Market Structure and Competition in Airilines Markets

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Outline

This is a sketch...

- Game of simultaneous entry and pricing decisions.
- Let $i = 1, 2$ denote the firms and $j = 1, ..., J$ the number of potential markets
- Then firms need to decide $y_{ij} = \{0, 1\}$ and set Pij conditional on $y_{ij} = 1$.
- Problem $\rightarrow$
  - Firms select into markets, so entry decision needs to be modelled (vs BLP that takes market entry as given)
  - This affects the analysis of merger policy and effects.
  - Basically, expand BLP to introduce endogeneous market entry

Literature Review

1. BLP: estimate competition model, nash eq, heterogeneous products etc.
2. + add entry game very similar as Ciliberto Tamer 2009
   Mention other important methods where this has been applied. . . they mention it in their paper. (This is important to have an idea of the key idea of the paper)

Simple model

full info, pure strategy game (think it can be extended to mixed)

$$y_1 = \not\Vdash [\delta_2 y_2 + \gamma Z_1 + \upsilon_1] \, y_2 = \not\Vdash [\delta_1 y_1 + \gamma Z_2 + \upsilon_2]$$

$S_1 = X_1\beta + \alpha_1 V_1 + \psi_1 S_2 = X_2\beta + \alpha_2 V_2 + \psi_2(1)$ explain the variables that are exogeenous and the endogeneous. The fundamental idea is this one: where $(\upsilon_1, upsilon_2, \phi_1, phi_2) \sim (N, \Sigma)$
And the off-diagonal entries of sigma are not 0! this introduces the source of selection biased, explain example here (similar to Heckman's selection model, potentially).

Simple model

$$y_1 = \nVdash[\delta_2 y_2 + \gamma Z_1 + \upsilon_1]\, y_2 = \nVdash[\delta_1 y_1 + \gamma Z_2 + \upsilon_2]$$

$S_1 = X_1\beta + \alpha_1 V_1 + \psi_1 S_2 = X_2\beta + \alpha_2 V_2 + \psi_2 (2)$ explain the variables that are exogeenous and the endogeneous. The fundamental idea is this one: where $(\upsilon_1, upsilon_2, \phi_1, phi_2) \sim (N, \Sigma)$
And the off-diagonal entries of sigma are not 0! this introduces the source of selection biased, explain example here (similar to Heckman's selection model, potentially). Maybe talk about the non-standard problems that we may have here -multiple eq and setting of price (endogeneity).

Simple model

But how to do inference?
We can estimate the distribution of what we observe in the data $(S_1 y_1, V_1 y_1, y_1, S_2 y_2, V_2 y_2, y_2)$ compare this with simulated moments–¿ using
$P(\psi_1 \leq t_1; y_1 = 1, y2 = 0)$ and we can compare this to:
$P(\psi_1 \leq t_1; y_1 = 1, y2 = 0) = P(\psi_1 \leq t_1; (\upsilon_1, \upsilon_2) \in A^u_{(1,0)}) + P(d_{1,0}|\psi_1 \leq t_1; (\upsilon_1, \upsilon_2) \in A^{nu}_{(1,0)}) P(\psi_1 \leq t_1; (\upsilon_1, \upsilon_2) \in A^{nu}_{(1,0)})$
So we can easily bound these two inequalities using:

$$P(\psi_1 \leq t_1; (\upsilon_1, \upsilon_2) \in A^u_{(1,0)}) \leq P(\psi_1 \leq t_1; y_1 = 1, y2 = 0) \leq P(\psi_1 \leq t_1; (\upsilon_1,$$

If we repeat this exercise we can repeat it for firm two 0,1 condition. And what is left is 1,1 , 0,0 , but these are easily bounded:
$P(y_1 = 0, y_2 = 0) = (\upsilon_1 \leq -\gamma Z_1, \upsilon_2 \leq -\gamma Z_2)$ one is the opposite... This gives us these moment conditions
$\mathbb{E}\left(G(\theta, S1Y1 \ldots)\right) \leq 0$

The structural model

$$y_1 = 1 \iff \pi_1 = (p_1 - c(W_1, \eta_1)M \cdot \tilde{s}_1(\mathbf{p}, \mathbf{X}, \mathbf{Y}, \xi) - F(Z_1, \upsilon_1)) \geq 0 y_2 = 1$$

$$\mathrm{S}_1 = \tilde{s}_1(\mathbf{p}, \mathbf{X}, \mathbf{Y}, \xi) S_2 = \tilde{s}_2(\mathbf{p}, \mathbf{X}, \mathbf{Y}, \xi)$$
$$(p_1 - c(W_1, \eta_1)) \frac{\partial \tilde{s}_1}{\partial p_1} + \tilde{s}_1(\mathbf{p}, \mathbf{X}, \mathbf{Y}, \xi) \, (p_2 - c(W_2, \eta_2)) \frac{\partial \tilde{s}_2}{\partial p_2} + \tilde{s}_2(\mathbf{p}, \mathbf{X}, \mathbf{Y}, \xi)$$
(3)

Mention assumptions on functions-parametrization and assumptions on how unobservables are correlated , which is the essential idea of the paper (accouont for selection problem)

Describe the algorithm that they use! the main idea is simple and requires to compute first the distribution of errors and then compare them to the simulated probabilities.

Actual application Show self-selection of carriers Show model of BLP vs BLP with endogeneous entry.