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# Proceedings of the Transportation Research Forum

Volume 4

1989

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31st TRF Annual Forum  
Williamsburg, Virginia

October 11-13, 1989

19 470AA XL1 1112 GBC  
11/94 02-013-01

**Non-Stop, Direct, and Connecting Flights: Reviewing Air Service at St. Louis Airport, by Richard Macchi, Graduate Student, Technology and Policy Program, Massachusetts Institute of Technology, Cambridge, Massachusetts.**

**Introduction**

Deregulation of the airline industry has brought many changes in airline and airport operations, including a number of air carrier mergers and a shift to hub and spoke networks. The resulting domination of particular airports by single carriers has caused concern among some analysts and government officials.

Two government reports have analyzed competitive conditions at the St. Louis airport following the merger of Trans World Airlines (TWA) and Ozark Airlines. Both reports used only nonstop and direct flights to compare fares and level of service. This paper argues that connecting flights should be included in the analysis, and a comparison of fares or level of service without such flights may give a distorted view of competitive conditions.

This paper examines the level of competitive air service at Lambert-St. Louis International Airport for three randomly selected city-pair markets. All nonstop, direct, and connecting flights to the selected destinations available in the EAASY SABRE computer reservation system database are presented. In addition, a list of many other St. Louis city-pair markets is given in Appendix A, with potential connecting hubs and airlines shown for each city-pair market. This paper does not include any fare information.

**Background**

In 1986, Trans World Airlines (TWA) and Ozark Air Lines merged. With the Ozark merger, TWA's share of enplanements at St. Louis increased from 56 percent to 82 percent. The merger made TWA the dominant carrier at St. Louis, and provoked concern that TWA might use its dominance to increase fares and reduce service. A September, 1988 report by the General Accounting Office (GAO), prepared at the request of Senator John Danforth (R-MO),

analyzed fare and service changes at Lambert-St. Louis International Airport after the merger [1].

The GAO report examined:

- changes in TWA's share of the air travel market at Lambert-St. Louis International Airport,
- changes in the number of cities served and types of air service available to St. Louis air travelers, and
- changes in air fares for travel to and from St. Louis,
- prospects for increased competition at Lambert-St. Louis.

After the GAO report was published, the U.S. Department of Transportation (DOT) was asked by Senator Danforth to evaluate competitive conditions at St. Louis in light of the GAO report [2]. The DOT report reviewed the GAO findings and, in addition, performed some further analysis of the competitive situation at the St. Louis airport.

A full review of the methodologies and conclusions of the two reports is beyond the scope of this paper. In very general terms, the GAO was critical of the dominance by TWA of the St. Louis airport, and concluded that average fares had risen, service was reduced, and that other air carriers faced substantial entry barriers to challenging TWA's position.

The DOT reported that the GAO had been provided faulty data for some of its analysis, and did not agree with all the conclusions of the GAO report. The DOT found that although many changes occurred at St. Louis since the merger, its analysis did not support the conclusion that TWA was exploiting its airport dominance with higher fares or reduced service. The DOT also did not conclude that substantial entry barriers existed at St. Louis.

**Competition and Market Definition**

IBM has a monopoly on PS/2 personal computers. The company does not have a monopoly on computers. The corner store has a monopoly on milk available within 3 blocks of my house. It does not have a monopoly on milk sales.

The key to analyzing competition or the lack of it is defining the market. Any



market defined sufficiently narrow will show high concentration and any market defined sufficiently broad will show low concentration.

Using only nonstop and direct flights is too narrow a definition of the market for air travel to and from Lambert-St. Louis, or any other airport. Although those would usually be the preferred flights, it is necessary to include connection flights to properly analyze a city-pair travel market.

#### Markets Analyzed

The GAO report analyzed 67 city-pair markets, divided into four categories based on whether service was provided, before the merger, by a particular combination of TWA, Ozark, and other carriers. Reviewing all 67 markets analyzed by the GAO is beyond the scope of this paper. Although the GAO separated the markets into four categories, I separated the markets into three categories, based on the size of the airport of the destination city. I thought that the availability of connecting flights might depend on the amount of service to and from a major hub airport. Therefore, the results would differ depending on whether the destination city was a large hub, medium hub, or small hub. (Large, medium, and small classifications are from FAA airport statistics, and are based on total enplanements.)

