

The Economic Impact of Airport Congestion



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Agenda



- Introduction
- General Entry Trends
- Models Estimating Yields and Route Entry
- Model Estimating Entry at Airports
- Conclusions and Implications

Introduction



- US Department of Transportation findings - airline prices in real terms are 33 percent lower than 20 years ago.
- However, concerns remain over the failure of new entrant carriers and impediments to new entry.

Introduction



- Our data show that new entries onto routes declined significantly during the 1990s.

Introduction



- Potential barriers cited in a recent Department of Transportation Study arise from: Computer reservation systems, frequent-flyer programs, travel agent commission overrides, predatory behavior by airlines, economies of scale in operations, and external airport constraints (e.g., environmental regulations).

Introduction



- US Department of Transportation would like more information on barriers arising from “airport operating practices” and their competitive effects.

Yield and Route Entry



- We examine the impact of 3 airport operating practices on Yield and Route Entry:
 - Slot Controls
 - Gate Constraints
 - Gate Utilization During Peak Periods

Model: Yield



- Yield = g (Passenger Demand, Entry Barriers, Other Route Characteristics)
- Other Route Characteristics were: Market Concentration, Vacation Route Dummy, Route Distance.

Model: Route Entry

- Entry = f (Entry Barriers, Other Route Characteristics, Entrant Characteristics)
- Other Route Characteristics were: Yield, and Average Number of Flight Segments of Existing Passengers.
- Entrant Characteristics - Not significant and dropped from model.

Data



- Collected data on all entries onto the top 500 US air routes from the 3rd quarter of 1996 to the 2nd quarter of 1997.
- Entries: All new non-stop services involving average fleet size of at least 70 seats (58 entries).

Data



- Yield: Average revenue per mile for all passengers on a route.
- Slot Controls: Dummy variable for the routes with at least 1 endpoint at one of the four slot-controlled airports.

Data



- Gate Constraints: Dummy variable for the routes with at least 1 endpoint at one of the six gate-constrained airports identified in a 1996 survey by the US General Accounting Office of airline executives. Gate constrained airports had a high percentage of exclusive use gates.

Data



- Gate Usage During Peak Periods was derived from a 1998 study by the Airports Council International - North America. The airports reported on the usage rates of gates during their busiest 3 hour period in their busiest month. We used the highest of the two percentages for each route endpoint in our sample.

Results - Yield Equation

<u>Variable</u>	<u>Coefficient Estimate</u>
Constant	-4.13*
Herfindahl Index	0.21*
Vacation Route Dummy	-0.16*
Distance	-0.52*
Gate Constraints	0.27*
Slot Controls	0.23*
Peak Gate Utilization	0.51*
Passengers – Fitted Value	0.39*

* Significant at .01.

Results - Entry Equation

<u>Variable</u>	<u>Estimated Coefficient</u>
Constant	1.16
Lagged Yield	0.65 [^]
Coupons/Flight Segments	0.89
Slot Controls	-0.60
Peak Gate Utilization	-3.62*
Gate Constraints	-0.17

* Significant at .01. [^] Significant at .05.

Results - Sensitivity Analysis

Gate Constraints	Slot Controls	Peak Gate Use	Predicted Yield (dollars)	Predicted Probability Of Entry
0	0	.50	.075	.135
1	0	.50	.098	.136
0	1	.50	.094	.091
0	0	.75	.092	.067
0	0	.95	.103	.037
1	1	.95	.169	.024

Model: Airport Entry



- Preliminary work on entry from the airport, rather than the route, perspective.
- Examine how airport leasing arrangements, hub dominance, and other variables have affected entry.

Model: Airport Entry

- Entry = f (Total Gates, Exclusive Use Gates, Slot Controls, Gate Utilization, Airport Dominance, Population, Personal Income, Year Dummy)
- Gathered all entry data for 1992 and 1998 from 46 airports for which we could obtain gate leasing data.

Variables: Airport Entry



- Entry - Total number of new direct services.
- Total Gates - Total number of gates.
- Exclusive Use Gates - Total number of exclusive use gates.
- Slot Control - Dummy variable if the airport was slot controlled.
- Airport Dominance - Enplaned passenger share of largest carrier.

Variables: Airport Entry



- Gate Utilization - Average number of passengers per gate.
- Population - Number of people in the metropolitan area.
- Personal Income - Average per capita income in the metropolitan area.
- Year Dummy - 0 for 1992, 1 for 1998.

Results: Airport Entry

Variable	All Entries	Majors	Southwest	Other Carriers
Total Gates	0.41*	0.16*	0.05	0.33*
Exclusive Use Gates	6.05	-1.61	2.53	7.27
Slot Controls	-16.39~	1.81	-54.11*	-20.24*
Passengers/Gate	-1.54*	-0.69^	-0.62~	-1.26*
Dominance	-22.72^	-1.95	-19.34^	-19.44~
Year Dummy	-27.77*	-19.73*	5.36	-19.30*

Significance: * = .01, ^ = .05, ~ = .10

Conclusions and Implications



- There was a general decline in route entries during the 1990s.
- All three airport barriers put upward pressure on yields.
- Peak gate usage/gate congestion has a negative and significant effect on entry.
- Airport dominance deters entry by smaller carriers and Southwest.

Conclusions and Implications



- If airports want to increase entry, they need to make gates available to new entrants during peak usage or congested periods.