

Noise surcharges at German airports and their effects

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Noise surcharges

- their effectiveness and efficiency
- some German and European evidence

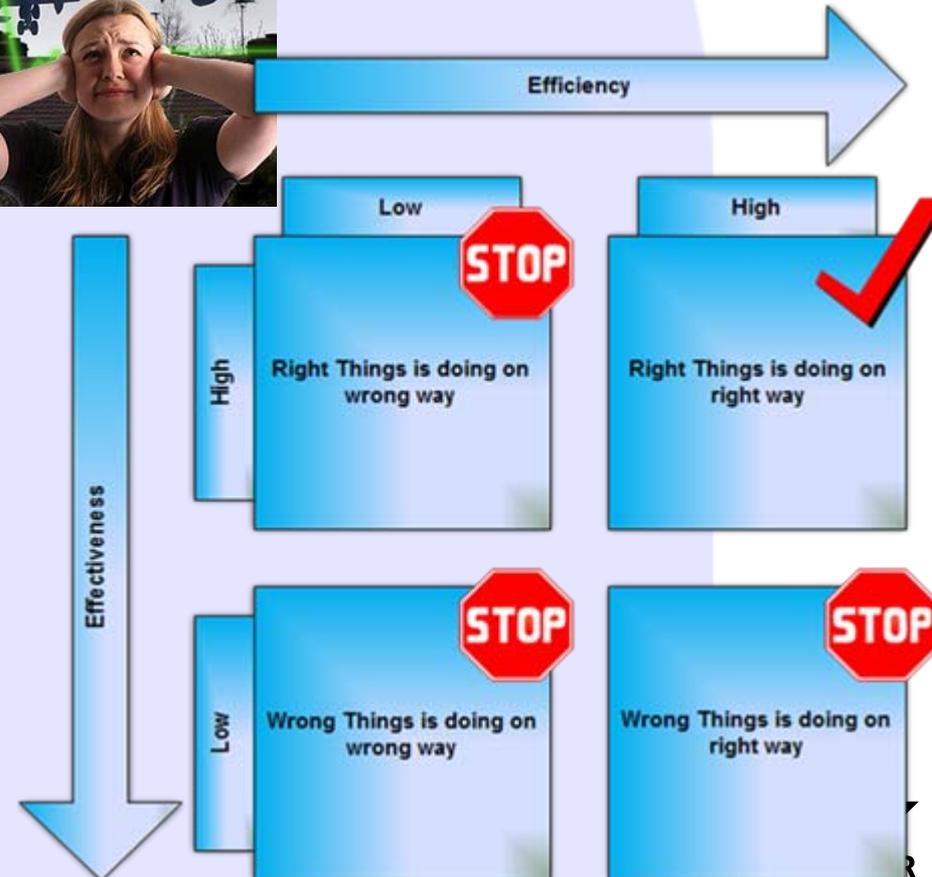
Overview

1. Introduction
2. Short theoretical background
3. Legal background
4. Orientation of noise charges
5. Future developments



Some definitions

- (Sur-)Charges
price for a service, mostly administratively regulated
- Noise
loud and unpleasant sound, not absolute but depends on perception
- Effectiveness
ability to bring about the result intended
- Efficiency
state or quality of being able to perform duties well



