

The Evolution of the “Southwest Effect”

The Honors Program
Senior Capstone Project
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May 2012

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ABSTRACT

The “Southwest effect” - a large decrease in fares paired with an increase in traffic - has been discussed around the airline industry since the term was first coined in a government study in the early 1990s. But the airline industry has drastically changed since then - Southwest has become the largest domestic airline, and many of its competitors have had the chance to restructure through bankruptcy.

This study examines some of Southwest's latest city additions, as well as a few of the airline's intra-California routes where it is now a dominant player. Using publically-available government data, the change in passengers and average fare was measured. The change in average fare was also evaluated with a two-sample t-test, while the difference in distribution of fares was evaluated with the Kolmogorov-Smirnov test. The results indicate that Southwest can stimulate traffic and lower fares, the effect of its entrance into a new market decreases over time. In addition, an analysis of some key intra-California routes indicates that the opposite of the “Southwest effect” can happen once Southwest becomes the dominant player on a route.

INTRODUCTION

Since its founding forty years ago, Southwest Airlines has been known for launching aggressive levels of service in short-haul, point-to-point markets across the country, such as routes within Texas and California. On many of these routes, significant increases in passenger volumes are paired with large decreases in average fares. A 1993 paper from the Department of Transportation's Office of Aviation Analysis labeled these market shifts as the “Southwest Effect.”

There has been little research on this phenomenon in recent years. Since the paper's original publication, Southwest's route network has drastically changed. The carrier has entered new regions of the country, such as the Northeast in the mid-1990s, and has also begun flying longer routes. In fact, the airline's average stage length has increased by more than 33% over the past ten years.

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In addition, in recent years Southwest has re-tooled its revenue management techniques, started carrying more connecting passengers, and rationalized capacity in some markets in response to higher fuel prices and a generally weak national economy. Meanwhile, the carrier has also launched service to markets it has typically avoided, such as Boston, New York-LaGuardia, and Philadelphia.

In addition, Southwest’s costs have evolved as the carrier has grown. Perhaps more importantly, major airlines like Delta, United, and most recently, American, have had the chance to adjust their cost structures during the bankruptcy process, affecting Southwest’s competitive edge in the process. In a recent letter to employees, Southwest CEO Gary Kelly said the airline must bring “costs down through increased productivity to compete against these new legacy airlines.” He also wrote: “Their costs are much lower than they were. Their labor costs are lower than ours. Actually, they aren't what you would call legacy airlines. They are new. They are different. The old legacy airlines are dead and buried,” (Maxon, 2011).

With these events in mind, further research of the “Southwest Effect” seems is quite appropriate. The topic is constantly discussed in various forms of media when Southwest launches a new market (Grantham, 2010). The “Southwest Effect” has also been referred to by Southwest management in certain political dealings (Securities and Exchange Commission, 2011).

There also appears to be a gap in the research of this phenomenon. Based on a literature review, it appears that most researchers have focused on the entry of Southwest, or another low-cost carrier, on a market, but have not thoroughly examined the long-term effects of Southwest’s presence in a market, especially one where incumbent carriers exit in the face of new competition. The original researchers of the Southwest Effect expressed concern about such a scenario, arguing that “without a competitive discipline, over time Southwest's fares will increase to cover cost inefficiencies that will creep in, and to extract monopoly profits,” (Bennett & Craun, 1993).

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This capstone project will analyze multiple Southwest markets, but will largely focus on Southwest’s new markets, like Boston, New York-LaGuardia, Minneapolis, and Milwaukee. Here one could examine the effects of Southwest’s entry into a new route where it did not already have a significant presence in one of the cities. Also included in the analysis is Southwest’s intra-California service, which was the main subject of the original “Southwest Effect” research. Southwest’s market share in these markets has greatly increased since the initial study, especially as other airlines like United have cut their competition with Southwest on these routes. Also included will be some of Southwest’s short-haul routes out of Philadelphia, a market where Southwest has begun trimming its schedule(O’Tolle, 2011). A study of these routes is useful in determining how the Southwest effect has changed over time.

Previous studies have focused on the entrance of Southwest in airline markets. This research will examine the long-term effects of Southwest’s entrance, to see if the initial stimulus persists for a significant amount of time, especially if competing carriers reduce or eliminate their presence on a route in response to the entry of Southwest.

LITERATURE REVIEW

A 1993 research paper written by Randall D. Bennett and James M. Craun (1993) of the Department of Transportation’s Office of Aviation Analysis was the first to coin the term “Southwest effect,” a decrease in average fare and increase in volume after Southwest launches a new route. The two researchers utilize many examples of intra-California routes to display this phenomenon. For example, they note that the average fare on flights from Oakland to Ontario decreased 60%, while traffic increased 300% (Bennett & Craun, 1993, p. 7).

Bennett and Craun show that Southwest’s growth had major effects throughout the entire industry by comparing the average fares for markets of certain stage lengths to the government-calculated Standard Industry Fare Level. They note a dramatic decline in industry short-haul fares(Bennett & Craun, 1993, p. 5).

The researchers note that Southwest’s low prices are made possible thanks to a significant cost advantage relative to other airlines. The carrier with the costs closest to Southwest, America West, had stage-length adjusted unit costs 20% higher than Southwest. Costs for other airlines were about 50-70% higher than Southwest (Bennett & Craun, 1993, p. 3).

Bennett and Craun also express concern about Southwest’s actions in a market over the long-term. They warn that after Southwest dominates a market, the airline could begin raising fares. To avoid such a situation, they advocate for additional competition in these markets (Bennett and Craun, 1993, p. 9).

