Airport Pricing and Revenues from Non-Aviation

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Control of Infrastructure

- To start/land at a coordinated airport, an airline needs ...

  ... a „Slot“ allocated by Airport Coordination for free

  ... to pay Airport-Charges to the Airport

Airport Charges

Orientated worldwide at ICAO document 9082/4

„Cost-relatedness“ - „Non-Discrimination“ - „Single Till“

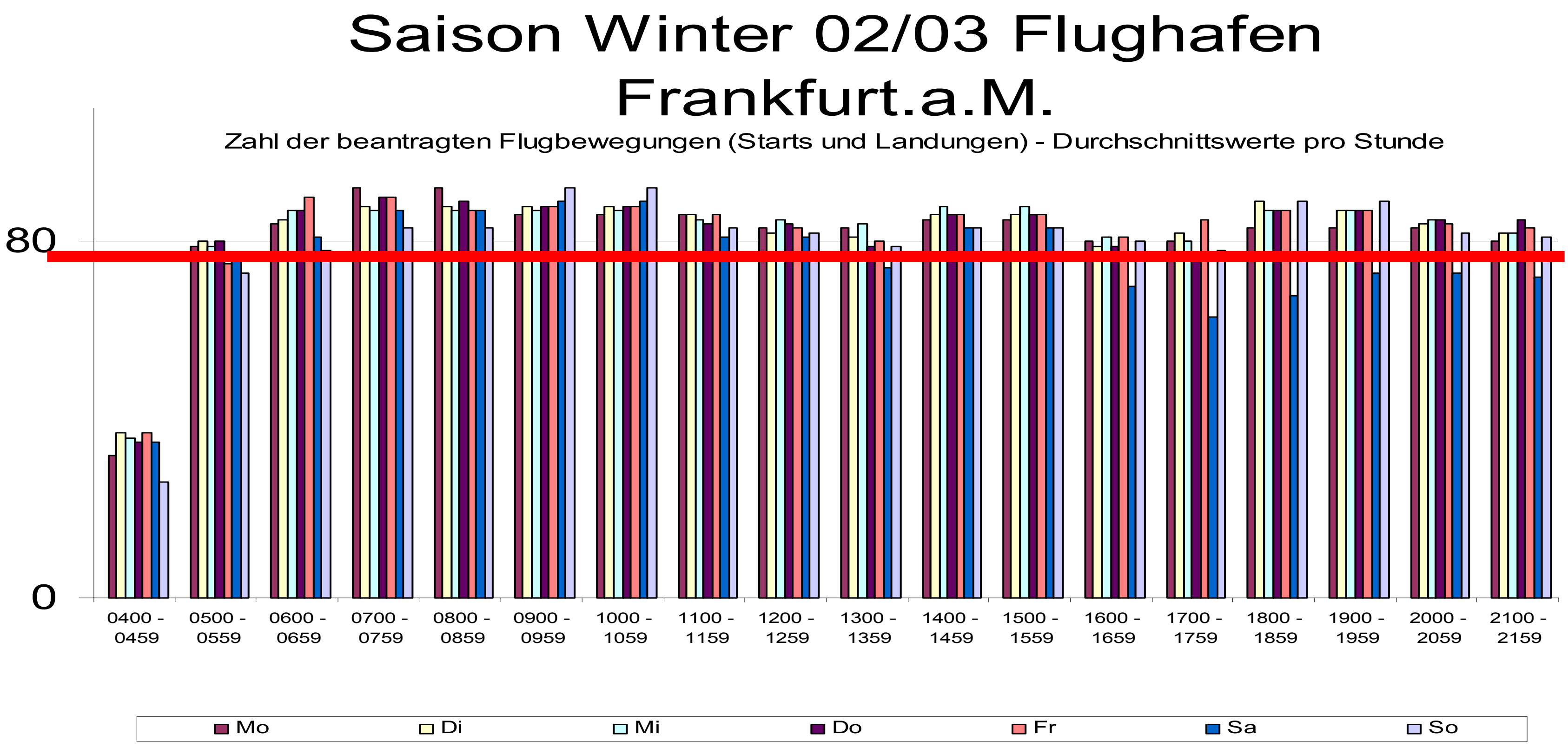
Pattern of Aviation-Charges	
Start/Landing fees	Based on MTOW
Passenger fees	Based on Number of passengers
Aircraft Parking	
Others	

Aviation Charges in Frankfurt/Main

	Boeing 747 – 400 400 Passengers Destination: Tokyo MTOW: 400 tons	Airbus A-300 250 Passengers Destination: Hamburg MTOW: 165 tons	Gates Learjet LJ45 8 Passengers Destination: Hamburg MTOW: 8,3 tons
1. Start/Landing fee	1540,00 €	568,00 €	250,00 €
2. Passenger fees	4964,00 €	2552,50 €	88,88 €
3. Aircraft Parking	240,00 €	220,00 €	25,00 €
4. Others			
„BI“	2060,00 €	650,00 €	-
“Noise-surcharge“	220,00 €	135,00 €	9,00 €
	∑ = 9024,00 €	**∑ = 4125,50 €**	**∑ = 372,88 €**

Tarifs according to „Flughafenentgelte Frankfurt Main“ from January 2002. Charges do not include any taxes.

