U.S. Airline Networks and Their Effects on Prices

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Introduction

- What Effects Flight Fares?
  - Economies of Scale
    - Bigger Planes
    - Larger Airports
  - Route Alternatives
    - Number of routes offered from point A to B
    - Competing airlines on the route
- Effect of Airline Mergers
  - Better economies of scale
  - Less Route alternatives and competition

2007 Flights

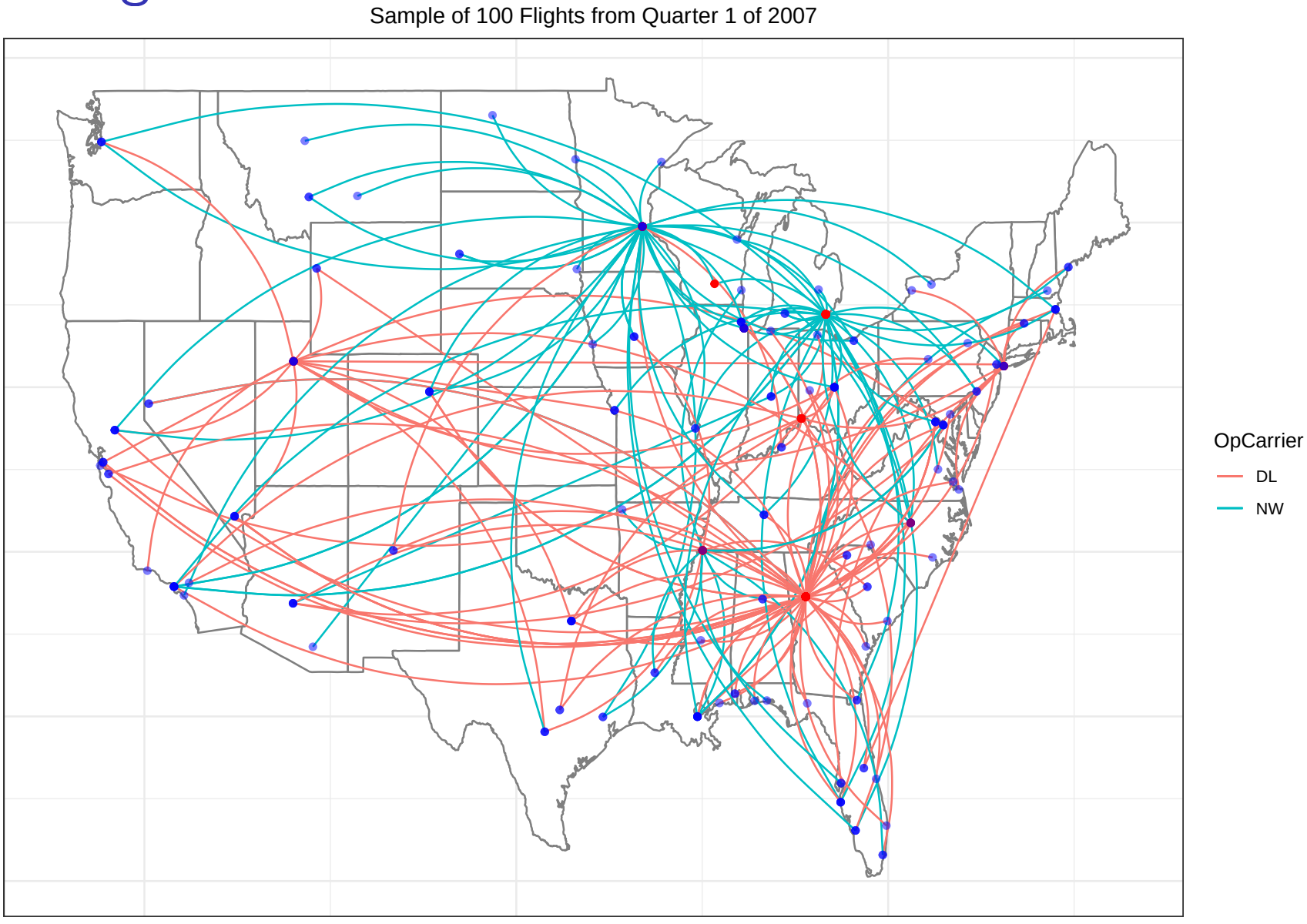


