Assessing the Impact of Subsidized Gulf Carrier Expansion on U.S.-International Passenger Traffic

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1) Introduction

Compelling evidence has recently emerged that three of the world's largest and fastest growing airlines—Emirates Airline ("Emirates"), Qatar Airways ("Qatar"), Etihad Airways ("Etihad"), (collectively the "Gulf carriers")—have been the beneficiaries of over $40 billion dollars of state subsidies and other unfair advantages over the past decade.[1] Although Gulf carrier expansion to the United States is still in early stages, each of the Gulf carriers has stated its intention to make the United States a focal point for their future growth.[2] In just the past two months, for example, Emirates has announced that it would add its 10th U.S. destination (Orlando, effective September 1, 2015) and double its daily frequencies between Dubai and Seattle (effective July 7, 2015) and Boston (effective October 1, 2015).[3] More recently, Qatar announced that it would add new daily non-stop service between its Doha hub and Los Angeles (effective January 1, 2016), Boston (effective March 16, 2016) and Atlanta (effective July 1, 2016), as well as an additional daily frequency to New York City (effective March 1, 2016).[4] In light of the magnitude of the documented Gulf carrier subsidies and their aggressive U.S. expansion plans going forward, this paper provides an empirical analysis of the impact that subsidized Gulf carrier expansion has had on international passenger traffic to/from the United States.

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[1] *See* Charles Anderson, "Evidence of Actionable Government Subsidies Received by Etihad Airways, Qatar Airways, and Emirates Airlines", CapTrade Whitepaper, January 25, 2015.

[2] *See, e.g.* "Emirates Airline President Plans to Rebut Subsidy Allegations," Dow Jones Newswire, March 17, 2015, noting that Tim Clark, the CEO of Emirates, stated that Emirates plans to increase the number of airports served in the United States from nine to 20; "Emirates Air Planning Expansion of U.S. Rivals' Home Turf", *Bloomberg* (September 22, 2014), noting that "Emirates Airline, the largest international carrier, is planning an expansion that would make the U.S. market one of its three largest sources of revenue" and quoting Emirates CEO Tim Clark ("[the U.S.] is hugely important"); "Airline Eyes More US Destinations," *Gulf Times* (Apr. 13, 2013), quoting Qatar Airways CEO Akbar Al Baker ("The United States remains a focal point for the airline") and "Etihad Eyes US Expansion," *Emirates24/7.com* (Nov. 14, 2012), quoting Etihad CEO James Hogan ("…we are also keen to expand further in the US and are examining a number of other destinations, particularly on the West Coast").

[3] *See* "Emirates to make Orlando its 10th U.S. destination", *USA Today*, March 24, 2015; "Emirates Adds 2nd daily Seattle Service from July", http://airlineroute.net/2015/03/24/ek-sea-jul15/; and "Emirates Adding Second Daily Dubai-Boston Flight", *TravelPulse*, April 13, 2015.

[4] *See* "Qatar Airways Set to Expand its USA Network with the Addition of Three New Routes", Qatar Airways Press Release, May 4, 2015. http://www.qatarairways.com/global/en/press-release.page?pr_id=pressrelease_usa.

One common justification for the Gulf carriers' torrid rate of capacity growth has been that they "stimulate demand".[5] However, based on an analysis of a wide variety of standard industry data sources (e.g., capacity and schedule data from the Official Airline Guide ("OAG"), passenger data from the U.S. Department of Transportation's origin and destination survey database ("DB1B") and passenger booking data compiled by a variety of global distribution systems ("GDSs"))[6], we find that Gulf carriers' expansion to the United States *has failed to meaningfully stimulate additional traffic*. For example, notwithstanding the flood of new capacity that was added between the United States and Dubai, Doha and Abu Dhabi from 2008 to 2014 (i.e., approximately 11,000 daily seats, more than 95% of which was added by the Gulf carriers), origin and destination ("O&D")[7] traffic between the United States and the three Gulf carrier hubs over this period remained essentially flat. Similarly, traffic growth between the United States and the Gulf carriers' largest source of U.S. traffic (the Indian subcontinent) has lagged behind traffic growth between the United States and other Asian countries with similar rates of economic growth (e.g., China and South Korea), but where excess circuity has (thus far) prevented the Gulf carriers from capturing a meaningful share of passenger traffic to/from the United States. Moreover, a statistical (i.e., regression) analysis of passenger traffic at the city-pair[8] level for the period from 2008 to the third quarter of 2014 indicates that Gulf carrier

[5] *See*, for example, CAPA Americas summit debate in US and Gulf carriers, 28-Apr-2015, (video available at http://centreforaviation.com/analysis/capa-americas-aviation-summit-las-vegas-a-high-level-gulf-us-airline-debate---video-221863), with Jim Callaghan of Etihad starting at 12:25 (authors' transcription): *"My flight from Abu Dhabi to Los Angeles on Etihad Airways, 777 Boeing aircraft, made in the USA, capacity of 225 people, load 215 – 95% load factor. We had passengers from 18 destinations who joined the flight in Abu Dhabi and flew 16 hours to get to Los Angeles, actually it was less than 16 hours, we had a good tail wind. But these are folks who otherwise would not have been able to get to the U.S. There were two of those destinations that were actually served by U.S. carriers – two out of 18. Now, either those folks wouldn't have been able to travel to the U.S. or they would have to take two or three stops before getting here. Pretty sure most of them wouldn't have come here." See also* Keynote Address by John R. Byerly, Strategy Summit – Routes Americas in Denver, February 1, 2015: "With respect to the Gulf carriers, a recently published study by Professor Martin Dresner of the University of Maryland and several colleagues demonstrates convincingly that Emirates, Qatar, and Etihad have succeeded in the U.S. market, not because they are 'stealing' traffic from U.S. airlines, but because they opened new markets to places like India, Africa, and the Middle East that U.S. airlines largely ignored."

[6] The various data sources used to conduct the analyses contained within this paper are described in Appendix A.

[7] O&D ("origin and destination") passengers (also referred to as "local" passengers) are counted based on the starting and ending point of a passenger's journey, regardless of whether or not they make a connection. For example, a passenger traveling from New York City to Mumbai making a connection in Dubai is counted as an O&D passenger for New York City and Mumbai (but not for Dubai).

[8] A "city-pair" is a standard method of defining a market in the airline industry based on passengers traveling between one city or metropolitan area and another (e.g., New York City-Hyderabad). Because several large metropolitan areas are served by multiple airports (e.g., the New York City region has three main airports: John F.

presence has failed to meaningfully stimulate additional traffic (i.e., on average, the presence of Gulf carriers on a city-pair to/from the United States does *not* have a statistically significant impact on traffic levels on the city-pair after controlling for other factors that affect passenger demand such as per capita income and population).

Because subsidized Gulf carrier capacity additions have failed to meaningfully stimulate additional traffic to/from the United States, Gulf carrier share gains have come *at the expense of U.S. and other carriers*. For example, our regression analysis demonstrates that the presence of each Gulf carrier with as little as a 3% share on a city-pair reduces the number of passengers on U.S. carriers on that city-pair by approximately 8% on average (i.e., when all three Gulf carriers are present on a U.S. international city-pair, U.S carrier passengers are—on average—24% lower than they would otherwise be, but for Gulf carrier presence). Regression analysis also demonstrates that on city-pairs to/from U.S. cities served by all three Gulf carriers where each of the Gulf carriers has at least a 10% share, U.S. carrier passengers have been reduced by 50%, on average.

The traffic losses that U.S. carriers have suffered as a result of Gulf carriers' subsidized U.S. expansion have already had a profound adverse impact on the U.S. carriers, and its effect will only grow worse as Gulf carriers' expansion to the United States continues. For example, since the start of the proliferation of subsidized Gulf carrier capacity to the United States (approximately half of which is used to serve passengers between the United States and the Indian Subcontinent *via the Gulf),* both Delta and American have discontinued their daily non-stop flights between the United States and India. Moreover, subsidized Gulf carrier expansion has also severely undermined U.S. carriers' ability to *expand* their non-stop service from the United States not only to the Indian subcontinent and other growing regions of the world,[9] but

Kennedy International ("JFK"), Newark Liberty International ("EWR"), and LaGuardia ("LGA")), a given city-pair (e.g., New York City-Hyderabad) may consist of multiple airport-pairs (e.g., JFK-HYD, EWR- HYD, LGA- HYD).

[9] It is important to emphasize that the deleterious effects of Gulf carriers' subsidized expansion on U.S. carriers is not limited to city-pairs between the United States and the Middle East or the Indian subcontinent. For example, in only seven years (i.e., between 2008 and 2014) Gulf carriers' share of bookings between the eastern third of the United States and many countries in Southeast Asia such as Thailand, Malaysia, Indonesia and the Philippines grew more than ten-fold. Source: MIDT.

also to the hubs of their joint venture ("JV"[10]) or other alliance partners in Europe or Asia, where many U.S. carrier passengers make connections to/from their overseas destination.

The remainder of this paper is organized as follows. Section 2 documents some key facts regarding Gulf carriers' expansion to the United States and provides examples demonstrating that the Gulf carriers' U.S. expansion has failed to meaningfully stimulate additional traffic. Section 3 presents the econometric analysis assessing the impact of Gulf carrier presence on U.S.-international passenger traffic, both for non-Gulf (e.g., U.S.) carriers as well as the total traffic levels of all carriers (including the Gulf carriers). Section 4 provides concluding remarks.

2) A Basic Analysis of Passenger Booking Data Demonstrates That Gulf Carriers Have Failed to Meaningfully Stimulate Additional Traffic to/from the United States

Gulf carriers (and their advocates) have frequently argued that their services stimulate new traffic.[11] As described below, however, an analysis of passenger booking data[12] shows that the Gulf carriers have *failed to meaningfully stimulate new traffic* to and from the United States. As a result, the traffic gains enjoyed by the Gulf carriers due to their subsidized expansion to the United States (and elsewhere) have come at the expense of U.S. and other carriers.

Increased Gulf carrier capacity on routes between the United States and Gulf carrier hubs could—*in theory*—be expected to stimulate demand for two types of travel: (1) travel between the United States and the Gulf carriers' hub cities (i.e., Dubai, Doha and Abu Dhabi), and (2) travel between the United States and points *beyond*/*behind* the Gulf carriers' hubs, such as

[10] Each of the U.S. large network carriers is party to one or more international joint venture ("JV") agreements with other international carriers. Under these JV agreements—which require regulatory approval—the JV partners are permitted to coordinate prices and schedules for all services under the defined geography of the agreement. Moreover, a regulatory requirement of these JV agreements is that the member carriers are indifferent about which carrier transports any particular passenger, a condition known as "metal neutrality." Metal neutrality is typically achieved through some form of revenue or profit sharing agreement whereby all revenues or profits generated by the JV partners (for the defined geography) is pooled and shared according to pre-defined formulas. For the purposes of this paper, the U.S. carrier's JV partners include: Delta Air Lines (Air France/KLM, V-Australia, Alitalia, Virgin Atlantic), American Airlines (British Airways/Iberia, Qantas, JAL), United Airlines (Lufthansa, Swiss, Brussels, Austrian, Air Canada, ANA).

