PLATFORM PRICING AND CONSUMER FORESIGHT: THE CASE OF AIRPORTS

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Introduction: two-sided

- Airports are an example of two-sided platforms
  - revenues come from two sources
    - Aeronautical: landing fees charged to airlines
    - Retail (e.g., shops, food and beverage, car parking...): concessions contracts
  - Demand complementarity
    - Passengers only purchase retail goods if they fly
    - Special feature: one-way complementarity
  - Externality between the sources of revenues
    - Landing fee $\uparrow \Rightarrow$ flight price $\uparrow \Rightarrow$
      $\Rightarrow$ demand $\downarrow \Rightarrow$ retail revenues $\downarrow$
Introduction: retail revenues

- Retail revenues are becoming more and more important for airports

- Massive investment projects
  - Beijing Airport Terminal 3
    - designed by archistar Norman Foster
    - floor space of 1,000,000 m²
  - Dubai International Airport Terminal 3
    - floor space of 1,700,000 m²

Source: ATRS, 2013
Introduction: shopping decision

Shopping decisions are often anticipated

According to Mintel (2013)
- more than 15% of European leisure travellers anticipate airport shopping
- 16% of German leisure travellers
- 18% of British leisure travellers
- Asian-Pacific international travellers are also committed “anticipated” shoppers
Introduction: retail competition

- Retail structure in airport is chosen by airports, which choose
  - Identity of franchisees
  - Type of contract

- Retail competition affect airport revenues in many ways
  - Negative effect: competition reduces retail profits and thus revenues that can be extracted
  - Positive effect: retail competition decreases prices and thus enhances demand for flights (with foresighted consumer)
Introduction: demand for flights

Demand for flights is affected by many factors

- **Airlines**
  - Flights fares (chosen by airlines, but see below …)

- **Airports**
  - landing fee, when passed through to passengers into final flight fares
    - Often regulated; the two-sided nature of the airport business limits the degree of market power (airports claim so…)
  - shopping activity that can be carried out at the airports
    - This in turns depends on retail competition, which decreases prices (if consumers are foresighted)
Aim of the paper

- Study the optimal airport behaviour, looking at the interplay between
  - Landing fee
  - Airport retail market structure

- Novel approach
  - One of the first papers to make explicit the one-way demand complementarity
  - First paper to account for the endogenous nature of the retail market structure
  - First paper to model the varying degree of consumer foresight, i.e., the extent to which passengers anticipate, at the time of purchasing their flight, the retail consumer surplus
Main findings

- Degree of consumer foresight crucial in determining optimal airport’s behaviour
  - Perfectly myopic consumers
    - Minimum number of retailers
    - Low landing fee (can be 0)
  - Perfectly forward looking consumers
    - Maximum number of retailers
    - Higher landing fee

- Optimal behaviour non-linear in consumers’ foresight
Caveat

- More than an airport paper
- In many markets, you may find the same ingredients
  - One-way demand complementarity
  - Imperfect foresight

- Amusement parks
- Shopping malls
- Hotel rooms
- Bank accounts
- Mobile phones
- …
Related literature

- **Airports**
  - Two-sided: Zhang and Zhang (TRE, 1997), Ivaldi et al. (2012)
  - Pricing: Czerny (JRE, 2006), D’Alfonso et al. (JTEP, 2013)...

- **Consumer myopia**
  - Strolz (RES, 1995), Verboven (JINDEC, 1999)...

- **Ex ante demand uncertainty**
  - Heidhues and Koszegi (AER, 2009), Karle and Peitz (RAND, 2014)...

- **Markets with primary and secondary goods**
  - Oi (QJE, 1971), Ellison (QJE, 2005), Shulman and Geng (MS, 2013)

- **Shopping malls**
  - Hagiu (JEMS, 2009), Pashigan and Gould (JLE, 1998)...

- **Platform openness**
  - Huang et al. (MS, 2013), Hagiu and Spulber (MS, 2013)…
The model (1)

- 3 (sets of) agents: airport, airlines, and retailers
- Static two-stage game
  - First stage:
    - airport set landing fees and chooses the number of retailers
  - Second-stage:
    - retailers and airlines set prices
  - Then, trade takes place and payoffs are collected
- Full information and subgame perfection
The model (2)

- Linear (in passengers) landing fee
- All costs normalised to 0, except the landing fees for airlines
- Two-step process for passengers decisions
  - first, they purchase their flight tickets;
  - second, they buy retail goods at the airport
- Infinite number of potential retailers:
  - Airport able to fully internalised retail profits by auctioning concessions
Air travel demand

- Infinite number of potential consumers/travellers
- Each consumer derives this utility from flying once
  \[ U_h(p_A, p_R; z, \delta) = z_h - p_A + \delta \cdot CS(p_R) \]