Figure 1: Sample of 100 Flights from Quarter 1 of 2007

2011 Flights

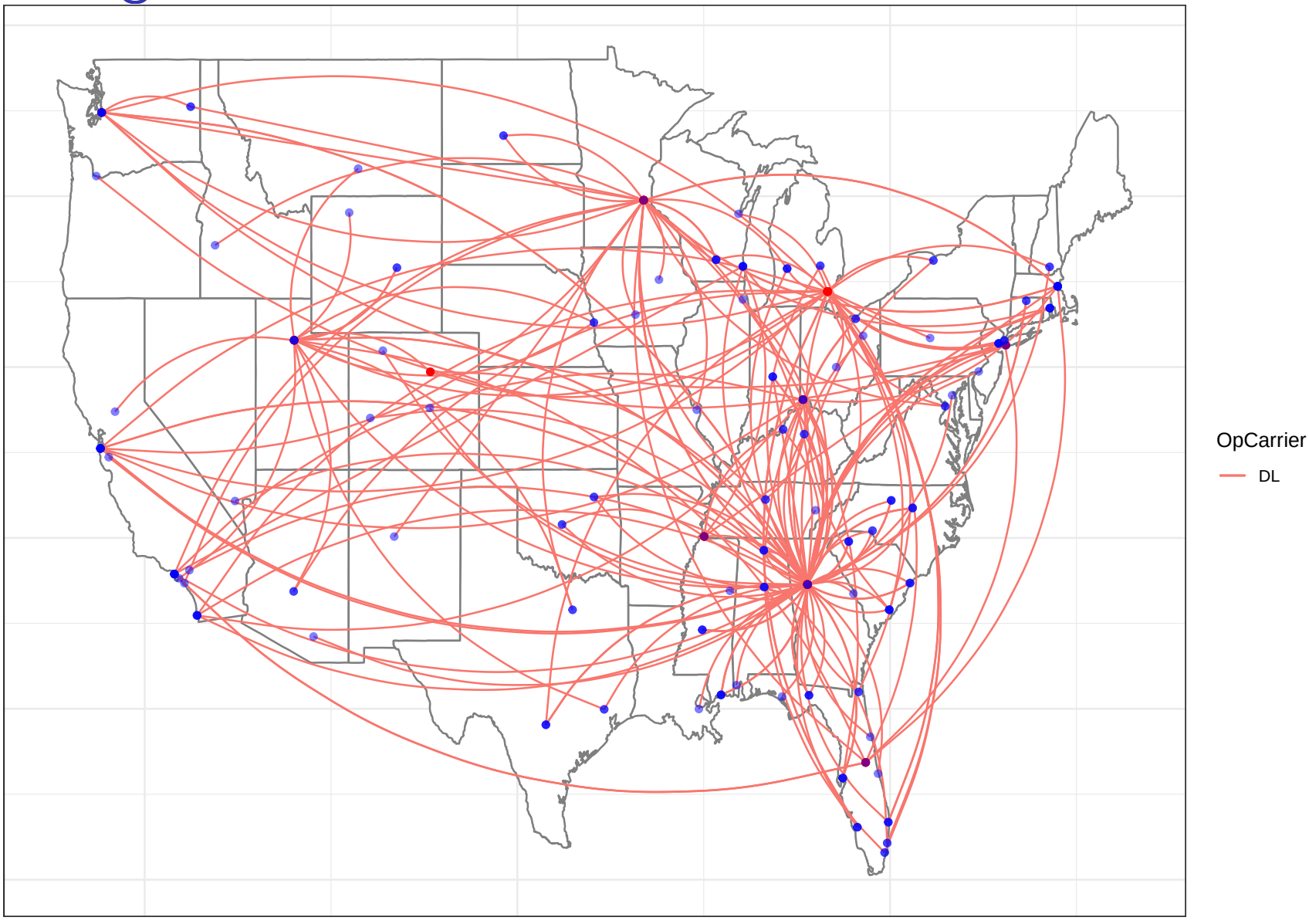


Figure 2: Sample of 100 Flights from Quarter 4 of 2011

Flight Tables

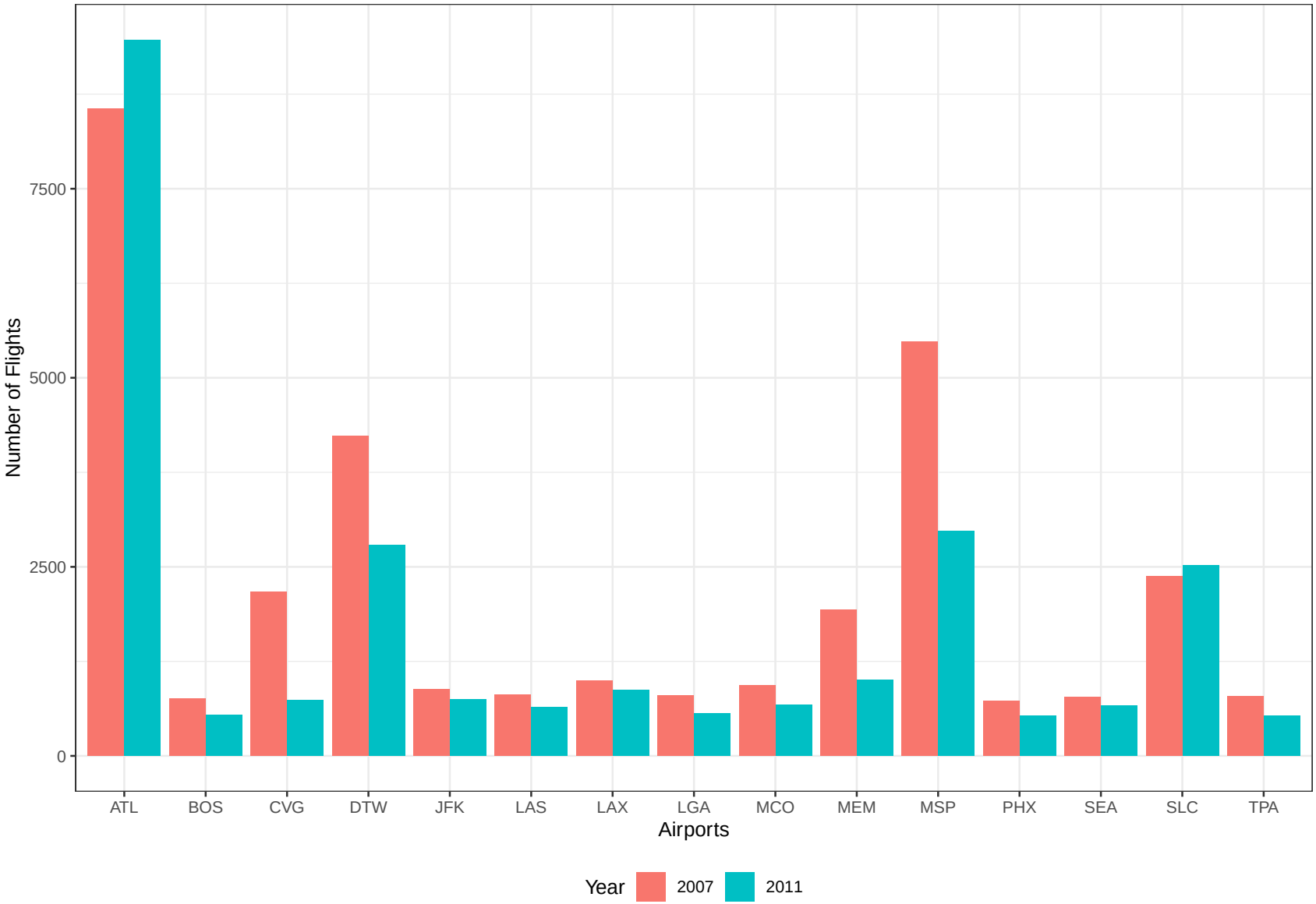
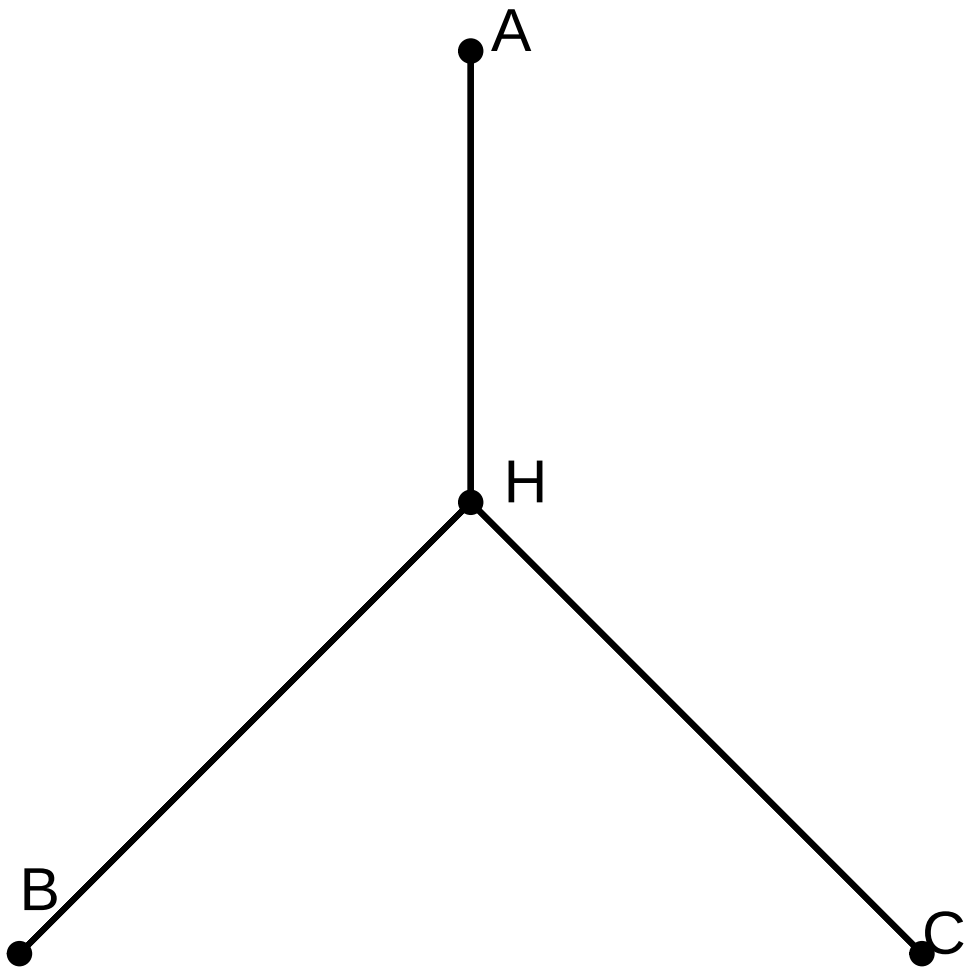