[11] *See* footnote 5 above.

[12] Throughout this paper, we rely on Marketing Information Data Tapes data ("MIDT"), which—as described in Appendix A—reflect airline "bookings" made through GDSs. Although the number of bookings may differ from the actual number of flown passengers, the overall trends based on MIDT booking data are generally understood to reflect the trends of actual flown passengers for long-haul international travel. For the purposes of this paper, bookings are measured directionally (i.e., a round-trip itinerary generates two bookings).

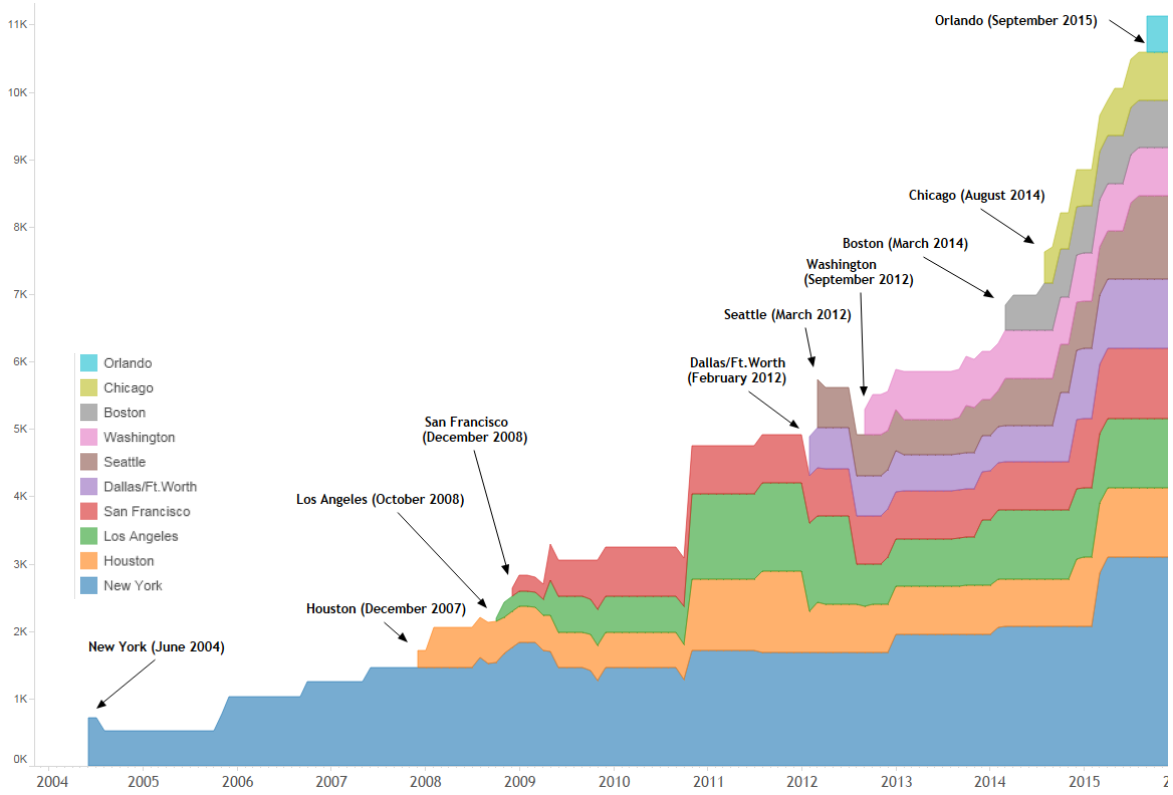
to/from the Indian subcontinent. However, an analysis of MIDT booking data from 2008 to 2014 indicates that Gulf carriers have failed to meaningfully stimulate additional traffic of either type.

a) Gulf carriers have failed to meaningfully stimulate additional local traffic to/from their hub cities

Because most carriers' international hubs are based in cities that generate substantial demand for local air transportation (i.e., service to/from the hub city), new international non-stop routes are typically expected to stimulate significant amounts of local passenger demand from travelers that had previously been unable to fly between the two endpoints without making a connection. As shown in Exhibit 1, to date, Emirates has added new non-stop service between its hub in Dubai and eight U.S. cities since the end of 2007 (in addition to its inaugural U.S. service to New York City which it launched in 2004).[13]

[13] As noted above and as shown in Exhibit 1, Emirates will add its 10th U.S. destination on September 1, 2015, when it begins daily non-stop service between Dubai and Orlando.

EXHIBIT 1: AVERAGE DAILY SEATS AND LAUNCH DATES OF EMIRATES' NON-STOP SERVICE TO U.S. CITIES FROM DUBAI

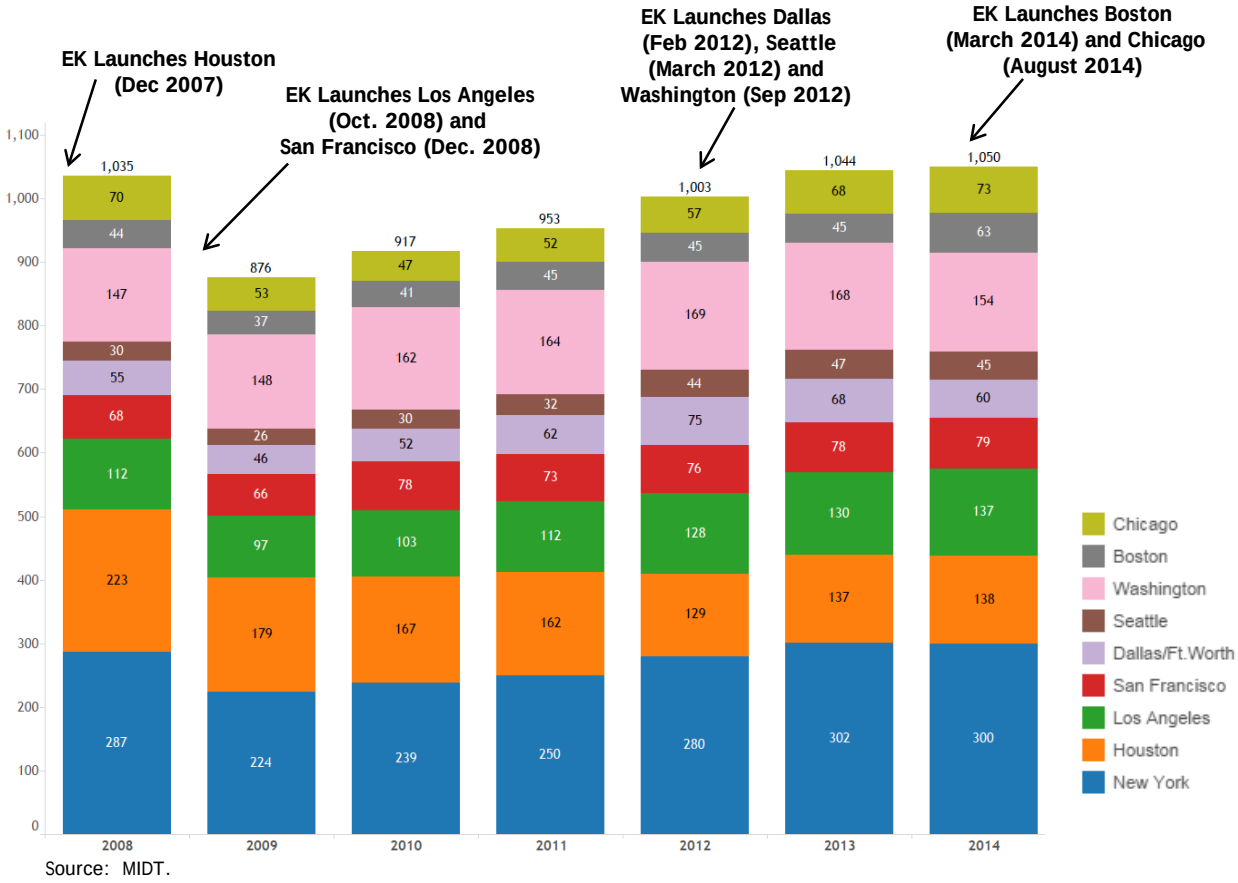


Source: OAG.
Notes: Excludes Emirates service between Milan and JFK.

Despite the addition of over 5,000 daily seats by Emirates between Dubai and the carrier's nine current U.S. destinations between 2008 to 2014, aggregate average daily bookings by local passengers (across all carriers) on these routes has remained relatively flat, as shown in Exhibit 2. This lack of booking growth suggests that there was little—if any—unmet demand for travel between these U.S. cities and Dubai prior to 2008.[14]

[14] When the MIDT booking data shown in Exhibit 2 is adjusted to reflect passengers that made their travel plans using non-GDS channels by scaling bookings in MIDT to the U.S. DOT's T-100 passenger data, there was a net addition of only 57 passengers between the first three quarters of 2008 and the first three quarters of 2014, reflecting a compound average annual growth rate ("CAGR") of only 1.0%. By way of comparison, Emirates grew its average daily seats between Dubai and its nine U.S. gateway cities between 2008 and 2014 at a CAGR of 22.7%. Source: OAG.

EXHIBIT 2: AVERAGE DAILY BOOKINGS BETWEEN EMIRATES' U.S. GATEWAYS AND DUBAI (ALL CARRIERS), 2008-2014

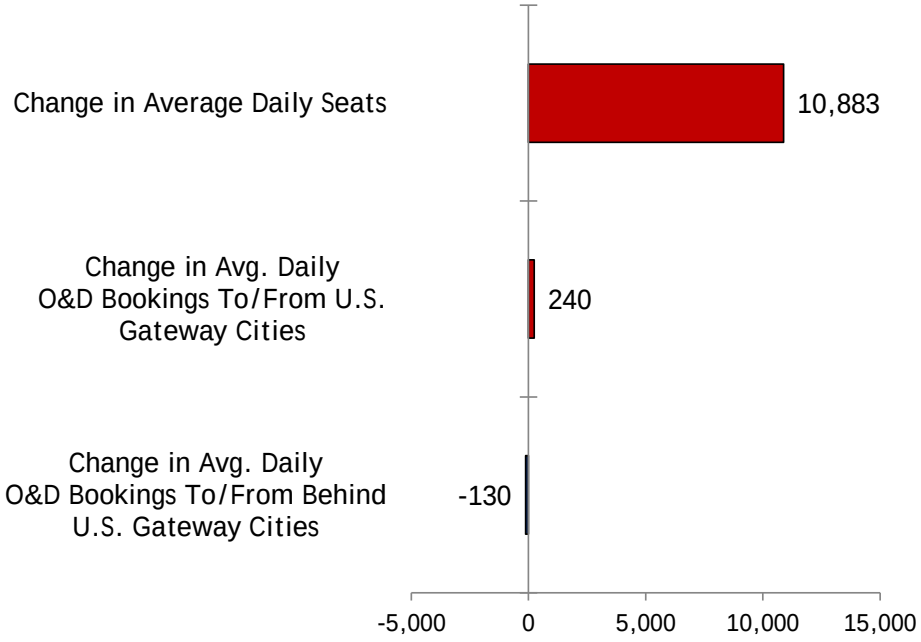


Source: MIDT.