Slotanmeldungen Frankfurt



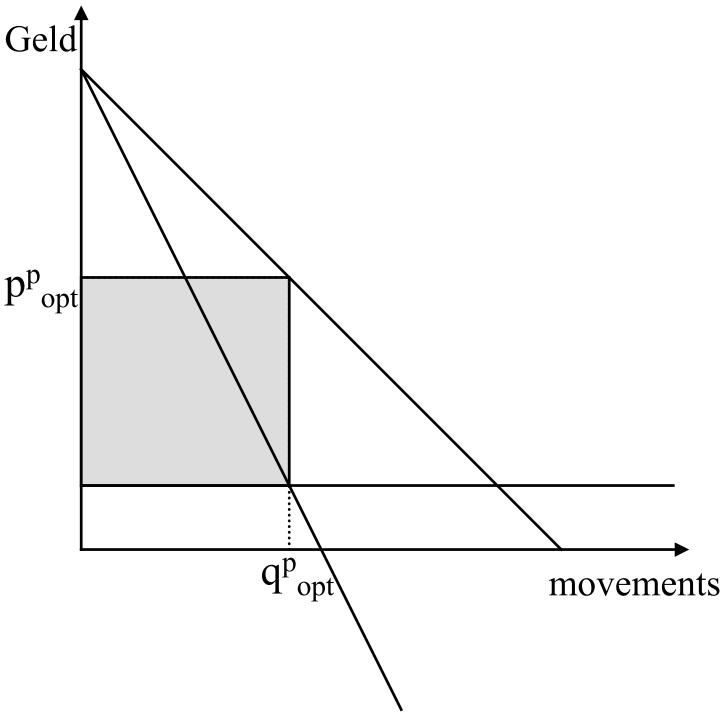
Quelle: Flughafenkoordinator der Bundesrepublik Deutschlan

Literature (Airport Pricing)

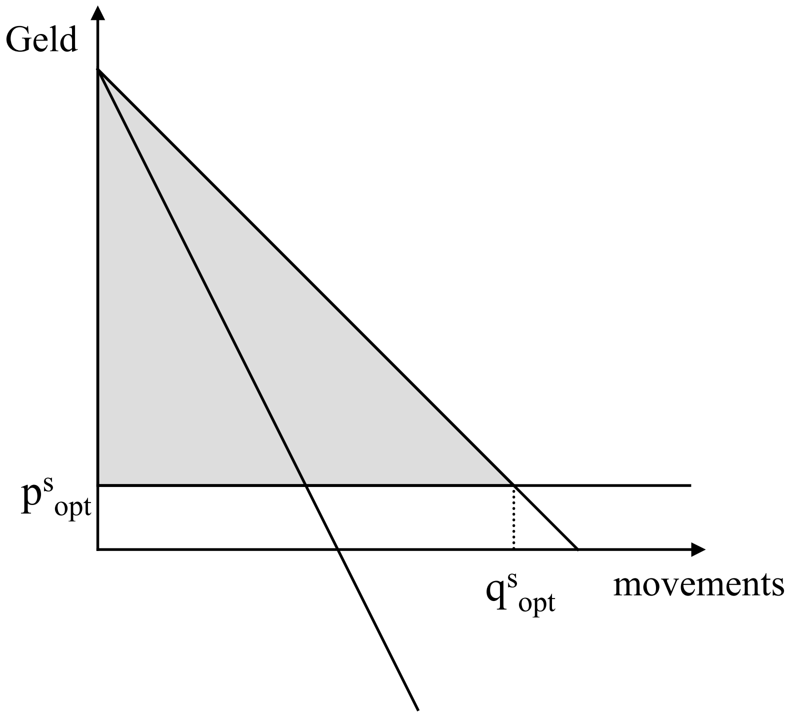
- Levine (1969)
- Carlin; Park (1970)
- Morrison(1982, 1987)
- Zhang; Zhang (1997)
- Starkie (2001)

