PLATFORM PRICING AND CONSUMER FORESIGHT: THE CASE OF AIRPORTS

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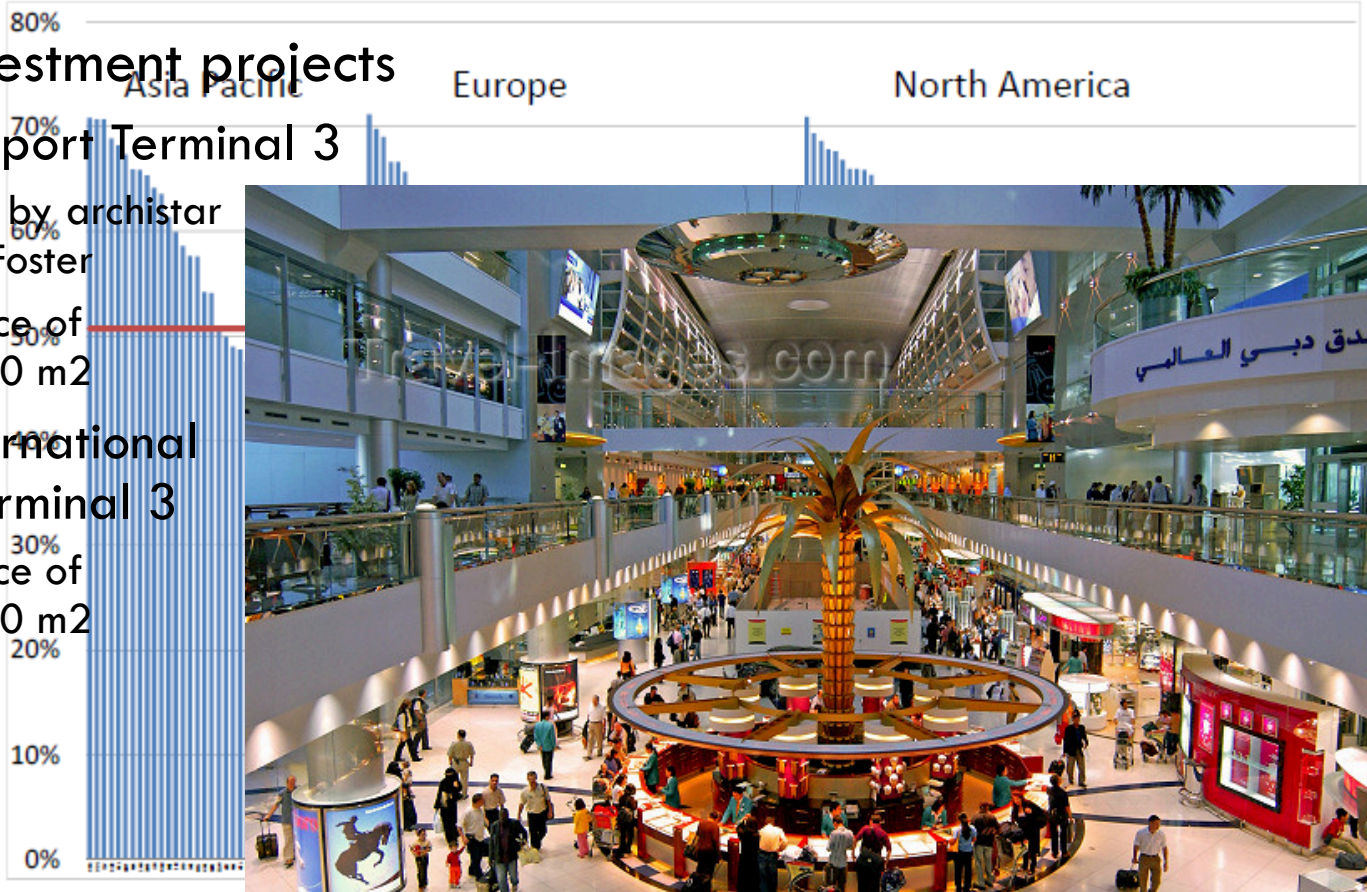
Introduction: two-sided

- 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 ↑ ⇨ flight price ↑ ⇨
      ⇨ demand ↓ ⇨ retail revenues ↓

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



% of retail revenues at largest airports (2011)

