

# The Construction of a Low Cost Airline Network

Facing Competition and Exploring New Markets

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# Agenda

1. Motivation
2. Determinants of Entry in Airline Markets
3. Characterization of JetBlue Airways
4. Data, Empirical Approach and Results
5. Conclusion

# Motivation

- **Entry decisions**
  - Success of a firm's business strategy is often tied to its sequential decisions to enter multiple markets (e.g., banking or transport services)
- **Two distinct entry strategies**
  - enter existing markets ('facing competition')
  - identify and enter new markets ('exploring new markets')
- **U.S. airline industry provides a suitable environment for an empirical assessment of the determinants of entry**
  - Pronounced consolidation trend in the last decade
  - Market entry and growth of JetBlue Airways
- **Research questions**
  - *Which factors have driven JetBlue's entry decisions?*
  - Of which nature are entry barriers in the airline industry?

# Determinants of entry considerations

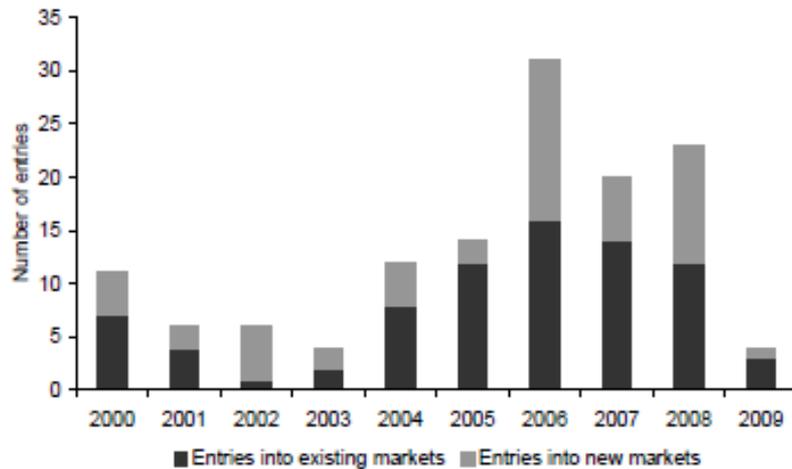
- **NPV of expected post-entry profits  $>$  sunk costs of entry**
  - expectations on post-entry competition
  - level of sunk costs
  - market growth expectations
  - network profitability
- **Entry barriers**
  - Access to airport facilities (gates, slots, ...)
  - FFP, flight frequency
  - Network size and breadth
- **Related empirical literature**
  - Structural models: Reiss and Spiller (1989); Berry (1992); Dunn (2008); Ciliberto and Tamer (2009)
  - Reduced form approach: Sinclair (1995); Lederman and Januszewski (2003); Boguslaski et al. (2004)

# Background: JetBlue Airways

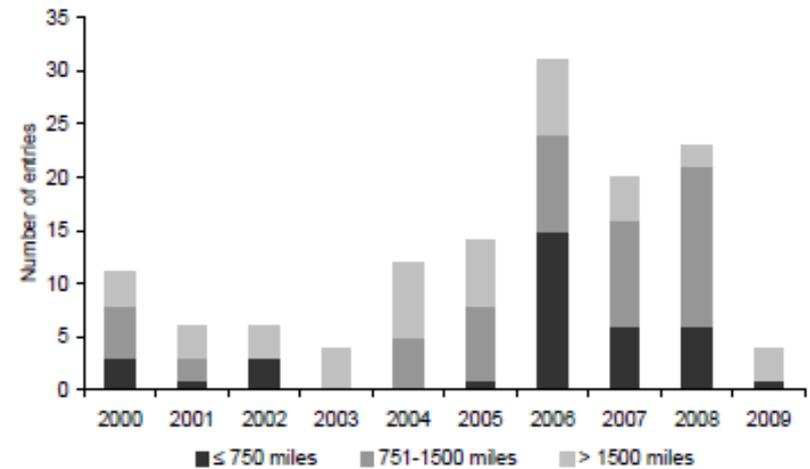
- Successful new low cost carrier (remained profitable even after 9/11)
- First entry in 2000; quickly gaining reputation as ‚hybrid‘ LCC
- Follows a ‘low cost’ – ‘high quality’ strategy in several dimensions (e.g., in-flight entertain., more legroom, leather seats)
- Now one of the 10 largest domestic carriers
- Established its first and major hub in JFK (and add focus cities)
- Introduces LCC services on long-haul routes above 1,500 miles
- Has recently started its international presence via codesharing agreements with Aer Lingus and Lufthansa
- Considered as future alliance member