Effectiveness and efficiency



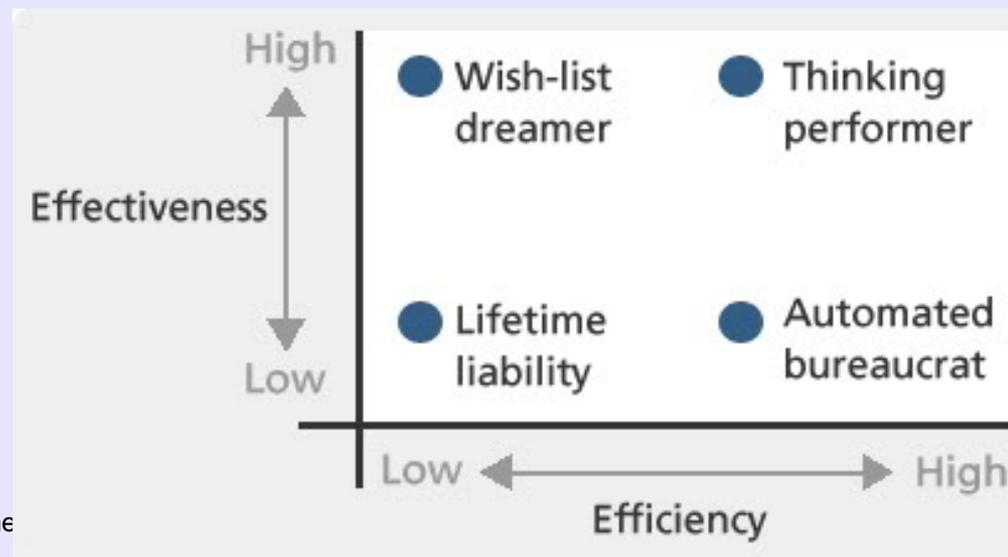
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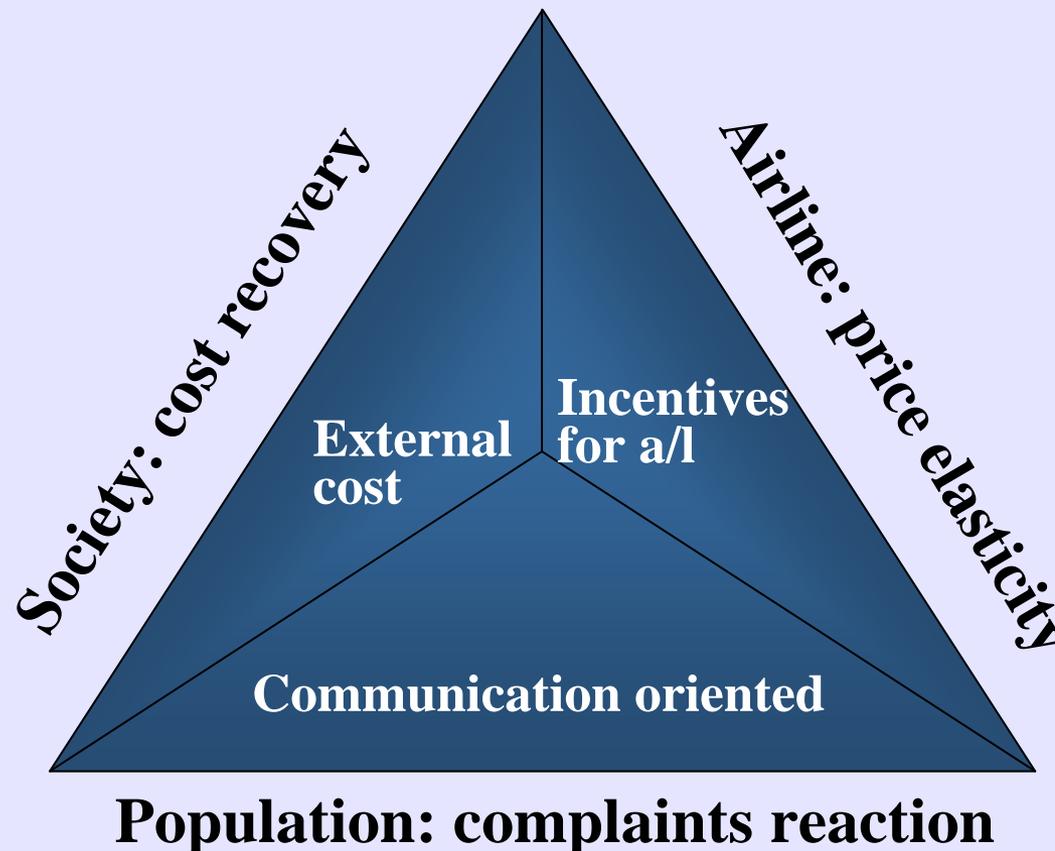


Efficiency	Effectiveness
Concerns Cost Saving on Time, Budget or Efforts	Concerns Quality of output
Skillfulness in avoiding wasted factors	Quality to bring about an effect
The 'means'	The 'ends'
Measures ratio between input and output	Measures the output and its impact





Short theoretical background – stakeholder oriented



Social / external cost of noise at airports



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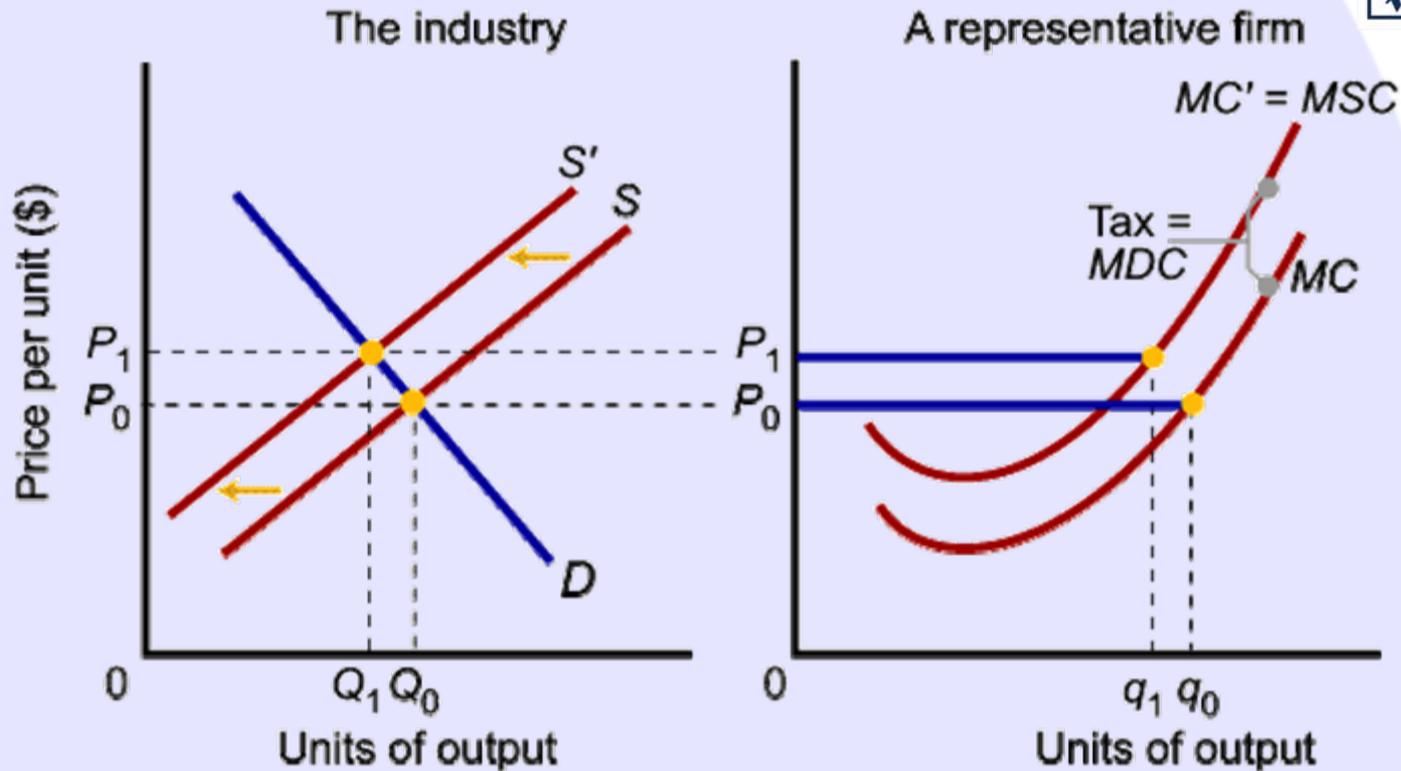
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- Bigger problem at night than at day time
- Indicator: real estate / housing prices
→ internalization?
→ different directions of development
- Prices for windows, ...
→ internalization is done!
- Price for quality of life?
- If these cost are calculated who gets the money?
- What about direct compensation?