Source: ATRS, 2013

Introduction: shopping decision

- Shopping decisions are <u>often anticipated</u>
- According to Mintel (2013)
  - more that 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

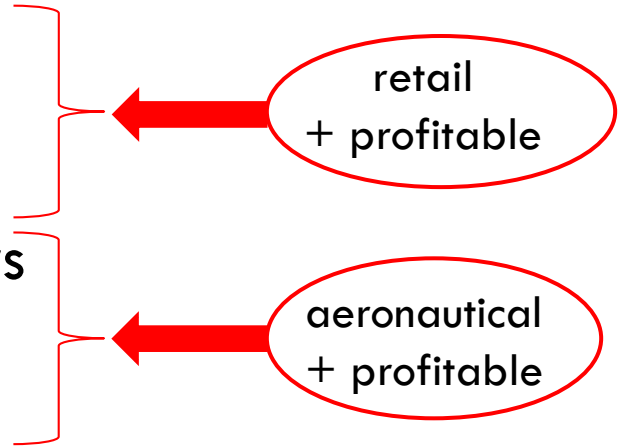
- Airlines
  - Flights fares (chosen by airlines, but see below …)
- Airports
  - landing fee, when passed through to passengers into final flight fares
    - Often regulated; the two-sided nature of the airport business limits the degree of market power (airports claim so…)
  - shopping activity that 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

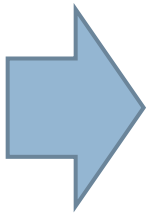
- Degree of consumer foresight crucial in determining optimal airport's behaviour
  - Perfectly myopic consumers
    - Minimum number of retailers
    - Low landing fee (can be 0)
  - Perfectly forward looking consumers
    - Maximum number of retailers
    - Higher landing fee



- 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 consumers derives this utility from flying once

$$U_h(p_A, p_R; z, \delta) = z_h - p_A + \delta\, CS(p_R)$$

Uniformly distributed

Consumer foresight

Expected CS from retail

- Threshold level of parameter z

$$\tilde{z}(p_A, p_R; \delta) = p_A - \delta\, CS(p_R)$$

- Air travel demand is then

$$q_A(p_A, p_R; \delta) = 1 - \tilde{z}(p_A, p_R; \delta)$$
$$= 1 - p_A + \delta\, CS(p_R)$$

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*: $\pi_i = p_i\, X(p_i, \boldsymbol{p}_{-i}; p_A)$

2nd stage: retail market

- Retailers compete along the Salop circle

$$\max_{p_i} \quad \pi_i(p_i, \boldsymbol{p}_{-i}; p_A)$$

➔ symmetric Nash equilibrium prices $p_R(p_A)$

- Some comparative statics, when consumers are foresighted
  - Retail price is lower than with no foresight

$$p_R(p_A)\Big|_{\delta>0} < p_R(p_A)\Big|_{\delta=0}$$

Salop price

  - Retail price may go down with fewer retailers
  - Retail price may go down as ℓ increases

