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NETWORK VS. LCC COMPETITION AND AIRFARES: NEW EMPIRICAL EVIDENCE FROM THE US¹

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One of the most vexing questions plaguing the global airline industry is why it remains consistently unprofitable over an entire business cycle. Between 2000 and 2009, for example, it is estimated that the global airline industry incurred net losses in excess of \$52 billion dollars and over a much longer period (i.e., 1980-2009), industry wide net losses are estimated to be approximately \$16 billion. One commonly posited explanation for the airline industry's inability to earn positive economic returns over the business cycle is that it remains too fragmented, is characterized by excess capacity, and thus is particularly susceptible to exogenous shocks (e.g., September 11th, SARS, spike in oil prices, etc.) which have become all too frequent. Numerous industry executives and analysts have therefore argued that consolidation is necessary in order for the industry to evolve to the point where it can achieve long run economic stability. Proponents of consolidation argue that mergers enable carriers to realize significant cost savings through the more efficient use of back office, overhead and airport resources and by optimizing fleet resources across a broader route network to better match supply with demand on any given route. Likewise, a merged carrier—it is argued—is able to generate enhanced revenue opportunities by offering travelers a more attractive network with more efficient and frequent schedule options and non-stop service to new destinations.

The forces driving industry consolidation appear to have gained traction across the globe. In October 2008, Delta Air Lines and Northwest Airlines merged to form the world's largest airline, a title previously held by Air France/KLM (itself the result of a merger in 2004). Likewise, over the past several years, Lufthansa Group has acquired several carriers, including SWISS, Austrian, BMI and Germanwings and also has acquired significant ownership stakes in several other carriers including Brussels Airlines and US low cost carrier jetBlue. Southwest Airlines, the world's largest "low cost carrier" attempted (unsuccessfully) to engineer its own merger, by bidding to acquire Denver-based Frontier Airlines out of Chapter 11 bankruptcy.

¹ The views expressed in this editorial are those of the authors and do not reflect those of LECG, LCC or any other of its experts.

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The trend towards consolidation has not been universally praised. Indeed, critics of consolidation point to the potential for “mega carriers” to exercise market power. These concerns, however, are often based on long-standing (and generally unchallenged) beliefs regarding the nature of competition in the airline industry, which in turn are often informed by academic studies that are based on data from more than 20 years ago. For example, both the US Department of Justice and European Commission still rely on published studies from the early 1990s that examined the expected “price effects” of reducing the number of network carriers on a given route. These studies found, for example, that reducing the number of network carriers from two to one on a given airport pair could be expected to raise fares by between 7% and 8%, while reducing the number of network carriers from three to two is expected to raise fares by 4%-6%.⁵ However, the industry has undergone numerous structural changes since these studies were carried out, including the proliferation of LCCs, increased price transparency as a result of Internet based search and booking channels, numerous bankruptcies and mergers, divestiture of airline owned GDSs and the blurring distinction between business and leisure passengers. In light of these dramatic changes and the likely trend toward continued consolidation, a comprehensive reappraisal of competition and airfares is long overdue.

We have recently completed a new, comprehensive research study of competition and prices in US domestic airline markets.⁶ The US domestic aviation market provides a unique opportunity to study the likely price impacts resulting from potential consolidation. Not only have LCCs successfully penetrated most large US domestic routes over the past two decades, but unlike most of the rest of the world, there is highly detailed, publicly available data in the US collected by the Department of Transportation (a 10% sample of all tickets sold regardless of channel) that allows researchers like ourselves to conduct detailed and rigorous empirical analyses. Our study builds on the earlier published “price effect” studies, but also incorporates findings from more recent studies in the academic literature addressing the evolving competitive dynamics shaping the industry, in particular LCC competition. Our primary empirical question is simple: *What is the expected price effect of reducing the number of non-stop network carriers⁷ on average fares on an airport-pair route?* In order to answer this question, we used what economists refer to a “reduced form” econometric model. Our model includes variables that capture the expected price effect of the incremental second and third non-stop network carriers on a route, as well as the price effect from an additional non-stop network carrier providing service on an “adjacent” route.⁸ Our econometric model also controls for four categories of factors that are posited to impact average fares on a given airport pair, including:

1. **Competition on the airport pair**, that can be in the form of both non-stop and connecting service, and offered by both LCCs⁹ and network carriers;
2. **Competition on “adjacent” airport pairs**, which can be from non-stop and connecting services offered by both LCCs and other network carriers (for example BWI-MDW on DCA-ORD, HOU-DEN on IAH-DEN, etc.)¹⁰;

⁵ See, for example, Jan Brueckner, Nichola Dyer, and Pablo T. Spiller, “Fare Determination in Airline Hub and Spoke Networks,” *RAND Journal of Economics* 23 (1992), 309–333 or Jan Brueckner and Pablo T. Spiller, “Economies of Traffic Density in the Deregulated Airline Industry,” *Journal of Law and Economics* 37 (October 1994), 379–415.