Internalizing Externalities



- A **tax** per unit equal to MDC is imposed on the firm. The firm will weigh the tax, and thus the damage costs, in its decisions. Instead of the tax any other kind of **surcharge**.



Noise emission measurement – Calculation of potential internalization

- External costs for a given airport is a function of:
 - Number of people exposed to aircraft noise
 - Number of properties affected by the aircraft noise
 - Number of scheduled flights from and to an airport and
 - Type of Aircraft
- Intention: **Raising funds** for noise protection measures
and
- act as an **incentive** for airlines to use modern and less noisy aircraft.



Limits and alternative to external cost calculation



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- Limits to the calculation of external costs
 - Calculation of external cost with high subjective influence
 - Compensation of costs is limited
 - Is internalization ineffective?
- Alternative: concentrating on incentives
 - For those being affected by noise
 - For those being responsible for the noise



DLR



Incentive based charges

- Incentive for the airlines to reduce noise
- Charge has to be high enough
→ airline has to react
- Airline has to have choice
 - Either within the same a/c size
 - Or with a change of frequency:
 - 10 x A 320 = 1500 seats
 - 15 x EMB 195 = 1500 seats
 - 7 x B 757 = 1470 seats
- Airline has to reduce flights (esp. at night)



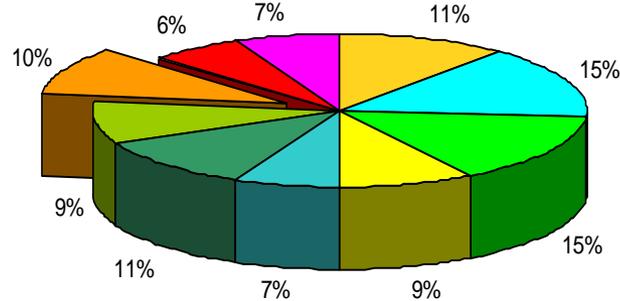
Reduction of flights

Elasticity of demand high enough

2008

- Fuel & Oil
- Station, Ground, Passengerservices
- Marketing, Sales
- Maintenance MRO
- Flight Crew
- Cabin Crew
- Depreciation
- Charges
- Administration
- Rest

Cost Calculation of Airlines 2002

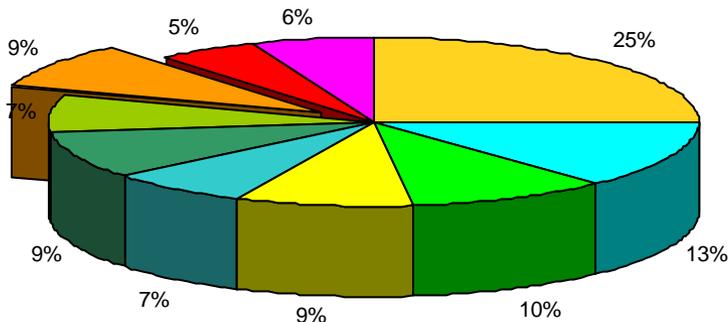


2008: charges 8%

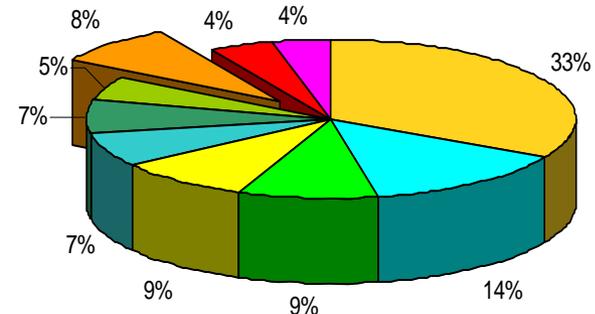
→ Noise charges < 2%

→ But: profit-margin
also < 2%

Cost Calculation of Airlines 2005



Cost Calculation of Airlines 2008





Noise awareness and medical research

Changes over the years:

Aviation noise decreases – noise awareness increases!