More generally, as shown in Exhibit 3, between 2008 and 2014 the number of average daily seats between the United States and Gulf carrier hubs in Dubai, Doha and Abu Dhabi increased by nearly 11,000 per day, with 95% of that growth coming from Gulf carriers. Despite this flood of new capacity, however, average daily O&D bookings (across all carriers) between the Gulf carriers' 11 U.S. gateway cities and Dubai/Doha/Abu Dhabi have increased by only 240, while the total number of bookings by passengers traveling between Dubai, Doha and Abu Dhabi and other U.S. cities beyond/behind their 11 U.S. gateways *fell* by 130 per day, for a net increase of only 110 daily bookings (i.e., approximately one percent of the new capacity added since 2008).[15]

[15] When the MIDT booking data shown in Exhibit 3 is adjusted to capture passengers that made their travel plans using non-GDS channels by scaling bookings in MIDT to the U.S. DOT's T-100 passenger data, there was a net addition of only 178 passengers between the first three quarters of 2008 and the first three quarters of 2014 (i.e., less than two percent of the seats added over this period).

EXHIBIT 3: CHANGE IN AVERAGE DAILY SEATS AND AVERAGE DAILY O&D BOOKINGS BETWEEN U.S. CITIES AND DUBAI, DOHA & ABU DHABI, 2008-2014



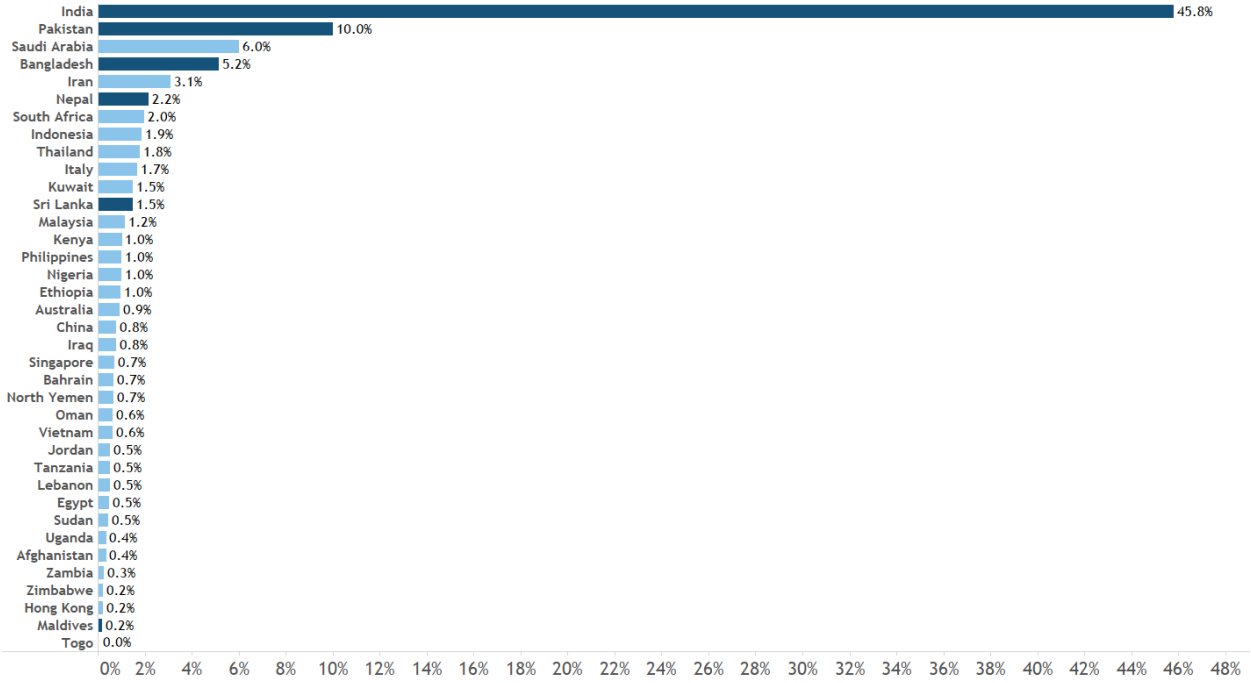
Sources: MIDT and OAG, 2008 and 2014.
Notes: U.S. Gateway cities include New York City, Washington, Houston, Los Angeles, Chicago, San Francisco, Boston, Dallas-Fort Worth, Miami, Seattle and Philadelphia.

b) MIDT booking data also demonstrates that Gulf carrier entry has failed to meaningfully stimulate additional traffic on U.S.-International city-pairs beyond their Gulf hubs

The vast majority (i.e., over 90%) of bookings on the Gulf carriers' flights to/from the United States are for passengers connecting to/from points beyond/behind their hubs in Dubai, Doha and Abu Dhabi and, as shown in Exhibit 4**,** of these "sixth freedom" bookings, the majority (i.e., close to 65%) are for passengers traveling to/from the Indian subcontinent.[16]

[16] Source: MIDT.

EXHIBIT 4: DISTRIBUTION OF GULF CARRIERS' BOOKINGS TO/FROM THE UNITED STATES TRAVELLING BEHIND/BEYOND DUBAI, DOHA AND ABU DHABI (2014)



Source: MIDT, 2014. Gulf carriers includes Emirates, Qatar and Etihad.

As a result, Gulf carriers have grown their share of U.S.-Indian Subcontinent bookings from approximately 12% in 2008 to 40% in 2014.[17] This share growth, however, has come largely *at the expense of other carriers* which have experienced a net loss of over 5,000 bookings/day between the United States and the Indian subcontinent since 2008.[18] For example, between 2008 and 2014, the average number of daily bookings between the United States and the Indian subcontinent on U.S. carriers fell from just over 3,400/day to just over 2,300/day, as two of the three U.S. carriers were forced to discontinue their non-stop services between the United States and India and rely more heavily on connecting services flown in conjunction with their European JV partners.[19] Overall the combined number of daily booking between the United States and the

[17] Source: MIDT.

[18] Unlike the subsidized Gulf carriers, most other carriers—particularly those that are privately owned—are unable to remain in a market indefinitely when there is overcapacity.

[19] As noted above, although U.S. carriers can and do rely on their JV partners to transport passengers on the leg of their journey to destinations they do not serve using their own aircraft (e.g., from Paris to Mumbai for a passenger traveling from Atlanta-Paris-Mumbai), this results in an additional stop for passengers that might otherwise have been able to fly non-stop and fewer jobs for U.S. airline employees.

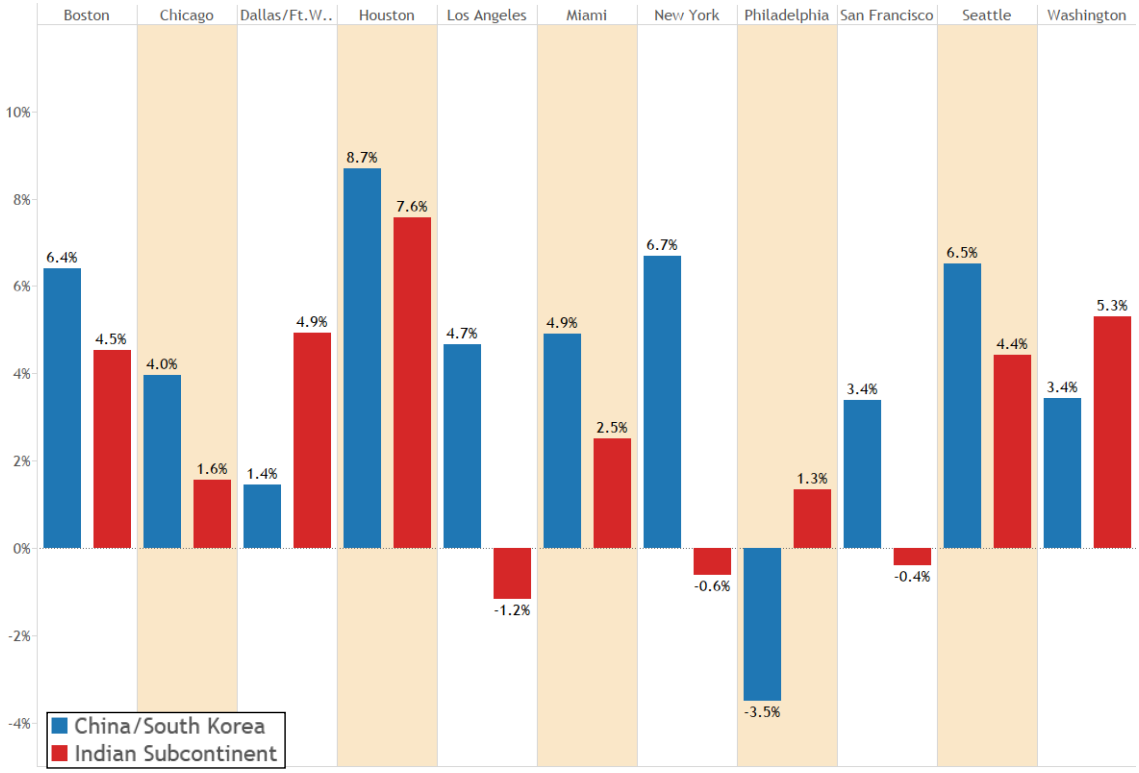
Indian Subcontinent by U.S. carriers and their JV partners fell by just over 800 per day between 2008 and 2014.[20]

If it were true that Gulf carriers' services stimulated significant amounts of new traffic to/from the United States, one would expect to see faster traffic growth between the U.S. gateway cities served by the Gulf carriers and their primary source of sixth freedom traffic (i.e., the Indian Subcontinent) than between their U.S. gateway cities and other parts of Asia where excess circuity of flying via the Gulf makes Gulf carrier service less attractive (i.e., China/South Korea), and, thus, where Gulf carrier service is unlikely to have "stimulated" any traffic growth.[21] However, in eight of eleven U.S. cities currently served by Gulf carriers, industry-wide booking growth between that city and the Indian subcontinent has lagged behind (often by a wide margin) booking growth to China (including Hong Kong and Taiwan) and South Korea, suggesting little—if any—traffic stimulation to/from the Indian subcontinent in response to the flood of new Gulf carrier capacity targeted largely at this traffic.

[20] Source: MIDT. Other carriers that experienced a decline in U.S.-Indian Subcontinent bookings between 2008 and 2014 include Singapore Airlines (from approximately 1,380/day to approximately 640/day) and Air India (from approximately 3,650/day to approximately 2,220/day). Jet Airways also experienced a dramatic decline in bookings (from approximately 1,990/day to approximately 610/day), but formed a strategic alliance with Etihad in November 2013 whereby Etihad acquired a 24% stake in the Indian carrier. *See* http://www.jetairways.com/EN/US/AboutUs/JetAirwaysEtihadStrategicAlliance.aspx.