Timothy M. Vowles(2001) examines Southwest’s effect on cities that are served by more than one airport. Southwest has often utilized alternate airports to serve other cities, such as Baltimore to serve the Washington, DC area.(Since publication of the study, Southwest has launched service to Washington-Dulles, though its operation there is much smaller than Baltimore’s.) Vowles proposes that Southwest’s entrance at an alternate airport can have an effect on the main airports. For example, after Southwest launched service from Providence to

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Baltimore, fares to Washington-Dulles and Washington-National also decreased (Vowles 255). Vowles also examines markets with service to both Chicago O’Hare (a hub for American and United) and Chicago Midway (one of Southwest’s largest focus city). Vowles notes that traffic between Louisville and Chicago Midway increased 6431%, while traffic to O’Hare declined despite fares being cut in half (Vowles, 2001, p. 256).

In their paper “City Pairs vs. Airport Pairs: A Market-Definition Methodology of the Airline Industry,” Jan K. Brueckner, Darin Lee, and Ethan Singer (2010) examine the effects of LCCs on alternate airports, such as Manchester and Providence on Boston. Such research is useful as Southwest has avoided some major airports. For example, the airline serves the Miami area through Ft. Lauderdale and West Palm Beach. The research attempts to determine if some of these alternate airports should be grouped together to make up one market, a question that is very important for domestic aviation regulatory policy. Such research also implies how much an effect Southwest’s presence at alternate airports has on airports served by legacy carriers. They find that in some cases, alternate airports should not be grouped with major airports, such as Providence and Manchester and Boston. But in some cases, airports like Miami and Fort Lauderdale should be grouped together, though West Palm Beach should be considered independent (Brueckner, Lee, & Singer, City-Pairs vs. Airport-Pairs: A Market-Definition Methodology for the Airline Industry, 2010, p. 42).

D.E Pitfield’s (2008) study, “The Southwest Effect: A time-series analysis on passengers carried by selected routes and a market share comparison,” attempts to quantify the effects of Southwest’s entry into a market using statistical models. It is especially worthy of note as the paper is one of the most recent research papers on the “Southwest Effect.” Pitfield’s research primarily focuses on market share data on five routes, and finds that Southwest is able to quickly grow its share in some markets. In two cases, Southwest’s market share nears 20% (Pitfield, 2008, p. 119).

Pitfield’s data, however, is based on the Department of Transportation’s T-100 Domestic Market data set, which could distort market share numbers. For example, Southwest might

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have a flight from Chicago (Midway) to Baltimore that continues on to Orlando. If I were to examine the Chicago – Baltimore data in T-100 Market, passengers that continue on to Orlando would be excluded. All passengers that deplane in Baltimore, however, are counted, including those connecting onto other flights. On city pairs like Chicago-Washington in Pitfield’s study, connecting traffic might be a large portion of passenger volume and affect market share data. This factor is especially worthy of consideration in this market, especially as both American and United operate hubs at Chicago O’Hare. Replicating this study with the DOT’s DB1B data set, which tracks origin and destination (O&D) passengers could be a better choice that yields some interesting results.

Research from Austan Goolsbee and Chad Syverson (2004) indicates that Southwest need not provide nonstop service on a route to provide fare relief consumers, as existing carriers will adjust their pricing to the threat of new competition:

...incumbents do indeed react to the threat of Southwest’s entry before actual entry takes place. Incumbents drop fares significantly in anticipation of entry. This is not simply due to airport-specific cost shocks because fares drop on threatened routes relative to incumbents’ fares on other routes from the same airports. The fare declines are accompanied by a sizable increase in the number of passengers flying the incumbents’ threatened routes. The fare decreases are largest for routes that are concentrated beforehand, but do not decrease at all for routes into neighboring airports in the same MSA (i.e., where Southwest is not directly threatening entry). There is only weak evidence that the incumbents expand capacity (the number of available seats and flights), but there is strong evidence that load factors increase on those flights they have... The findings of this paper suggest that Southwest Airlines has a powerful competitive effect in the U.S. passenger airline industry, and that this effect does not operate solely through Southwest’s head-to-head competition with major carriers (Gooslbee and Syverson, 2004, p. 17).

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Overall, the two researchers find in markets where Southwest begins competing with a legacy carrier, fares are lowered by 26% (Gooslbee and Syverson, 2004, p. 9).

Recent research by Jan K. Brueckner, Darin Lee, and Ethan Singer (2010) in their paper “Airline Competition and Domestic U.S. Airfares: A Comprehensive Reappraisal” examined the effect of low cost carriers on average fares. While many studies have focused solely on Southwest, this paper examines on other low cost carriers, such as AirTran, Frontier, and JetBlue, as well. They find that LCC competition significantly reduces fares, but that Southwest often reduces fares the most:

Several broad conclusions emerge from the empirical analysis. First, the impact of LCC competition is dramatic. The presence of in-market, nonstop LCC competition reduces fares by as much as 34 percent in the nonstop markets, and adjacent LCC competition in these markets reduces fares by as much as 19 percent. The strongest effects come from Southwest, which is usually separated from other LCCs in the regressions. By contrast, the effect of legacy competition is slight. An additional legacy carrier providing nonstop service lowers fares by at most 4.1 percent in the nonstop markets, with no effect in some specifications. When an additional legacy carrier offers adjacent nonstop service, the fare impact in the nonstop markets is insignificantly different from zero in many specifications (Brueckner, Lee, & Singer, Airline Competition and Domestic U.S. Airfares: A Comprehensive Reappraisal, 2010, p. 5).

Depending on the model used by the researchers, Southwest’s impact relative to other LCCs is significant. One model for nonstop flights suggests that Southwest’s presence lowers fares about 28%, while the reduction for other LCCs is 13% (Brueckner, Lee, & Singer, Airline Competition and Domestic U.S. Airfares: A Comprehensive Reappraisal, 2010, p. 20).

