Air Alliances Impact on Consumer Surplus: A reappraisal by means of auction models

M. Ivaldi, M. Petrova, M. Urdanoz

Toulouse School of Economics

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Section 1

Motivation
We concern ourselves with two issues

- The airline industry and the DB1B data set: challenges, the empirical literature
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- The airline industry and the DB1B data set: challenges, the empirical literature
- A fresh look at the US domestic airline market: competition, airline alliances
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- Basis for a wide range of empirical studies:
  - Mergers, low cost carrier entry, multimarket contact, alliances, etc.
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- EX: a direct flight ticket is purchased 10 days in advance to fly on 8AM on Monday and return 8PM on Wednesday, with origin city New York and destination Chicago
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  - Recorded: the Ori and Dest airport (market), the carrier and the number of connections (product)
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  - Not recorded: the take-off time or the day of the week (flight), purchase days in advance of flight (advance purchase)
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  • Strong assumptions or auxiliary data needed
A fresh look at the airline market: Competition

- Changes in the competitive structure of the airline industry in last 10 years
  - LCC, online ticket sales, smaller efficient aircraft, higher fuel costs, video conferencing and economic crises
  - The result:
    - Higher price and connection sensitivity of both business and leisure travellers
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  - (see Berry and Jia (2010), Borenstein and Rose (2013), and Brueckner, Lee and Singer (2012))
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- Majority of research in the early years of formation
- Our goal: find how alliances affected prices in the recent economic environment using the DB1B data in a new way
Section 2

Model
Price competition in the airline market

- Buyers buy the lowest price ticket $\Rightarrow$ Bertrand competition
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- Auction empirical methodology allows us to:

  - Interpret each ticket sale as outcome of an auction
  - Estimate the effect of covariates on the distribution of prices
  - Similar to bid price control in revenue management practices (Martinez-de-Albeniz and Tallury (2010))
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Section 3

Estimation
Estimation equations

- Use the MLE approach of Paarsch (1997)
Motivation Model Estimation

**Estimation equations**

- Use the MLE approach of Paarsch (1997)
- Price $P_i = \text{the second-lowest order statistic of value } V_i$

$$L = \prod_{i=1}^{N} f_{P_i}(p_i; \mu, \sigma) = \prod_{i=1}^{N} 2F_{V_i}(p_i; \mu, \sigma)$$

Mean and variance with observed deterministic components:

$$\mu_{jk} = \alpha A_{\text{Alliance} jk} + \alpha X \ln X_{jk} + \alpha Y \ln Y_j + \alpha Z \ln Z_k$$

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- Likelihood for a set of observed sales $N = 1, .., i$:
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<td>Distance</td>
<td>0.107***</td>
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</tr>
<tr>
<td>Origin population</td>
<td>-0.043***</td>
<td>0.001.</td>
</tr>
<tr>
<td>Dest. population</td>
<td>0.031***</td>
<td>-0.003.</td>
</tr>
<tr>
<td>Origin income</td>
<td>0.007</td>
<td>0.401***</td>
</tr>
<tr>
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<td>0.085</td>
<td>0.094.</td>
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<tr>
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<td>0.016</td>
<td>-0.112***</td>
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<tr>
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<td>0.076***</td>
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<td>0.054***</td>
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<td>Dest. connections</td>
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Results

- Positive alliance effect on prices of 6.6%, or about 25 USD for the average ticket of 400 USD
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