Runway as Monopoly

- Private Optimum



- Social Optimum



Runway as Monopoly

- Private Optimum

$$\underset{p}{Max}\,\Pi = q(p)\,p - C[q(p)]$$

…

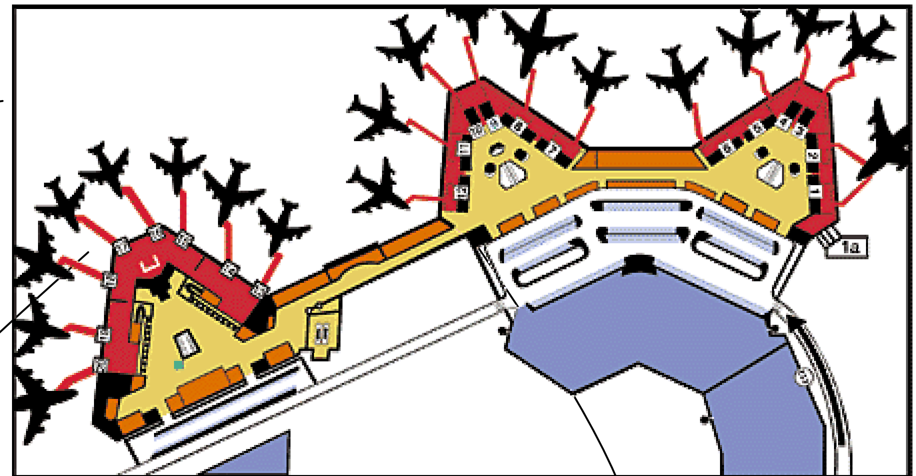
$$\frac{p - MC}{p} = -\frac{1}{\varepsilon_{q,p}}$$

- Social Optimum

$$\underset{p}{Max}\,S\ddot{U}(p) = \int_{p}^{p_0} q(\tilde{p})\,d\tilde{p} + pq(p) - C(q(p))$$