→ inverse reaction

High awareness of aircraft noise in the population

→ not only in the neighborhood of airports

In noise related medical research often a problem of the
sample

No help of medical research if it's better to have

- less movements with bigger / noisier aircrafts
- more movements with smaller / less noisy aircrafts



Political Concepts for Traffic-Noise-Reduction

Noise-abatement-measures and Effected Spheres

- **Noise-related measures**
 - noise surcharges 
 - noise budget restrictions
 - aircraft related noise-level-limitations
- **Operational measures**
 - curfews
 - operating quotas
 - frequency capping
 - aircraft size steering
 - airport cooperation for noise reduction
 - administrative traffic-steering
 - modal-split-steering
- **Preliminary procedures and measures for decision, implementation and enforcement of noise-reduction measures**
 - Mediation
 - Incentives for providers
 - Individual prosecution of noise-violations
- **Measures directed to increase the noise-acceptance and to reduce the exposure to noise**
 - Incentives for noise-exposed population
 - real-estate- and land-use-policy

Affected Spheres:
Ecology Traffic
Economy

Impact of Noise Charges - Airport View – Restrictions shall be applied individually

Where do airports differ?

- Traffic composition consisting of:
 - Total traffic volume
 - Passenger traffic
 - Cargo traffic
 - Hub- or non-hub-traffic
- Amount of affected people
- Distance to next airport
- Noise measuring system
- Bilateral air service contracts in place

Selection of restriction

How to fine-tune restrictions?

- Global or partial
- With timely effectiveness
- Based on aircraft noise
- Combination of different restrictions possible
- Amount of revenues

Impact of Noise Charges - Airline View

- Switching cost
 - between different aircraft types
 - between airports
- Reallocation of cost
- Possible reactions
- Airline model
- Airline flexibility
 - Rate of fleet change
 - New fees are faster than new aircraft



Criteria for effectiveness and efficiency

Effectiveness

- Decrease of...
 - Maximum noise levels of single events
 - Continuous noise level (Leq)
 - Noise at certain (critical) times

Efficiency

- Allocative efficiency: internalization of external cost according polluter principle – wealth transfer
- Pareto-efficiency: if the wealth of one stakeholder increases without decreasing the one of other stakeholders
- Administrative intervention (direct regulation):
 - Movement limitation, curfews, quotas, min. aircraft size; limitation of esp. noisy aircraft
- Setting of incentives (indirect regulation):
 - Noise charge, noise quota



Effectiveness of charges

Noise charge

Effect towards noise

- No noise effects as yet¹
- Obvious economic tool for incentivising² and long term fleet optimisation
- Individualised treatment of each noise impact possible

Effect towards stakeholders

- Internalisation of external cost²
- Did not lead to reduction in movements¹
- Partially leads to technical upgrades and fleet renewal¹
- Increase in ticket prices and possibly reduction of service quality²

Restriction not designed well². Incentivising potential unused as yet.²

1) Source: Questionnaire

2) Source: Literature

Noise Fee Implementation on German Airports for the 7 airports



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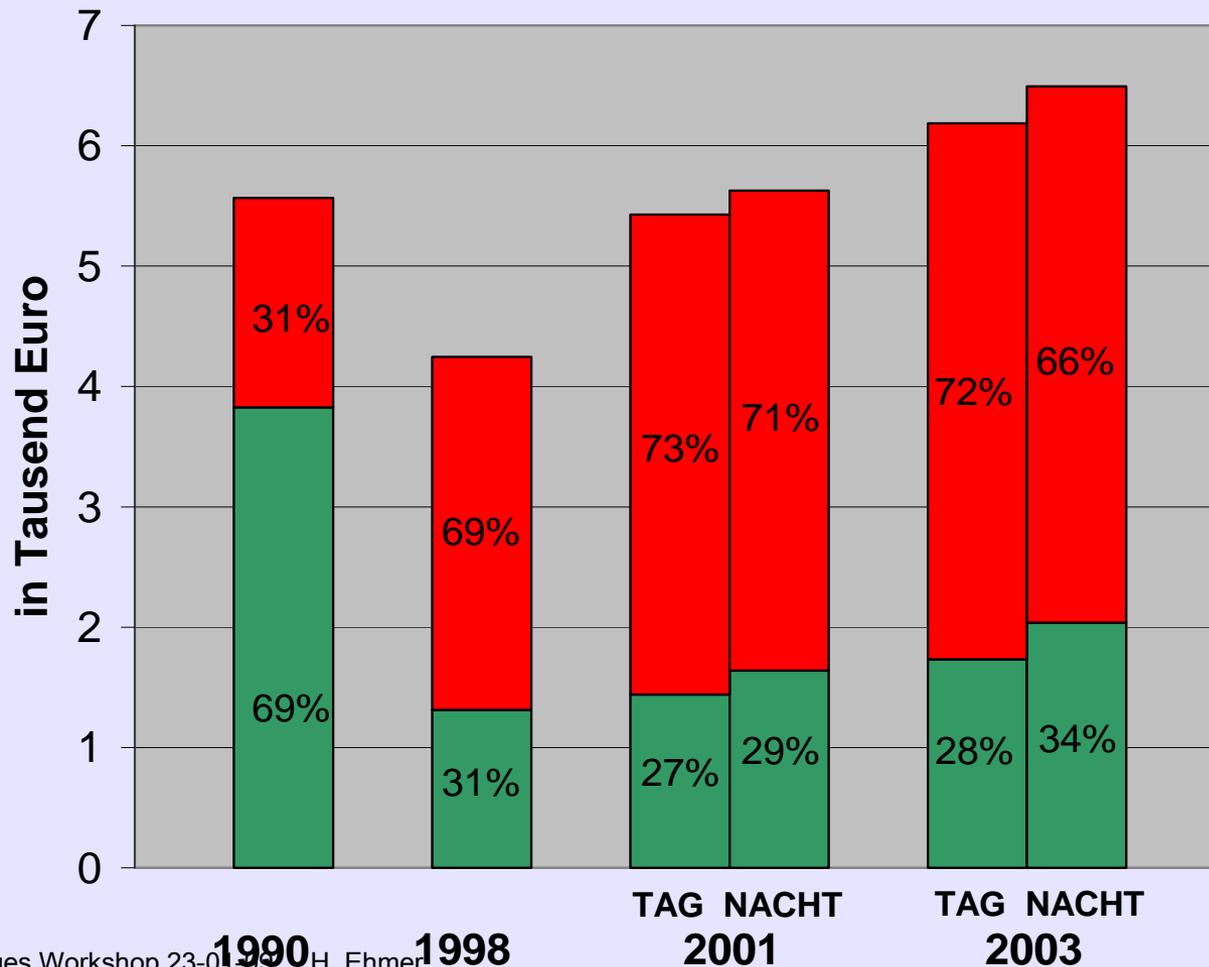
	ICAO Chapters	Airport Noise Categories	Separate Noise Fee	Daytime Distinction	Other Noise Fee	Remarks
FRA		X		X		2008
HAM		X		X		2008
HAJ	X		X	X		separate noise fee only at night (2008)
SXF		X		X		2007 Daytime distinction only from cat 5 up
TXL		X		X		2007
DUS	X			(X)	X	2008 Daytime distinction only for non chapter 3 aircraft
MUC		X				2006
CGN	X			X		2008
STR		X				2007

