Project: The Impact of Ultra-Low-Cost-Carrier Competition on Airfare

Course: Senior Capstone

Keywords: Econometrics, airline competition, fixed-effect regression models

Project Summary:

This project was discovered after my internship experience at Southwest Airlines as a Market Strategy Analyst in December 2016. During my internship, I was responsible for creating a yield management strategy for 7 airline markets in the United States. At Southwest I noticed that Ultra-Low-Cost-Carriers, such as Frontier, Spirit, and Allegiant, were credited for dramatically decreasing fares in airline markets. As a capstone intern project, I used an econometric model, produced by Michael D. Wittman and William S. Swelbar at the MIT International Center for Air Transportation, to identify what the fare decreases Southwest could expect when ULCC entered their markets.

My research expands on previous literature and econometric models to incorporate the effect of ULCC over their period of their existence. Using panel data collected from the Department of Transportation, I perform an empirical analysis. I use a fixed-effect regression model to incorporate time and market fixed-effects. My empirical results add to the limited research on ULCC and demonstrate a unique decrease in fare to be associated with ULCCs. With my updated econometric model, additional control variables are included which more adequately represent the effect of ULCCs on airfare. This research was presented at the 2018 National Conference for Undergraduate Research.

The Impact of Ultra-Low-Cost-Carriers on Market Airfare

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Background

- Since the airline deregulation, carriers have been classified based on their unit costs and fare offerings and were previously classified as either:
  - legacy carriers and low-cost carriers (LCC)
- In 2010 the classification of ultra-low-cost-carriers (ULCC) emerged in the US and features airlines with:
  - lower unit costs, offer extremely low base fares, and rely heavily on ancillary fees, e.g., baggage fees, to obtain revenue
- This study empirically explores the impact of the presence of ULCC's on the average fare in a market

Data Collection

Data was collected from the DOT's Domestic Airline Consumer Airfare Report. The data included domestic markets under 750 miles and average market fare, carrier average fare and passenger count

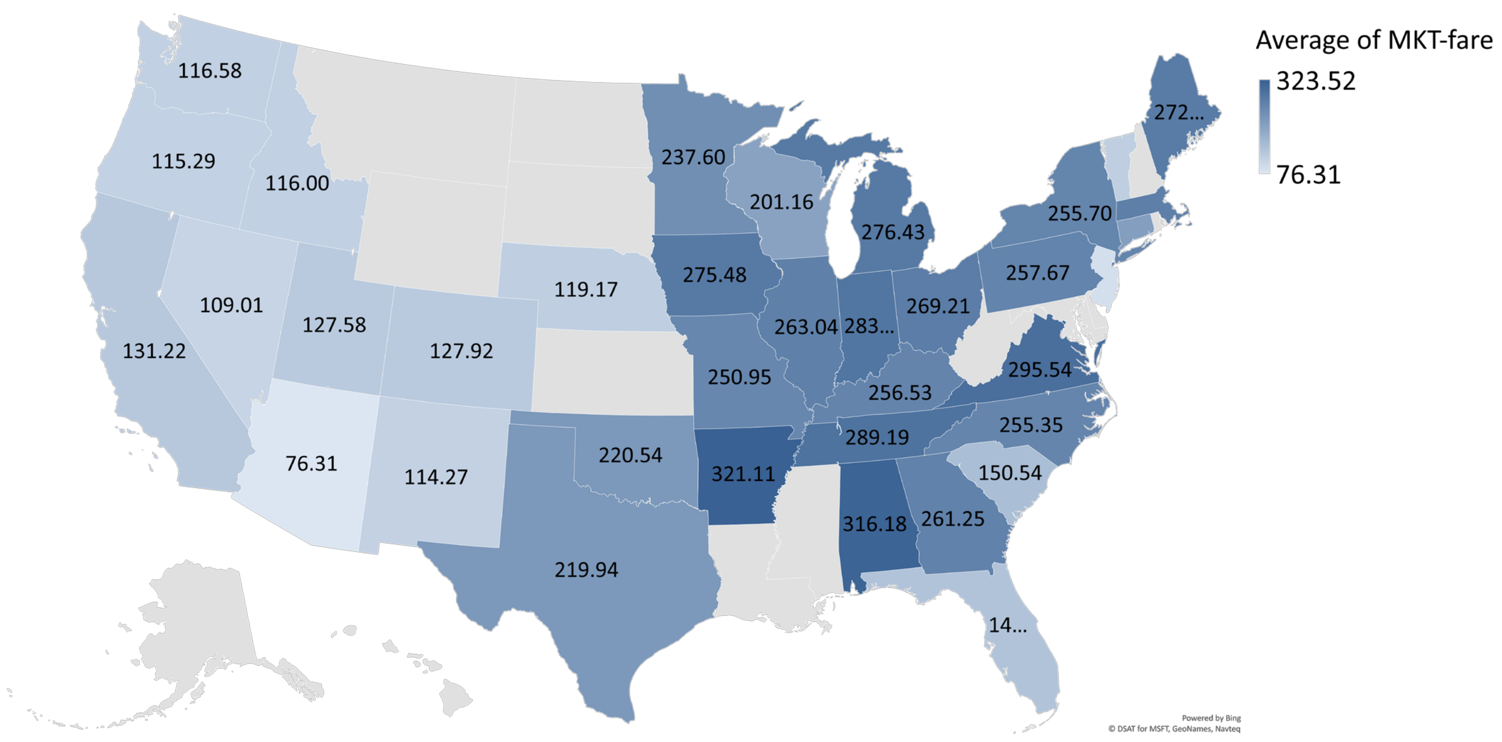


Table 1: Summary Statistics

	Miles	Market Fare	Passengers
Mean	503.92	$243.03	26,369
Standard Error	5.46	3.05	1,637