An October 2011 paper by Kerry M. Tan (2011) also examines the effects of a low-cost-carrier’s entry into a new market, and notes that the simulative effects in an airline market

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brought about by the entry of Southwest can similarly occur when other airlines enter, writing that “JetBlue Airways and AirTran Airways demonstrate how other low-cost carriers can mirror the entry effects exhibited with Southwest Airlines.” Tan also argues that the “the Southwest Effect can no longer be considered as a special case relevant to one particular airline, particularly as it pertains to legacy carrier incumbents” and that “the entry effect pertains to low-cost carriers in general,” (Tan, 2011, p. 16). Tan notes, however, that in general Southwest tends to have the greatest effect on pricing of all incumbents when it enters a market:

“...incumbents tend to decrease their mean airfares the quarter before entry, the quarter of entry, and the quarter after entry. Southwest Airlines had the largest average entry effect, with the aforementioned result of inducing incumbents to decrease prices by 12.24%, on average, the quarter after actual entry. Other low-cost carriers had similar, yet weaker effects. AirTran Airways induced a decrease of 10.81%, while incumbents also reacted to entry by JetBlue Airways and Spirit Airlines, but only by a modest amount of 5.57% and 5.36%, respectively. Nevertheless, each low-cost carrier induced incumbents to decrease their prices before and after actual entry,” (Tan, 2011, p. 14).

Tan’s analysis examines the twelve quarters prior to entry, the quarter of entry, and the following twelve quarters. Interestingly, the effect of Southwest’s entrance into a market diminishes over time, though a statistically significant decrease in fares is still observed.

Tan further examines the response of legacy carriers when low-cost carriers like Southwest, JetBlue, or Spirit enter a market and finds that they “respond to entry by low-cost carriers by dramatically decreasing their average airfares,” and that the response of legacy carriers to low-cost carriers is greater than recorded when all types of incumbent carriers are considered

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(Tan, 2011, p. 14). Interestingly, Tan discovers that the strongest response by legacy carriers is seen when AirTran, recently acquired by Southwest, enters a new market:

“Southwest Airlines induces incumbents to decrease their average prices by 13.09%. However, AirTran Airways induces an even stronger effect than that of Southwest as incumbents cut their mean airfare by an average of 13.31% the quarter after AirTran Airways actually enters a route. Entry by JetBlue Airways and Spirit Airlines invokes legacy carrier incumbents to decrease their prices by 7.07% and 7.98%, respectively,” (Tan, 2011, p. 14).

Tan also analyzes the DB1B data to estimate the effect on entry of a low-cost carrier on low-cost carrier incumbents, and finds that “low-cost carrier incumbents do not significantly alter their mean airfare.”

In addition to examining mean airfares, Tan also looks at changes in 10th percentile airfare and the 90th percentile airfare in response to low-cost carrier entry. Airlines typically offer numerous fare buckets in any given market, and can potentially adjust some more than others in response to a new-entrant competitor. For example, discount fares (perhaps located in the 10th percentile) might be lowered more in response to new entrants, while not changing higher (sometimes refundable) fares in the 90th percentile. Like the decrease in mean airfares, Tan notices a significant decrease in fares charged by legacy carriers in response to LCC entry:

“...legacy carrier incumbents slash their 10th percentile prices immediately before and immediately after entry. In the quarter after Southwest Airlines actually enters a route, legacy carrier incumbents decreased their 10th percentile prices by 11.56%, on average, relative to the excluded period (the thirteenth to sixteenth quarter before entry). Other low-cost entrants induced similar effects, with legacy carrier incumbents dropping prices by an average of 8.09%, 7.49%, and 7.69% when AirTran Airways, JetBlue Airways, and Spirit Airlines entered the route, respectively. These results suggest that legacy

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carrier incumbents significantly decrease their discount prices in response to entry by a low-cost carrier,” (Tan, 2011, p. 17).

The analysis of 10th percentile fares for LCCs in response to the entrance of another LCC are similar to what was seen in mean airfares. Tan reports that “low-cost carriers do not significantly alter their 10th percentile prices in response to entry by a rival low-cost carrier,” (Tan, 2011, p. 17).

Tan notes similar effects in the 90th percentile, or highest, fares:

“Southwest Airlines induces legacy carrier incumbents to decrease their 90th percentile prices by 14.86%, while legacy carriers decreased their 90th percentile price by 14.68% and 14.05% in the quarter after actual entry by AirTran Airways and Spirit Airlines, respectively. Interestingly, these effects are of similar magnitudes than that on the 10th percentile prices. Full fare prices charged by legacy carriers decreased by 3.35%, on average, in response to entry by JetBlue Airways. Although this is not as strong as their effect on 10th percentile prices, entry by JetBlue Airways still put downward pressure on the incumbents’ full fare prices,” (Tan, 2011, p. 18).

Tan also notes, however, that in terms of 90th percentile fares, “low-cost carriers do not strongly respond to entry” by another LCC.

Charles Boguslaski, Harumi Ito, and Darin Lee in a 2004 study attempts to evaluate Southwest’s entry decisions into a market, and notes that over the course of the 1990s Southwest’s market entry decisions changed over time:

After successfully exploiting a number of very dense short-haul markets, Southwest expanded into medium-haul vacation markets by tapping into many customers who had previously not traveled on these routes. We also found that

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starting in 1995, Southwest began entering into a number of relatively thin, long-haul markets that it had previously avoided. Likewise, we found that Southwest’s entry decisions during the latter half of the 1990s became more strongly influenced by network effects. However, Southwest’s network is markedly different from that of traditional hub-and-spoke carriers, in that their route system tends to be far less concentrated,” (Boguslaski, Ito, & Lee, 2004, p. 349).