…

$$p = MC$$



Runway

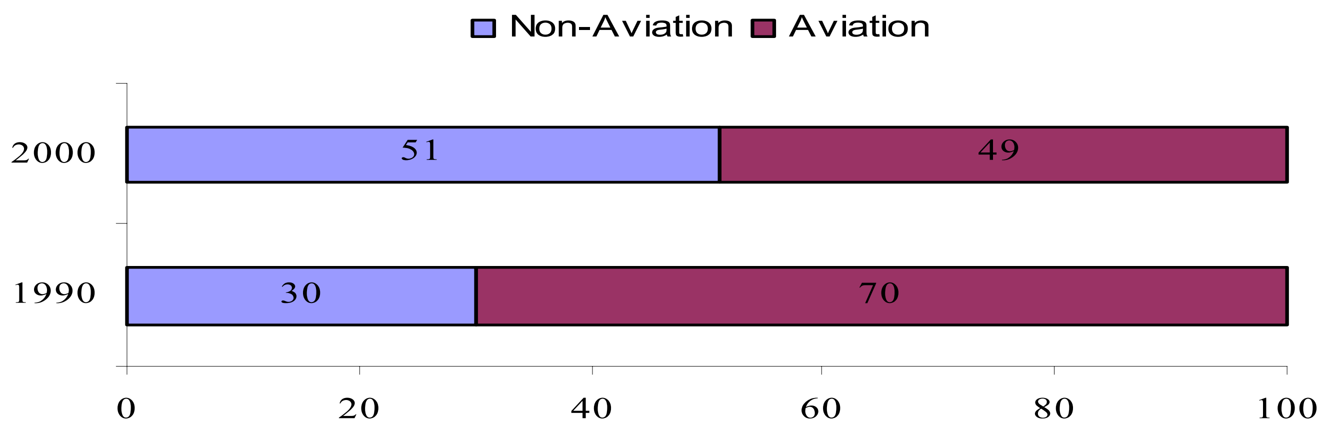
Taxiways; Aprons

Retailing; Hotels; Car Parking

Aviation

Non-Aviation

Backround

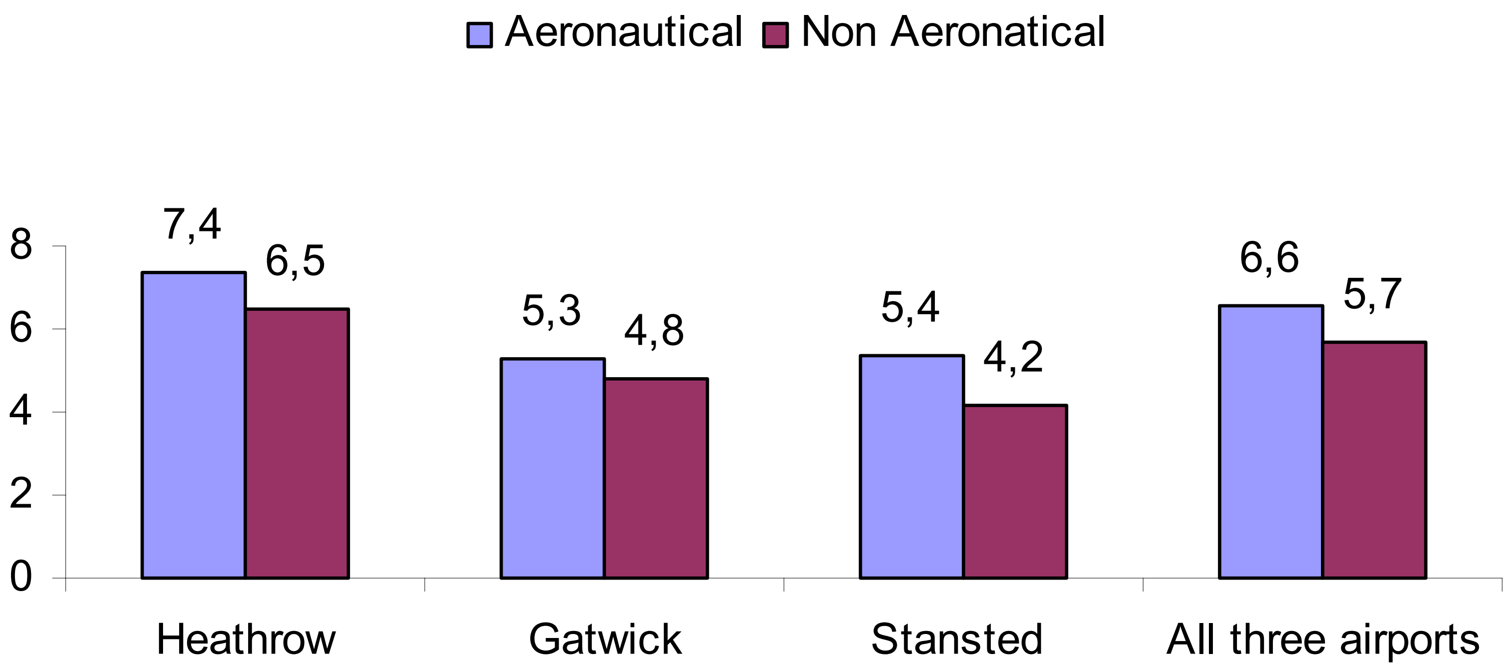


Share of Non-Aviation-Revenues as a percentage from Total Revenues between 1990 and 2000

(Source: ACI Airport Economics Survey – 2000)

Revenues per Passenger

[London BAA Airports 2000/01]



Source: Calculations based on data from CAA (2002), p. 84 and p. 263

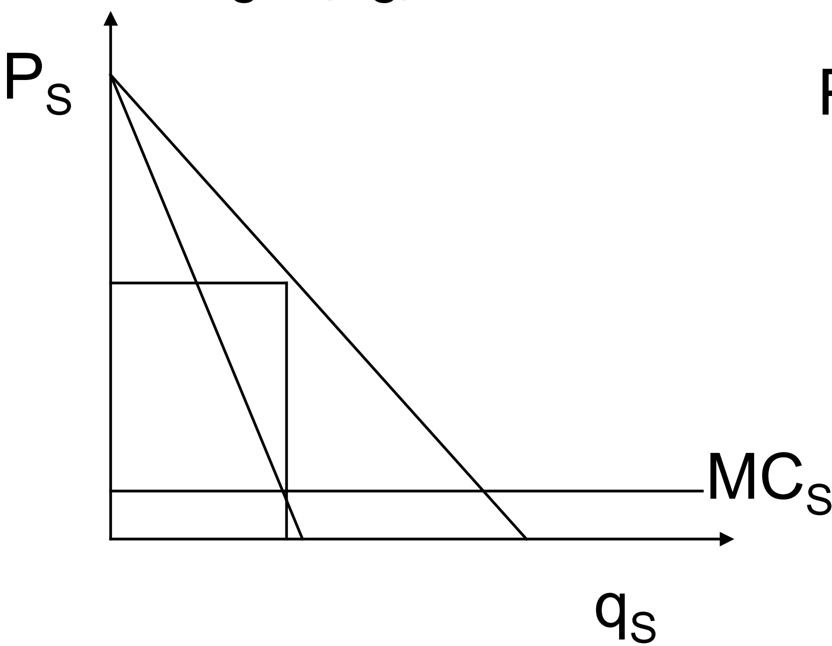
Interdependent Demand

Complementarity between Aviation and Non-Aviation

- Aviation

(Notation: „S“ for Start-Landing Movement)