2nd stage: air travel market

- Airlines compete in quantities

$$\max_{q_k} \; (1 + \delta\, CS(p_R) - q_k - q_{-k} - \ell)\, q_k$$

p_A

Landing fee

➔ 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

$$\max_{\ell, n_R} \ \ell \, n_A \, q_A + p_R \, n_A \, q_A$$

Aeronautical profits — Number of passengers — Retail profits

- 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 δ

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

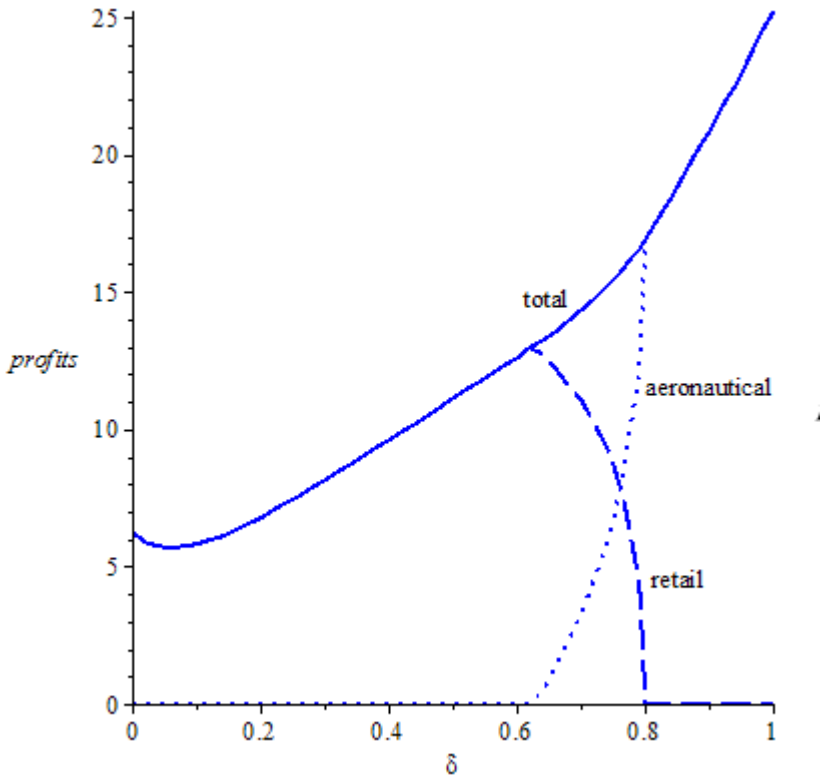
- Since consumers are foresighted, they are attracted to the airport by low retail prices
- Large number of consumers has a positive effect on aeronautical profits
- Consumers' willingness to pay is extracted by the aeronautical activities

Equilibrium: profits

- How do profits vary with δ ?
- An answer to this question illustrates the profitability of advertising campaigns by airport
- Casual observation gives strong evidence that consumers ARE NOT FULLY MYOPIC !!

Equilibrium: profits

- 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

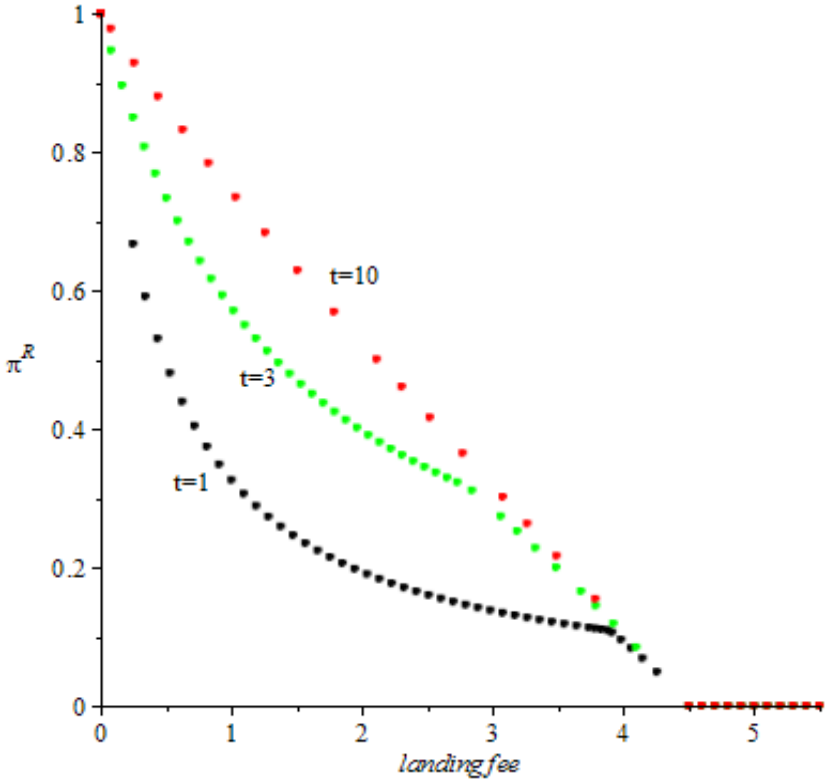
- A clear pattern emerges in our analysis:

  negative relationship between **landing fees** and **competition in the retail market**

- Hence:

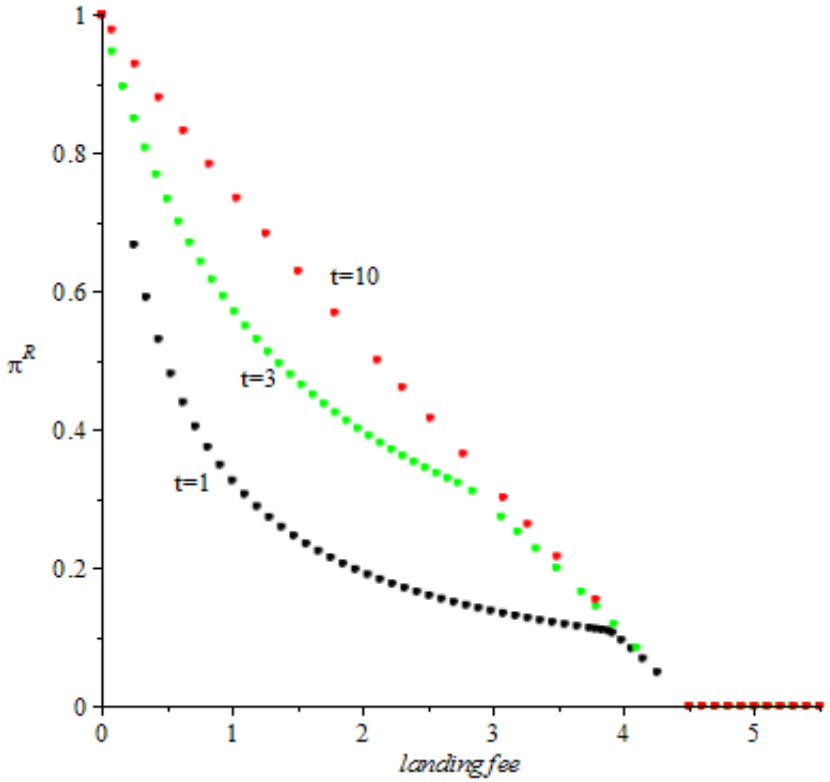
  negative relationship between **landing fees** and the **share of profits from retail activities**

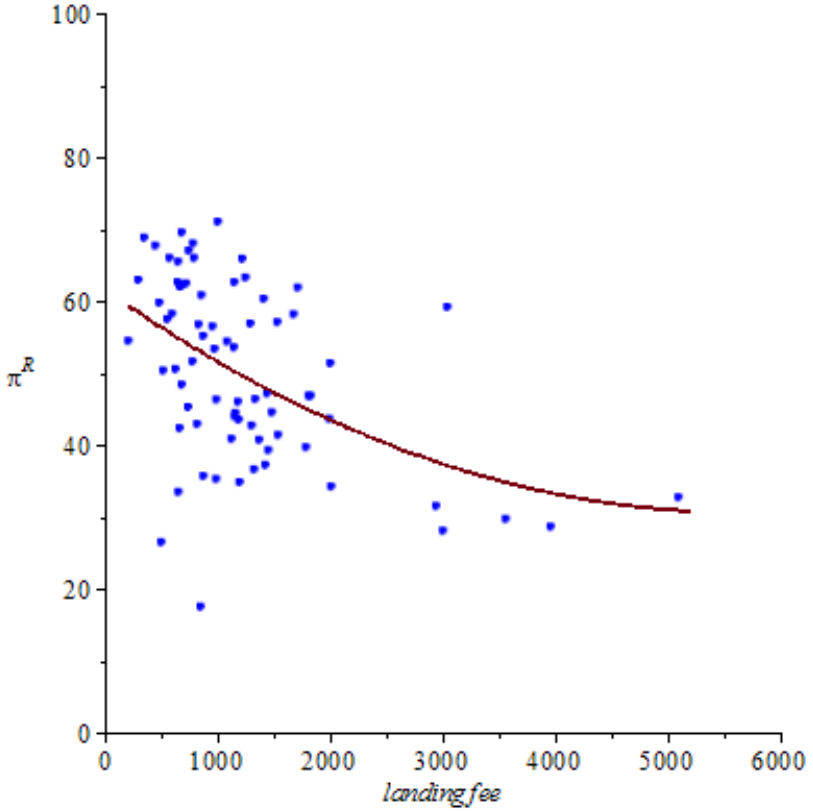
- A testable implication of our model !!



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 δ: efficient retail structure but inefficient landing fee
  - Low δ: efficient landing fee but inefficient retail structure

Regulatory implications (2)

- 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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