Like other researchers, Kai Hüscherlath and Kathrin Müller explain in a 2011 paper that other LCCs, not just Southwest, can stimulate markets they enter:

“...our analysis suggested that, first, Southwest cannot be considered as the only significant low-cost carrier anymore since several other members of this group showed equal or even more significant effects of entry. Although it seems likely that part of this result is driven by Southwest’s (and JetBlue’s) outstanding reputation – leading the respective incumbent carriers to substantial price reductions as soon as it becomes sufficiently likely that one of those carriers will eventually enter the respective route (i.e., before the actual entry event) – entries by other low-cost carriers are found to cause substantial drops in the average market yield in the quarter of entry. Second, due to its merger with the low-cost carrier America West in 2005, US Airways must be considered as a hybrid carrier positioned between network carriers and low-cost carriers,” (Hüscherlath & Müller, 2011, p. 27).

It is worth noting, however, that these authors write that in their “empirical analysis of entry patterns and effects of entry, regional airlines are excluded from the analysis,” and argue that “most of those smaller airlines operate in small feeder traffic markets,” (Hüscherlath & Müller, 2011, p. 5). Such a statement has become less true over the year as the regional airline industry has dramatically shifted over the past decade.

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Mainline carriers have been able to reach agreements with their pilot unions that allows for the flying of larger (roughly 70-90 seats) regional jets by outsourced airlines. In addition, American, Delta, United, and US Airways have added first class seating to at least a portion of their larger regional aircraft, harmonizing the product with mainline service. Mainline carriers have used such aircraft to enter into large business markets, such as Delta Air Lines’ shuttle service from Chicago-O’Hare to New York-LaGuardia.

By excluding regional carriers, these researchers have potentially ignored market entries by mainline carriers, and have also ignored the possibility of mainline carriers mixing regional service with their own. For example, comparing Southwest’s performance in the Providence-Philadelphia market with US Airways while ignoring regional carriers would exclude most of US Airways’ capacity in the market from the analysis.

METHODOLOGY

This capstone project will utilize multiple Department of Transportation (DOT) data sources to analyze Southwest’s passenger volume, revenue, and costs. DOT-published data is not only comprehensive and free, but is also utilized by many other academic research papers covering the airline industry.

The quarterly Origin and Destination survey (DB1B) data set, the most important for use in this study, is based on a 10% sample of all airline tickets and contains fare and routing information on individual itineraries. This database contains a sample of itineraries across the country, and contains the number of passengers and fare for each itinerary. This data can then be aggregated to calculate the average fare in a market and the total number of origin and destination (O&D) passengers traveling between two cities.

DB1B also contains fields to filter out connecting itineraries, which is useful as this study will focus on direct flights. The DOT includes other useful fields to help filter the data. For example, the government agency flags certain itineraries with “non-credible” fares, which are usually quite high outliers. Itineraries with multiple ticketing carriers (interline itineraries) and bulk fares have also been eliminated.

It is very important that only O&D passengers be considered for this study, as raw traffic numbers will skew the results. For example, solely examining the traffic numbers on the Providence-Philadelphia route after Southwest’s entry would not provide meaningful results. Many of the passengers flying this route on US Airways are connecting to other cities in the US Airways network, and as such are not impacted by Southwest’s entry in the route. It is only valid to study passengers who are actually flying between the two cities.

While average fares are certainly interesting and worthwhile to examine for this research, it will also be useful to examine the distribution of fares in a market. A wider distribution of fares charged in a market could be an indicator of Southwest’s attempt to more effectively utilize revenue management techniques to exact the highest revenue possible from passengers.

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The most basic way to test for the presence of the “Southwest effect” is to look for the percentage change in passengers (listed as pax in data tables) and average fares. In addition, two types of statistical tests have been used to aid the analysis of the selected markets. The first is the Kolmogorov–Smirnov test, which will be used to compare the empirical distribution functions of fares from two different time periods. The test generates the statistic D, or the maximum distance between the two distribution functions. As such, higher levels of D would be expected when the greatest change in fares seen. A simple pooled two-sample t-test is also used to examine the magnitude and significance of the change in fare.

RESULTS

Boston

Market	Base Period	Comp Period	Pax Change	Avg. Fare Change	D	KS p-value	T score	T P-value
BWI	20091	20101	149.1%	-27.4%	0.221118	<.0001	48.78	<.0001
BWI	20091	20111	98.4%	-25.9%	0.326721	<.0001	40.08	<.0001
CHI*	20091	20111	42.8%	-21.3%	0.305002	<.0001	35.30	<.0001
CHI*	20091	20111	36.4%	-4.4%	0.137670	<.0001	6.93	<.0001
DEN	20092	20102	41.8%	-10.8%	0.253779	<.0001	12.98	<.0001
DEN	20092	20112	51.8%	-6.1%	0.214994	<.0001	7.64	<.0001
PHX	20101	20111	81.2%	-23.8%	0.322618	<.0001	16.41	<.0001
STL	20092	20102	-10.5%	16.3%	0.301967	<.0001	-10.91	<.0001
STL	20092	20112	-33.8%	27.0%	0.519334	<.0001	-17.52	<.0001
PHL	20094	20104	510.1%	-52.8%	0.455430	<.0001	84.35	<.0001

**Includes MDW and ORD*

For over a decade, Southwest did not serve Boston and told its customers to fly into Providence or Manchester instead. In 2009, however, the airline changed its mind and began serving Boston, initially from Baltimore (BWI) and Chicago-Midway (MDW), and service to other cities followed.