[21] In 2014, Gulf carriers' share of bookings between the United States and China/South Korea was below one percent. Furthermore, the average annual GDP growth between 2008 and 2013 for the two regions was roughly equivalent (i.e., 6.6% for the Indian Subcontinent vs. 7.4% for China/South Korea). Source: World Bank.

EXHIBIT 5: COMPOUND ANNUAL GROWTH RATE OF BOOKINGS BETWEEN GULF CARRIERS' U.S. GATEWAY CITIES AND ASIAN REGIONS, 2008-2014



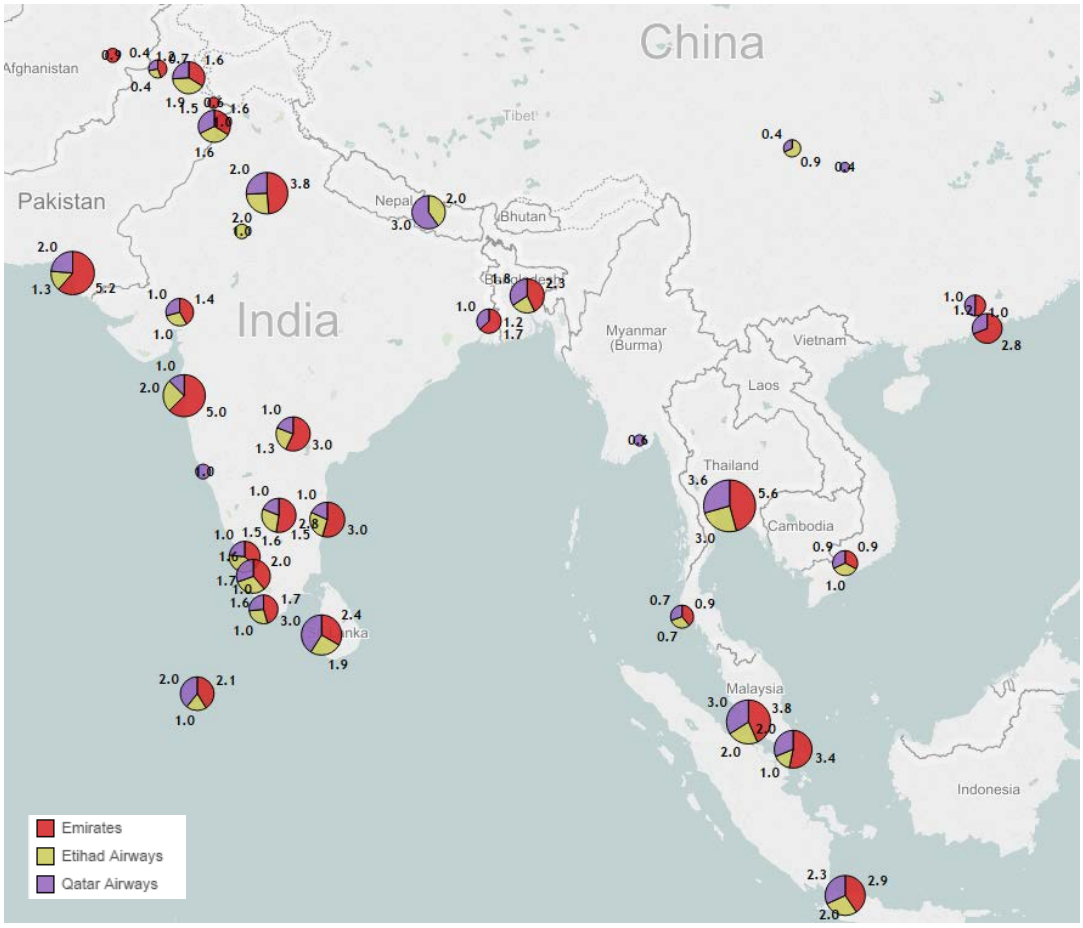
Source: MIDT.
Notes: Indian subcontinent includes India, Pakistan, Bangladesh, Nepal, Sri Lanka and the Maldives. China includes Hong Kong and Taiwan.

The fact that Gulf carriers have failed to meaningfully stimulate additional traffic is unsurprising in light of the fact that all but a small handful of the destinations served by the Gulf carriers are already served by U.S. carriers and/or their non-Gulf carrier global alliance partners.[22] As shown in Exhibit 6, Emirates', Etihad's and Qatar's respective networks (the bulk of which were established over just the past decade) are highly redundant, suggesting little—if any—potential for demand stimulation because of service to "new" destinations as they introduced largely duplicative networks.[23]

[22] For example, all but the three of the destinations served by one or more of the Gulf carriers is served by a Star Alliance member. Moreover, the three destinations not served by a Star Alliance member (Hoffuf, Saudi Arabia, Peshwar, Pakistan and Sialkot, Pakistan) generate very little traffic between to/from the United States (approximately 26 daily bookings in 2014 *combined*). Qatar Airways joined oneworld in October 2013. Source: MIDT and OAG.

[23] Indeed, the econometric analysis described in Section 3 below confirms that this "redundancy" of Gulf carrier networks harms U.S. carriers, as the presence of each incremental Gulf carrier on a city-pair exacerbates the problem of overcapacity, thereby forcing U.S. carriers to offer less capacity than they otherwise would in these markets.

EXHIBIT 6: AVERAGE DAILY GULF CARRIER DEPARTURES, 2014



Source: OAG.

In sum, a basic analysis of booking data for the past seven years shows that Gulf carriers have failed to meaningfully stimulate additional traffic to/from the United States—either to/from their hub cities, or to/from their largest source of sixth freedom traffic beyond their hubs (i.e., the Indian subcontinent).

3) Econometric Analysis Confirms that Gulf Carrier Presence On U.S-International City-Pairs Has Failed to Meaningfully Stimulate Additional Passenger Traffic

To formally test how Gulf carrier expansion to the United has affected passenger traffic levels on city-pairs to/from the United States, we estimated a series of passenger traffic regression models using quarterly data from the first quarter of 2008 through the third quarter of 2014 for all city-

pairs between the continental United States and destinations in Asia, Africa, Europe, the Middle East and Australasia,[24] with the exception of city-pairs to and from Milan.[25] Regression analysis is a standard analytical tool used by economists (and other researchers) to determine the relative importance of potential "independent" (or "control") variables in explaining the variation of a variable being analyzed (the "dependent" variable), which in this case is international passenger traffic. As described below, these regressions confirm two key facts: (1) Gulf carriers' traffic gains on city-pairs to/from the United States have come at the expense of U.S. and other carriers, and (2) Gulf carriers have failed to meaningfully stimulate additional traffic above and beyond what would be expected based on changes in the city-pair's underlying demand.

a) Data and Control Variables

For each of the regressions described below, the dependent variable is the natural logarithm of the number of passengers (or bookings, when MIDT data is used) during the quarter. The unit of observation for the regression data set was collapsed to the non-directional city-pair level for each carrier (e.g., passengers traveling on Emirates between Boston and Mumbai, in either direction).[26]

The key independent variable of interest is *Number of Gulf Carriers Present*, a variable that counts the number of Gulf carriers "serving" a city-pair. More specifically, a Gulf carrier was assumed to be "present" on a city-pair if it had at least a 3% share of bookings in the quarter based on MIDT data, and *Number of Gulf Carriers* is a count of the number of Gulf carriers present (*i.e.*, 0, 1, 2, or 3) on a city-pair in the given quarter. Because it is well understood that the underlying demand for international air travel depends heavily on the rate of economic

[24] Following the published literature, we grouped the major airports in the following U.S. metropolitan areas: New York City (EWR, JFK, LGA), Chicago (ORD, MDW), Houston (IAH, HOU), Los Angeles (LAX, LGB, BUR), Washington D.C. (IAD, DCA, BWI), Dallas/Fort Worth (DFW, DAL), San Francisco (SFO,OAK), Cincinnati (CVG, DAY), Cleveland (CLE, CAK) and Miami (MIA, FLL) as, particularly for very long haul international traffic, these are substitutable airports. Major airports in the same foreign city are similarly grouped.

[25] Emirates' entry between New York City and Milan has resulted in overcapacity on this city-pair. While the expected result is that one or more U.S. carriers will eventually be forced to exit (or substantially reduce capacity on) the route, Emirates entered the route only recently, thus, the current number of passengers traveling between the United States and Milan do not yet reflect the steady state level with the presence of subsidized capacity.

[26] When a connecting itinerary included multiple carriers, the itinerary was assigned to the carrier that operated the overseas segment (when using U.S. DOT DB1B data) or the carrier that operated the largest proportion of total distance flown (when using MIDT).

growth (e.g., gross domestic product ("GDP")),[27] the regression models includes the natural log of the geometric mean of the population of the U.S. city and the population of the country containing the foreign endpoint (denoted *ln*(*Population)*) and the natural log of the geometric mean of the U.S. city and foreign country per-capita incomes (denoted *ln(income per capita)*).[28] In addition, the model includes city-pair "fixed effects",[29] as well as year and quarter fixed effects.[30] Finally, each of the traffic regression models is estimated separately for city-pairs to/from one the 11 U.S. gateway cities served by Gulf carriers in 2014 (i.e., New York, Washington, Chicago, Los Angeles, Houston, Seattle, San Francisco, Dallas, Boston, Philadelphia and Miami)[31], as well as city-pairs to/from U.S. cities that are "behind" one of the Gulf carriers' U.S. gateway cities (e.g., Buffalo-Dubai, Austin-Bangalore, etc.).[32]

b) Results for U.S. Carrier, JV Partner Carrier and Non-Gulf Foreign Carrier Traffic Regressions

In order to assess the impact that subsidized Gulf carrier presence has had on the traffic levels of U.S. and other non-Gulf carriers, we first estimate the regression model using the traffic levels of various subsets of non-Gulf carriers as the dependent variable. If the presence of Gulf carriers on a city-pair has resulted in the *diversion* of passengers away from non-Gulf carriers to the Gulf

[27] *See*, for example, Mark Smyth and Brian Pearce, *IATA Economics Briefing No. 9: Air Travel Demand*, IATA, April 2008 at 10: "The growth of incomes, often proxied by GDP, has been found to be the fundamental driver of the demand for air travel." *See also*, *Current Market Outlook 2014-2033*, Boeing, 2014 at 3: "Economic growth, as measured by gross domestic product (GDP), is a primary contributor to aviation industry growth."

[28] The demographic variables (i.e., income and population) are measured at the annual level and therefore take the same value for each quarter in a given year. In addition, 2014 data was not generally available for the demographic variables, and therefore, we imputed their 2014 values by taking the compound average growth rate from 2008 to 2013 and applying this to the 2013 levels.

[29] By including city-pair fixed effects, the regression analysis is effectively performing thousands of individual "case studies" of the impact of Gulf carrier presence on traffic levels in a particular city-pair and averaging the effect across all of the city-pairs contained in the data set.