# Entry patterns of JetBlue Airways

## Entries by type of market



## Entries by haul



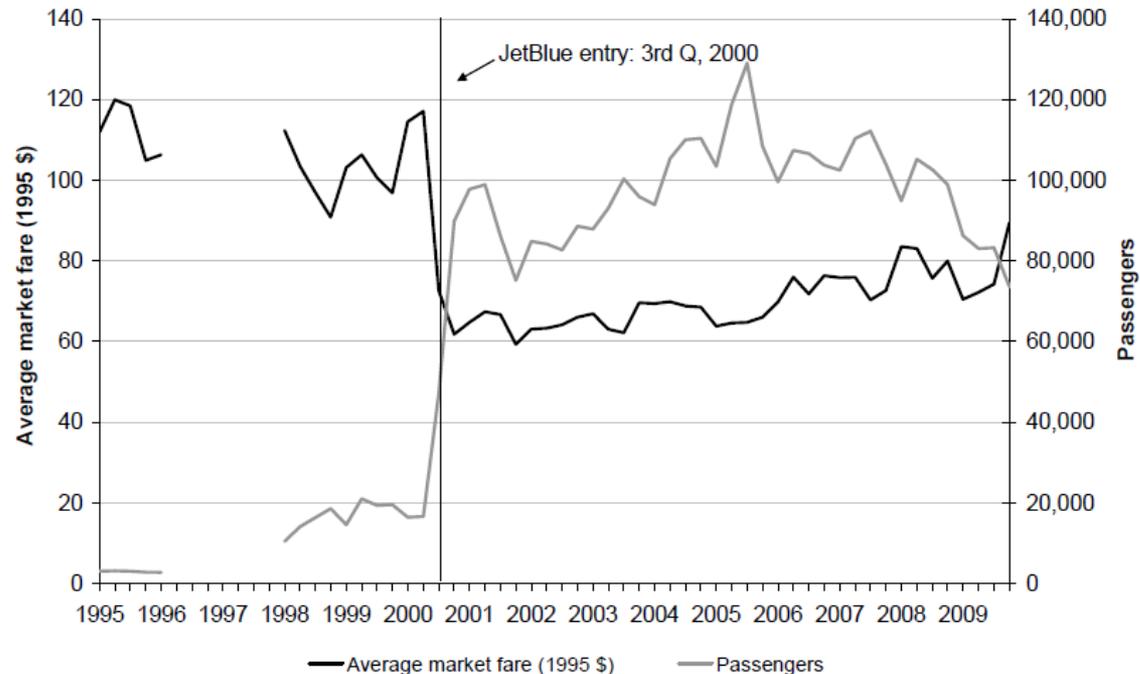
- Out of the 124 B6 route entries, 45 were new entries and 79 are classified as entries into existing routes
  - B6 long-haul passenger share 2009: 23% (WN: 8%)

# JetBlue Airways – Entry JFK:ROC

**Table 3: Market dynamics on the New York JFK - Rochester route (264 miles)**

Year/Quarter	Operating airlines
1995/1-1996/1	Delta Air Lines
1996/2-1997/4	No airline in the market according to T-100 data
1998/1-1998/3	American Airlines
1998/4-2000/2	American Airlines and Trans World Airways
2000/3-2001/4	American Airlines and JetBlue ( <i>LCC entry</i> )
2002/1-2006/2	JetBlue (LCC)
2006/3-2009/4	JetBlue (LCC) and Delta Air Lines

Data source: U.S. DOT, T-100 Domestic Segment Data



# Data

- **Route and airport data**
  - DB1B Market Origin and Destination Data and T-100 Segments Data (U.S. DOT): 1999/3 - 2009/4
  - DB1B:
    - Identify a sample of non-stop and connecting routes JetBlue possibly might enter
    - Construct route variables for new routes
  - T-100:
    - Identify (time and type) of JetBlue's entry events
    - Construct route variables for existing routes
    - Construct various airport characteristics
- **Demographics**
  - U.S. Census Bureau and Bureau of Labor Statistics
  - Restrict the sample to routes which connect the 200 largest MSAs

