

Young Researchers Seminar 2009

Torino, Italy, 3 to 5 June 2009

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”.

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

Hubs versus Dominance

Volodymyr Bilotkach



Destinations Served by Main Carriers

	Atlanta		Denver		Dallas		Chicago		Phoenix	
	DL	FL	UA	F9	AA	DL	AA	UA	HP	WN
July 1999	124	30	86	17	120	58	91	88	53	32
July 2000	134	29	80	20	120	63	96	96	54	37
July 2001	138	32	83	29	118	65	93	103	56	38
July 2002	138	36	80	29	119	60	96	84	55	43
July 2003	137	38	81	30	116	66	82	91	58	41
July 2004	137	42	75	36	126	72	109	116	56	42
July 2005	154	45	75	39	135	6	110	119	56	45

Hubs versus Dominance

Volodymyr Bilotkach



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.

Identification – General

- 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

Hubs versus Dominance

Volodymyr Bilotkach



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

Hubs versus Dominance

Volodymyr Bilotkach



Instruments

- 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”.