

Prof. Dr. Richard Klophaus
Worms University of Applied Sciences

***Estimating Revenues and Consumer Surplus
for the German Air Transport Markets***

***8th Conference on Applied Infrastructure Research
(INFRADAY)
TU Berlin***

October 10, 2009

Key issue

How to measure the impact of air transport on economic welfare beyond direct, indirect and induced impacts?

Relevant for:

- ✈ **(Further) liberalisation of air transport**
- ✈ **Investment in infrastructure (airports etc)**
- ✈ **Airport regulation (eg night curfews)**
- ✈ **Policy decisions to raise the cost of air transport (eg increase of airport charges, inclusion in emissions trading schemes)**

Literature

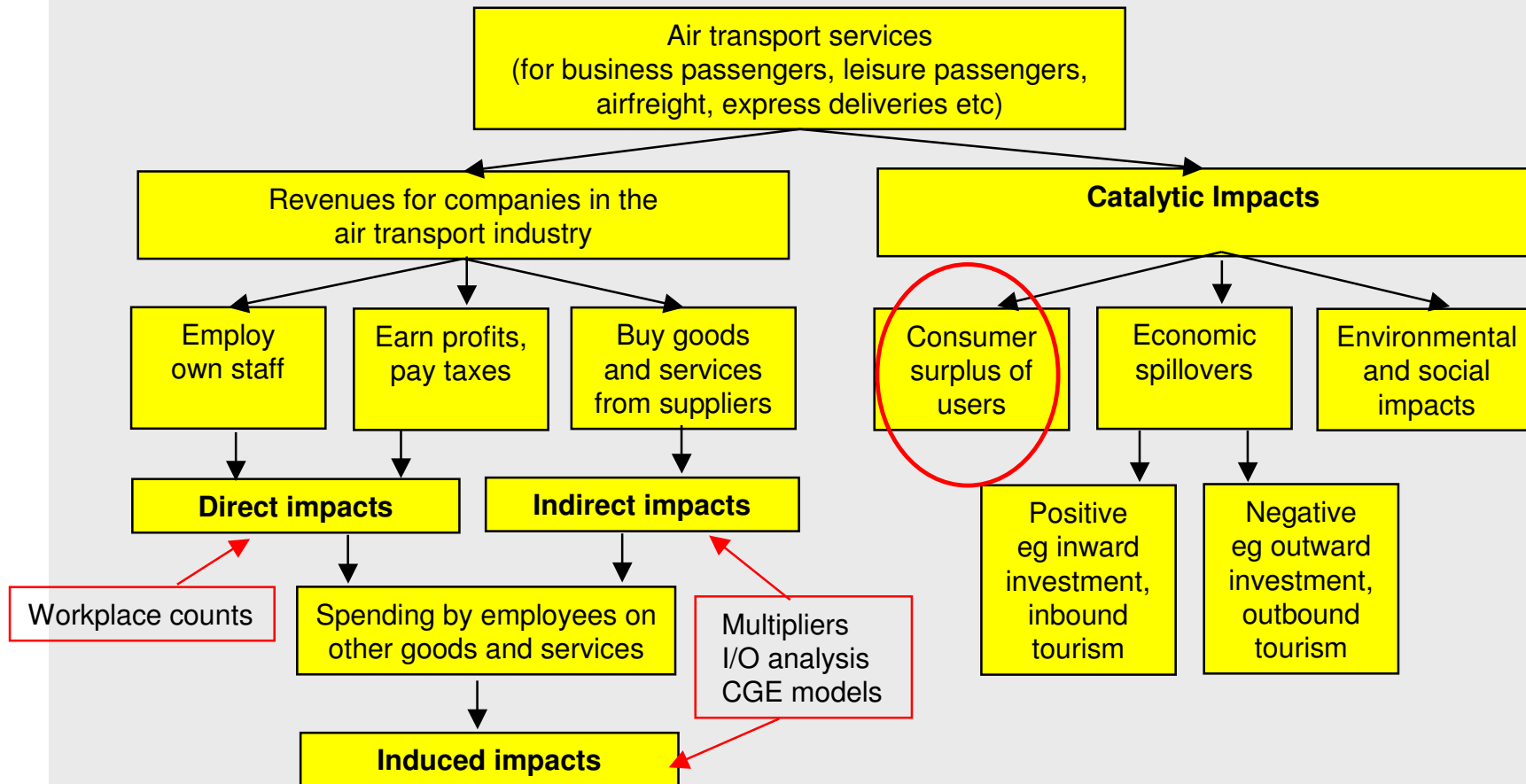
Economic impact of air transport

- ACI Europe (2004), The Social and Economic Impact of Airports in Europe
- MPD Group (2005), Assessing the Economic Costs of Night Flight Restrictions
- Oxford Economic Forecasting (2005), The Economic Catalytic Effects of Air Transport in Europe

Air transport demand elasticities

- Gillen / Morrison / Stewart (2003)
- InterVISTAS Consulting (2007)
- Ernst & Young (2007)

