Hubs versus Airport Dominance

Volodymyr Bilotkach (joint with Vivek Pai)
Background

• Airport dominance effect has been documented on the US market
  – Airline with a dominant position at an airport charges more for flight into/from that gateway:
    • As compared to what it charges over the remainder of its network
    • As compared to other airlines flying into the same airport
  • What is behind this effect?
Background

• Traditional explanation: airport dominance = market power

• However, customers (especially frequent fliers) living around a dominated airport can view service by dominant carrier as “higher quality”:
  – Access to a network of non-stop flights;
  – Reinforced by loyalty programs (FFP);
  – This issue has not been considered in previous research.

• In the end, it is not clear how much of observed dominance effect is “quality based” versus “market power based”.

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Idea

• Separate quality component of airport dominance effect from market power component.
• Pick airports serving as hub for two carriers:
  – Atlanta (Delta and AirTran) – Delta dominates;
  – Denver (United and Frontier) – United dominates;
  – Dallas-Ft. Worth (American and Delta) – American dominates; Delta dismantled its hub several years ago;
  – Phoenix (America West and Southwest) – neither dominates;
  – Chicago O’Hare (American and United) – neither dominates.
• These five airports combined handle one in six flights within the US.
• Use simple difference-in-differences to get the effects we are interested in.
Previous Studies

• Borenstein (1989)
  – First study of airport dominance effects;
  – Suggested reasons – frequent flier programs and then prevalent feature of ticket distribution market.

• Borenstein (1991)
  – Shows dominant carrier has larger market share of passengers traveling from the respective airport than to the same.

• Evans, Kessides (1993)
  – Airport dominance is a more important source of market power than route dominance

• Marin (1995)
  – Analysis of some European markets – no dominance effect observed
Previous Studies

- Berry, Carnal, Spiller (2006)
  - Structural model
  - Airport dominance effect applies to business travelers
- Lee, Luengo-Prado (2005)
  - Difference in differences
  - Airport dominance premium can be explained by passenger mix
- Bilotkach (2007)
  - Estimates airport dominance effect for several transatlantic routes
- Lederman (2008)
  - FFP partnerships help non-dominant carriers get dominance premium
  - Consistent with our story
## Destinations Served by Main Carriers

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<th></th>
<th>Atlanta</th>
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Identification – General

- Dominant airline’s price for trips to/from the hub includes:
  - Airline effect;
  - Hub effect (quality based)
  - Dominance effect (market power based)
- Same price for non-dominant hub operator includes:
  - Airline effect;
  - Hub effect (quality based)
- Same price for “third” airlines only includes:
  - Airline effect;
- To control for airline effects for dominant airline and non-dominant hub operator, use fares they charge for flights through the airport.

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With fare or yield as dependent variable, the effects we are looking for are identified as follows:

- Quality based hub effect – difference between
  - HubOperator*Non-Stop interaction and
  - OtherCarrier*Non-Stop interaction
- Market power based dominance effect – difference between
  - DominantAirline*Non-Stop interaction and
  - NonDominantHubOperator*Non-Stop interaction

For airports with two hub operators and no dominant carrier; no dominance effect should be observed
Data

- DB1B – the ultimate data source for airline pricing research
  - Collected quarterly by US Department of Transportation
  - 10% sample of tickets issued in the quarter
- We use DB1B for 1999-2005
- Roundtrips only, within lower 48 states, one stop at most in either direction
- To, From or THROUGH one of the five airports in sample
- Restricted economy class itineraries only
  - Over 85% of all itineraries ticketed as such
  - Most consistent category across airlines and time
- Fares less than 2 cents per mile in 2000 prices ($100 LA-NY roundtrip) dropped
- Only markets where 100 or more passengers are observed in a given year
- Result – over 600,000 observations; 5400 directional airport-pair markets

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Dependent Variable

- Natural logarithm of passenger-weighted mean fare
- Natural logarithm of passenger-weighted mean yield

- Fares in year 2000 dollars
- Weighing at airline-routing level (regional carriers merged with respective major carriers):
  - Directional
- Also obtained – standard deviation:
  - Passenger-weighted mean plus standard deviation fare
  - Passenger-weighted mean plus standard deviation yield
Model and Controls

• Directional airport-pair market fixed effects
  – Same airport-pair market includes multiple possible routings between the cities

• Controls – dummies and interactions
  – Airline
  – Year
  – Quarter
  – Year-quarter
  – Non-stop flight

• Controls – continuous variables
  – HHI
    • separately for non-stop and one-stop services
    • one stop services – irrespective of routing
  – Distance (total roundtrip)
  – Airline’s market share (separately for non-stop and one-stop)
  – Geometric average for endpoints’ population

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• Concentration and Market Share are endogenous; need instruments
• HHI – same lagged one year
• Market share – more complicated:
  – Airline’s average market share for flights to/from a given airport excluding the current service.
  – In spirit of using other markets’ characteristics to instrument for endogenous variables.
  – Correlation with market share = 0.51
Results

• Airport dominance effect is more pronounced in average fares than at the right end of distribution
• Hub effect is more pronounced for high fares
• Estimated airport dominance effect is lower in instrumental variables regressions
• More stable results (and better fit) for yield than price
• Considerable variation across the airports
  – REVERSE results for Dallas
  – Some specifications report dominance effect for Phoenix where it should not exist
Magnitude

• Yield as dependent variable, entire sample, IV
  – Average yield:
    • Hub operator’s premium over other airlines’ yields – 8.3 percent
    • Dominant hub operator’s premium over non-dominant – 5.5 percent
  – High yield:
    • Hub operator’s premium – 18 percent (consistent with higher valuation of quality by presumably less price sensitive customers)
    • Non-dominant hub operators’ yield is 6 percent above dominant.
      – Shows up only in IV regressions; FE gives 10 percent dominance premium
Implications

• Most of what is observed as airport dominance premium appears to be premium for access to network, presumably reinforced by frequent flier programs

• Airport dominance premium has been detected:
  – Applies more to average traveler
  – In contrast to other studies suggesting business travelers are the ones paying dominance premium
  – Most of what business travelers pay is the quality based “hub premium”.

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