indicates that the average distance traveled by Dulles passengers declined by over 200 miles (16.8%) between 1990 and 2000. Since trip length is inversely related to the cost *per mile* of providing air service, a significant part of the increase in average prices at Dulles are no doubt explained by the increased proportions of short haul trips being taken by Dulles passengers.

Also noteworthy from Table 5 are the price per mile figures at airports where Southwest has a large (over 50%) share of O&D passengers. At Dallas's Love Field for example, where Southwest held a 90.6% local passenger share in 2000, the average price per mile increased 57.5% from 1990 to 2000, significantly more than at any hub airport. Indeed, of all of the airports reported in Table 5, Dallas's Love Field is the only one where both nominal and *real* prices have increased.[16]

[15] Note that our measure of price per mile will therefore differ from airline *yield*, a commonly cited price figure by airlines which is defined as passenger revenue per revenue passenger mile (i.e., price paid per mile flown.)

[16] Moreover, this large increase in the price per mile paid is not explained by shorter average flights. Indeed,

Table 5: Average Nominal Price Per Mile (cents) At Major Hub Airports: 1990-2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Avg. Annual % Change
All Airports	18.8	18.5	17.9	19.4	17.3	18.4	18.1	17.8	17.7	17.9	18.6	-0.1%
U.S. CPI	130.7	136.2	140.3	144.5	148.2	152.4	156.9	160.5	163	166.6	172.2	2.8%
American Hub Airports												
DFW	20.9	20.2	18.8	22.5	21.9	21.3	21.8	21.0	20.9	21.7	23.0	0.9%
MIA	12.6	13.7	14.4	15.6	14.1	15.3	14.7	14.0	14.7	15.0	16.0	2.5%
ORD	20.5	19.5	18.8	21.6	18.2	19.2	19.9	20.6	20.7	21.4	21.8	0.6%
Continental Hub Airports												
CLE	21.3	20.6	19.7	20.3	15.8	18.6	19.7	18.7	17.4	19.3	19.9	-0.7%
EWR	18.4	18.3	17.7	18.5	15.1	17.3	17.5	17.7	16.7	17.6	18.6	0.1%
IAH	19.0	18.9	18.0	20.6	18.4	19.6	19.9	19.1	17.7	19.5	20.9	1.0%
Delta Hub Airports												
ATL	23.6	24.5	22.5	24.0	20.4	20.9	19.7	20.5	19.7	20.4	21.4	-1.0%
CVG	28.6	27.5	25.9	29.0	24.4	28.8	26.7	25.4	26.6	26.2	27.6	-0.3%
SLC	19.1	18.4	16.9	14.6	13.6	13.9	12.9	13.7	14.1	14.9	15.5	-2.0%
Detroit Hub Airports												
DTW	18.2	18.1	18.5	20.5	19.5	19.6	19.8	18.7	17.8	18.0	18.9	0.4%
MEM	25.3	25.5	23.3	25.8	24.5	24.4	24.8	25.0	24.7	24.7	25.1	-0.1%
MSP	21.3	20.4	19.4	21.0	21.9	21.5	22.4	22.0	22.4	21.4	20.1	-0.6%
United Hub Airports												
DEN	19.5	18.4	17.3	19.3	16.3	18.2	18.0	16.7	17.8	19.5	20.5	0.5%
IAD	17.3	17.8	18.0	20.5	18.3	18.5	19.3	18.1	18.0	18.9	21.1	2.0%
ORD	20.5	19.5	18.8	21.6	18.2	19.2	19.9	20.6	20.7	21.4	21.8	0.6%
SFO	12.9	11.9	11.6	14.0	12.3	12.9	13.3	13.5	13.8	14.6	15.9	2.1%
US Airways Hub Airports												
CLT	28.2	28.7	28.1	30.4	23.6	30.4	30.7	31.1	30.4	29.6	32.0	1.3%
PHL	19.3	20.3	20.7	22.2	18.3	19.9	20.5	19.9	20.7	21.0	20.7	0.7%
PIT	22.4	23.6	24.3	25.8	24.0	25.7	26.0	26.6	26.9	26.0	27.1	1.9%
Airports Where Southwest Has a Greater than 50% Share of O&D Passengers												
DAL	16.0	16.5	16.8	16.8	17.4	18.8	20.1	21.0	22.9	24.3	25.2	4.6%
HOU	15.2	15.6	15.1	15.8	15.1	16.3	16.1	17.0	17.0	17.1	17.8	1.6%
OAK	14.8	12.9	13.1	13.0	12.2	11.9	12.6	13.0	13.5	14.1	15.4	0.4%
ONT	13.5	12.5	12.1	13.0	12.8	12.8	12.9	13.3	13.4	13.9	14.7	0.8%
SMF	17.2	13.5	12.3	13.6	12.7	12.8	12.8	13.1	13.1	14.1	14.8	-1.4%

Notes: All domestic Origin and Destination revenue passengers excluding interline passengers. Price per mile based on non-stop distance, excluding taxes and fees. Avg. Annual % Change computed as $(p_{2000}/p_{1990})^{.1} - 1$. Mean price per mile weighted by passengers. CPI is All Urban Consumers, All Goods.
Sources: U.S. DOT DB1A Database and Bureau of Labor Statistics.

between 1990 and 2000, the average trip length of passengers traveling to and from Love Field increased by 23.4%, or 70 miles (see Table 6).