[30] The inclusion of quarter variables control for seasonality of demand across quarters and the inclusion of year variables control for other factors that vary across time that are not city-pair specific (i.e., fuel prices and or global economic trends).

[31] In 2014, these 11 metropolitan areas accounted for approximately 73% of all international bookings between the United States (lower 48 states) and destinations in Europe, Asia, the Middle East, Africa and Australasia. Source: MIDT.

[32] For the purposes of this discussion, "Behind U.S. gateway" city-pairs are defined as those city-pairs where the U.S. endpoint is a city other than one of the 11 cities served by a Gulf carrier in 2014, regardless of whether the passenger was connecting from "behind" the gateway (i.e., flying from the United States overseas) or traveling beyond the U.S. gateway (flying from overseas to the United States).

carriers in that city-pair, the estimated coefficient on *Number of Gulf Carriers Present* should be negative (and statistically significant).[33]

The results of the traffic regressions for *non-Gulf carrier* passengers are shown in Exhibit 7. The table includes the estimated coefficients for each independent variable in addition to their standard errors (in parentheses). Estimated coefficients noted with a single asterisk (*) are statistically significant at the 95% confidence level and estimated coefficients noted with two asterisks (**) are significant at the 99% confidence level. The estimated coefficients are interpreted as the marginal effect of that variable on the traffic levels of carriers included in the dependent variable (e.g., U.S. carriers), on average, holding all other independent variables constant.

Columns (1) through (3) show the results for *U.S. carrier passengers* based on U.S. DOT DB1B data. Column (1) shows the results for U.S. carrier passengers traveling on city-pairs to/from one of the eleven gateway cities served by Gulf carriers, column (2) shows the results for non-gateway city-pairs and column (3) shows the results for the combined set of city-pairs.

[33] It is standard practice among economists and statisticians to evaluate statistical significance based at the 5% and 1% levels (alternatively, the 95% and 99% confidence levels). Thus, when the probability of an observed value is greater than 5%, economists and statisticians typically agree that the observed value could well have been the result of random variation.

EXHIBIT 7: REGRESSION ANALYSIS OF U.S. – INTERNATIONAL TRAFFIC FOR U.S. CARRIERS AND JV PARTNERS

	US Carrier Passengers (DB1B)			US + JV Carrier Bookings (MIDT)			Other Non-Gulf Foreign Carriers (MIDT)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Gulf Carrier U.S. Gateways	Behind Gulf Carrier U.S. Gateways	All Cities	Gulf Carrier U.S. Gateways	Behind Gulf Carrier U.S. Gateways	All Cities	Gulf Carrier U.S. Gateways	Behind Gulf Carrier U.S. Gateways	All Cities
Number of Gulf Carriers Present	-0.0804**	-0.0788**	-0.0810**	-0.0978**	-0.0754**	-0.0915**	-0.154**	-0.0780**	-0.140**
	(0.0138)	(0.00549)	(0.00807)	(0.00783)	(0.00413)	(0.00522)	(0.0159)	(0.00871)	(0.0133)
ln(Population)	1.687**	1.633**	1.753**	0.880**	1.623**	1.311**	-2.786**	1.795**	-2.311**
	(0.262)	(0.107)	(0.134)	(0.158)	(0.0825)	(0.102)	(0.404)	(0.245)	(0.331)
ln(Income per Capita)	1.820**	0.809**	1.377**	0.932**	0.0674	0.598**	0.457**	0.196	0.467**
	(0.124)	(0.0569)	(0.0764)	(0.0893)	(0.0492)	(0.0610)	(0.117)	(0.116)	(0.106)
D(Quarter 2)	0.364**	0.413**	0.387**	0.282**	0.275**	0.279**	0.140**	0.104**	0.135**
	(0.00803)	(0.00450)	(0.00497)	(0.00553)	(0.00381)	(0.00387)	(0.00943)	(0.00881)	(0.00816)
D(Quarter 3)	0.430**	0.368**	0.403**	0.408**	0.309**	0.375**	0.288**	0.149**	0.268**
	(0.00885)	(0.00445)	(0.00538)	(0.00623)	(0.00426)	(0.00436)	(0.0109)	(0.00916)	(0.00945)
D(Quarter 4)	0.195**	0.152**	0.177**	0.126**	0.0751**	0.108**	0.0362**	-0.0559**	0.0220*
	(0.00944)	(0.00498)	(0.00593)	(0.00621)	(0.00415)	(0.00440)	(0.00986)	(0.00908)	(0.00859)
D(2008)	0.206**	0.149**	0.184**	0.144**	0.0870**	0.130**	-0.234**	0.203**	-0.182**
	(0.0209)	(0.0101)	(0.0122)	(0.0138)	(0.00883)	(0.00969)	(0.0297)	(0.0274)	(0.0262)
D(2009)	0.203**	0.105**	0.162**	0.0669**	-0.0574**	0.0262*	-0.339**	-0.0126	-0.301**
	(0.0213)	(0.0102)	(0.0127)	(0.0146)	(0.00922)	(0.0103)	(0.0294)	(0.0270)	(0.0260)
D(2010)	0.213**	0.0957**	0.162**	0.0954**	-0.00852	0.0614**	-0.250**	0.0743**	-0.211**
	(0.0183)	(0.00861)	(0.0110)	(0.0122)	(0.00805)	(0.00867)	(0.0244)	(0.0219)	(0.0216)
D(2011)	0.138**	0.0429**	0.0965**	0.0553**	-0.0269**	0.0288**	-0.257**	0.0320	-0.222**
	(0.0149)	(0.00714)	(0.00894)	(0.00995)	(0.00695)	(0.00708)	(0.0190)	(0.0169)	(0.0168)
D(2012)	0.0767**	0.0132*	0.0492**	0.0140	-0.0446**	-0.00427	-0.170**	0.0169	-0.148**
	(0.0126)	(0.00635)	(0.00765)	(0.00858)	(0.00629)	(0.00610)	(0.0156)	(0.0133)	(0.0138)
D(2013)	0.0322**	0.00833	0.0216**	-0.00343	-0.0297**	-0.0119*	-0.113**	0.0324**	-0.0953**
	(0.0121)	(0.00645)	(0.00741)	(0.00821)	(0.00699)	(0.00593)	(0.0140)	(0.0114)	(0.0123)
Constant	-45.31**	-33.70**	-41.98**	-18.82**	-25.77**	-24.57**	64.04**	-31.64**	52.79**
	(5.556)	(2.191)	(2.870)	(3.368)	(1.652)	(2.180)	(8.721)	(5.116)	(7.110)
Observations	87,008	467,583	554,591	195,543	1,295,657	1,491,200	152,250	571,998	724,248
R-squared	0.968	0.964	0.976	0.980	0.976	0.985	0.966	0.945	0.975

* p<0.05, ** p<0.01

Sources: U.S. DOT DB1B; MIDT; World Bank; BEA.

Notes: Robust standard errors in parenthesis. Passenger Weighted. A Gulf carrier is present on a city-pair in a quarter if its share of MIDT bookings on a city-pair is at least 3%. A passenger is a U.S. carrier passenger if the operating carrier (on the "overseas" segment for DB1B or on the longest total distance flown for MIDT) of an itinerary was one of the U.S. carriers (e.g., American, Continental, Delta, Northwest, US Airways, United). Regression covers the period 2008/Q1-2014/Q3. Population and Income are annual. 2014 population and income based on 2013 grown at the cumulative average growth rate from 2008-2013. Includes market fixed effects (not shown). Includes passengers on mainland U.S-international city pairs , except itineraries to/from North America and South America, and itineraries starting or ending in Milan. Gulf Carrier U.S. Gateways includes itineraries to/from: New York City (EWR, JFK, LGA), Chicago (ORD, MDW), Houston (IAH, HOU), Los Angeles (LAX, LGB, BUR), Washington D.C. (IAD, DCA, BWI), Seattle (SEA), Dallas/Fort Worth (DFW, DAL), San Francisco (SFO, OAK), Boston (BOS), Philadelphia (PHL), and Miami (MIA,FLL).

Column (1) of Exhibit 7 shows that the presence of each Gulf carrier on a city-pair to/from one of the Gulf carriers' 11 U.S. gateway cities reduces the number passengers on U.S. carriers by approximately 8.0% (*when Gulf carrier "presence" is defined as having as little as a 3% share).* Likewise, Column (2) shows that the presence of each Gulf carrier reduces the number of passengers on U.S. carriers traveling on city-pairs to/from a U.S. city behind one of the 11 Gulf carrier U.S. gateway cities by 7.9%. Similarly, Column (3) shows that for the combined set of city-pairs, the presence of each Gulf carrier reduces the number of passengers on U.S. carriers by 8.1%. And as discussed earlier, when all three Gulf carriers are present on a city-pair, the traffic loss effects are magnified three-fold (i.e., U.S. carrier passengers are approximately 24% lower than they would be, absent Gulf carrier service on that city-pair). It is important to emphasize

that Gulf carriers typically have greater than a 3% share on the city-pairs that they serve.[34] Not surprisingly, as Gulf carriers' average share on a city-pair increases, the average impact on U.S. carriers' passenger levels becomes *even more pronounced*. For example, when the threshold for Gulf carrier presence is increased to 10% (from 3%), the presence of each Gulf carrier on a city pair to/from one the Gulf carriers' U.S. Gateway cities reduces U.S. carriers' passengers on the city-pair by 16.9% (compared to 8.0% using the 3% threshold). For city-pairs to/from other U.S. cities, each Gulf carrier with at least a 10% share reduces U.S. carriers' passengers by 12.1% (compared to 7.9% using the 3% threshold). Finally, for the combined set of city-pairs, each Gulf carrier with at least a 10% share reduces U.S. carriers' passengers by 14.8% (compared to 8.1% using the 3% threshold). And as discussed above, when all three Gulf carriers are present with a 10% share, the passenger loss effects are magnified by a factor of three. Thus, on city-pairs to/from U.S. cities served by all three Gulf carriers where each of the Gulf carriers has at least a 10% share, U.S. carriers' passengers have been reduced by 50%, on average.[35]

Columns (4) through (6) of Exhibit 7 repeat the regressions from Columns (1) through (3), respectively, replacing U.S. carrier passengers with U.S. carrier/JV partner bookings based on MIDT data. Column (4) shows that for city-pairs to/from one of the Gulf carriers' 11 U.S. gateway cities, each Gulf carrier lowers the number of bookings on U.S. carriers and their JV partners by 9.8%. Column (5) shows that the presence each Gulf carrier on city-pairs to/from other U.S. cities reduces the number of bookings on U.S. carriers and their JV partners by approximately 7.5%. Finally, column (6) shows that for the combined set of city-pairs, each Gulf carrier present reduces the number of bookings on U.S. carriers and their JV partners by

[34] For example, during the fourth quarter of 2014, on city-pairs where there was a single Gulf carrier with at least a 3% share, Gulf carriers' combined share on that city-pair averaged approximately 18.9%. On city-pairs where there were two Gulf carriers with at least a 3% share each, Gulf carriers had a combined share of 36.7%, on average. When all three Gulf carriers were present on a city-pair with at least a 3% share each, Gulf carriers had a combined share of 49.8%, on average. Source: MIDT; averages are weighted by bookings across city-pairs.