Example: fees and charges



B 747-400; bonuslist aircraft; MTOW 395 t; max. 390 seats;
with 280 passengers on board; intercont. traffic; airport **FRA**

until the end of 2000 no night-supplement in **FRA**!



■ Passagiergebühr

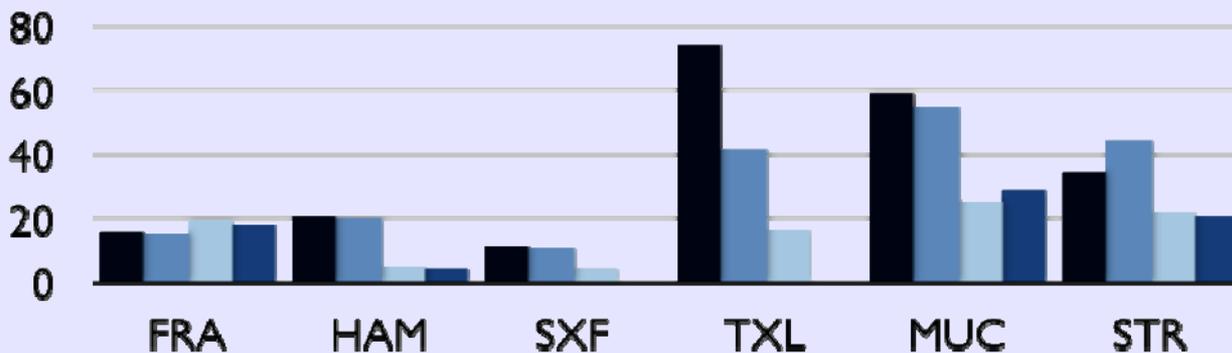
■ Gewichtsabhängige
Gebühr (MTOW)¹⁾

¹⁾ ab 2001
inkl. Lärmzuschlag
ab 2002 zusätzlich Schall-
schutz- und Lärmzuschläge