Figure 3: Amount of Flights from most popular Airports

Brueckner, Dyer, Splliller (1992)

- More spoke traffic means lower fares
- Competition does not lower fares across the board
- Higher traffic in the network lowers fares

Theoretical Framework from Brueckner, Dyer, and Spiller



- This is a hub and spoke network of airports with H as the hub
- $D(Q_{ij})$ is the inverse demand function where Q_{ij} is the traffic for a round trip from i to j

Theoretical Framework Continued

- $R(Q_{ij}) = Q_{ij} * D(Q_{ij})$ is revenue for a round trip from i to j
- Total Revenue $R(Q)$ for the above hub and spoke is then:

$$R(Q_{AB}) + R(Q_{AC}) + R(A_{BC}) + R(Q_{AH}) + R(Q_{BH}) + R(Q_{CH}) \quad (1)$$

- $c(Q_{ij})$ is the cost of a round trip from i to j
- Since there are increasing returns to scale $c' > 0$ and $c'' < 0$
- Profit is maximized by setting marginal revenue $R'(Q)$ equal to marginal cost $c'(Q)$

Theoretical Framework Continued

- In a hub and spoke network there is no direct travel from spokes A to B or A to C or B to C
- Profit maximization for a spoke node A to the hub node H is simply:

$$R'(Q_{AH}) = c'(Q_{AB} + Q_{AC} + Q_{AH}) \tag{2}$$

- Profit maximization for a spoke node A to another spoke B is more complicated:
- Because there are no direct flights then marginal revenue for a flight from A to B would be:

$$R'(Q_{AB}) = R'(Q_{AH}) + R'(Q_{BH}) \tag{3}$$

- Substituting in the marginal cost functions yeilds:

$$R'(Q_{AB}) = c'(Q_{AB} + Q_{AC} + Q_{AH} + Q_{BA} + Q_{BC} + Q_{BH}) \tag{4}$$

Applying the framework

- As the Airlines increasingly convert to hub and spoke models what is the effect on prices?
  - It depends on how strong the economies of density are.
  - Hub and spoke models increase the ability for airlines to use bigger planes and increase scaling
  - Hub and spoke models also require more connections which increases the number of flights.
  - which prevails?

Huschelrath and Muller (2014)

- Analyzes the effect of America West - US Airlines merger in 2005
- Uses a differences-in-differences appraoch fixing effects across route and ex-ante carrier
- Two types of routes used
  - Direct routes
  - Single connections
- Compares the price effects on each route depending on the type of competition between the airlines prior to the merger
- Found that on routes where competition between airlines took place there was an increase in fares but on routes that saw almost no competition between airlines there was a decrease in prices that was larger
- Overall increase in consumer welfare

My paper

- My paper will combine the two approaches
- Using the network characteristics of the airports along with the route competition to enhance the analyses done by Huschelrath and Muller
- The goal is to use a differences-in-differences approach and control for network characteristics to analyze the consumer welfare effects of the Northwest-Delta Merger of 2010.