Carrier Classifications

Ultra-low-cost-carriers

Frontier Airlines, Spirit (Less money. More go.), Allegiant

Low-cost-carriers	Legacy
Southwest	Delta
jetBlue	American Airlines
	United
	Alaska

Data Summary

Table 2: Carrier Classifications Count in Observations

ULCC	LCC	Legacy
327	357	452

Table 3: Competition Count

Competition 1	Competition 2	Competition 3	Competition 4
403	294	92	11
50%	37%	12%	1%

Econometric Framework & Results

$$Airfare_{it} = \beta_0 + \beta_1*(Frontier_{it}) + \beta_2*(Allegiant_{it}) + \beta_3*(Spirit_{it}) + \beta_4*(American_{it}) + \beta_5*(Alaska_{it}) + \beta_6*(United_{it}) + \beta_7*(LCC_{it}) + \beta_8*(Hub_i) + \beta_9*(Miles_i) + \beta_{10}*(Competition_{it}) + \alpha_t + R_i*\gamma_t + U_{it}$$

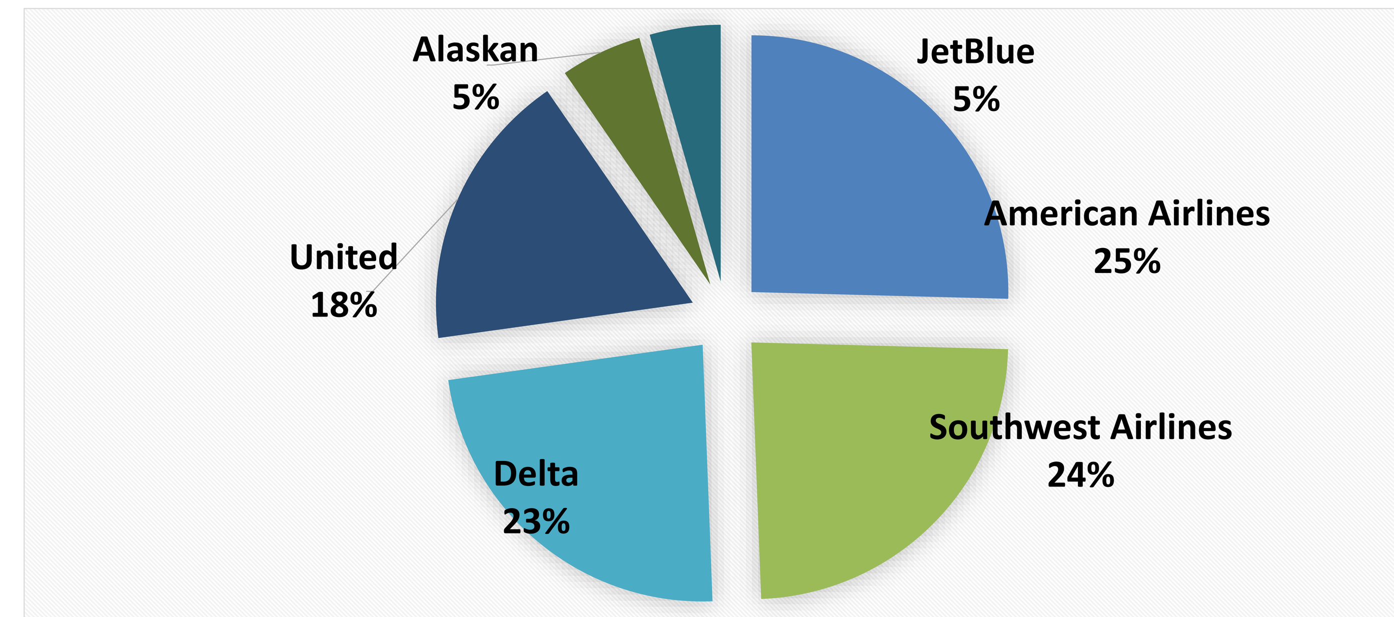
- The dependent variable is the average market fare, which is a weighted average of: carrier's fare * passenger share
- A fixed-effect regression model is used to estimate the binary measure of the presence of ULCC's. The ULCC category was assigned "1" if Frontier, Allegiant and/or Spirit are present, "0" if they are not