[35] It is also important to note that since the estimated coefficient on *Number of Gulf Carriers Present* is interpreted as the amount by which U.S. carrier passengers *are reduced* due to Gulf carrier presence, the percent by which U.S. carrier passengers *would increase* if Gulf carriers were not present on a particular city-pair is equal to 1/(1 – (number of Gulf Carriers present × estimated coefficient). For example, if there are three Gulf carriers present with at least a 10% share on a city-pair to/from one of the Gulf carrier's U.S. gateway cities, U.S. carriers would carry approximately twice as many passengers (i.e., 1/(1-(3 × 16.9%)) = 2.0) on that city-pair but for the Gulf carrier presence.

approximately 9.2%.[36] Like the effects of Gulf carrier presence on U.S. carrier passengers described above, when all three Gulf carriers are present on a city-pair, the loss in bookings for U.S. carriers and their JV partners are magnified three-fold (i.e., range from 22.5% to 29.4%).

Finally, Columns (7) through (9) of Exhibit 7 repeat the regressions from Columns (4) through (6), respectively, replacing U.S. carrier/JV partner bookings with the bookings for all "other" foreign carriers (i.e., non-JV partner and non-Gulf carriers) based on MIDT data. Column (7) shows that for city-pairs to/from one of the Gulf carriers' 11 U.S. gateway cities, the presence of each Gulf carrier lowers the number of bookings on other foreign carriers by 15.4%. Column (8) shows that the presence of each Gulf carrier on city-pairs to/from other U.S. cities reduces the number of bookings on other foreign carriers by approximately 7.8%. Finally, column (9) shows that for the combined set of city-pairs, each Gulf carrier present reduces the number of bookings on other foreign carriers by approximately 14.0%.[37] Once again, when all three Gulf carriers are present on a city-pair, the effects are increased by a factor of three.

Overall, the regressions analysis summarized in Exhibit 7 clearly demonstrates that Gulf carriers' subsidized capacity growth to the United States has come at the expense of U.S. and other carriers. And although the magnitude of the traffic losses that U.S. carriers have already suffered is substantial (i.e., approximately 24%, on average, when all three Gulf carriers are present with at least a 3% share on a city-pair), this harm will only grow worse as Gulf carriers add additional U.S. routes (and grow capacity on their existing routes). As noted above, on city-pairs to/from U.S. cities served by all three Gulf carriers where each of the Gulf carriers has at least a 10% share, U.S. carrier passengers have been reduced by 50%, on average. Passenger losses of this

[36] When the threshold for Gulf carrier presence is increased to 10% (from 3%), the presence of each Gulf carrier on a city-pair to/from one the Gulf carriers' U.S. Gateway cities reduces U.S. and JV carriers' bookings on the city-pair by 16.9% (compared to 9.8% using the 3% threshold). For city-pairs to/from other U.S. cities, each Gulf carrier with at least a 10% share reduces U.S. and JV carriers' bookings by 17.2% (compared to 7.5% using the 3% threshold). For the combined set of city-pairs, each Gulf carrier with at least a 10% share reduces U.S. and JV carriers' bookings by 17.1% (compared to 9.2% using the 3% threshold). When all three Gulf carriers are present with at least a 10% share, these booking loss effects are magnified by a factor of three.

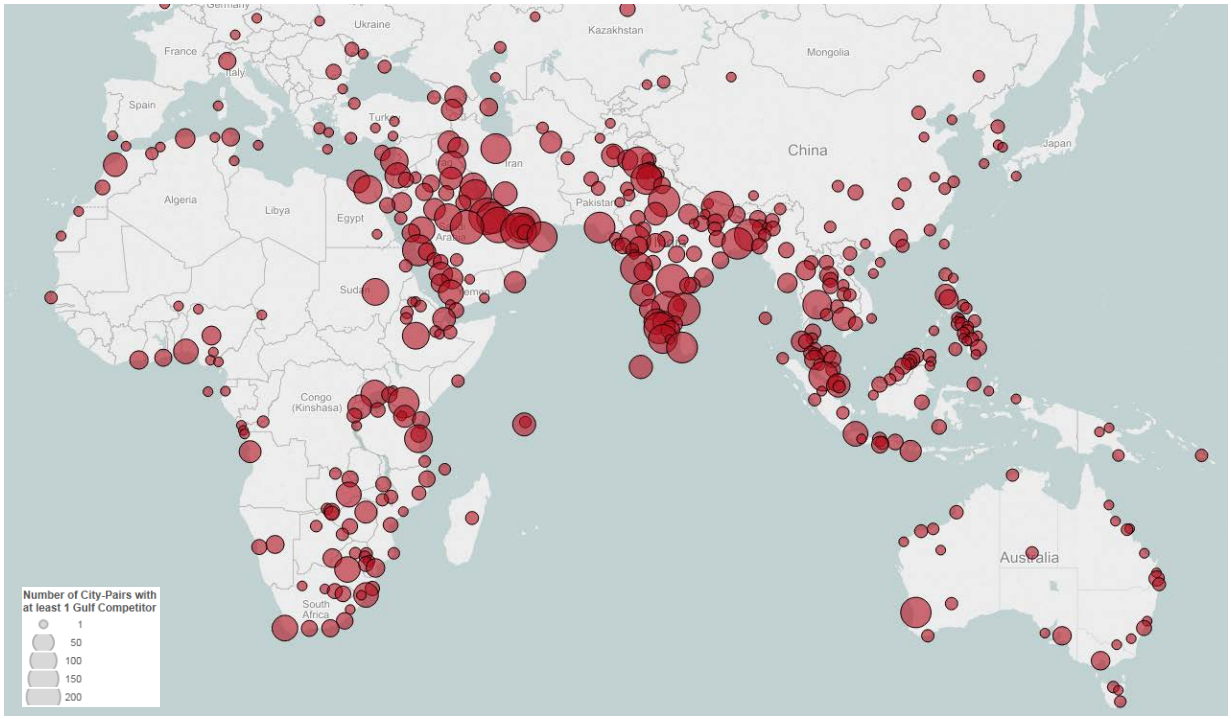
[37] When the threshold for Gulf carrier presence is increased to 10% (from 3%), the presence of each Gulf carrier on a city-pair to/from one the Gulf carriers' U.S. Gateway cities reduces other foreign carriers' bookings on the city-pair by 25.8% (compared to 15.4% using the 3% threshold). For city-pairs to/from other U.S. cities, each Gulf carrier with at least a 10% share reduces other foreign carriers' bookings by 18.2% (compared to 7.8% using the 3% threshold). For the combined set of city-pairs, each Gulf carrier with at least a 5% share reduces other foreign carriers' bookings by 24.6% (compared to 14.0% using the 3% threshold). When all three Gulf carriers are present with at least a 10% share, these booking loss effects are magnified by a factor of three.

magnitude not only weaken U.S. carriers' ability to sustain non-stop service to a variety of international destinations (e.g.., India), but they also inhibit U.S. carriers' ability to launch new non-stop services to destinations that are now saturated with Gulf carrier capacity. Moreover, passenger losses of this magnitude also prevent U.S. carriers from expanding capacity on existing services to the hubs of their JV (and other alliance) partners in Europe and Asia, since a significant proportion of U.S. carriers' passengers on their flights to/from those hubs would have connected to destinations now saturated with subsidized Gulf carrier capacity.

Moreover, it is important to emphasize that the geographic breadth of U.S.-international city-pairs where U.S. carriers have already suffered passenger losses because of the Gulf carriers' subsidized service is widespread, and not limited to the Middle East or Indian subcontinent. For example, as shown in Exhibit 8, during the fourth quarter of 2014, there were nearly 9,000 U.S.-international city-pairs where at least one Gulf carrier was present.[38]

[38] U.S. carriers' booking share in these city-pairs has also fallen sharply. For example, between Q1-2008 and Q4-2014, U.S. carriers' booking share across the 8,870 city-pairs with Gulf carrier presence fell from 20.7% to 15.3%. U.S. carriers' and their JV partners' combined booking share fell from 50.0% to 39.7% over the same time period. Source: MIDT.

EXHIBIT 8: NUMBER OF U.S.-INTERNATIONAL CITY-PAIRS (BY FOREIGN DESTINATION) WITH GULF CARRIER PRESENCE (Q4-2014)



Sources: MIDT.
Notes: A city-pair is defined to have a Gulf Carrier presence if one or more Gulf Carrier had at least a 3% share of bookings during the fourth quarter of 2014.

c) Regressions of <u>overall</u> traffic levels to/from the United States

Section (b) above demonstrates that subsidized Gulf carrier expansion to the United States has directly harmed U.S. carriers and their JV partners by diverting a large portion of their traffic on overlapping city-pairs (i.e., when all three Gulf carriers are present on a city-pair with at least a 3% share of bookings, U.S. carrier and JV partner bookings fall by 27%, on average). Nevertheless, it is still possible—at least in theory—that subsidized capacity growth by Gulf carriers could have resulted in an increase in the *overall* level of traffic if their services have stimulated demand.

To assess whether Gulf carrier presence has had a stimulative impact on the *total* amount of international traffic to/from the United States across all carriers, two additional sets of regressions were estimated. Columns (1) through (3) in Exhibit 9 below replicate the models estimated in Columns (4) through (6), respectively, from Exhibit 7 above, replacing U.S. and JV partner bookings with *total* bookings by all carriers (including the Gulf carriers). As shown in

Column (1) of Exhibit 9, the estimated coefficient on *Number of Gulf Carriers Present* is statistically ***insignificant*** (and negative), demonstrating that on city-pairs to/from one of their U.S. gateway cities, Gulf carriers have failed to meaningfully stimulate additional traffic above and beyond what traffic levels would have been based on underlying demand (e.g., economic/demographic factors such as population and per capita income). The estimated coefficient on *Number of Gulf Carriers Present* in column (2) is positive and statistically significant, indicating that on city-pairs to/from their non-U.S. gateway cities, the presence of each Gulf carrier has stimulated demand, but only by a small amount (i.e., approximately 2.7%.).[39] As shown in Column (3) of Exhibit 9, however, for the aggregate set of all U.S.-international city-pairs (excluding those within the Americas), the presence of Gulf carriers has had no statistically significant impact on overall traffic after controlling for other factors that impact underlying passenger demand.[40]

Because the booking figures in MIDT exclude passengers that made their travel reservations through a non-GDS based channel (e.g., on a carrier's own website, over the telephone with a carrier's reservations agent, or in person at the airport/ticket office[41]), Columns (4) through (6) in Exhibit 9 re-estimate the models in Columns (1) through (3) using the number of U.S.-international *passengers* from the U.S. DOT's T-100 database allocated across city-pairs for each carrier based on their distribution of bookings from MIDT.[42] The estimated coefficients (and their statistical significance) on *Number of Gulf Carriers Present* in columns (4) through (6) largely mimic those in columns (1) through (3) with one notable exception: the minimal amount of stimulation from the presence of each Gulf carrier in city-pairs to/from Gulf carriers' non-

[39] However, this minimal stimulation amounted to only about 450 daily bookings in 2014 (about three percent of the 14,800 daily seats Gulf carriers offered in 2014). Of this number, we estimate that less than half would represent visitors to the United States.

