Airline Competition and
Operating Strategy in Multi-
Airport Systems

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Abstract

This report examines the operations of airlines in a multi-airport system, with a particular emphasis on the entrance of a low-cost carrier at a secondary airport. It looks at the factors that determine the airport that an airline chooses to service. The “Southwest Effect” in the California Corridor, as well as in Baltimore/Washington region is examined. In these two cases, Southwest’s entry drove fares down and increased passenger traffic in, not only the immediate market, but in the entire region’s routes as well. In the Washington D.C. region, BWI’s low airport costs and level of congestion were attractive to Southwest and it has since become one of its largest gateways. Chicago Midway and O’Hare are chosen to illustrate that the empirical S-Curve theory fails in markets that have a interdependent nature. The S-Curve is also inadequate for explaining a legacy carrier’s entry in a secondary airport when it has not yet dominated the primary market.

Introduction

A multi-airport system is the set of airports that serve a particular metropolitan area (de Neufville, May 1994). Travelers will be familiar with the San Francisco Bay Area multi-airport system, which consists of San Jose, Oakland, and San Francisco International Airports, as well as the New York City multi-airport system composed of Newark, Kennedy, and LaGuardia Airport. From the user’s perspective, all of the airports that effectively service their travel needs in the region are conglomerated into the multi-airport system. Regardless of jurisdiction, airports in different cities (or perhaps even a different state) can effectively serve the same users if it has a degree of accessibility that allows it to have an active role in the region’s traffic flows.
For example, highways around Boston’s city center make the secondary airports in Manchester, New Hampshire and Providence Rhode Island an attractive alternative to venturing into the congested urban city to catch a flight.

While passengers choose an airport based on its convenience and services offered, commercial airlines operate with the same state of mind.

### Concentration of Traffic

**Catchment Model**

The gap in traffic distribution is typically significant between the primary and secondary airports in a regional system. Often, the largest secondary airport carries less than 50% of the traffic observed in the primary airport (de Neufville, May 1994). Regardless of more convenient access to the airport and less congestion (both in transit to the airport and flying out of the airport), secondary airports have a significantly smaller market share compared to the primary airport.

These facts directly contradict the commonly used catchment model, where passengers utilize the most convenient airport. It seems intuitively correct that passengers will flow to the most convenient airport. Reality, however, does not confirm this model. In the case of the San Francisco Bay Area, Oakland Airport is actually closer to downtown San Francisco than San Francisco International Airport and more convenient for about half of the region’s passengers. Despite extensive marketing efforts, however, OAK serves a significantly smaller percent of the region’s traffic. This leads us to the next model.

Another example to counter the catchment model is evident in Manchester, N.H. In this case, passengers are entirely willing to go out of their way to an airport that provides the services that they want. In 1998, when Southwest Airlines launched
service out of Manchester, N.H., only 4% of the airport’s million passengers came from the Boston area, according to Manchester Airport. Today, more than 20% of Manchester’s four million passengers come from the Boston area. (Harris, 2004)

*Market-Share/Frequency Share S-Curve Model*

In addition to fares and quality of service, airlines compete for passengers and market share based on frequency of service and departure schedule on each route served (Belobaba, 2004). Similarly, passengers evaluate the combination of flight schedules and routes as well as quality of service offered at an airport that minimizes their disutility of air travel.

Airline market shares are approximately equal to their frequency shares, but there is empirical evidence of an S-Curve relationship. Higher frequency shares are associated with disproportionately higher market shares (Fruhan, 1972). An airline with twice as many flights will have more than twice as many passengers. When an airline is the only one to offer a flight at a specific time, it will capture the entire demand of passengers wishing to depart at that time. When other airlines offer a flight at the same time, they will both share the demand. This creates a tendency for competing airlines to match flight frequencies to retain market share (Belobaba, 2004). Unless an airline with a low frequency share has a special exception by offering a special low fare service, it will be forced to withdraw from the market.
The primary airport is the natural geographic location for both airlines and passengers to congregate because supply and demand have a venue to be exchanged. This drives an airline to focus on competing for market share at the primary airport while capturing a known source of demand rather than spreading out their services to another location. The S-Curve relationship is especially important in understanding how an airport locates an additional flight (de Neufville, 2003). The marginal benefit of an additional flight in the market is the greatest at the primary airport because of the highly nonlinear incremental market share. Competition dictates where airline services will be present (Gelerman and de Neufville, 1973).

