CE Delft
Solutions for environment, economy and technology

Internalising external costs

Policy instruments to internalise externalities at airports

Jasper Faber, 13 May 2008

CE Delft

- Independent, not-for profit consultancy
- Transport, Energy, Economy
- Over 10 years of experience with environmental policies for aviation
- EC, national governments, airports, airlines, aircraft manufacturers, UNFCCC, ICAO

Outline

- Externalities at airports
- Aims of internalisation
- Policies to internalise noise externalities
- Policies to internalise air pollution externalities
- Conclusions

Externalities at airports

- Noise
- Air pollution
- Land use
- Climate change
- External safety

- At airports, noise and air pollution are the largest externalities

Externalities at airports

- Noise costs per LTO

Aircraft category	External noise cost per LTO (€1999)
40 seats	180
100 seats	300
200 seats	600
400 seats	1,200

- CE (2002) External costs of aviation

Externalities at airports

- Air pollution costs per LTO

Aircraft category	NOx	PM2.5	HC + SO_2	Total (€1999)
40 seats	10	20	3	33
100 seats	66	44	9	119
200 seats	186	44	11	241
400 seats	512	95	24	631

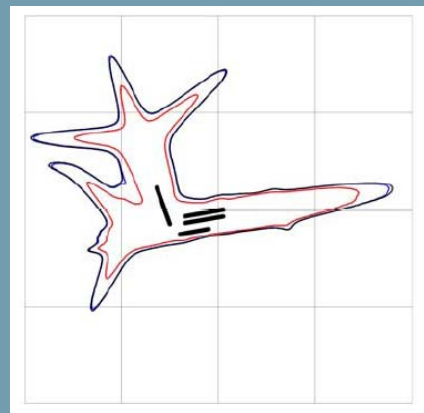
- CE (2002) External costs of aviation

Aims of internalisation

- Make polluter pay
- Arriving at socially optimal level of externalities
  - Increasing welfare

Internalising noise externalities

- Differentiated landing fees
- Noise charges
- Noise permit trading
- Cross-cutting issues



Internalising noise externalities

Differentiated landing fees

- Prevalent at 50% of major EU airports
- Basis often cumulative margin
- Often classes of aircraft (e.g. Chapter 4; Chapter 3 -5dB; Chapter 3)
- Based on certification data

Internalising noise externalities

Differentiated landing fees

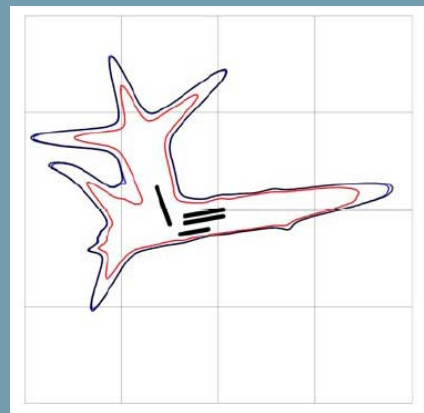
- Revenues (if any) used for insulation, noise measurement, et cetera
- Few airports have quantified effect (1-2 dB reduction in noise; 45% reduction in contour area)

Internalising noise externalities

Noise charges

- Levied at some airports
- Often aimed to generate revenues for insulation and other measures
- Basis
  - Cumulative margin

$$-10^{\left(\frac{FO+LA+AP-270}{45}\right)}$$



Internalising noise externalities

Noise permit trading

- Possible in principle
  - Permits based on certificated noise or quota count
  - Geographical scope: airport
  - Trading entities: aircraft operators and inhabitants of noise contour
- Permit may have different value depending on time of day
- Feasibility may be limited due to market power of home carrier
- Needs further assessment

Internalising noise externalities

- Measured noise or certificated noise
  - Administrative burden
  - Incentive for acquisition or for operation
- Certificated noise or noise margin?
  - Certificated noise more alligned with size of externality
  - Margin accounts for fact that large aircraft make more noise
- dB value or 10^dB value
  - dB value is logarithmic: noisy aircraft pay relatively less

Internalising LAQ externalities

- LTO NOx charges
- Air emission charges
- NOx emission trading
- Differentiated ticket tax/departure tax
- Cross-cutting issues

Internalising LAQ externalities

LTO NOx charges

- Charges based on NOx emitted in LTO
  - ICAO engine emission databank
  - ICCAIA turboprop databank
  - Swiss database
- Aircraft in classes (CH) or charge per kg (ECAC/ERLIG recommendation 27/4)

Internalising LAQ externalities

LTO NOx charges

- In one case (ARL) level based on external costs
  - Not clear whether damage of NOx emitted at height is the same as emissions at ground level
- Revenue neutral at most airports
  - Charge/benefit scheme (BAA)
  - Reduced airport fees (ARL)

Internalising LAQ externalities

Air emission charges

- LTO NOx charges can be extended to air emission charges
- Similar calculation for PM, CO, HC
  - SO_2 depends on fuel
- Values for external costs are avaliable
- Currently not applied
- Air emission charges would internalise LAQ externalities better than NOx charges

Internalising LAQ externalities

NOx emission trading

- Currently not applied in aviation
- Would increase efficiency if cheap options for reductions exist in other sectors
- Administration more complex than charge or charge/benefit scheme

Internalising LAQ externalities

NOx emission trading

- Feasible in principle
  - Basis: LTO emissions
  - Geographical scope: airport and region
  - Trading entity: aircraft operator, installation operator
  - Cap: in line with air quality directive?

Internalising LAQ externalities

Differentiated air travel tax/departure tax

- Currently being contemplated in NL
- Only feasible if tax exists
- Tax differentated according to
  - LTO NOx emissions per seat or MTOW
  - Aircraft in classes

Internalising LAQ externalities

- Internalisation currently based on calculated LTO NOx emissions
  - Approximation of real emissions
  - Incentive for fleet renewal
  - No incentive for operational measures to reduce emissions

Conclusions

- Several instruments exist to internalise external costs of aviation noise and air emissions
- Currently most instruments are revenue neutral or earmarked
  - Provides incentives
  - Not all polluters pay
- Currently most instruments based on certificated noise and emission data
  - Administratively simple
  - Incentivises technical measures only

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Thank You

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