⁶ See *Airline Competition and Domestic U.S. Airfares: A Comprehensive Reappraisal*, by Jan K. Brueckner, Darin Lee and Ethan Singer, unpublished working paper, soon available for download at <http://www.darinlee.net> and <http://lecgaviation.com>. See also:

<http://www.hamburg-aviation-conference.de/pdf/present2010/Session-V-Darin-Lee.pdf>

⁷ The “legacy” (or network) carriers in our study include American, Continental, Delta, Northwest, United, US Airways, Alaska and Midwest.

⁸ For example, the effect on prices for New York (LaGuardia) to Buffalo service from a network carrier offering Buffalo service from nearby JFK or Newark airports.

⁹ The LCCs in our study include Southwest, AirTran, Allegiant, Frontier, jetBlue, Spirit, Sun Country and Virgin America. Because we find that Southwest has a significantly larger competitive effect than the other LCCs in our study, to simplify our analysis, we group all LCCs except Southwest into a single category we call “other LCCs”.

3. **Potential competition** by LCCs – Recent research has shown that the threat of entry on the airport-pair or adjacent airport pair (as measured by a carrier serving both endpoints, but not the actual route non-stop) can lower fares¹¹; and
4. **Route and Itinerary characteristics** such as distance, endpoint demographics, vacation, slot constraints, etc.

Our model is then estimated on a cross section of approximately 1,500 US airport-pairs using data from the four quarters ending Q2-2008 (just prior to the announcement of Delta/Northwest merger). For comparative purposes, we also estimated our model using data from 2000. To test the robustness of our results, we estimated models using a wide variety of econometric techniques, including the weighting of routes by passengers, and aggregating the data up to the “market” level.

Some key findings of our study are summarized in Table 1. Column (1) shows the results for the “base” model for year ending 2008-Q2, and most closely follows the estimation techniques from the earlier published literature.¹² Column (2) shows the results when data is aggregated at the “market” level and weighted by passengers.¹³ Finally, Column (3) repeats the same estimation method as in Column (2) but with data from 2000.

An examination of the results summarized in Table 1 yields some startling conclusions. First, in the “base” model, the impact of eliminating a network carrier on an airport pair has no expected effect on airfares, even when only a single network carrier remains. Likewise, the impact of eliminating a network carrier on an adjacent airport-pair also has no expected price effect. In contrast, LCC competition, be it on the same airport-pair, an adjacent airport pair, or via “potential” competition have large expected (negative) price effects.

Table 1: Estimated Price Effects	(1)	(2)	(3)
Estimated Price Effect On An Airport Pair From:	Base Model (YE 2000-Q2)	Market Weighted Model (YE 2008-Q2)	Market Weighted Model (2000)
Reducing Number of Network Carriers on an airport pair from two to one	No effect*	Raises Fares By 3.9%	Raises Fares By 11.8%
Reducing Number of Network Carriers on an airport pair from three to two	No effect*	No effect*	Raises Fares By 4.1%
Incremental network carrier on an adjacent airport pair	No effect*	No effect*	Lowers Fares By 5.4%
Southwest Non-Stop Presence on an airport pair	Lowers fares by 29.3%	Lowers fares by 27.2%	Lowers fares by 46.2%
Non-Stop Presence of an LCC other than Southwest on an airport pair	Lowers fares by 12.6%	Lowers fares by 17.6%	Lowers fares by 27.3%
Non-Stop Presence by Southwest an Adjacent Airport Pair	Lowers fares by 12.7%	Lowers fares by 17.0%	Lowers fares by 38.7%
Non-Stop Presence by an LCC other than Southwest on an Adjacent Airport Pair	Lowers fares by 4.7%	Lowers fares by 6.4%	No Effect*
Southwest as a Potential Entrant on an airport pair	Lowers fares by 9.3%	Lowers fares by 9.9%	Lowers fares by 17.7%
Potential LCC Entrant other than Southwest on an airport pair.	Lowers fares by 3.9%	No Effect*	No Effect*

*No statistically significant effect at the 5% level of confidence.

