Effect of Consolidation in US Airline Sector on ticket prices and Supply

Hayagreev Ramesh

University of Minnesota

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Introduction

- ► Concern in recent years regarding consolidation in airline sector resulting in collusive behavior/lack of competition
- Sector looks closer to an oligopoly today as compared to the past
- ► Top 4 airlines control 68% of total capacity today as compared to 56% in 1995 and less than 50% in 2009
- Airlines have made record profits in last 5 years

Timeline of Mergers

Airline	1920s	1930s	1940s	1950s	1960s	1970s	1980	Os 1990)s	2000s	2010s
American		1934			15 Trans C	970 aribbean vays	1986 ————————————————————————————————————	1990 Eastern Airlines Latin American routes	1999 Reno Air	-2001 TWA U	2013 S Airways
Delta	192	9		1953 Chicago and Southern Air Lines		1972 lortheast Airlines	1987 — Western Airlines	1991 Pan Am trans- atlantic routes and shuttle	2000 ASA and Comair	2008 Northwe	est
Southwest						1971		1994 Morris Air		20	D11 Tran
United		1934			1962 Capital Airlines		1986 Pan Am Pacific routes	Pan Am P London Latin	1991 lan Am American routes	20° Contin	10

Sources: Cathay Financial and airline company documents.

Figure 1: Timeline of mergers in airline industry

Supply/Demand in Airline Sector

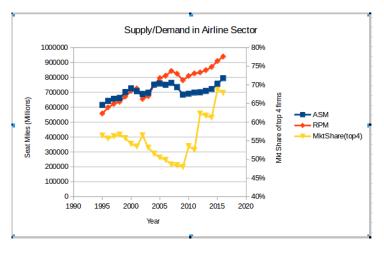


Figure 2: Supply/Demand in airline industry on left axis. Market share of top 4 firms on right axis

OLS:Fixed Effects

$$\textit{pyield} = \alpha_i + \beta_1 \textit{Load} + \beta_2 \textit{Fuel} + \beta_3 \textit{Labor} + \beta_4 \textit{NonLabor} + \beta_5 \textit{Conc} + \epsilon \tag{1}$$

- $pyield = \frac{\text{Total fare paid by passengers}}{\text{Passenger Revenue Miles(PRM)}}$
- ► Load = $\frac{\text{Passenger Revenue Miles(PRM)}}{\text{Available Seat miles (ASM)}}$
- Fuel Fuel costs per ASM
- Labor Labor costs per ASM
- Nonlabor Costs other than fuel and labor per ASM
- Conc Herfindahl-Hirschman index (HHI). Measures industry concentration

Fixed and Random Effects: Results

Table 1: Results. *,** and *** signify significance at 10%,5% and 1% respectively

Variable	RE	FE		
α	3.34***	-		
Load	-0.009***	-0.011***		
Fuel	0.133***	0.159**		
Labor	0.415***	0.411***		
NonLabor	-0.05	-0.138*		
Conc	0.24	0.171		
R^2	0.36	0.99		

Simultaneous Equations

$$\Delta q^D = \alpha_D + \beta_1 \Delta \ln(p) + \beta_2 \Delta \ln(GDP) + \epsilon_D \tag{2}$$

$$\Delta q^{S} = \alpha_{S} + \gamma_{1} \Delta ln(p) + \gamma_{2} Conc + Z' \gamma_{3} \epsilon_{S}$$

$$q^{D} = q^{S}$$
(3)

Solution to this system is given by

$$\Delta \ln(p) = \frac{\alpha_{\mathcal{S}} - \alpha_{\mathcal{D}}}{\beta_{1} - \gamma_{1}} + \frac{\gamma_{2} \operatorname{Conc}}{\beta_{1} - \gamma_{1}} + \frac{Z' \gamma_{3}}{\beta_{1} - \gamma_{1}} - \frac{\beta_{2} \ln(\operatorname{GDP})}{\beta_{1} - \gamma_{1}} + \frac{\epsilon_{\mathcal{S}} - \epsilon_{\mathcal{D}}}{\beta_{1} - \gamma_{1}} \tag{4}$$

$$\Delta ln(q) = \frac{\beta_1 \alpha_S - \gamma_1 \alpha_D}{\beta_1 - \gamma_1} + \frac{\beta_1 \gamma_2 Conc}{\beta_1 - \gamma_1} + \frac{\beta_1 Z' \gamma_3}{\beta_1 - \gamma_1} - \frac{\beta_2 \gamma_1 ln(GDP)}{\beta_1 - \gamma_1} + \frac{\epsilon_S - \epsilon_D}{\beta_1 - \gamma_1}$$
(5)

GMM

- β_1 is over-identified in the simultaneous equations model. Therefore, I resort to the two-step GMM to estimate the supply equation.
- ▶ Instrument $X = [\Delta In(GDP) \quad Conc \quad Z']$

Table 2: Results. *,** and *** signify significance at 10%,5% and 1% respectively

Variable	GMM			
α	0.1***			
Δ pyield	2.2**			
Δ FuelCost	-0.277***			
Δ LaborCost	-0.493***			
Conc	-0.274			
R^2	0.52			

Conclusions

- ► The effect of an increase in industry concentration on ticket prices is positive, but the effect is not statistically significant
- ▶ Effect on supply is negative but is not statistically significant