Table 4: Fixed Effects Estimation Results

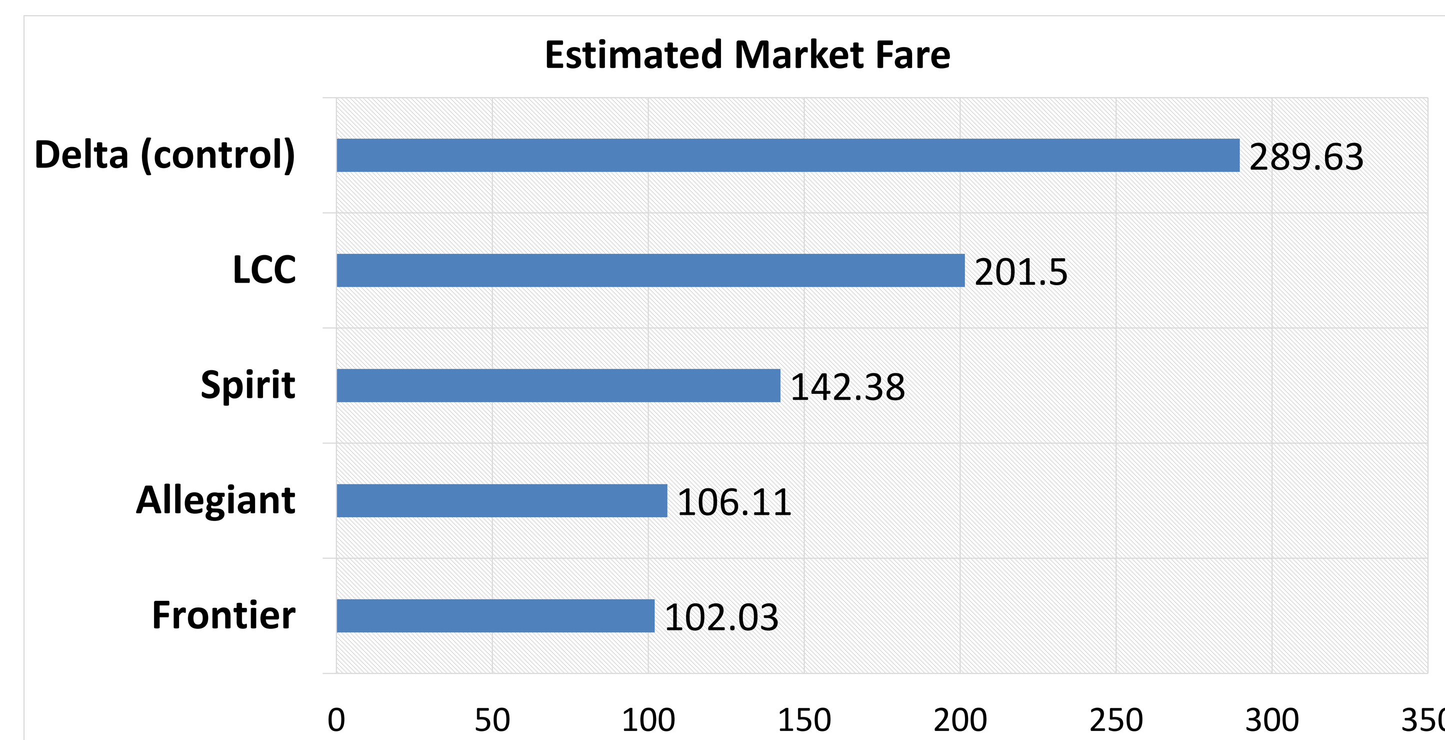
Variables	Coefficients	P-Value
(Constant)	**289.63*** **	0.000
Frontier	**-187.6*** **	0.000
Allegiant	**-183.52*** **	0.000
Spirit	**-147.25*** **	0.000
American	**-9.46** **	0.04
Alaska	**-108.44*** **	0.000
United	**-21.8*** **	0.000
LCC	**-88.13*** **	0.000
HUB	-4.88	0.31
Miles	0.002	0.871
Competition 2	**30.71*** **	0.000
Competition 3	**48.78*** **	0.000
Competition 4	**34.62** **	0.039
Year-Quarter FE	Yes	
Region-quarter FE	Yes	
Adjusted R Square: 0.803		

* = 90% significance, ** = 95% significance, *** = 99% significance

Market Share



Application



- We can forecast the market fare when a specific classification is present
- The model estimates the following for ULCC's: Spirit is associated with a $142.38 fare, Allegiant with a $106.11 fare, Frontier with a $102.03 fare
- A LCC is associated with a $201.5 average fare and Delta (Legacy) associated with a $289.63 average fare
- On average ULCC's are $84.66 cheaper than LCC's and $172 cheaper than legacies

Future Research

- Further analysis could be performed on each of the ULCC's over time. Previous literature suggests the effect to be partially diminishing as carriers try to yield higher revenue opportunities (Swelbar & Wittman, 2013)
- Competition interaction variables could also be included. This would be able to identify the estimated fare impacts of two, three, or even four carriers competing in a single market

References

- Swelbar, W. S., & Wittman, M. D. (2013). Evolving Trends of U.S. Domestic Airfares: The Impacts of Competition, Consolidation, and Low-Cost Carriers. *MIT International Center for Air Transportation*.