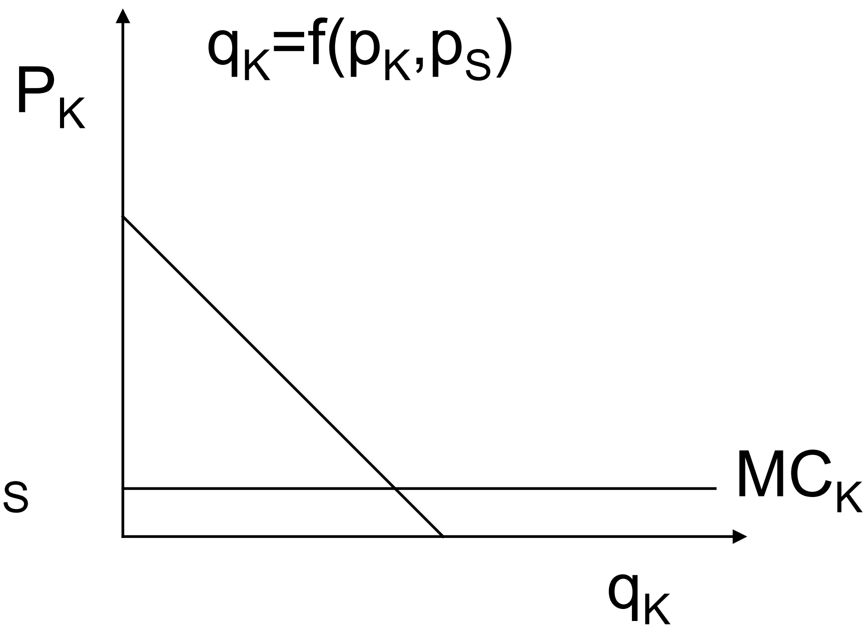
$q_S=f(p_S)$



- Non-Aviation

(Notation: „K“ for Commercial)

$q_K=f(p_K,p_S)$



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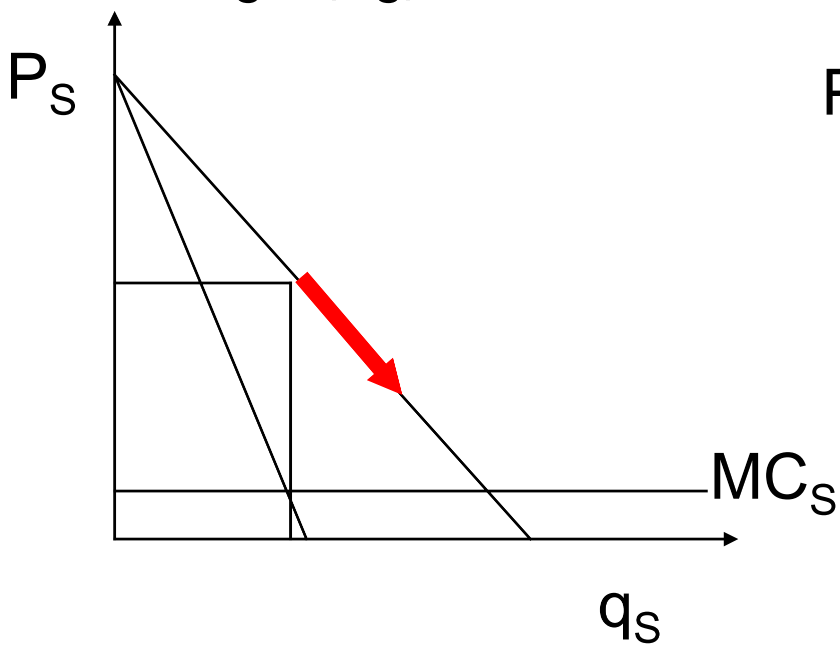