# Hypotheses

- **Route characteristics**
  - Distance (+), Density (+)
  - Route HHI (+), LCC competition (-)
  - Chapter 11 route (+)
- **Airport characteristics**
  - Secondary airport (+), # of B6 routes (+)
  - slot constraints (-), dominated airports (-), PFC (-)
- **Demographic characteristics**
  - Population (+)
  - Income (+)
  - Unemployment (-)

# Empirical approach

- Analysis of network construction involves studying not only **which routes** the airline decides to serve with non-stop flights, but also at **what point in time** the entries take place
- Investigating the **timing of entry** - from the very beginning of the market presence of the entrant - distinguishes our approach from previous studies on the determinants of market entry by LCCs
- A convenient set of models which make it possible to account for the sequence of entry are **duration models** commonly used in survival analysis, but also suitable for **entry analysis**
- These models **explain the hazard rate** ( $t$ ).
  - In our case, the hazard rate allows us to approximate the probability of starting to serve a route directly within a short interval of time, conditional on not having entered that route up to the starting time of the interval

# Empirical approach (cont.)

- Technically, we estimate a **Cox proportional hazard model with time-varying covariates**
  - The underlying baseline hazard varies according to the time which has passed by
  - The dependent variable is the overall hazard rate (conditional entry rate, entry risk) which is the baseline-hazard shifted by the covariates
- **Interpretation**
  - A positive coefficient ( $\beta_k$ ) means that the hazard rate ( $\sim$ probability of entry) increases by  $\exp(\beta_k)-1$  and vice versa
- We restrict the sample to **routes between Top 200 Metropolitan Statistical Areas**
  1. Identify all routes which are served at least at via two-stops (*non-stop entry all markets*)
  2. Identify all routes which are only served via one- or two-stop (*non-stop entry into new markets*)
  3. Identify all routes which have been served non-stop by at least one other carrier in the quarter before entry (*non-stop entry into existing markets*)

# Main results

- Four factors appear in all three regressions as robust predictors of JetBlue's entry decisions
  - JetBlue was more likely to enter more **concentrated airport-pairs**
    - The hazard rate of entry increases by about 20 percent if the route's HHI increases by 10 percentage points
  - Jet Blue shied away from **concentrated airports**
    - The magnitudes of the coefficients show that airport concentration appears as a strong entry deterrent
  - JetBlue is apparently more likely to enter a route, if the carrier is **already present at both endpoint airports**
    - If JetBlue serves one more non-stop route from each of the endpoint airports, the hazard of entry increases by 24 percent
  - The effect of **population** on the likelihood of entry is also robust and significant in all specifications

# Main results (cont.)

- Results for the remaining variables diverge between samples
  - **Distance** exhibits a significant effect in the entire sample, and for entries into existing markets
    - Consistent with what is believed about JetBlue's strategy, the carrier is more likely to enter longer-haul routes already served by its competitors
  - **Number of passengers** served on the market predicts entry into new routes, but not into existing markets
    - This result simply implies that JetBlue successfully identified markets with many connecting passengers but no non-stop services
  - **Presence of other low cost carrier(s)** serves as an important deterrent for entry into new markets
  - JetBlue also tried to avoid routes, served by the airlines under **Chapter 11 bankruptcy protection**

# Main results (cont.)

- Support for the commonly accepted wisdom that low cost carriers tend to choose **secondary airports** appears mixed
  - It is true that JetBlue is more likely to choose secondary gateways when entering new markets; however, the corresponding coefficient is not significant for regression analyzing the carrier's entry into existing routes

# Conclusion

- JetBlue's success might be driven by its entry decisions for which clear patterns can be identified
- It has early entered longer-haul thicker and more concentrated markets
- Considerations concerning network development have clearly driven subsequent entries
- Indicators that JetBlue avoided direct confrontation
- Entry barriers: Entry deterrence effect of airport dominance is not limited to hubs or large airports
- Main message: Successful entry in the U.S. airline industry is difficult but still possible

Thank you very much  
for your attention!