*Movement to Secondary Airports*

While primary airports seem to be the natural meeting place for airlines and passengers to exchange and receive services, congestion is the major factor influencing the development of secondary airports. Primary airports often have higher costs imposed on airlines, in terms of both delay and airport service fees. When the negative
impact of these costs outweigh the motivation for serving the primary airport (such as the large base of customers, the need to compete to retain market share), airlines begin to consider the attractiveness of a satellite airport.

Additionally, if an airline is already dominant at an airport and sees little marginal benefit in the addition of another flight, it may then look to expanding its sphere of influence by entering secondary airports.

**Low-Cost Carriers**

While legacy carriers may feel the impetus to compete and retain market share at a primary airport, a low-cost carrier does not seek to compete with legacy carriers on traditional metrics. Instead, a low-cost, low-fare carrier provides a distinct product that often lacks the hub connectivity of full service airlines. Operations are often located at uncongested, low-cost airports, bypassing the primary airport in a multi-airport region (de Neufville, 2003). The lower cost of overhead allows the airline to offer lower fares with a no-frills strategy. In recent decades, the growth of low-cost carriers has spurred the development of many secondary airports.

**Southwest Airlines Strategy**

Southwest Airlines is the archetype of a successful low-cost carrier that began its operations by serving two secondary airports in Texas in the 1970s. Except for a few cases, Southwest has consistently followed its original strategy to target alternative, less-congested airports and offering a no-frills product. As a result, Southwest Airlines has a geographic network structure that parallels the traditional network of traditional airlines but does not always share use of the same airport.
Today, Southwest is the nation’s most profitable airline. Its profit formula relies on keeping costs low by squeezing the maximum profit out of its aircraft use. Southwest features one-size-fits-all seating, while focusing on short haul flights, and a rapid turnaround time of twenty minutes (Trottman, 2001). In addition, Southwest only has one type of aircraft, the Boeing 737, so that pilots can fly all planes.

Although Southwest Airlines did not begin with the intention of competing with the legacy carriers by offering a no-frills product, the changing dynamics of the airline industry have forced other airlines to regard Southwest differently. In each of the markets that Southwest has entered, average fares have plummeted as competitors tried to stem their loss of traffic. This phenomenon has been documented as the “Southwest effect”, where a low-cost airline enters a market, drives fares down, and generates an increase in demand. (Bond, 2003)
California Corridor

In conquering short-haul routes in California, Southwest focused on the secondary airports of Burbank, Ontario, Oakland, and San Jose (McCartney, 1996). The California Corridor refers to the route between Northern California (namely Oakland and San Francisco) and Southern California (namely Los Angeles, Burbank, Ontario, and Long Beach). Southwest’s performance in the California Corridor is a prime example of how Southwest has changed the industry. As traffic grew, big carriers such as American, Delta and USAir attempted to compete with Southwest for several years, but then gave up on competing with Southwest and pulled out of short-haul markets (Bennett and Craun, 1993). In response to the competition, United Airlines launched its own low-cost, high frequency shuttle on the West Coast in 1994. It didn’t take long, however, for United to realize that even a shuttle could not effectively compete with Southwest. In all, eight airlines surrendered West Coast routes, while fares fell by one-third and traffic increased 60% (McCartney, 1996).

Southwest first began service in the California Corridor during the first quarter of 1989, when SFO was the dominant airport in the Corridor (Bennett and Craun, 1993). Southwest did not serve SFO, but the following figure illustrates that Southwest became the dominant carrier overall in just three and a half years.
Southwest’s first entry onto the California Corridor was the OAK-ONT airport pair in 1989. Prices declined by 60% and traffic tripled. Most interesting, is that the traffic increase on this route was not at the expense of other routes. All of the other airport city pairs experienced fare decreases and traffic increases of their own (Bennett and Craun, 1993).