I separated the cities into the three categories, large hubs, medium hubs, and small hubs. Five of the 67 markets were not in any of the three classes, and were eliminated. A random number generator in LOTUS 1-2-3 was used to pick one airport from each category. The three airports chosen for detailed analysis were:

1. Las Vegas, Nevada -- Large Hub
2. Austin, Texas -- Medium Hub
3. Toledo, Ohio -- Small Hub

To compare the service available from TWA and from other carriers, I had to choose a time period, and what flights would be considered competitive with service from TWA. For a time period, I chose a single weekday, Thursday, July 20, 1989 -- far enough ahead in time, hopefully, to avoid any filled or canceled flights.

I chose a few conditions for determining if a flight was relevant. Although EASY creates many connecting flights of more than one carrier, I eliminated all flights

requiring booking with more than a single carrier. Flights created with "dual-designated" carriers, usually regional carriers with agreements with a major carrier, were kept. Only nonstops, direct, and one stop connecting flights are included; two plane, two stops (one nonstop and one direct) were also eliminated. All three leg trips were excluded.

The following is a summary of all the nonstop, direct, and connecting flights available for travel between St. Louis and the destination city. Also, at the end of each listing are any TWA connecting flights. I thought that TWA connecting flights should be listed to present a proper total picture of the level of TWA service and the level of other carrier service. However, if TWA provides nonstop service to a city, it seems unlikely that a passenger would choose a connecting flight, unless there was a time of day preference served by the connecting flight.

The most notable result of presenting these flights is the substantial difference in the "market", depending on whether or not connecting flights are included. There are at least four competitors to TWA in each market, and there are between four to six times as many alternative flights as there are TWA nonstop or direct flights. Adding in connecting flights increases the number of carriers, greatly increases the number of available flights, and significantly changes the picture of competition in these three example air markets.

However, all the connecting flights have longer trip times than the nonstop flights, as would be expected. The connecting flight trip times are on average 50% to 135% longer than the direct flight, or in absolute terms, one and one half to two hours longer. Therefore, although many competitors may offer alternative air service, TWA offers superior service in terms of travel time. This service advantage should allow TWA to charge a higher fare, all other things equal. The fare differential would be proportional to the value of time, such that the additional fare paid to TWA is just equal to the value of the time saved flying nonstop instead of a connecting flight.

The valuation of time is usually higher for business travelers than for tourist travelers, such that the fare differential should be greater for the higher fare classes than for the lower fare classes.

It may be possible to analyze the fares for the nonstop, direct, and connecting flights,

and calculate ranges of value of time for the different fare classes. Then these ranges could be checked for reasonableness, and fare differentials resulting in low or reasonable values of time would imply TWA is not using hub dominance to extract fare premiums.

If the fare differentials resulted in extreme values of time, then there may be reason to believe that TWA is exercising some market power at St. Louis to raise fares above a competitive level, or there are other service differentials in addition to shorter trip time. Such analysis is left for future research.

It seems clear that to properly analyze competitive conditions at St. Louis airport, connecting flights of other carriers must be included in any survey of level of service. This paper only presented flight options for three of the 67 markets the GAO report analyzed. A complete analysis would analyze the other 64 markets, or possibly the top 25, 50, or 100 markets traveled by St. Louis originating passengers. Since connecting flights are important, and the GAO picked the 67 markets based on pre-merger TWA and Ozark nonstop service, there may not be anything particular relevant about the 67 markets chosen.

To examine competition in an air travel market, or any other market, the relevant market must be defined properly. If air travelers are willing to travel to their destinations via connecting flights, then any analysis of air travel domination at an airport or an air corridor must include ALL the relevant options from which the consumer has to choose. This necessitates the inclusion of connecting flights for city-pair markets analysis.

#### References

1. Fare and Service Changes at St. Louis Since the TWA-Ozark Merger, General Accounting Office, September, 1988.
2. A Comparison of Air Fares and Services at St. Louis Before and After Trans World Airlines Acquired Ozark Airlines, U.S. Department of Transportation, January, 1989.

3. The Airline Industry's Recent Trends of Competitive Issues, Office of Economics, U.S. Department of Transportation, February, 1989.

#### Appendix A Other City-Pair Markets

The table below lists the 67 city-pair markets that were analyzed by the GAO. The 67 markets were sequentially numbered, based on the order given in the appendix of the GAO report. The GAO used four categories for markets, and these are designated in the table as A, B, C, or D under "CATEG."

The four categories are:

A. St. Louis routes where the two carriers offering nonstop service in March 1986 were TWA and Ozark (17 cities)

B. St. Louis routes where at least three carriers, including both TWA and Ozark, provided nonstop service in March 1986 (12 cities)

C. St. Louis routes where the only nonstop service in March 1986 was provided by either TWA or Ozark (31 cities)

D. St. Louis routes where either TWA or Ozark, and at least one other carrier, offered nonstop service in March 1986 (7 cities)

The table is sorted by size of the airport and then alphabetically by city. For each city market, potential connecting airports are listed along with the carriers who have hubs at this airport.