The Role of Noise Fees in Relation to total Landing Fees

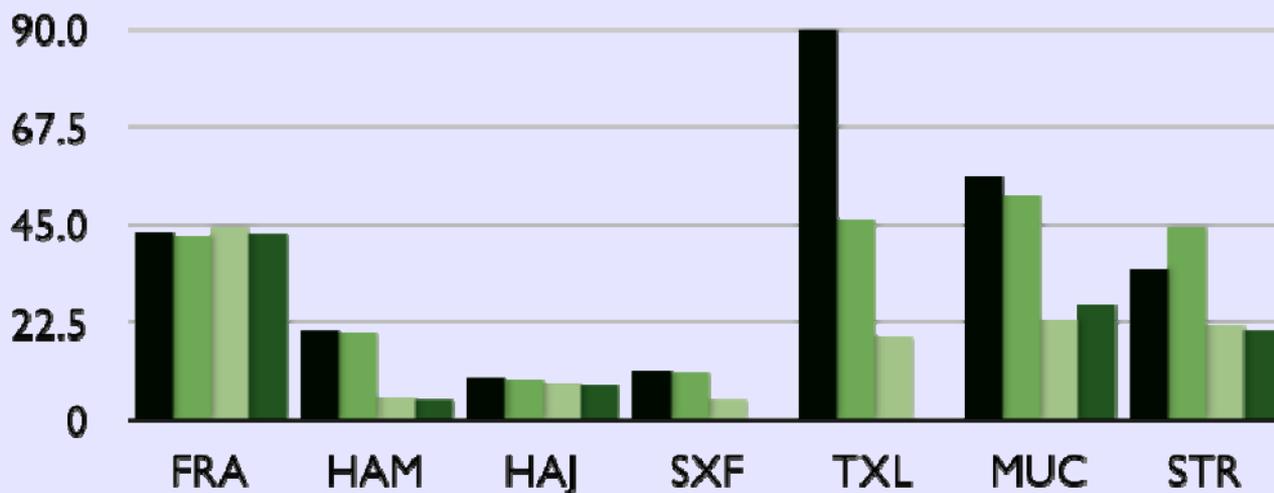


Proportion of noise fee in relation to total landing fee (day) in %



- B737-700
- A320
- B777-200LR
- A340-500

Proportion of noise fee in relation to total landing fee (night) in %



- B737-700
- A320
- B777-200LR
- A340-500

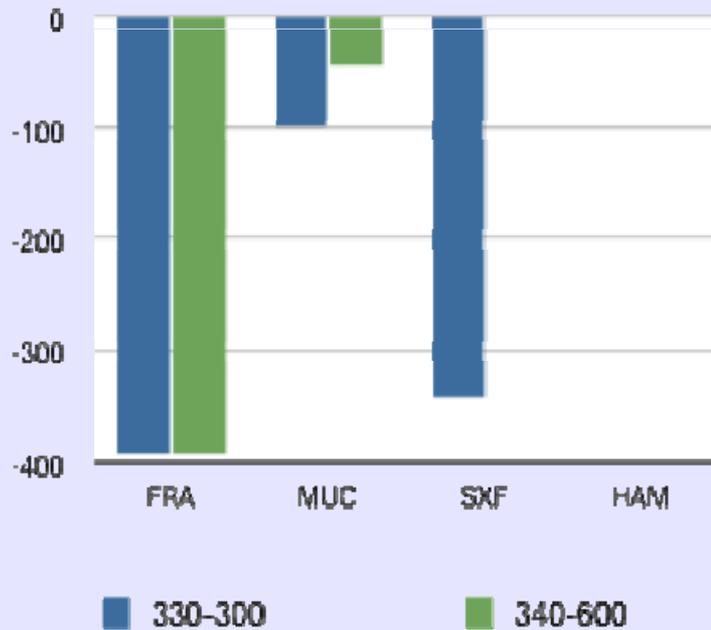




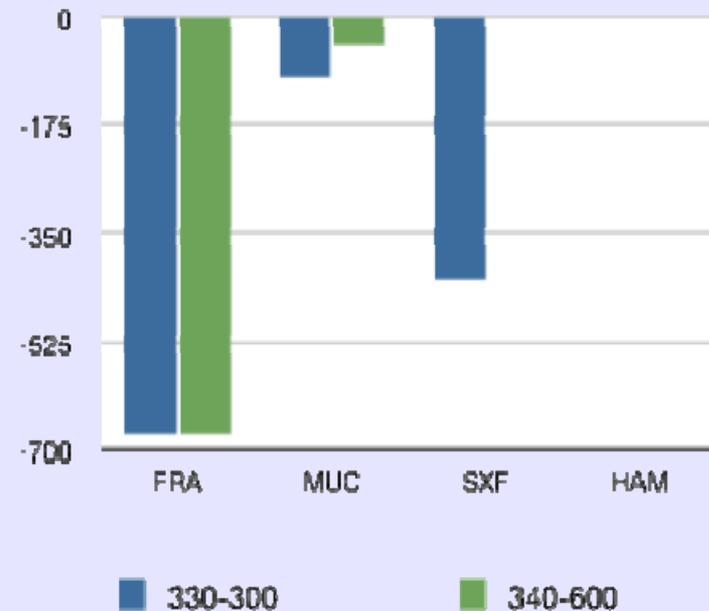
Noise Fees at German Airports – Comparison of aircraft

Cost and savings in relation to aircraft type
– related to 747-400

Deviation of noise charges in comparison to B747-400 (day)



Deviation of noise charges in comparison to B747-400 (night)

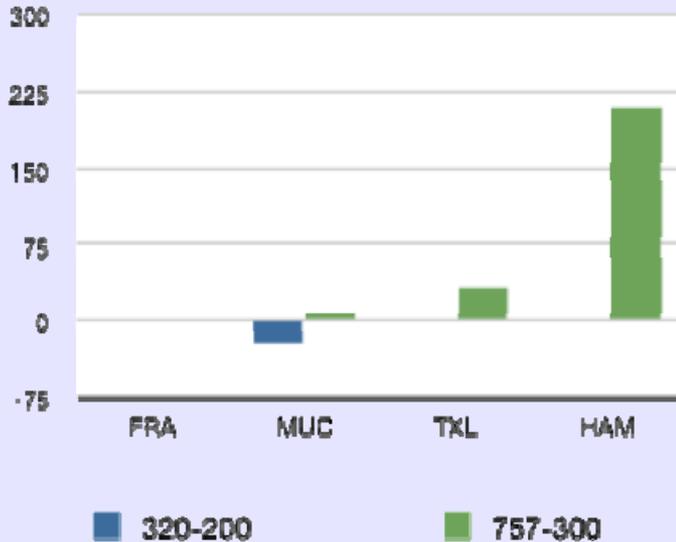


Noise Fees at German Airports - Comparison of aircraft

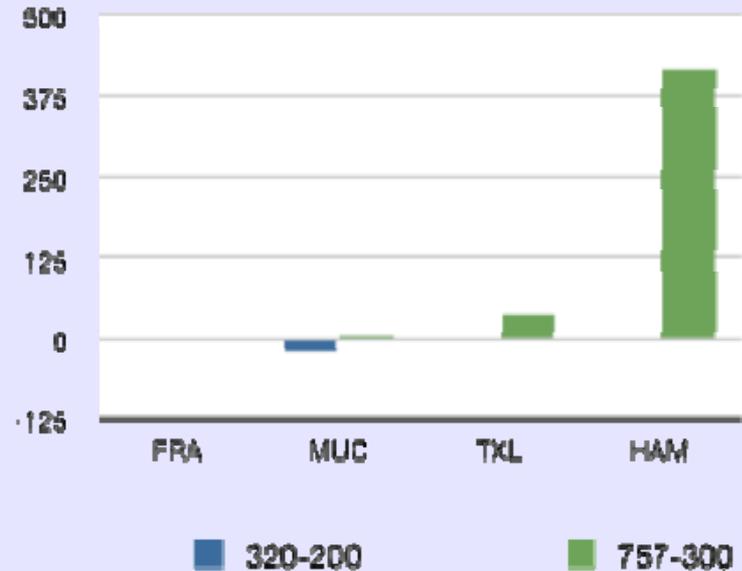


Cost and savings in relation to aircraft type
– related to 737-800

Deviation of noise charges in comparison to B737-800 (day)