Philadelphia experienced the largest increase in passengers and the largest (and most significant) decrease in fares. This market alone would indicate that the “Southwest effect” is

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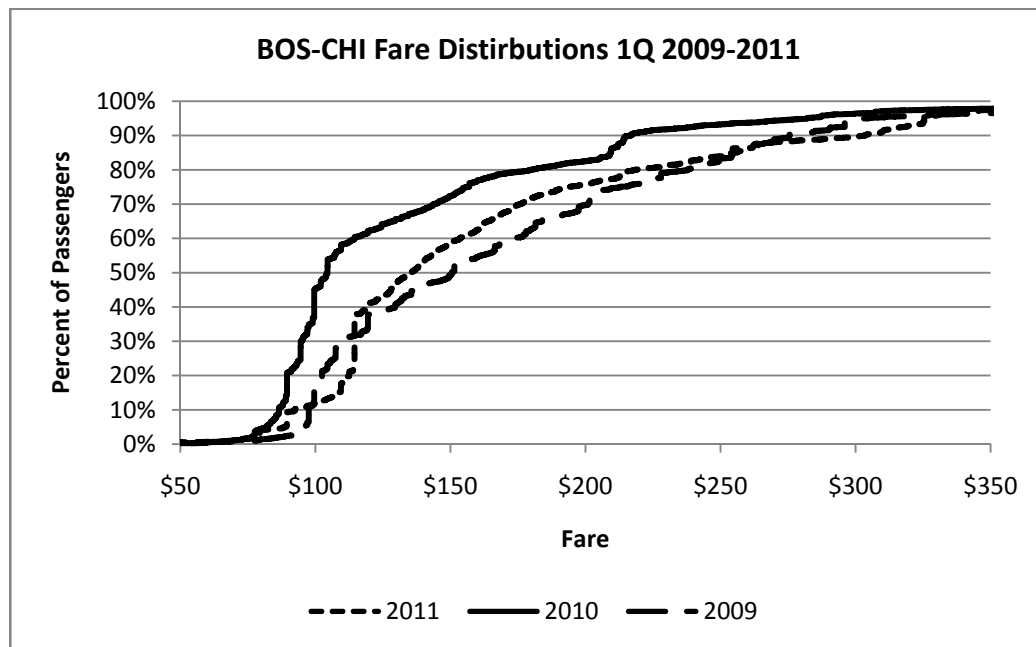
alive and well, and that Southwest can certainly stimulate a market when it wants to. But Southwest eventually decided to cease service on the route earlier this year, suggesting that the low fares being charged were the airline were not particularly sustainable.

Baltimore also experienced an increase in passengers and the biggest decrease in fares. Such a result is not surprising, especially since JetBlue began service on the route later in 2009. It should be noticed, however, that the increase in passengers and decrease in fares was less in the next period compared. A similar situation can be found in the Denver market.

In one market, St. Louis, passengers decreased and fares increased after Southwest’s entrance. Some of this change could perhaps be attributed to American’s dropping of the route. Today, Southwest is the only airline to serve the city pair.

The Chicago market is also notable – as one would expect, passenger numbers rose and fares decreased after Southwest’s entry. The difference in fares, shrunk significantly as the market matured. For example, the t-score for fare difference was 35.30 for a comparison of 2009 with 2010, but it shrunk to 6.93 for 2009 and 2011. The distribution of fares also shows this change. The 2010 fare distribution (the green line) is much further to the left than the 2009 distribution (the blue line), but the 2011 distribution is much closer to 2009 levels. The D statistic generated by the Kolmogorov-Smirnov test confirms this, as distance from the 2009 distribution decreased from 0.31 in 2010 to 0.14 in 2011.

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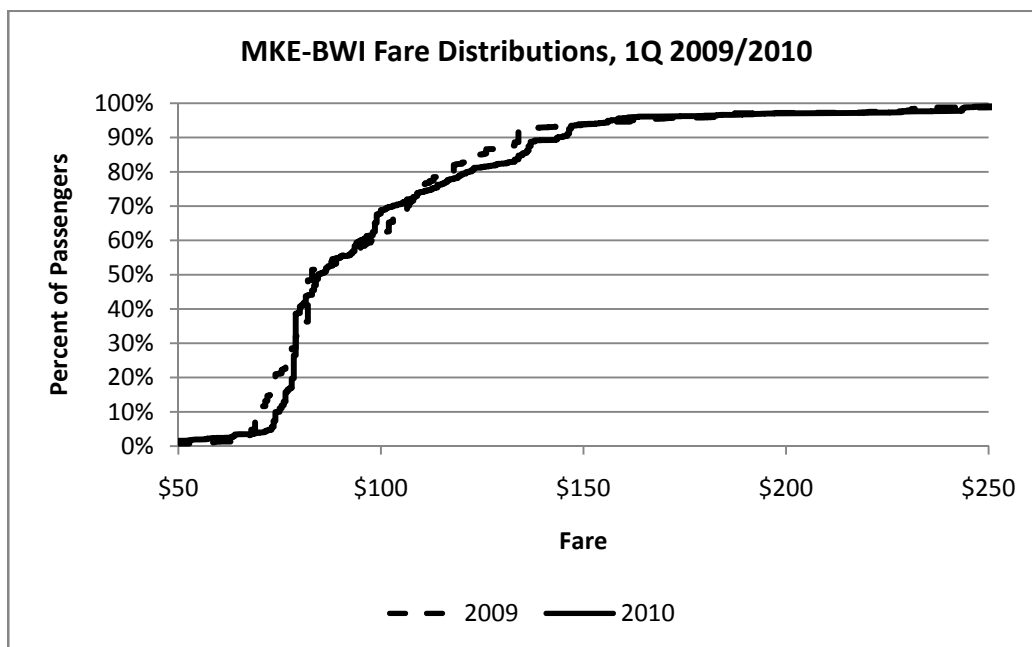