[40] When the Gulf carrier share threshold is increased to 10%, the regression estimates confirm that there is no statistically significant increase in bookings from the presence of Gulf carriers on a city-pair to/from one the Gulf carriers U.S. Gateway cities. For city-pairs to/from other U.S. cities, increasing the threshold to 10% reduces the impact of each Gulf carrier to 2.66% (from 2.71% using the 3% threshold). For the combined set of city-pairs, there continues to be no statistically significant impact of Gulf carrier presence when the 10% threshold is used.

[41] *See* Appendix A below.

[42] The U.S. DOT T-100 database contains a count of all passengers travelling on all flights to, from or within the United States (including those operated by foreign carriers). As described in Appendix A, however, the T-100 data does not provide any information regarding a passengers' origin or destination. Therefore, we have used MIDT data to allocate those T-100 passengers across the U.S.-international city-pairs served by each carrier.

gateway U.S. cities falls from 2.7% using MIDT bookings (column (2)) to only 1.1% when using the MIDT-adjusted T-100 passenger counts (column (5)).[43]

EXHIBIT 9*:* REGRESSION ANALYSIS OF TOTAL U.S. – INTERNATIONAL TRAFFIC

	All Bookings (MIDT)			All Passengers (T100)		
	(1)	(2)	(3)	(4)	(5)	(6)
	Gulf Carrier U.S. Gateways	Behind Gulf Carrier U.S. Gateways	All Cities	Gulf Carrier U.S. Gateways	Behind Gulf Carrier U.S. Gateways	All Cities
Number of Gulf Carriers Present	-0.0126	0.0271**	-0.00219	-0.00798	0.0106**	-0.00325
	(0.00801)	(0.00321)	(0.00572)	(0.00619)	(0.00318)	(0.00436)
ln(Income per Capita)	1.109**	0.198**	0.876**	1.784**	0.890**	1.520**
	(0.0681)	(0.0454)	(0.0535)	(0.0669)	(0.0534)	(0.0509)
ln(Population)	0.983**	1.701**	1.250**	1.563**	1.549**	1.625**
	(0.139)	(0.0731)	(0.0953)	(0.143)	(0.0749)	(0.0971)
D(Quarter 2)	0.232**	0.247**	0.237**	0.244**	0.267**	0.251**
	(0.00512)	(0.00352)	(0.00382)	(0.00540)	(0.00379)	(0.00401)
D(Quarter 3)	0.362**	0.283**	0.341**	0.377**	0.308**	0.357**
	(0.00572)	(0.00393)	(0.00428)	(0.00627)	(0.00420)	(0.00462)
D(Quarter 4)	0.0952**	0.0552**	0.0839**	0.135**	0.0918**	0.122**
	(0.00553)	(0.00379)	(0.00416)	(0.00617)	(0.00432)	(0.00461)
D(2008)	0.0883**	0.102**	0.0941**	0.0913**	0.0407**	0.0770**
	(0.0119)	(0.00836)	(0.00885)	(0.0141)	(0.0103)	(0.0104)
D(2009)	0.00627	-0.0499**	-0.00744	0.0919**	-0.0117	0.0614**
	(0.0128)	(0.00890)	(0.00963)	(0.0143)	(0.0109)	(0.0107)
D(2010)	0.0404**	0.00708	0.0327**	0.0643**	-0.0153	0.0410**
	(0.0107)	(0.00774)	(0.00802)	(0.0121)	(0.00950)	(0.00909)
D(2011)	-0.00686	-0.0168*	-0.00860	0.0298**	-0.0225**	0.0145
	(0.00874)	(0.00654)	(0.00658)	(0.0100)	(0.00821)	(0.00759)
D(2012)	-0.0249**	-0.0313**	-0.0258**	-0.00194	-0.0274**	-0.00909
	(0.00745)	(0.00578)	(0.00565)	(0.00895)	(0.00749)	(0.00683)
D(2013)	-0.0294**	-0.0195**	-0.0266**	-0.00373	-0.0106	-0.00587
	(0.00708)	(0.00616)	(0.00543)	(0.00827)	(0.00752)	(0.00640)
Constant	-22.22**	-28.59**	-25.78**	-41.33**	-32.50**	-40.07**
	(3.048)	(1.492)	(2.085)	(3.104)	(1.546)	(2.101)
Observations	228,914	1,482,209	1,711,123	218,441	1,414,946	1,633,387
R-squared	0.983	0.976	0.987	0.984	0.977	0.987

* p<0.05, ** p<0.01
Sources: U.S. DOT DB1B; MIDT; World Bank; BEA.
Notes: Robust standard errors in parenthesis. Regressions are passenger weighted. A Gulf carrier is present on a city-pair in a quarter if its share of MIDT bookings on a city-pair is at least 3%. All Passenger (T100) is the total US DOT T100 long haul international passengers for each carriers, allocated to city-pairs based on MIDT proportions to each citypair. A passenger is a U.S. carrier passenger if the operating carrier (on the "overseas" segment for DB1B or on the longest total distance flown for MIDT) of an itinerary was one of the U.S. carriers (e.g., American, Continental, Delta, Northwest, US Airways, United). Regression covers the period 2008/Q1-2014/Q3 (T100 regressions through 2014Q2). Population and Income are annual. 2014 population and income based on 2013 grown at the cumulative average growth rate from 2008-2013. Includes market fixed effects (not shown). Includes passengers on mainland U.S-international city pairs , except itineraries to/from North America and South America, and itineraries starting or ending in Milan. Gulf Carrier U.S. Gateways includes itineraries to/from: New York City (EWR, JFK, LGA), Chicago (ORD, MDW), Houston (IAH, HOU), Los Angeles (LAX, LGB, BUR), Washington D.C. (IAD, DCA, BWI), Seattle (SEA), Dallas/Fort Worth (DFW, DAL), San Francisco (SFO, OAK), Boston (BOS), Philadelphia (PHL), and Miami (MIA,FLL).

Combined, the findings from Exhibit 7 (i.e., the presence of each Gulf carrier reduces traffic levels on U.S. carriers, their JV partners and other non-Gulf foreign carriers by between 8% and 14%, on average) and Exhibit 9 (i.e., Gulf carrier presence has failed to meaningfully stimulate additional traffic) leads to one incontrovertible conclusion: *Gulf carriers' subsidized expansion has come almost entirely at the expense of U.S. and other carriers.*

[43] Based on a stimulation factor of 1.06% (per Gulf carrier) on this set of city-pairs, this implies that Gulf carrier presence has resulted in only an additional 150 passengers per day (i.e., approximately one percent of the 14,800 daily seats Gulf carriers offered in 2014). Of this number, we estimate that less than half would represent visitors to the United States.

As a final robustness test of the finding that Gulf carriers' share gains have come at the expense of U.S. and other carriers (rather than as a result of traffic stimulation), Exhibit 10 re-estimates the passenger regressions from above on the subset of city-pairs included in the U.S. DOT's DB1B database that require any passenger flying on a foreign carrier to connect to a U.S. carrier behind the foreign carrier's U.S. gateway. Because the DB1B database is limited to itineraries where at least one segment was operated by a U.S. carrier, it excludes most passengers traveling exclusively on foreign carriers (e.g., the Gulf carriers). However, limiting the set of city-pairs to those to/from U.S. cities without non-stop transoceanic flights on *any* foreign carrier ensures that all passengers (including those connecting to/from foreign carriers for the international portion of their journey) are included in the DB1B data.[44]

Column (1) of Exhibit 10 shows that each Gulf carrier present decreases the number of passengers carried by U.S. carriers on this subset of city-pairs by approximately 7.6%. Likewise, Column (2) of Exhibit 10 shows that each Gulf carrier reduces U.S. and JV carrier passengers by approximately 7.8%.[45] Column (3), however, shows that for this subset of city-pairs, there has been no statistically significant increase in the overall number of passengers (across all carriers). This provides further confirmation that Gulf passenger traffic gains have come at the expense of U.S. carriers and their JV partners *but have failed to meaningfully stimulate additional traffic to/from the United States*.

[44] The set of "pure" behind foreign carrier U.S. gateway itineraries includes passengers traveling to/from U.S. cities such as Raleigh Durham, North Carolina, Cincinnati, Ohio, and San Antonio, Texas, as well as hundreds of small and medium-sized communities.

[45] Not surprisingly, the estimated coefficients for *Number of Gulf Carriers Present* in columns (1) and (2) of Exhibit 10 corresponds closely to the estimated coefficients in columns (2) and (5) of Exhibit 7. Moreover, as noted above, when all three Gulf carriers are present, the effect is magnified by a factor of three.

EXHIBIT 10: REGRESSION ANALYSIS OF U.S. – INTERNATIONAL PASSENGERS ON BEHIND FOREIGN CARRIER U.S. GATEWAY CITY-PAIRS

	Behind Foreign Carrier U.S. Gateways		
	(1)	(2)	(3)
	US Carrier Passengers (DB1B)	US + JV Carrier Passengers (DB1B)	All Passengers (DB1B)
Number of Gulf Carriers Present	-0.0760**	-0.0777**	-0.00451
	(0.00525)	(0.00466)	(0.00396)
ln(Income per Capita)	0.363**	0.139**	0.225**
	(0.0471)	(0.0446)	(0.0416)
ln(Population)	2.284**	2.252**	2.292**
	(0.0994)	(0.0926)	(0.0862)
D(Quarter 2)	0.422**	0.412**	0.400**
	(0.00377)	(0.00350)	(0.00327)
D(Quarter 3)	0.348**	0.343**	0.325**
	(0.00383)	(0.00354)	(0.00333)
D(Quarter 4)	0.128**	0.135**	0.125**
	(0.00408)	(0.00377)	(0.00350)
D(2008)	0.120**	0.0388**	0.0538**
	(0.00909)	(0.00825)	(0.00797)
D(2009)	0.0661**	-0.0332**	-0.0229**
	(0.00888)	(0.00815)	(0.00789)
D(2010)	0.0622**	-0.0178*	-0.00578
	(0.00753)	(0.00693)	(0.00669)
D(2011)	0.0356**	-0.0214**	-0.0128*
	(0.00630)	(0.00580)	(0.00559)
D(2012)	0.0189**	-0.0114*	0.00169
	(0.00545)	(0.00502)	(0.00484)
D(2013)	0.00162	-0.0151**	-0.00196
	(0.00527)	(0.00485)	(0.00464)
Constant	-42.21**	-39.19**	-40.84**
	(2.045)	(1.889)	(1.759)
Observations	386,043	433,015	480,508
R-squared	0.947	0.950	0.950

* p<0.05, ** p<0.01

Sources: U.S. DOT DB1B; MIDT; World Bank; BEA.