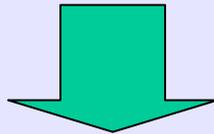
Deviation of noise charges in comparison to B737-800 (night)



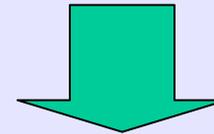


Noise charges in Europe, short comparison

- Noise charges for the A380 and the B747 vary quite considerably between airports due to different formulas for calculation and different variables being used
- MAD, OSL and LIS no noise charge system in force
- Two different types of calculation are used as basis of calculation:



MTOW ICAO Annex 16:
CDG, LHR and CIA



Combination of different
aircraft noise levels
(APNL, TONL, SLNL):
ARN, FRA, AMS and HEL



Noise emission measurement – Calculation

- ICAO Annex 16 Chapter 4 provides a list of noise emissions of different aircraft in relation to their Maximum take-off weight (MTOW).

Example Airbus 380-800 and Boeing 747-400:

Type of Aircraft	MTOW in t	Number of Engines	Noise level according to ICAO-Annex 16 in EPNdB (Effective Perceived Noise Level)		
			Take-off	Sideline	Approach
A380-800	560	4	93.7	95.3	97.9
B747-400	386	4	99.0	98.3	100.3





Noise charges – some Final Results

- MTOW ICAO Annex 16:

Airport	A380 in €	B747 in €	Basis of Calculation	Appraisal
CDG (daytime)	69.90	68.30	MTOW ICAO	+
CIA	47.95	32.43	MTOW	-
LHR	688.43	688.43	MTOW ICAO (mod.)	-



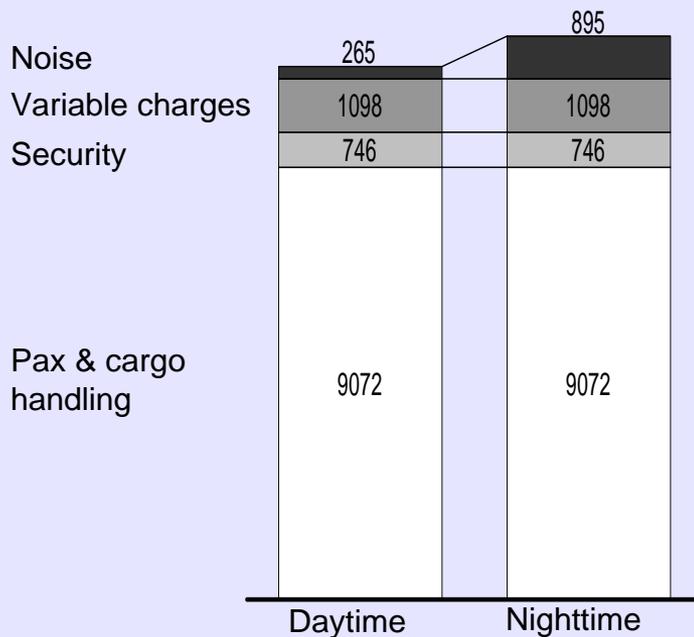
Noise charges – some Final Results

- Combination of different aircraft noise levels during take-off and landing leads to a more sophisticated noise charging scheme:

Airport	A380 in €	B747 in €	Basis of Calculation	Appraisal
ARN	38.51	64.75	APNL, TONL, SLNL	+
FRA (daytime)	75.00	270.00	APNL, TONL, SLNL	+
HEL	49.92	167.87	TONL, SLNL	+
AMS (daytime)	198.42	559.11	APNL, TONL, SLNL and MTOW	++

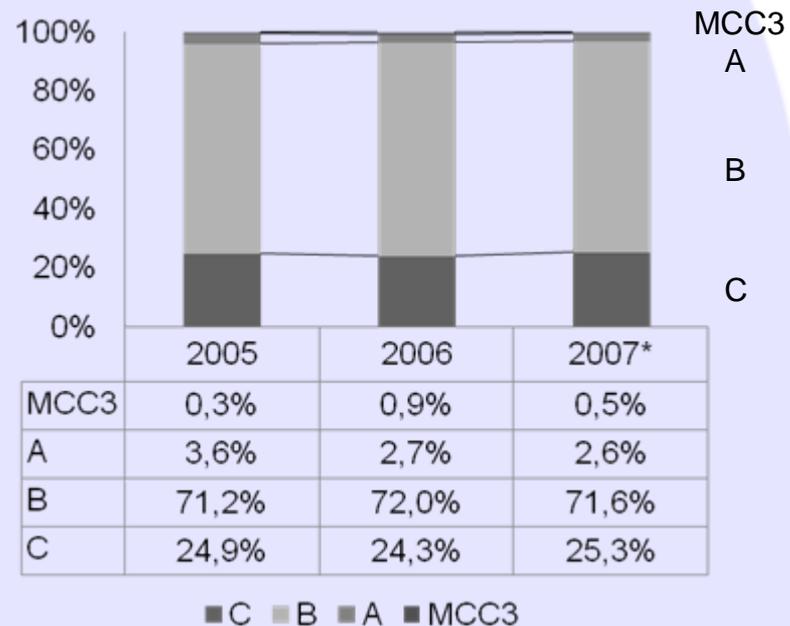
Noise charges are often inefficiently established

Charges in FRA¹



➤ Incentive of charges too weak to push a fleet adaptation

Noise classes in AMS²



➤ Noise classes too wide spread to set right incentives

1) B747-400 mit 396T MTOM, FRA-LAX, departure day at 14:00 CET, departure night at 04:00 CET.