Southwest’s entry onto the Oakland-Burbank intra-California route in 1990 resulted in a 55% price drop and a six fold increase in passenger traffic (Bennett and Craun, 1993). United Airlines simultaneously added capacity on this route in response to Southwest, which resulted in a tripling of capacity. When Southwest entered OAK-ONT, competitors in the OAK-BUR initially slashed their fares, and returned to its pre-Southwest levels, before slashing their fares again when Southwest entered the OAK-BUR market.
Oakland-Long Beach is the only airport pair that Southwest does not serve. Alaska Airlines, which does serve this pair initially attempted to compete with Southwest, but after Southwest entered its third airport pair, Alaska decided that it would not continue struggling for market share by matching Southwest’s prices. It was economically infeasible to do so, and Alaska Airlines increased its fares steadily despite a loss of traffic.
AS, the only OAK-LAX carrier apparently has decided that it must increase its fares despite the resulting loss of traffic.

Figure 5: California Corridor: OAK-LGB: Effect of Southwest Entry on Price and Traffic

(Bennett and Craun, 1993)

The same situation is evident in the San Francisco airport pairs, where Southwest does not fly. Carriers initially responded to Southwest’s entry by reducing their fares and trying to retain market share. However, by the time Southwest entered its third California Corridor pair, the legacy carriers realized that they could not compete for local traffic with Southwest with their current cost and service structure. This forced eight airlines to either exit a route, or significantly increase prices despite a major loss in traffic. By doing so, they surrendered their market share, as well as short haul markets to Southwest (Bennett and Craun, 1993).

This experience in the California Corridor is not an exception to any of the markets that Southwest has entered. The following is an ad campaign that Southwest ran in 1992 that points to its competitions’ inability to sustain matched fares.
In 1996, Southwest began its invasion of the Northeast by introducing service into Providence. Providence is located a convenient sixty miles from Boston’s Logan International Airport. Southwest’s short-hop technique had already been tried and tested in the Texas and California markets. Its first target was the Boston-Washington corridor, where it launched sixteen flights a day between the satellite airports in Providence and Baltimore for $118 round-trip (McCartney, 1996). At the time, US Airways dominated that route entirely and its lowest unrestricted round-trip fare was $518 from the satellite airports and $538 from Boston Logan to Washington Dulles International Airport. In Southwest’s first year of service, the overall traffic at
Providence jumped 88% (Trottman, 2004). Rhode Island’s T.F. Green Airport became the fastest growing airport in 1997 after Southwest started service (Southwest, 2004).

When Southwest announced its entry to Providence, American Airlines and United Airlines immediately threatened that it would have to stop flying from Providence to Chicago (McCartney, 1996). The two giant carriers could not possibly match Southwest’s fares and remain profitable.

Philadelphia

Southwest generally avoids primary airports dominated by a larger carrier. The few exceptions are Los Angeles, Detroit, and most recently in May 2004, Philadelphia, which is US Air’s largest hub. Southwest and US Air have faced off before in 1993 when Southwest entered Baltimore/Washington International, the smallest of the US Air hubs. Southwest’s entry into this market in 1993 proved to be devastating for US Air. At the time US Airway’s operating costs were too high to profitably sustain matching Southwest’s lower fares. As Baltimore developed into one of Southwest’s busiest gateways, US Airways lost its hold of the No. 6 spot of the nation’s largest carriers measured by traffic (Trottman, 2004). A case study on Southwest’s effect on the Washington DC market will be discussed in more detail below.