Table 6: Mean Trip Distance To and From Major Hub Airports: 1990-2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	% Δ 90-2000
All Pax	924	936	955	924	921	913	929	943	959	969	989	7.1%
Non Hub	909	923	943	911	907	901	916	931	950	963	982	8.0%
American Hub Airports												
DFW	866	883	895	890	876	884	904	922	930	943	960	10.8%
MIA	1107	1103	1136	1124	1116	1081	1111	1153	1151	1138	1171	5.7%
ORD	896	891	902	888	883	872	897	885	893	903	932	3.9%
Continental Hub Airports												
CLE	811	838	812	772	763	778	800	809	825	833	860	6.0%
EWR	1061	1103	1101	1062	1063	1100	1115	1133	1165	1184	1205	13.6%
IAH	896	938	947	928	934	916	929	946	959	971	985	10.0%
Delta Hub Airports												
ATL	756	774	802	780	744	751	780	779	772	769	780	3.3%
CVG	724	716	716	699	764	660	697	752	787	782	808	11.6%
SLC	1037	1058	1099	881	867	862	886	916	946	942	960	-7.5%
Northwest Hub Airports												
DTW	808	816	822	807	805	806	839	868	857	868	901	11.6%
MEM	738	717	744	744	720	719	719	726	729	738	752	1.9%
MSP	920	933	931	936	936	917	931	931	933	950	973	5.8%
United Hub Airports												
DEN	1001	1003	1002	988	1001	955	963	978	1001	1017	1024	2.4%
IAD	1273	1244	1247	1275	1313	1152	1160	1208	1128	1010	1059	-16.8%
ORD	896	891	902	888	883	872	897	885	893	903	932	3.9%
SFO	1416	1357	1448	1390	1458	1439	1423	1438	1456	1463	1506	6.3%
US Airways Hub Airports												
CLT	633	645	665	653	702	695	709	675	738	773	773	22.1%
PHL	956	982	985	976	1002	974	989	1003	996	1011	1059	10.8%
PIT	733	737	744	738	760	747	743	755	760	783	790	7.8%
Airports Where Southwest Has a Greater Than 50% Share of O&D Passengers												
DAL	299	301	302	307	302	301	312	310	318	329	369	23.7%
HOU	596	585	610	599	588	584	616	603	624	640	645	8.2%
OAK	743	679	704	660	624	619	659	661	688	712	756	1.8%
ONT	933	892	938	868	821	827	838	840	859	877	905	-3.0%
SMF	1017	941	946	898	861	831	830	840	856	866	901	-11.3%

Notes: All domestic Origin and Destination revenue passengers excluding interlining passengers.
Mean distance weighted by passengers. Includes all carriers.
Sources: U.S. DOT DB1A Database.

4 Conclusions

Despite frequently voiced concerns about an increase in industry concentration along with rising prices, our analysis of Department of Transportation data from 1990-2000 indicate no such trends.

To the contrary, we find that overall industry concentration has remained flat throughout the 1990's and that average prices have declined significantly in real terms over the same period. Moreover, declining real prices have not been limited to non-hub airports. The average price per mile paid at all nineteen hub airports in our sample declined in real terms between 1990 and 2000; in nominal terms, prices declined at six of these airports.

The 1990's also saw the continued growth of a number of low fare and niche airlines. Southwest Airlines has recently become the nation's largest largest airline in terms of O&D passengers and a number of other low fare or niche airlines such as AirTran, Frontier, and ATA have grown substantially. More recently, the highly successful initial public offering of JetBlue on April 12, 2002 has demonstrated that entry into the U.S. airline industry remains possible when based on a sound business strategy and a solid, experienced management team.[17]

It is important to stress however, that these are summary results, and that care must therefore be taken in interpreting them. For example, our findings are based on fares paid by all types of travelers, and thus, does not allow us to analyze whether or not particular segments of the traveling public (for example, business travelers) have benefited from declining real fares. Likewise, we have made no attempt in this study to analyze the "hub premium," i.e., whether or not network airlines are successful in charging higher fares for travel to and from their respective hubs than throughout the remainder of their system. Nevertheless, our findings indicate that recent reports of increasing concentration and rising prices may be exaggerated.

[17]Based on its April 12, 2002 IPO, JetBlue's market capitalization exceeded that of United, Northwest, US Airways or Alaska Airlines, and was roughly equal to that of Continental.

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