2) EPNdB decrease of Chapter 3: MCC3= 0- -5; A= -5 - -9; B= -9 - -18; C= < -18



Future developments on noise charges I

- Further research needed
 - If an **equilibrium of the stakeholders** is possible
 - If there can be a solution if it is better
 - to have less but louder flights
 - or to have more movements
 - Relevant only with enough capacity (at night)
- Orientation towards **certified noise** level (as with the EU COM) is **not efficient**
 - Big difference for one single aircraft according weight
 - A 320 FRA – PAR 50% SLF; A 320 FRA – LPA 85% SLF
 - Alternative: more differentiated calculation
 - Example: FRA (and others) an average over the year
 - Is it fair for different kinds of airlines / flights?
 - Weight indirectly included via variable charges

Future developments on noise charges II



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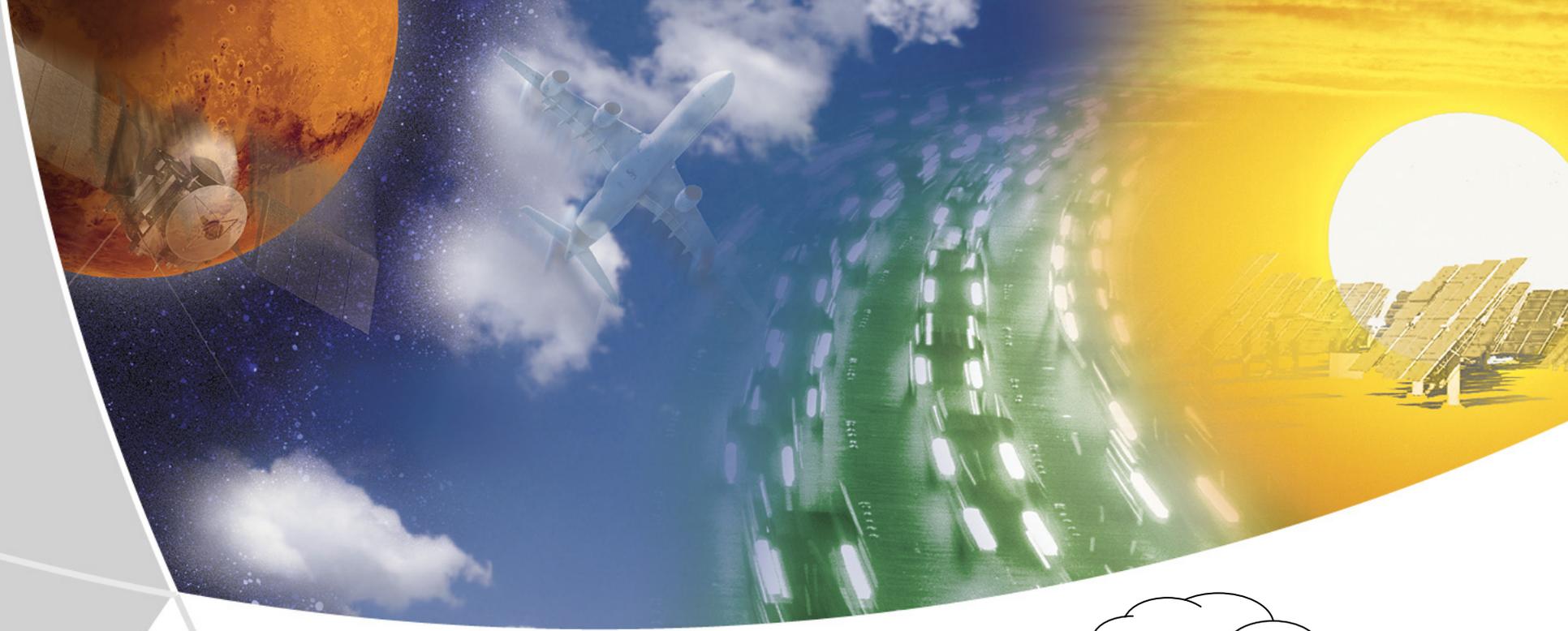
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- Optimization:
 - Is it optimal to calculate dB(A) per flight?
 - Influence of weather, DFS, technical reasons
 - Proposal:
 - (Further) differentiation landing / starting fee
 - yearly average per airline (FRA)
 - Per flight calculation including the actual weight
- Efficiency control is needed!
 - Any differences between the airports in noise development?
 - Controlling strategies should be “normal”
 - Noise forecasts are required for new investment – are they in any way strategy related?
 - Reasons for changes of strategies though no results
 - Reasons for results without a change of strategy

Future developments beyond noise charges

- Since about November 2006 (Stern report) **emissions** became more important than noise – at least in general
- In the surrounding of an airport **noise** remains more important
- **Air quality** at the airport is still better than in city areas
- **Air pollution** is more a problem of high altitudes
- However first airports started to introduce an emission oriented surcharge on the landing fee
- Orientation of the fee on NO_x, not on CO₂
- The introduction is intended to be cost neutral
- Forerunners FRA and MUC, CGN following



Thank you for your attention!

Time for questions and discussion

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