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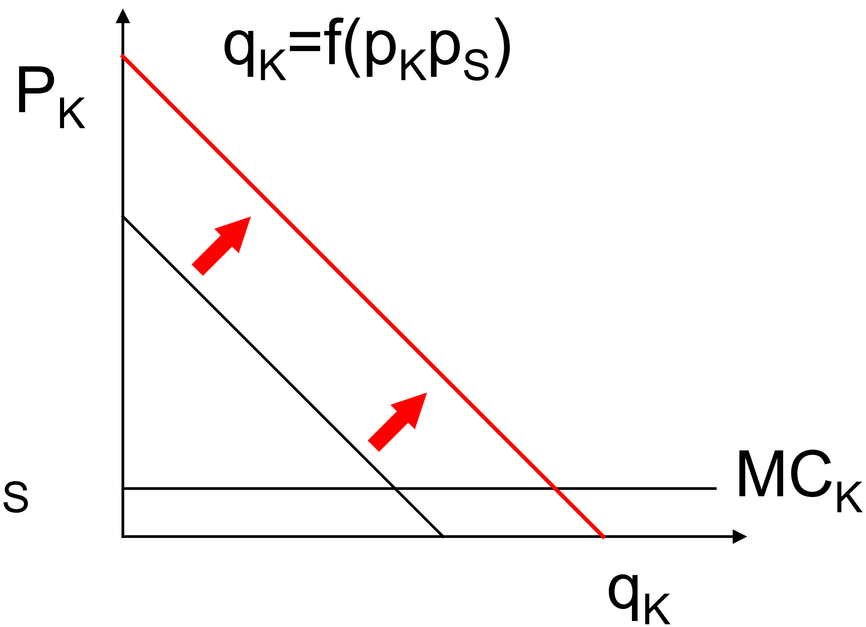

Private Optimum (1)

$$\underset{p_S, p_K}{Max}\,\Pi = q_S(p_S)p_S + q_K(p_S, p_K)p_K - C_S(q_S(p_S)) - C_K(q_K(p_S, p_K))$$

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Aviation-Revenues

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Non-Aviation-Revenues

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Cost of Aviation

Private Optimum (1)

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Cost of Non-Aviation

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$$\underset{p_S, p_K}{Max}\, \Pi = q_S(p_S)p_S + q_K(p_S, p_K)p_K - C_S(q_S(p_S)) - C_K(q_K(p_S, p_K))$$

F.O.C.: Differentiate to p_S

$$\frac{\partial \Pi}{\partial p_S} = q_S + \frac{\partial q_S}{\partial p_S} p_S + \frac{\partial q_K}{\partial p_S} p_K - MC_S \frac{\partial q_S}{\partial p_S} - MC_K \frac{\partial q_K}{\partial p_S} \overset{!}{=} 0$$

$$\underbrace{q_S + \frac{\partial q_S}{\partial p_S} p_S + \frac{\partial q_K}{\partial p_S} p_K}_{\text{Marginal Revenue}} = \underbrace{MC_S \frac{\partial q_S}{\partial p_S} + MC_K \frac{\partial q_K}{\partial p_S}}_{\text{Marginal Costs}}$$

F.O.C.: Differentiate to p_K

$$\frac{\partial \Pi}{\partial p_K} = q_K + \frac{\partial q_K}{\partial p_K} p_K - MC_K \frac{\partial q_K}{\partial p_K} \overset{!}{=} 0$$

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$$\underbrace{q_K + \frac{\partial q_K}{\partial p_K} p_K}_{\text{Marginal Revenue}} = \underbrace{MC_K \frac{\partial q_K}{\partial p_K}}_{\text{Marginal Costs}}$$

Private Optimum (2)

... to p_S

$$q_S + \frac{\partial q_S}{\partial p_S} p_S - \frac{\partial q_S}{\partial p_S} MC_S = \frac{\partial q_K}{\partial p_S} MC_K - \frac{\partial q_K}{\partial p_S} p_K$$

$$(p_S - MC_S)\frac{\partial q_S}{\partial p_S} = \frac{\partial q_K}{\partial p_S}(MC_K - p_K) - q_S$$

$$p_S - MC_S = \frac{\partial q_K}{\partial p_S}\frac{\partial p_S}{\partial q_S}(MC_K - p_K) - q_S \frac{\partial p_S}{\partial q_S}$$

$$\frac{p_S - MC_S}{p_S} = \frac{\partial q_K}{\partial p_S}\frac{\partial p_S}{\partial q_S}\frac{1}{p_S}(MC_K - p_K) - \frac{\partial p_S}{\partial q_S}\frac{q_S}{p_S}$$

Optimal Mark-up Aviation:

$$\frac{p_S - MC_S}{p_S} = -\frac{1}{\varepsilon_{q_s, p_s}}\left[1 - \frac{(p_K - MC_K) q_K (-\varepsilon_{K, p_s})}{p_S q_S}\right]$$

... to p_K

$$q_K + \frac{\partial q_K}{\partial p_K}(p_K - MC_K) = 0$$

$$p_K - MC_K = -q_K \frac{\partial p_K}{\partial q_K}$$

Optimal Mark-up Non-Aviation:

$$\frac{p_K - MC_K}{p_K} = -\frac{1}{\varepsilon_{K, p_K}}$$

Private Optimum (2)

... to p_S

$$q_S + \frac{\partial q_S}{\partial p_S} p_S - \frac{\partial q_S}{\partial p_S} MC_S = \frac{\partial q_K}{\partial p_S} MC_K - \frac{\partial q_K}{\partial p_S} p_K$$

