ANTITRUST IMMUNITY GRANTS TO JOINT VENTURE AGREEMENTS: EVIDENCE FROM INTERNATIONAL AIRLINE ALLIANCES

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APPENDIX A

TECHNICAL APPENDIX FOR COMPETITIVE EFFECTS ANALYSIS

DB1B DATA

The DOT’s DB1B fare data are the only publicly available trans-Atlantic ticket fare data. The data are compiled quarterly, and this article uses data from 2005 quarter 1 through 2011 quarter 4. The only information provided for a ticket is the purchased price (in dollars), number of flight segments in the ticket's travel itinerary, number of sampled passengers traveling the itinerary at the particular fare, and, for each flight segment, the fare class, origin and destination airports as well as the operating and marketing carriers. DB1B ticket fare data include no data on individual customer characteristics, such as date of purchase or travel. This is a standard limitation of published studies, including those cited in the text, which use the DOT data.

The DB1B data are a 10 percent random sample of tickets either ticketed by a U.S. carrier or where a U.S. carrier operated at least one flight in the ticket's itinerary. Data for tickets ticketed by foreign carriers are not reported in the publicly available DB1B data when they include no flights operated by U.S. carriers. In the data, there are thus no online non-stop and connecting tickets for foreign carriers, which represent the vast majority of tickets sold by these carriers. The DOT collects these data under its Orders granting antitrust immunity to alliances (e.g. Orders 2002-7-39, 2001-12-18, 2000-4-22), but these data are not made publicly available. This has two principal implications. First, if the only carrier in a route is a foreign carrier, then there are insufficient data to reliably infer about fares and passenger volumes. This limits the scope of routes and entry/exit events that can be analyzed with the data. Second, when there is a U.S. carrier in the route, then the fares reported by U.S. carriers are assumed to be representative of fares across all carriers in the route.

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Flight Schedule Data

Non-stop flight schedule data are publicly available from Official Airline Guide (OAG). An airline is counted as serving a route non-stop in a year-quarter if it offers at least 60 non-stop flights in each direction in that period. [Results can be shown to be robust to a lower flight threshold.] As in the economics research cited by the applicants, the number of airlines offering non-stop flights in a trans-Atlantic route is taken, in the analysis, to be pre-determined prior to these airlines’ pricing decisions. This assumption is reasonable at two levels. First, since airline demand is revealed over time and the costs associated with establishing trans-Atlantic non-stop service are high, airlines that enter a trans-Atlantic route publish their flight schedule and advertise their new service well ahead of actual departure dates. Second, airlines with non-stop flights in a trans-Atlantic route are almost exclusively airlines with a hub at an endpoint of the route (95 percent of all carriers with non-stop service in a route have a hub in that route), and the number of non-stop carriers in a route is quite stable over time.

Trans-Atlantic routes where a foreign carrier offers online connecting flights cannot be identified in the public DB1B data (DB1B lacks foreign carrier data). The OAG non-stop flight data are used to identify airlines that may serve trans-Atlantic routes only with connecting service. Immunized carriers within an alliance are treated as a single carrier. Non-stop flights from U.S., EU, and Canadian carriers are paired by their destination-origin endpoints (the destination of the first flight is the origin of the second one) to form one-stop connecting itineraries that are online (the two flights are by the same carrier) or may be offered by carriers in the same alliance (the two flights are by different carriers that do not have immunity with each other in the alliance; each carrier is taken to offer the connecting itinerary). Connecting itineraries with total mileage over 120 percent of the great circle mileage distance between the endpoints of the route are deleted. The number of different carriers with connecting itineraries in a route, other than the carriers with non-stop service in the route, then represents the number of carriers that may serve the route only with connecting service (number of additional connecting carriers).

Across the trans-Atlantic routes in the sample data, the mean number of additional connecting carriers in a route in a year-quarter is 5.8, with a standard deviation of 2.1 (minimum is 0; maximum is 13). Over 93 percent of all route-year-quarter observations have at least 3 additional connecting carriers. Conclusions reported in the text are unchanged if the number of additional connecting carriers is computed in alternate ways. Mileage circuitry cut-offs other than the 120 percent reported above were considered. The number of additional connecting carriers was also defined (i) by including flights offered by non-U.S. and non-EU carriers; and (ii) based only on online connecting itineraries, excluding thus itineraries that may be offered by carriers in the same alliance. Across the trans-Atlantic routes in the data, the mean number of additional online connecting carriers in a route in a year-quarter is 5.1, with a standard deviation of 1.9.

Sample Data Used in the Analysis

The fare data are economy-class tickets in DB1B (tickets with fare class ‘X’ coupons). Trans-Atlantic business class service is known to differ significantly from economy-class service, and there are few business class tickets in the data (about 30 percent of route-year-
quarter observations have less than thirty sampled business passengers). Business class tickets also have a largely bi-modal distribution requiring different econometric treatment (see Appendix B for further details).

The fare data consist of online one-coupon tickets and two-coupons round-trip tickets sold by U.S. carriers, which represent 96 percent of all non-stop tickets in DB1B for the routes of interest. Round-trip tickets are split into two one-way tickets, with the round-trip fare divided by two. Tickets with zero prices and tickets in the bottom and top 5 percent of the fare distribution in a route in a year-quarter are eliminated.