The paper gives a detail analysis for only three sample cities. This table may give some indication of how representative the three cities are of the 67 markets, by presenting some information on the potential for connecting flight service to the other 64 cities.

LAS VEGAS, NEVADA

FROM (STL) ST LOUIS MO TO (LAS) LAS VEGAS NV JUL-20-89

SUMMARY: St. Louis to Las Vegas

TWA 4 nonstops, 1 connection

OTHER 6 carriers: BN, AA, DL, NW, CO, UA  
1 direct, 18 connections

NONSTOP:

FLT	DPTR	ARVL	D	M	ST	EQP	TRIP TIME
TW 259	STL	920A LAS	10	40A	5 B	0 72S	3:20
CLASSES: F Y B Q M V							
TW 419	STL	1205P LAS	13	5P	6 L	0 M80	3:30
CLASSES: F Y B Q M V							
TW 491	STL	714P LAS	8	41P	7 D	0 72S	3:27
CLASSES: F Y B Q M V K							
TW 121	STL	1020P LAS	11	45P	5 S	0 M80	3:25
CLASSES: FN YN B Q M V K							

DIRECT:

FLT	DPTR	ARVL	D	M	ST	EQP	TRIP TIME
BN 689	STL	825P LAS	10	38P	S	1 72S	4:13
CLASSES: YN B QN L M KN H							

CONNECTION:

FLT	DPTR	ARVL	D	M	ST	EQP	LAYOVER TIME	TRIP TIME
AA 7	STL	839A DFW	10	23A	8 B	0 S80	0:49	5:12
CLASSES: F Y M B H Q V								
AA 295		1112A LAS	11	51A	8 L	0 D10		
CLASSES: F Y M B H Q V								
DL 1431	STL	810A SLC	10	10A	8 B	0 73S	0:51	5:05
CLASSES: F Y B M Q H K L								
DL 1429		1101A LAS	11	5A	6 S	0 72S		
CLASSES: F Y B M Q H K L								
BN 559	STL	800A MCI	8	56A	S	0 72S	0:54	4:33
CLASSES: Y B Q L M K								

CLASSES: F Y B M Q H K L											
DL*3173	1040A	TOL	1140A					0	SWM		
CLASSES: Y B M Q H											
3AA	802	STL	1111A	ORD	1222P	7	S	0	S80	1:22 3:48	
CLASSES: F Y B M H Q V											
AA*4353	144P	TOL	359P					0	ATR		
CLASSES: Y B M H Q V											
1NW	458	STL	630A	DTW	855A	N	B	0	DC9	0:45 2:45	
CLASSES: F Y B M H Q V K											
NW*3140	940A	TOL	1015A					0	SWM		
CLASSES: Y B M H Q V K											
2DL	984	STL	1140A	CVG	148P	8	S	0	D95	0:49 2:57	
CLASSES: F Y B M Q H K L											
DL*3194	237P	TOL	337P					0	SWM		
CLASSES: Y B M											
3UA	702	STL	251P	ORD	400P	5		0	735	1:44 3:43	
CLASSES: F Y B M											
UA*2708	544P	TOL	734P					0	146		
CLASSES: Y M Q H V											
1DL*3082	STL	330P	CVG	559P				0	SF3	0:45 3:14	
CLASSES: Y B M											
DL*3260	644P	TOL	744P					0	SWM		
CLASSES: Y B M											
3CO	252	STL	515P	CLE	755P	8	D	0	737	1:25 3:45	
CLASSES: F Y H K B V Q L											
CO*4609	920P	TOL	1000P					0	SWM		
CLASSES: Y H K B V Q L											
3UA	940	STL	555P	ORD	718P	6	S	0	735	0:47 3:13	
CLASSES: F Y B M											
UA*2710	805P	TOL	1008P					0	F27		
CLASSES: Y M Q H											
2AA	800	STL	613P	ORD	739P	2	S	0	S80	0:38 3:20	
CLASSES: F Y B M H Q V											
AA*4357	817P	TOL	1033P					0	ATR		
CLASSES: Y B M H Q V											
2NW	530	STL	1230P	DTW	302P	9	S	0	D95	2:33 4:40	
CLASSES: F Y B M H Q V K											
NW*3148	535P	TOL	610P					0	SWM		
CLASSES: Y B M H Q V K											