Airport Congestion Pricing

Annika Reinhold
Vrije Universiteit Amsterdam
Master Thesis (work in progress)
Structure

• Congestion pricing in general
• Characteristics of airports
• Airport congestion pricing
• Some empirical evidence
• Conclusion and outlook
How does airport pricing contribute to rationing scarce airport capacity? What is the goal of the pricing mechanism?
Congestion pricing

- Users take into account AC
- Congestion pricing to cover marginal cost
- Optimal level of users (volume) and price

Diagram:
- AC
- MC
- D
- $p^*$
- $p^0$
- $v^*$
- $v^0$
Congestion pricing

• Weight-based pricing at many airports
• Bottleneck situation
  – Economically efficient allocation of capacity
  – Congestion charges induce users to take into account the congestion externality they impose on others
  – Incentives for investment in capacity
• However, marginal costs difficult to calculate
• This pricing scheme might face strong opposition from airline operators and other parties involved
Characteristics of airports

- Link-based pricing vs. node-based pricing
- Entry conditions
  - Free entry vs. negotiations
- Users
  - Atomistic vs. oligopolistic/monopolistic
- Hub-and-spoke networks
Airport congestion pricing

- Daniel (1995, 2001)
  - Stochastic queueing (bottleneck) model
  - Peak spreading throughout the day
  - Small aircraft/ general aviation might divert traffic to other airports
  - Composition of aircraft types changes
  - Welfare gains
Airport congestion pricing

• Brueckner (2002)
  – Airlines are non-atomistic
  – Congestion costs = passenger time costs and airline operating costs
  – Different types of travellers (business and leisure) \( \rightarrow \) benefit function
  – Monopolistic carrier
  – Oligopolistic carrier

\[
t = c_{cong} \times (1 - ms)
\]
Airport congestion pricing

- Pels/ Verhoef (2004)
  - Analysing the effect of market power of airlines on optimal toll (simple symmetric network)
  - Cournot duopolists maximise profits
  - Regulator maximises social welfare
  - Market power effect vs. congestion effect
  - Second-best tolls under these assumptions can be lower than what a pure congestion toll would suggest
Airport congestion pricing

  – Hub-and-spoke networks
  – Hub carrier: marginal benefits of hubbing = marginal delay (congestion) costs
  – Empirical evidence from Dallas-Fort Worth airport
    • Airports with low concentration have higher delays than hub airports
    • At hub airports hub carriers face higher delays than non-hub carriers
Some empirical evidence

- Boston Logan Airport (BOS)
  - Programme rejected
- New York Airports (JFK, LGR, EWR, TEB)
  - Prices targeted at a particular group and not market based
- London (LHR)
  - More in line with economic principles,
  - Small carriers priced off
  - BAA is phasing out peak load pricing
Conclusion and outlook

- Weight-based pricing not efficient when it comes to rationing scarce capacity/excess demand
- Modified results than those from road pricing
- Take into account different effects (internalization, market power, hub-and-spoke network)
- How to use the pricing mechanism (peak/congestion pricing) to allocate demand efficiently?
Thank you for your attention.