¹⁰ Airports that are considered “adjacent” to one another in our study are: Chicago (ORD, MDW), Cincinnati (CVG, DAY), Cleveland (CLE, CAK), Dallas (DFW, DAL), Houston (IAH, HOU), Los Angeles (LAX, BUR, LGB), Miami (MIA, FLL), New York (LGA, EWR, JFK), San Francisco (SFO, OAK), Tampa (TPA, PIE), Washington, DC (DCA, IAD, BWI).

¹¹ See Goolsbee, Austan, and Chad Syverson, “How do Incumbents Respond to the Threat of Entry? Evidence from Major Airlines,” *Quarterly Journal of Economics*, vol. 123 (2008), 1611-1633.

¹² In the base model, the data is kept disaggregated across carriers and all markets are weighted equally irrespective of the number of passengers.

¹³ In the market weighted model, the data is aggregated at the market level with each carrier’s data weighted by passengers, and markets are also weighted according to passengers.

When data is aggregated to the market level and weighted so that large markets have more influence, the results change slightly. Now, reducing the number of network carriers from two to one on an airport pair is expected to increase fares modestly, by approximately 3.9%.¹⁴ However, there is still no expected price effect from a three-to-two reduction, or from eliminating a network carrier on an adjacent airport pair. Like Column (1), the price effect from various types of LCC competition are large and negative.

One of the most startling findings of our study is found in Column (3), which reruns the “market” model from Column (2) with data from 2000. Here, we see that a reduction from two to one network carriers in 2000 raised fares by nearly 12% (vs. 3.9% today), while reducing the number of network carriers from three to two raised fares by over 4% (vs. no effect today). Moreover, eliminating a network carrier on an adjacent airport pair in 2000 raised fares by over 5% (vs. no effect today).

What drives these results? We believe that two main forces are at work. First and foremost is the pervasive growth of LCCs such as Southwest, jetBlue and AirTran. Collectively, LCCs now transport approximately one out of every three US domestic O&D passengers (up from one-in-five in 2000 and one-in-twenty in 1990). More importantly, in 2009, US LCCs served 456 of the largest 500 domestic O&D city-pairs non-stop. In short, because US LCCs have dramatically increased the geographic breadth of their service and because they enjoy much lower operating costs (when correctly adjusted for differences in average stage length), they have become the primary competitive force affecting domestic airfares. The second important factor that has evolved over the past decade that keep airline prices in check are Internet based search and booking tools such as Orbitz, Expedia and Travelocity, which accounted for only 6% of US airline tickets in 2000, but 56% in 2008.¹⁵ These websites have resulted in unprecedented price transparency and the ability for consumers to quickly shop for the cheapest fare with the simple click of a mouse which in turn has increased the competitive discipline provided by LCCs (relative to network carriers).

In sum, as the global airline industry searches to regain its footing after its worst two-year financial performance in history¹⁶ and the steepest single year drop in traffic in the post-war era¹⁷, many industry participants are pointing to further consolidation as a prudent next step towards creating a sustainable and healthy industry. The results from our recent study, which we believe is the most comprehensive study of competition and airfares undertaken to date, strongly suggests that network carrier mergers would have only a marginal impact on aggregate airfares if—as is the case in the US domestic market—LCCs have passed the proverbial “tipping point” in terms of market share, geographic breadth and customer acceptance.

The views expressed in this article are the author’s and not necessarily those of IATA.

¹⁴ When LCC share of O&D passengers in the city-pair is 45% or higher, this effect becomes statistically insignificant.

¹⁵ See, *Internet Sales of Airline Tickets*, Statement of the Honorable Kenneth M. Mead, Inspector General, U.S. Department of Transportation, Report Number: CR-2000-111, July 20, 2000 and *Presentation by Orbitz Worldwide, 2009 Citi Global Entertainment, Media & Telecommunications Conference*, January 7, 2009.

¹⁶ See http://www.iata.org/whatwedo/economics/Documents/Industry_Outlook_Dec09.pdf

¹⁷ See <http://www.iata.org/pressroom/pr/2010-01-27-01.htm>