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$$\frac{p_S - MC_S}{p_S} = -\frac{1}{\varepsilon_{q_s,p_s}}\underbrace{\left[1 - \frac{(p_K - MC_K)q_K(-\varepsilon_{q_K,p_s})}{p_S q_S}\right]}$$

„Appeasement“

Optimal Mark-up Aviation

$$\frac{p_S - MC_S}{p_S} = -\frac{1}{\varepsilon_{q_s,p_s}}\underbrace{\left[1 - \frac{(p_K - MC_K)\,q_K\,(-\varepsilon_{q_K,p_s})}{p_S q_S}\right]}_{\text{„Appeasement“}}$$

„Mark-up“ Aviation

- ... Profitmaximizing landing charges can be below marginal costs
- Aviation = „Loss leader“
- Def.: A good that is sold with losses to promote sales of a second good.
- Losses in Aviation must be offset in Non-Aviation

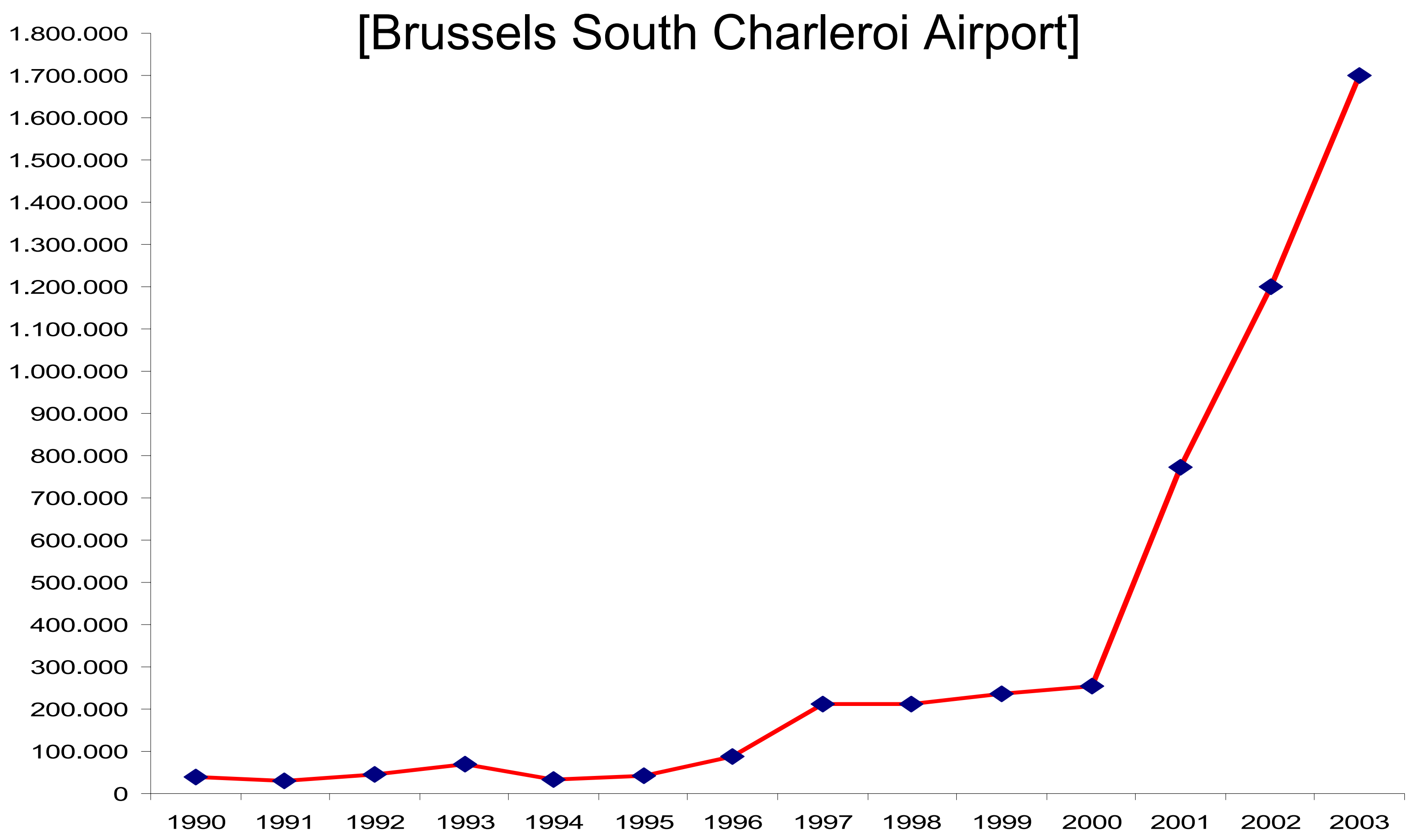
Consequences ...