Milwaukee

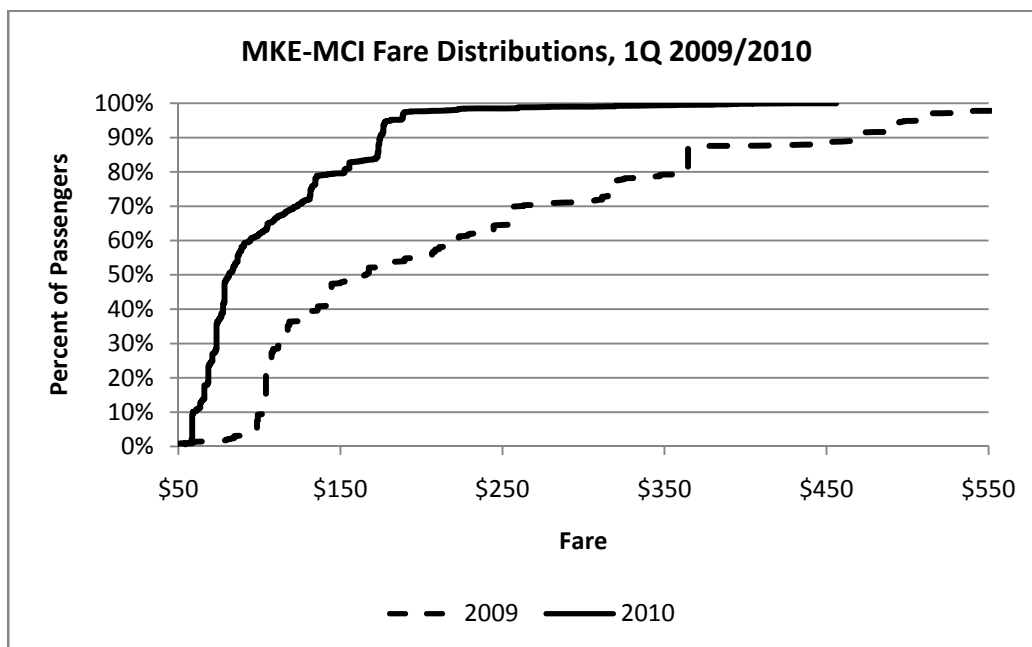
Market	Base Period	Comp Period	Pax Change	Avg. Fare Change	D	KS P-value	T score	T P-value
BWI	20091	20101	50.77%	0.70%	0.111385	<.0001	-0.63	0.5259
BWI	20091	20111	25.65%	24.19%	0.410165	<.0001	-16.62	<.0001
MCI	20091	20101	197.30%	-53.03%	0.571590	<.0001	36.39	<.0001
MCI	20091	20111	160.92%	-44.95%	0.409495	<.0001	29.18	<.0001
MCO	20091	20101	27.92%	-10.93%	0.254915	<.0001	19.31	<.0001
MCO	20091	20111	28.06%	-1.30%	0.159703	<.0001	2.13	0.0335

Southwest entered Milwaukee during a time of heated competition, as AirTran had quickly built up a Milwaukee focus city that competed with Midwest Airlines’ hub. AirTran’s presence seems to have tempered the effects of Southwest’s entrance. The change in average fares to Orlando, a city served by both Midwest and AirTran, was not particularly drastic. There was also passenger growth to Baltimore (where AirTran was the only competitor), but average fares were essentially unchanged between the first quarter of 2009 and 2010. In addition, there was not a large change in the distribution of fares.

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The largest changes in the average fare, number of passengers, and distance between fare distributions was seen on the Kansas City route, where Southwest was only competing with Midwest. While only a few routes are being analyzed here, the changes in the Milwaukee market indicate that at some times, the effects of a Southwest entry are minimized by the presence of another low-cost carrier.



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Minneapolis-St. Paul

Market	Base Period	Comp Period	Pax Change	Avg. Fare Change	D	KS P-value	T score	T P-value
CHI	20083	20093	53.00%	-61.54%	0.728878	<.0001	193.79	<.0001
CHI	20083	20103	40.15%	-50.27%	0.622310	<.0001	147.43	<.0001
CHI	20083	20113	34.36%	-44.41%	0.509076	<.0001	125.85	<.0001
STL	20092	20102	44.06%	-19.47%	0.250479	<.0001	18.70	<.0001
STL	20092	20112	41.10%	-17.32%	0.332355	<.0001	15.89	<.0001
DEN	20091	20101	22.05%	-12.51%	0.312960	<.0001	22.00	<.0001
DEN	20091	20111	31.15%	-3.51%	0.246585	<.0001	5.34	<.0001

It is clear that Southwest stimulated traffic from Minneapolis to Chicago and St. Louis, and also significantly reduced fares. These two effects, however, became more muted as time passed. In addition, according to the D statistic generated by the Kolmogorov–Smirnov test decreased as time passed, showing that the distance between two fare distributions decreased as the markets developed further.

Of the three markets examined, Denver experienced the smallest increases and passengers and decreases in fare. This effect could perhaps be attributed to the fact that Frontier Airlines, another low cost carrier, was also serving the market. Like the Milwaukee-Orlando and Milwaukee-Baltimore examples, the results in this market suggest that the effect of Southwest’s entry is more muted when low-cost carriers are already providing competition.

New York-LaGuardia (LGA)

Southwest started service from LaGuardia in 2009 with service to Baltimore and Chicago-Midway. LaGuardia is one of the few slot-controlled airports in the United States, and as a result it is very difficult to obtain access. Southwest was able to acquire LaGuardia slots from bankrupt carrier ATA Airlines to start eight daily flights.