Southwest’s move to enter the nation’s fifth largest city occurred at a time when the biggest airlines were lowering operating costs to compete in a new low-fare environment (Trottman, 2004). US Airways has declared that Southwest is trying to “kill it” and has slashed its own fares in the market in anticipation of Southwest’s arrival. Southwest’s co-founder and chairman, Herbert D. Kelleher, responded that Southwest’s introductory flight schedule paled in comparison to US Airways’ hundreds of flights per day. At the time, US Airways operated 375 flights from Philadelphia each day, and Southwest had announced that it would begin with fourteen flights per day.
(Zammit, 2004). Although the comparison of flight frequencies is a valid one, the industry is all too familiar with Southwest’s effect on any of the markets that it enters. Southwest planned to begin service from Philadelphia to Chicago, Las Vegas, Phoenix, Providence, Orlando, and Tampa. Four of Southwest’s introductory flights are among U.S. Air’s top eleven markets out of Philadelphia (Trottman, 2004).

Case Study: Baltimore/Washington D.C. (BWI)

Before 1993, BWI was an afterthought in the Washington/Baltimore metropolitan area (Mutzabaugh, 2003). It ranked a distant third in traffic behind the other two airports in the region, Washington Dulles International (IAD) and Washington Reagan National (DCA). However, this all changed after Southwest launched service from BWI and changed the dynamics of the operations in the Washington region.

Southwest chose BWI in 1993 because it had a large underserved market and plenty of gate space at reasonable rates. Executive VP Gary Kelly told Air Transport World “USAir had a hub there but was downsizing. The airport was not congested and was underpriced compared with others. Baltimore was a great option at the time, and obviously history has proved it was right.” (Schwartz, 2004) BWI’s landing fee is $1.63 per 1,000 of landed weight, compared to $2.50 and $2.51 at IAD and DCA, respectively. Additionally, the average cost per enplaned passenger is $4.33 at BWI, compared to $14.64 at IAD and $12.44 at DCA. These costs take into account landing fees and airline space rentals. (Schwartz, 2004)
Major rivals like US Airways were forced to slash their fares to match Southwest, but the Big Six carriers were no rival for Southwest and were forced to shrink their services. Today, BWI is the busiest of the three airports in the Washington multi-airport system, drawing passengers from as far away as Pennsylvania, New Jersey and West Virginia. Southwest predicts that BWI will likely become their busiest airport by 2005 (Mutzabaugh, 2003).

Since Southwest came to BWI, passenger traffic more than doubled, from 9 million in 1993 to 19.7 million in 2003. (Schwartz, 2004) Southwest passengers account for approximately half of BWI’s traffic. Southwest started at BWI with eight flights to Chicago Midway and Cleveland, operating out of two gates. Today, it operates 162 nonstop flights to 35 destinations from 21 gates.
BWI Airport has had an active role in Southwest’s development. BWI extended its piers in Concourse C and B to keep up with Southwest’s needs. In May 2005, the opening of the $219 million Concourse A will give the carrier a total of 26 gates.

Response of the Legacy Carriers- U.S. Airways MetroJet

In June 1998, US Airways launched its new low-fare airline, MetroJet, from Baltimore/Washington International Airport in an attempt to compete more effectively against low-cost carriers such as Southwest Airlines (Shifrin, 1998a). This was the fourth time in five years that a major airline started an “airline within an airline”, although none were able to put a dent in Southwest’s growth and profitability (Zellner, 1998). While the operating plan for MetroJet included an analysis of the market, other carriers’ services and fares, a key factor in their work was looking at how low-cost Southwest operated its low-fare services (Shifrin, 1998b). Like Southwest, its fleet consisted of only 737s and flew to secondary airports. Michael Scheeringa, head of the employee task force that created MetroJet, said “We looked and we learned…Southwest filled a void.” (Shifrin, 1998b)

While US Air had to pull out entirely from some of the routes that Southwest served, US Airways reintroduced the routes with MetroJet, and essentially matched Southwest’s fares. US Airways dropped out of BWI-Cleveland, but MetroJet was introduced to include that route. Unrestricted air fares on MetroJet would be 57-75% lower than those available on the parent airline (Shifrin, 1998b).

Three of its four inaugural city pairs were served by Southwest (Air Transport World, 1998). At the time, Southwest had six daily nonstop flights to Cleveland and nine daily nonstop flights to Providence. MetroJet initially began service by matching Southwest’s six daily non-stops to Cleveland and also introducing five daily departures to Providence. MetroJet’s three nonstop flights between Baltimore and Fort Lauderdale
was a significant improvement in service for travelers because Southwest only had one nonstop flight and six one-stop connection flights. Manchester had no service to Baltimore prior to MetroJet.