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# Back-up

# Description of variables

Variable	Description
<i>Route characteristics</i>	
Distance	Non-stop distance in 100 miles
Passengers	Sum of passengers (in thousands) in the previous period (DB1B)
Route HHI	Route HHI in the previous period (DB1B)
Chapter 11 route	At least one Chapter11-airline serves the route
LCC comp.	Number of other low-cost carrier serving the market
<i>Airport characteristics</i>	
Secondary airp.	At least one airport is a secondary airport
Slot restr. airp.	At least one airport is slot-restricted
B6 routes	JetBlue routes from the airports in the previous period (Mean)
Airp. HHI	HHI at the airports in the previous period (Mean)
Non-HUB	Airport's passenger share below 0.25 percent (at least one of the airp.)
PFC	Passenger Facility Charge (Mean)
<i>City/MSA characteristics</i>	
Population	Population estimate in Mio (Mean)
Income	Average weekly wage in 1995 USD (Mean)
Unempl.	Unemployment rate (Mean)

# Descriptive statistics

Variable	All markets		One- or two-stop markets		Existing non-stop markets	
	Mean	Std. D.	Mean	Std. D.	Mean	Std. D.
<b>Route characteristics</b>						
Distance	11.094	7.558	11.632	7.724	8.432	6.005
Passengers	8.763	28.352	2.143	3.962	41.573	58.450
Route HHI	55.581	24.712	54.691	25.116	59.990	22.084
Chapter 11 route	0.326	0.469	0.372	0.483	0.101	0.301
LCC comp.	0.310	0.614	0.222	0.513	0.746	0.845
<b>Airport characteristics</b>						
Secondary airp.	0.201	0.401	0.200	0.400	0.205	0.404
Slot restr. airp.	0.069	0.254	0.049	0.216	0.169	0.375
B6 routes	0.630	1.940	0.567	1.890	0.938	2.145
Airp. HHI	37.258	14.730	37.334	14.979	36.878	13.425
Non-HUB	0.781	0.414	0.872	0.334	0.330	0.470
PFC	3.400	1.044	3.375	1.045	3.526	1.030
<b>City/MSA characteristics</b>						
Population	2.382	2.621	2.089	2.478	3.832	2.820
Income	576.107	75.723	565.377	71.114	629.290	75.424
Unempl.	5.270	1.585	5.264	1.584	5.299	1.585
Observations	420,219		349,670		70,549	

Source: U.S. DOT T100 Market Segment and DB1B Origin and Destination Survey, U.S. Census Bureau, Bureau of Labor Statistics, authors' calculations.

# Main regression results

Variables	All non-stop entries		Non-stop entry into connecting markets		Non-stop entry into existing non-stop markets	
	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
<b>Route characteristics</b>						
Distance	0.277***	(0.064)	0.089	(0.088)	0.407***	(0.083)
Distance <sup>2</sup>	-0.008***	(0.002)	-0.003	(0.003)	-0.011***	(0.003)
Passengers	-0.000	(0.001)	0.056***	(0.017)	0.000	(0.002)
Route HHI	0.017***	(0.005)	0.018**	(0.009)	0.018***	(0.007)
LCC comp.	-0.180	(0.136)	-0.304	(0.278)	-0.366**	(0.172)
Chapter 11 route	-0.621**	(0.282)	-0.428	(0.485)	-0.873**	(0.424)
Existing market	1.086***	(0.311)				
<b>Airport characteristics</b>						
Secondary airp.	0.559**	(0.225)	1.406***	(0.421)	0.159	(0.294)
Slot restr. airp.	-0.963***	(0.328)	-0.743	(0.594)	-0.915**	(0.409)
B6 routes	0.216***	(0.021)	0.229***	(0.037)	0.213***	(0.025)
Airp. HHI	-0.097***	(0.013)	-0.057***	(0.021)	-0.118***	(0.016)
Non-HUB	-1.317*	(0.708)	-1.416	(0.952)	1.437	(1.322)
Airp. HHI × Non-HUB	0.009	(0.023)	0.005	(0.027)	-0.083	(0.059)
PFC	0.116	(0.136)	0.029	(0.188)	0.269	(0.212)
<b>City/MSA characteristics</b>						
Population	0.190***	(0.038)	0.167***	(0.061)	0.186***	(0.052)
Income	0.004***	(0.001)	0.004	(0.002)	0.004**	(0.002)
Unempl.	-0.359**	(0.169)	-0.238	(0.271)	-0.514**	(0.234)
Observations	420,219		349,670		70,549	
Markets	13,052		11,800		2,583	
Entries	124		45		79	
Log-likelihood	-845.2		-302.8		-440.3	
$\chi^2$	599.6		208.0		302.6	