Market	Base Period	Comp Period	Pax Change	Avg. Fare Change	D	KS P-value	T score	T P-value
BWI	20091	20101	667.92%	-36.58%	0.500440	<.0001	10.68	<.0001
BWI	20091	20111	292.45%	-26.62%	0.516464	<.0001	6.88	<.0001
CHI	20091	20101	49.29%	-24.93%	0.433096	<.0001	59.21	<.0001
CHI	20091	20111	58.65%	-12.00%	0.188263	<.0001	30.23	<.0001

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Baltimore-LaGuardia is an outlier in this study because there were huge increases in traffic paired with higher fares. This result is likely due to the fact that there was very little capacity between the two cities. Once Southwest entered the markets, some passengers may have switched from flying to other (higher-fare) flights to other Washington, DC airports to Baltimore instead. Nevertheless, the huge traffic increases decreased as Southwest raised fares further.

Southwest’s entrance into the LaGuardia-Chicago market certainly stimulated it, providing passenger growth and fare decreases that were highly statistically significant. Fares began to rise again, however, as the market began to mature.

Newark

The Department of Justice required that some slots at Newark be divested in order for the merger between Continental and United to be approved. As a result, a deal was struck for Southwest to receive the slots and begin service. Southwest first launched service to Chicago and St. Louis.

Market	Base Period	Comp Period	Pax Change	Avg. Fare Change	D	KS P-value	T score	T P-value
CHI	20103	20113	23.90%	-8.77%	0.213975	<.0001	14.63	<.0001
STL	20103	20113	95.94%	-32.90%	0.303105	<.0001	26.66	<.0001

Southwest stimulated both markets, but the effects of its entry were greater in St. Louis. The greater effect in this market could be attributed to the competitive situation on these routes: Chicago is served by both United and American, while St. Louis is only served United. It should be noted, however, that Southwest’s Newark station has been open for slightly more than a year, and as a result this market should be re-visited in the future. At the time of this writing, there is not enough data to examine some of the other markets served from Newark, like Denver and Houston.

Oakland

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This study has primarily focused on Southwest’s new markets, but three major Oakland routes were also examined to link this research back to prior examinations of Southwest. The original DOT study that coined the term “Southwest Effect” focused on intra-California routes, many of which involved Oakland. The authors of the study, NAMES, warned that the “Southwest Effect” could wear off over time. “Without a competitive discipline, over time Southwest’s fares will increase to cover cost inefficiencies that will creep in, and to extract monopoly profits,” they argued.

The intra-California market has shifted greatly since the Southwest effect was originally studied, as legacy competitors have reduced their presence. United Airlines, for example, had created the airline-within-an airline United Shuttle to better compete with Southwest, but ended up dropping the concept. As a result, Southwest was left with a monopoly on many routes. Three major intra-California markets were examined to judge recent developments:

Market	Base Period	Comp Period	Pax Change	Avg. Fare Change	D	KS P-value	T score	T P-value
LAX	20053	20073	-10.28%	-0.71%	0.357053	<.0001	2.91	.0036
LAX	20053	20093	-49.75%	13.27%	0.397915	<.0001	-44.70	<.0001
LAX	20053	20113	-53.39%	42.56%	.524078	<.0001	-117.81	<.0001
ONT	20053	20073	-3.83%	-2.11%	0.291614	<.0001	7.12	<.0001
ONT	20053	20093	-33.64%	13.08%	0.35046	<.0001	-34.48	<.0001
ONT	20053	20113	-42.93%	48.20%	0.555755	<.0001	-104.17	<.0001
BUR	20053	20073	2.56%	-2.54%	0.375436	<.0001	11.46	<.0001
BUR	20053	20093	-21.05%	12.14%	0.438665	<.0001	-40.58	<.0001
BUR	20053	20113	-29.89%	41.26%	0.598319	<.0001	-125.03	<.0001

All three markets have seen passengers decrease along with fare increases of increasing significance. In addition, the *D* statistic increased in each market, showing an increased difference in the fare distributions. In all three markets, Southwest either now has a monopoly or carries the vast majority of passengers. The results in these three markets would indicate that the authors’ concerns over 20 years ago were justified.

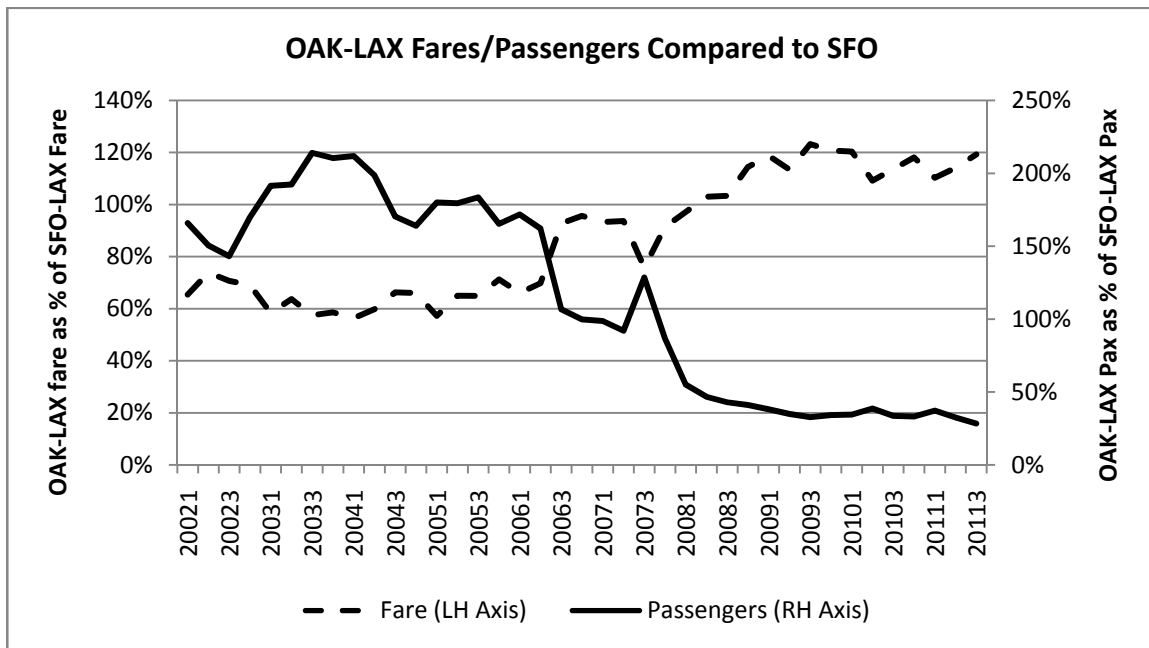
Of particular note is the significant decline in passengers on the Oakland-Los Angeles route is attributable to multiple factors. Increasing fares on the route could certainly temper demand,