![Figure 8: Comparison of MetroJet’s Non-Stop Inaugural Flights in 1998 with Southwest Airlines](image)

US Airways move to launch MetroJet from BWI had a lot to do with Southwest’s entry to BWI in 1993. BWI was the smallest of US Airways’ hubs, but from 1993 to 1997, Southwest grew its share of BWI seats from 1% to 20% (Air Transport World, 1998). At the time, US Airways was the nation’s sixth largest carrier, but its costs were the highest in the airline industry (Carey, 1998). Southwest’s presence in BWI forced US Air to shrink its operations there.

After the events of September 11, US Airways announced that it would close its MetroJet operations.
Chicago

In 1990, Southwest grabbed precious territory in Chicago after Midway Airlines folded (Trottman, 2001). From that point on, Southwest has had a leading role in the airport’s development and revival. Midway became popular with other low-cost carriers such as ATA, America West and AirTran. In comparison, two legacy carriers, American and United operate mega hubs at Chicago O’Hare.

Midway

ATA’s declared bankruptcy in October 2004 has the potential for a significant shift in status quo for not only the discount segment of the industry that operates from Midway, but also from the financially struggling giants at the larger O’Hare (Reed, 2004). The stakes are high at Midway because the airline that prevails will obtain ATA’s coveted 14 gates and have a competitive advantage. AirTran, America West, and Southwest are all vying for the gates, which will allow them to expand their current services. For Southwest, these fourteen gates in addition to their current nineteen would allow it to have an almost monopolistic hold of Midway’s operations. In this case, American and United at O’Hare might have an easier time matching Southwest’s fares (Reed, 2004).

O’Hare

American and United have had to cut their fares in response to competition with each other as well as with its competition across town (Reed, 2004). In comparison to American Airlines, United has more of everything, domestic destinations, flights and seats, passengers and RPMs (Unisys, 2004).
Failure of S-Curve Theory

From a theoretical S-Curve point of view, we would expect United to do substantially better than American. However, in their principal one-on-one competitive markets at O’Hare, American generally beats United relative to their seat shares. As can be seen below, American typically performs above the S-Curve while United performs below it. This is significant because United has a 16 point (30%) lead over American in domestic departing seats (Unisys, 2004). Some of the poor performers, such as United in San Antonio, can be explained by American’s DFW hub and American’s routing San Antonio hubs over to Dallas. The S-Curve does not always hold for real cases that involve the dynamic interdependence of the airline industry.

Figure 9: Share of Nonstop Seats vs. Share of Passenger Revenue. 12 O’Hare O&D Markets in Which United and American Together Offer More than 95% of the Seats, 12 Months ending Q1 2004
(Unisys, 2004)
After the earlier discussion of the theoretical S-Curve model, we would expect an airline with a large frequency share (and thus a large market share) to consider adding another flight at a secondary airport because the incremental benefit of a flight at the main airport would be miniscule. Along with the failure of the S-Curve in this scenario, it is also interesting to note that American has flights at Midway, but United does not. Thus, even though American has a smaller share of seats, it decided to add flights at Midway rather than at O’Hare to compete more with United. This contradicts the conclusions we had earlier reached from the studying the empirical S-Curve.

Conclusions

Low-cost carriers have significant implications for both competition in the airline industry as well as the growth of secondary airports in a metropolitan region. This has been shown for BWI after the entrance of Southwest. Low-cost carriers will continue to fly into airports where costs and congestion are low. The decision by the Big Six carriers, however, is not consistent with the general S-Curve model. The legacy carriers have attempted to mirror Southwest’s efforts by launching their own low-cost carriers, but have struggled to compete effectively. The low cost carriers will continue to have a profound effect on the airline industry as it continues to expand its parallel network. Future research may look at the change in costs and congestion at secondary airports as well as the decline of the major airports as demand for lower cost facilities continues to rise.
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