- The level of Aviation Charges
- The structure of Aviation Charges
- Auctioning of scarce runway-capacity
- Regulation of charges

What does it mean for airports with unused capacity?

- Lowering the level of landing charges will induce traffic.
- Landing charges can be below marginal cost - and even below zero, which means that it might make sence to pay airlines to land if - and only if - they bring enough valuable customers.

Passenger development

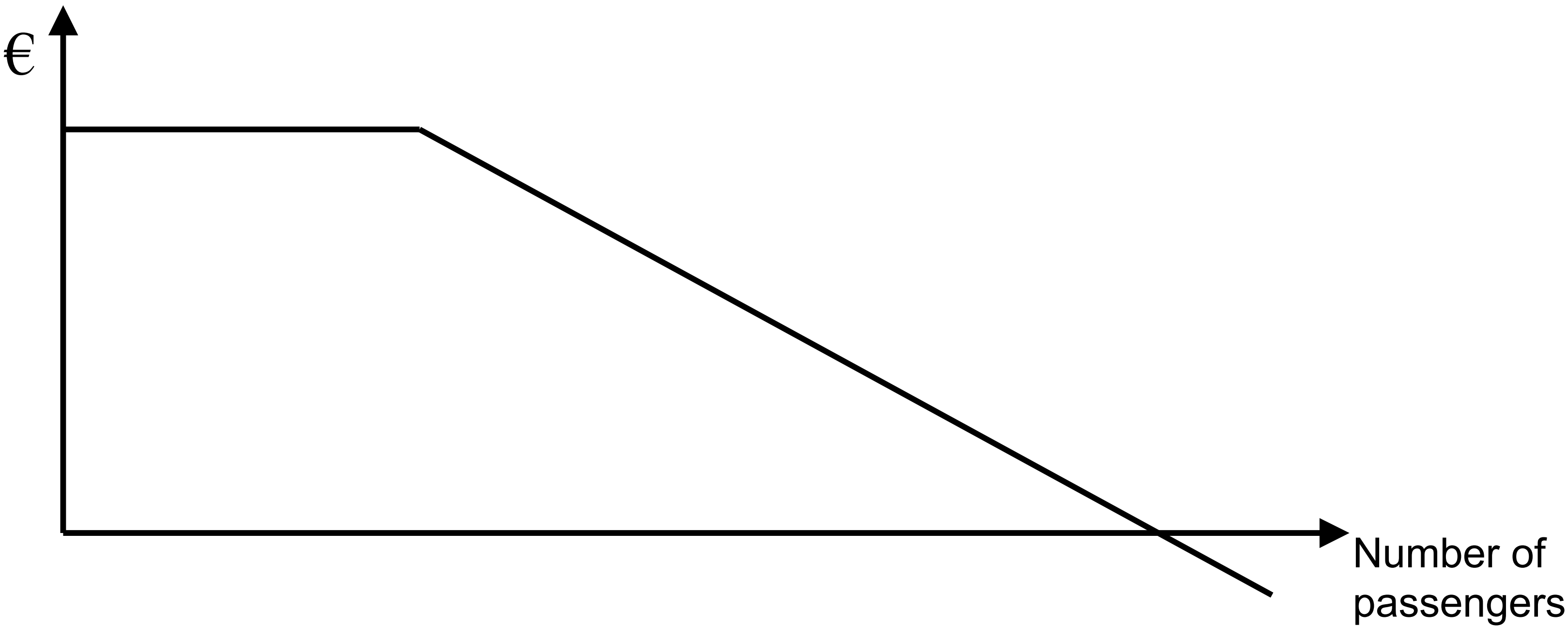


Source: Laurent Jossart (200[illegible])

What does it mean for congested airports?

- Lowering the level of landing charges will not induce traffic.
- But: Restructuring of charges may change structure of traffic-mix.

A „Two-part tariff“?



Fix Landing charge + Discount depending on number of passengers

What does it mean for auctioning ?

- Auctioning is instrument to reveal information
- May only reveal information about willingness to pay from airlines.
- Will not reveal information about cross-elasticities

Auctioning of scarce capacity

	Bid
Airline A	2200
Airline B	2150
Airline C	2100

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	Bid
Airline A	2200
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Auctioning of scarce capacity

	Bid	Pax	Non-Aviation-Revenue	Total
Airline A	2200	200*4	800	3000
Airline B	2150	250*4	1000	3150
Airline C	2100	300*4	1200	3300

Auctioning of scarce capacity

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