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but increased competition on the San Francisco-Los Angeles route is another factor.

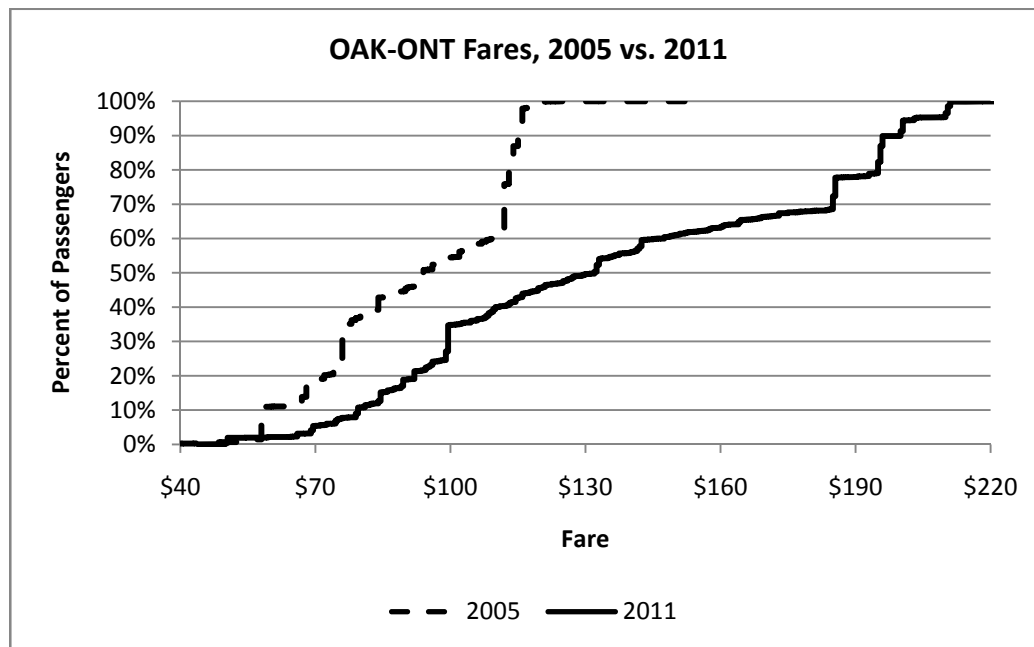
Southwest resumed service at San Francisco in late 2007, and its initial batch of destinations included Los Angeles. Start-up carrier Virgin America inaugurated service in the same year, and Delta entered the market in 2009.

Since more airlines have started the SFO-LAX route and some have ended the OAK-LAX route, the relationship between the two routes has greatly changed. Early last decade, there were significantly lower fares on the OAK-LAX route, and many more passengers flew this routing than SFO-LAX. Today, however, the opposite is true: OAK-LAX fares are higher, and more passengers fly SFO-LAX.



The distribution of fares in the intra-California markets also experienced changes. For example, there was very little variation in fare, especially among higher fares, in the Oakland-Ontario market in 2005. The distribution of fares in 2011 is quite different. The standard deviation of fare in the third quarter of 2011 was \$47.10, more than double its 2005 value.

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CONCLUSIONS

Only a sliver of Southwest’s massive network was examined in this study, but many important conclusions can be drawn. First, Southwest has continued to stimulate traffic and lower fares on some of its new routes, but these effects appear to wear off after time as these new markets mature. In addition, these effects can be muted if strong competition, especially from a low-cost carrier, already exists on a route. Additional analysis indicates that once Southwest dominates a market, the carrier begins to increase prices, resulting in decreased demand.

FUTURE RESEARCH

In an industry as dynamic as the airlines, there are always opportunities for further research of many topics. One interesting topic is the expansion of Spirit Airlines, which calls itself an ULCC, or ultra-low cost carrier. The airline has recently added flights that compete with Southwest’s in markets like Chicago-Minneapolis and Los Angeles-Las Vegas. The fact that another airline is now attempting to undercut Southwest shows how much Southwest has

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changed over the past few years. Much of Spirit’s domestic expansion, however, has been very recent, and as a result there is not much government data to study.

Southwest’s acquisition of AirTran last year will also provide an opportunity for further research, especially in terms of judging how Southwest adjusts AirTran’s business model. While there have already been plenty of changes, especially the elimination of service at many smaller airports, many steps in the integration remain. For example, Southwest continues to maintain the AirTran brand, and passengers are still not able to connect between the networks of the two airlines.

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