There is at most one ATI additional carrier across routes but for NYC-Amsterdam in the third and fourth quarters of 2008 where there are two ATI carriers. These two route-year-quarter observations are not included, without loss of generality, in the sample data.

In the model, the average fare in a route is computed across online tickets sold by U.S. carriers, and carrier-year-quarter effects are defined for U.S carriers (most foreign carriers appear in just one or two sample routes). In a route in a year-quarter when a U.S. carrier has non-stop flights, then the variable identifying that carrier has a value equal to 1 divided by the total number of U.S. carriers with non-stop flights in the route at that time. Fare effects from the number of competitors are interpreted holding constant the sum of the estimated carrier effects (given the model specification, these fare effects may represent in particular the fare effects associated with variations in the number of foreign competitors in a route, all else equal).

Lastly, allowing in the model in Table 4 for the number of competitors to affect fares non-linearly (using indicator variables for the number of competitors) can be shown to yield results similar to those reported in the Table.
APPENDIX B
TECHNICAL APPENDIX FOR EMPIRICAL ANALYSES OF EFFICIENCIES

The data are the DB1B data for the period 2005–2011 (see Appendix A). In this Part, ticket data for connecting travel itineraries with up to 6 flight segments, but no more than 3 flight segments one-way and no surface transfers, are extracted from the raw DB1B data. The focus is on economy-class tickets. Tickets in the bottom and top 5 percent of the fare per mile distribution are ruled out. This is equivalent to selecting connecting tickets with a round-trip fare per mile flown from $0.021 to $0.205.

Business-class tickets represent less than 4 percent of tickets sold to trans-Atlantic connecting passengers, and we observe on average only 0.4 sampled business passengers per route in a year-quarter. These are too few data to reliably infer about connecting business travel, which differs significantly in service from economy travel. In addition, the fare distribution of business tickets is largely bi-modal. Whereas 5 percent of connecting economy tickets have a round-trip fare less than $230 (greater than $2,000, respectively), 14 percent (76 percent, respectively) of business tickets do. This distribution of business fares requires special econometrics treatment if these fares are included in the data, unless the polarity in fares can be effectively controlled for—perhaps by including in the model control variables for whether a business ticket is the result of an upgrade, which may explain the cheap business fares in the data. Such control data are not publicly available.

An ATI ticket lists two or more airlines as operating or marketing carriers and all of the airlines listed on the ticket are immunized members of the same alliance. A non-ATI ticket is a ticket that lists two or more airlines, and all listed airlines are members of the same alliance, and at least one of the airlines is not an immunized alliance member.

A ticket is labeled as a SkyTeam ticket (Star, oneworld, respectively) when all flights in the ticket are operated and marketed by members of the SkyTeam alliance (Star, oneworld, respectively). A flight segment in a ticket is online if the operating carrier is the marketing carrier on the flight segment. If the carriers do not match, the flight segment may yet be online since the operating carrier may be a regional affiliate of the marketing carrier. The OAG flight listing data are used to identify regional carrier affiliations for major airlines on an individual flight segment basis. If all of the flight segments in a ticket are online flight segments from the same carrier, then the ticket is online. Note that when a ticket lists two or marketing carriers across flight segments (for example, 62 percent of ATI and non-ATI alliance tickets do so), it is not possible to infer from the DB1B data which of the marketing carriers sold the ticket.

The tickets included in the data have the following major carriers operating the trans-Atlantic flights (listed by two-letter codes): AA, CO, DL, NW, UA, US, AC, AF, AY, AZ, BA, BD, EI, IB, KL, LH, LO, LX, OA, OK, OS, SK, TP, and VS. For each carrier, we define a variable that equals zero except in tickets where the carrier operates a trans-Atlantic flight, in which case the variable equals 1 if it operates both trans-Atlantic flights in the ticket and 0.5 otherwise. Fare effects from the type of ticket are interpreted holding constant the sum of the
estimated carrier effects (holding constant for example, in our model, the identity of the carriers operating the trans-Atlantic flights in the tickets).

Under the cross-section approach, allowing in the economics model for the fare effect of the type of ticket to differ across alliances can be shown not to affect results.

Under the panel approach, a travel itinerary is defined as the sequence of airports visited and operating and marketing carriers for each of the flight segments on a ticket sold in a quarter. The focus is on travel itineraries where all flights are operated and marketed by SkyTeam members Delta, Northwest, Air France-KLM, Al Italia, and Czech Airlines. Excluding from the definition of an itinerary the identity of the operating carriers does not affect findings. The newly immunized itineraries are itineraries that include no ATI fares in the pre-grant period and no non-ATI fares post-grant. Expanding the set of newly-immunized itineraries to also include itineraries where each of ATI and non-ATI fares are observed in the pre-grant period—in which case the model captures how the average of ATI and non-ATI fares in the itinerary changed following the grant—does not affect conclusions.

Lastly, while changes in other factors, such as competition levels, may affect the panel approach’s difference-in-difference analysis, there are intrinsic difficulties given the available data in properly accounting for these factors. Competition measures constructed by authors in the literature for trans-Atlantic routes with no non-stop flights generally are not statistically significant in regression results. In addition, if routes with newly immunized itineraries became more competitive after the grant, then fares would all else equal have been even lower in newly immunized itineraries after the grant, making more likely to identify an effect, which results show is not present in the data.