Notes: Robust standard errors in parenthesis. Passenger Weighted. A Gulf carrier is present on a city-pair in a quarter if its share of MIDT bookings on a city-pair is at least 3%. A passenger is a U.S. carrier passenger if the operating carrier (on the "overseas" segment for DB1B or on the longest total distance flown for MIDT) of an itinerary was one of the U.S. carriers (e.g., American, Continental, Delta, Northwest, US Airways, United). Regression covers the period 2008/Q1-2014/Q3. Population and Income are annual. 2014 population and income based on 2013 grown at the cumulative average growth rate from 2008-2013. Includes market fixed effects (not shown). Includes passengers on mainland U.S-international city pairs , except itineraries to/from North America and South America, and itineraries starting or ending in Milan.

d) Findings contained in a recent study by Dresner et al. support the conclusion that Gulf carrier expansion to the United States has harmed U.S. carriers

A recent paper by Dresner et al.[46] is being cited by Emirates and its proponents to support the carrier's proposition that Gulf carrier expansion to the United States has not harmed U.S. carriers.[47] Although it is easy to understand how one could infer from a cursory review of the paper's abstract[48] and conclusions[49] that it supports Emirates' proposition, a careful analysis of the paper shows that its findings support precisely *the opposite conclusion*.

Emirates and its proponents have claimed that the Dresner et al. study "demonstrates convincingly" that Gulf carriers are stimulating new traffic, not diverting traffic from U.S. carriers. This claim is apparently based on Section 2 of the study ("Effects of Gulf Carrier Entry on Aggregate Passenger Traffic Between the U.S. and the Middle East") which uses U.S. DOT data to show that between 2003 and 2011 Gulf carrier entry resulted in a substantial increase in passengers traveling between the United States and the Middle East.[50] While it is true (in fact, definitional) that the number of passengers traveling on flights between the United States and the Middle East increased as Gulf carriers expanded service between their hubs in Dubai/Doha/Abu Dhabi and the United States, Emirates and its proponents appear to have overlooked a critical

[46] Martin Dresner, Cuneyt Eroglu, Christian Hofer, Frio Mendez and Kerry Tan, "The Impact of Gulf Carrier Competition on U.S. Airlines." Forthcoming: *Transportation Research Part A: Policy and Practice*, (hereafter "Dresner et al.").

[47] *See* Keynote Address by John R. Byerly, Strategy Summit – Routes Americas in Denver, February 1, 2015: "With respect to the Gulf carriers, a recently published study by Professor Martin Dresner of the University of Maryland and several colleagues demonstrates convincingly that Emirates, Qatar, and Etihad have succeeded in the U.S. market, not because they are 'stealing' traffic from U.S. airlines, but because they opened new markets to places like India, Africa, and the Middle East that U.S. airlines largely ignored." *See also* "American Consumers and Regional State Economies the Ultimate Victims of US Carriers' Protectionist Campaign, Cautions Emirates Airline's President", Emirates Press Release, March 18, 2015, discussing Dresner et. al: "…an independent paper published by US economists and academics examined the impact of gulf carrier competition on US carriers' passenger numbers and fares in international route markets and found that 'gulf carrier entry stimulated accelerated market growth' on US-Middle East traffic volumes…"

[48] *See* Dresner et. al, page 1: "…the empirical results suggest that greater competition by Gulf carriers in U.S. international markets is associated with 1) significant growth in U.S.-Middle East traffic volumes and 2) small but statistically significant traffic losses and fare reductions for U.S. carriers in route markets connecting the U.S. with Africa, Asia, Australia and Europe."

[49] *See* Dresner et al, page 21: "The empirical results suggest that these effects are small but statistically significant; that is a 1% growth in total Gulf carrier traffic to or from the U.S. is associated with a less than 0.1% drop in U.S. carriers' international passenger traffic and a less than 0.1% decrease in air fares."

[50] *See* Dresner et al, page 6: "with the arrival of Gulf carriers, a significant increase in the level or growth of passenger numbers is observed".

fact: the specific U.S. DOT dataset that Dresner et al. used in this section of their analysis (the T-100 database) only captures passenger counts *at the flight segment level*, not the O&D level.[51] Put differently, since the Gulf carrier model is premised on aggregating international passenger flows at their hubs and transferring them to third countries, one would expect to see a dramatic increase in passengers traveling between the United States and the Middle East in the T-100 data, even if all of their passengers were simply being diverted from other hubs in Europe and Asia without having any impact whatsoever on overall O&D passenger traffic levels.[52]

Thus, the fact that Dresner et al. document a large increase in passengers traveling between the United States and the Middle East provides no evidence to support the assertion that "Emirates, Qatar, and Etihad have succeeded in the U.S. market, not because they are 'stealing' traffic from U.S. airlines, but because they opened new markets to places like India, Africa, and the Middle East that U.S. airlines largely ignored."[53] In fact, the Dresner et al. study reaches the exact *opposite* conclusion: "...the growth in the U.S.-Middle East market may come *at the expense of traffic losses in (broadly) adjacent international route markets.*"[54]

4) Conclusions

One common justification for the Gulf carriers' torrid rate of capacity growth has been that they "stimulate demand". Our empirical analysis, however, finds little—if any—support for this assertion. To the contrary, our analysis demonstrates that Gulf carriers have failed to meaningfully stimulate additional traffic to/from the United States and that the overwhelming

[51] Therefore, even if 90% of the passengers traveling on an Emirates flight between Los Angeles and Dubai connected to points beyond Dubai (e.g., Asia, Africa, etc.), the T-100 data would not reflect that fact because T-100 data counts the number of passengers on a given segment (here, the flight between Los Angeles and Dubai) irrespective of their true destination (or origin).

[52] *See*, for example, Sky Talk (the Dallas Star-Telegram's airline, travel and aerospace blog), December 5, 2014: "*At DFW Airport's board meeting this week, airport chief executive Sean Donohue noted that passenger traffic to Europe had dropped 8 percent in October which the airport attributed to more travelers using the Gulf carriers to connect to destinations in the Indian subcontinent and Africa instead of connecting through Europe.*" In a March 23, 2015 update ("A little more about Gulf carriers effect at DFW Airport", http://www.star-telegram.com/news/business/aviation/sky-talk-blog/article16090664.html#/tabPane=tabs-b0710947-1-1), the Star-Telgram's SkyTalk noted "By the end of the year, European traffic is down 6.7 percent while Middle East traffic is up 122 percent."

[53] *See* Keynote Address by John R. Byerly, Strategy Summit – Routes Americas in Denver, February 1, 2015. In fact, U.S. carriers have not "ignored" these markets, but rather, our empirical analysis indicates that they have been largely foreclosed from serving them due to the flood of subsidized Gulf carrier capacity into these markets.

[54] *See* Dresner et al., page 9 (emphasis added).

majority of the traffic gains have come at the expense of U.S. and other carriers, whose passengers traveling between the United States and destinations in Asia/Africa/Middle East/Australasia have been diverted from routings that had traditionally been served either non-stop or via hubs of in Europe/Asia to routings over the Gulf carriers' subsidized hubs in Dubai, Doha and Abu Dhabi.

Although Gulf carriers' U.S. expansion is still in early phases, the harm to U.S. carriers from their subsidized capacity has already been substantial. Not only have U.S. carriers been foreclosed from entering or expanding service to many destinations now flooded with subsidized Gulf carrier capacity, U.S. carriers' capacity growth to the hubs of their JV and other alliance partners in Europe and Asia has also been impeded. Simply put, if subsidized Gulf carrier expansion is permitted to continue unabated, the expected outcome is that U.S. carriers will be forced to cede even a greater proportion of their international passengers (and hence long-haul flying) to the Gulf carriers as overcapacity results in U.S. carriers being unable to cover their cost of capital on those routes. And because the majority of U.S. carriers' long-haul international passengers make a connection to points beyond/behind their U.S. hubs,[55] a reduction in their long-haul international service will have negative spillover effects on their domestic networks, potentially jeopardizing the viability of service to many small and medium-sized communities.

[55] For the year ending 2014-Q2, approximately 60% of passengers traveling on a long haul-international flight operated by American, Delta, United or US Airways, made a "behind/beyond" connection to one of their domestic (or other international) flights (e.g., Canada, Mexico, etc.) at the U.S. gateway airport. Source: U.S. DOT DB1B.

Appendix A: Description of Data Sources Used

The analysis contained within this paper relies on a number of standard industry data sources.

a) OAG Schedule Data

OAG Schedule data contains the vast majority of scheduled airlines' historic and current flight schedules. For each calendar day, OAG data includes the scheduled departure and arrival times of every flight, the type of aircraft used (including its seating capacity) and both the operating and primary marketing carrier of the flight, as well as information on other airlines that can market the flight under a codesharing agreement with the operating carrier.

b) U.S. DOT T-100 Segment Data

T-100 segment data contains information reported by all air carriers (U.S. and foreign) at the non-stop route level (i.e., directional airport-pair) for routes with least one U.S. airport. The data includes information on the number of onboard passengers, seating capacity, the number of departures, operating carrier, and aircraft type and is available at the monthly level. Importantly, T-100 data does *not* contain any information regarding the origin and/or destination of passengers on board flights (e.g., Emirates' passengers between JFK and Dubai in the T-100 data base include all passengers on Emirates' flights, regardless of whether they are destined to Dubai, or points beyond Dubai).

c) U.S. DOT Origin and Destination Survey (DB1B)

The DB1B database is a 10% sample of airline tickets on which at least one segment was operated by a U.S. carrier and is reported at the quarterly level. The data includes (among other things) the origin and the destination of each itinerary, any intermediate stops, the operating and marketing carrier for each segment of the itinerary and the fare paid. DB1B excludes the vast majority of passengers traveling to/from the United States on itineraries operated exclusively by foreign carriers.

d) Marketing Information Data Tapes data (MIDT)

MIDT data is compiled from data collected by a variety of Global Distribution Systems ("GDSs").[56] Like the U.S. DOT DB1B data, MIDT data includes information regarding the itinerary's origin, destination, intermediate stops, and the operating and the marketing carrier of for each segment; however, it does *not* include any fare information. Unlike the DB1B data, MIDT includes bookings on all carriers (U.S. and foreign) that participate in the reporting GDSs. However, only those bookings that made through a GDS are included in the MIDT (i.e., the data does not include bookings made on most carriers' websites or directly with the carrier (e.g., over the phone, at the airport, or at a ticket office of the carrier)). Moreover, because the MIDT data is based on bookings rather than flown passengers, it may include bookings by some passengers that did not travel.

[56] The MIDT data used in this study contains the bookings made through ten Global Distribution Systems: Abacus, Apollo, Axess, Galileo, Infini, Sabre, Worldspan, Topas, TravelSky and Amadeus.