- Threshold level of parameter \( z \)
  \[ \tilde{z}(p_A, p_R; \delta) = p_A - \delta \cdot CS(p_R) \]

- Air travel demand is then
  \[ q_A(p_A, p_R; \delta) = 1 - \tilde{z}(p_A, p_R; \delta) = 1 - p_A + \delta \cdot CS(p_R) \]
Retail demand

- Retail competition modelled as in the Salop circle, with $n_R$ retailers and unit demand
- Marginal consumer between firm $i$ and $j$
  \[ \tilde{x}_{ij} = \frac{1}{2n_R} + \frac{p_i - p_j}{2t} \]
- Demand for firm $i$ (assuming symmetry btw rivals):
  \[ X(p_i, p_{-i}; p_A) = 2 \tilde{x}_{ij} q_A(p_A, p_R; \delta) \]
- Profits for firm $i$: \[ \pi_i = p_i X(p_i, p_{-i}; p_A) \]
2nd stage: retail market

- Retailers compete along the Salop circle
  \[
  \max_{p_i} \pi_i(p_i, p_{-i}; p_A)
  \]
  \[\Rightarrow\text{ symmetric Nash equilibrium prices } p_R(p_A)\]

- Some comparative statics, when consumers are foresighted
  - Retail price is lower than with no foresight
    \[p_R(p_A)\bigg|_{\delta>0} < p_R(p_A)\bigg|_{\delta=0}\]
  - Retail price may go down with fewer retailers
  - Retail price may go down as \(\ell\) increases
2\textsuperscript{nd} stage: air travel market

- Airlines compete in quantities

\[
\max_{q_k} \left( 1 + \delta \, CS(p_R) \right) - q_k - q_{-k} - \ell \right) q_k
\]

- Symmetric Nash equilibrium quantities \( q_A(p_R) \)

- Unsurprisingly, standard Cournot quantities, except for the shift parameter \( \delta \, CS(p_R) \)
1st stage

- Airports solve this problem
  \[
  \max_{\ell, n_R} \ell n_A q_A + p_R n_A q_A
  \]
  
  - Highly non-linear expression
  - Analytical equilibrium solutions for limiting cases
    - Perfectly myopic consumers $\delta = 0$
    - Forward looking consumers $\delta > 4/5$
    - Almost myopic consumers $\delta \to 0$
  - Numerical solutions for the remaining range of $\delta$
Equilibrium (1): myopic consumers

- Low landing fee (can be 0)
  - Low flight prices attract consumers into the airport

- Minimum number of retailers
  - → high retail prices
  - High retail profits, appropriated by the airport

- Since consumers are myopic, they cannot be attracted into the airport with low prices
- Most suitable instrument to attract passengers into the airport is a low flight fare (driven by a low landing fee)
- Consumers’ willingness to pay is extracted by the retail activities
Equilibrium (2): foresighted consumers

- **Maximum number of retailers (+infinity)**
  - low retail prices, which attract consumers into the airport
  - Zero retail profits

- **High landing fee**
  - high flight prices, but...
    - ... high number of passengers

- Since consumers are foresighted, they are attracted to the airport by low retail prices

- Large number of consumers has a positive effect on aeronautical profits

- Consumers’ willingness to pay is extracted by the aeronautical activities
Equilibrium: profits

- How do profits vary with $\delta$?
- An answer to this question illustrates the profitability of advertising campaigns by airport.
- Casual observation gives strong evidence that consumers ARE NOT FULLY MYOPIC!!
Our model confirms the airports’ interest in advertising campaigns (caution: no cost of ads, so incomplete analysis)

- Profits higher with foresighted consumers
- As $\delta \uparrow$, weight of retail profits $\downarrow$
  - aeronautical profits $\uparrow$

However, profits not always monotonically increasing in consumers’ foresight
A testable implication

- A clear pattern emerges in our analysis:
  - negative relationship between landing fees and competition in the retail market
- Hence:
  - negative relationship between landing fees and the share of profits from retail activities
- A testable implication of our model!!
A testable implication

- With no sophisticated (but reliable) econometric analysis, we collected landing fees and retail profit shares from major US airports and casually observe that....
Regulatory implications (1)

- Easy to characterise the first best
  - Most fragmented retail market structure
  - Landing fee = 0

- Airports alone never deliver it
  - High $\delta$: efficient retail structure but inefficient landing fee
  - Low $\delta$: efficient landing fee but inefficient retail structure
Is the two-sided argument against landing fee regulation well grounded?
- Yes, but only with myopic consumers

Endlessly debated regulatory question:
- *single till* or *dual till?*

Misplaced question: regulation should
- Not only look at revenues from both sides of the market
- But also at policies (in our case, nR) in both sides of the market
THANK YOU !!

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