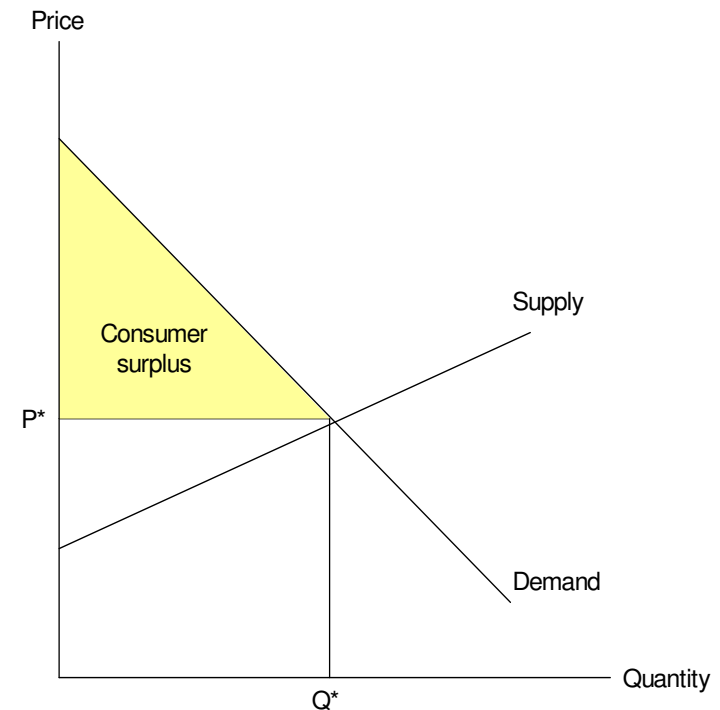
Benefits (and costs) of air transport



Consumer surplus

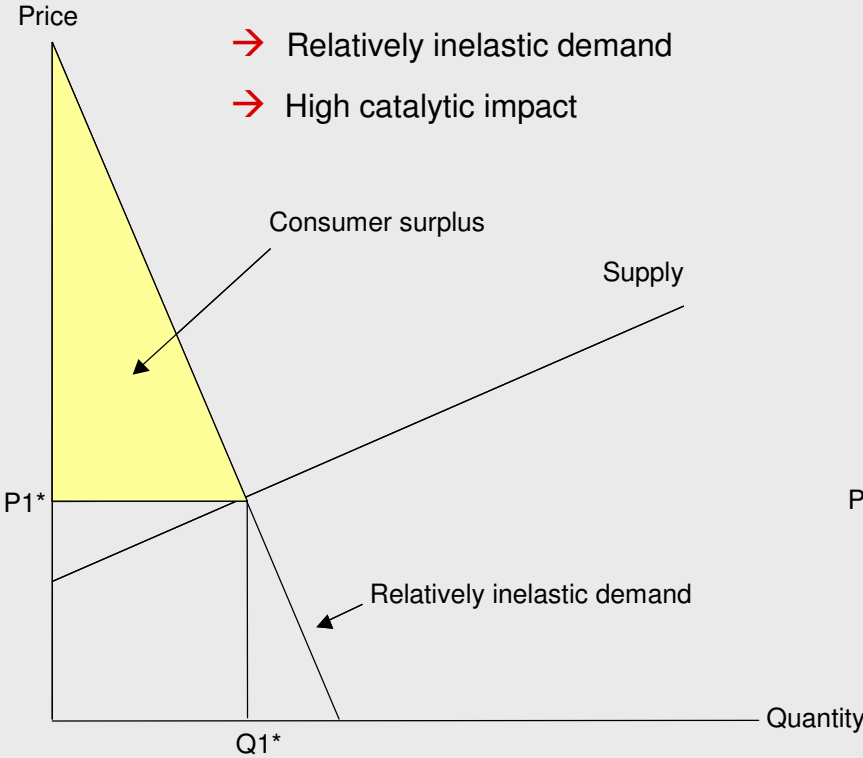
- **Consumer surplus as the difference between the user's willingness to pay and the actual air fare and cargo rate respectively**
- **In theory, consumer surplus is a convincing monetary measure of welfare, however, a practical method for implementation is needed**

- **Requires specification of**
 - **curvature of demand function,**
 - **average (own) price elasticity,**
 - **average price and sales volume of air transport market under consideration**

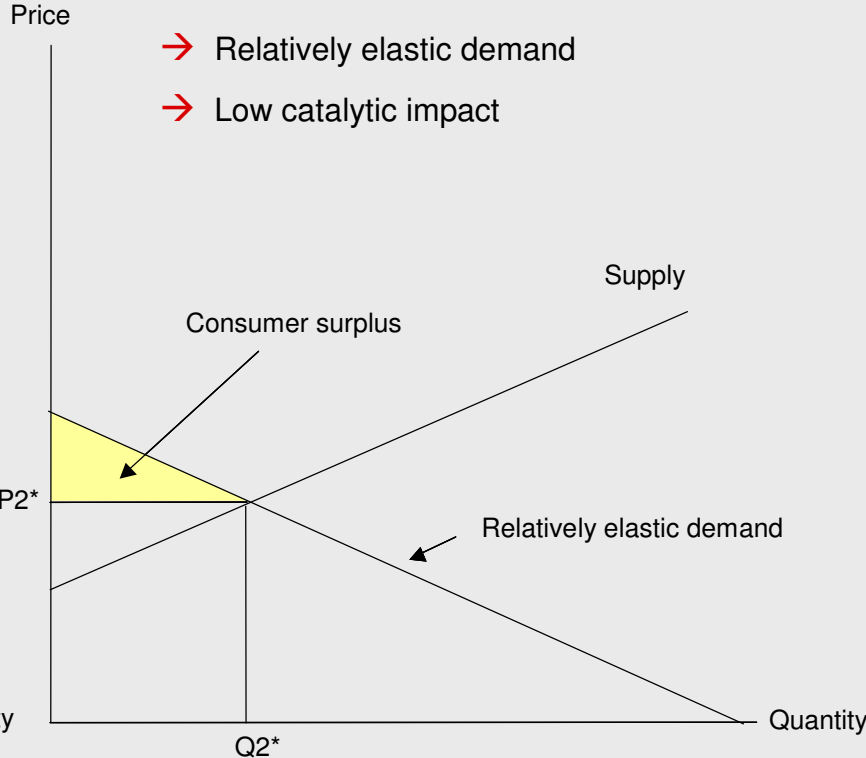


Two illustrative air transport markets

Express freight



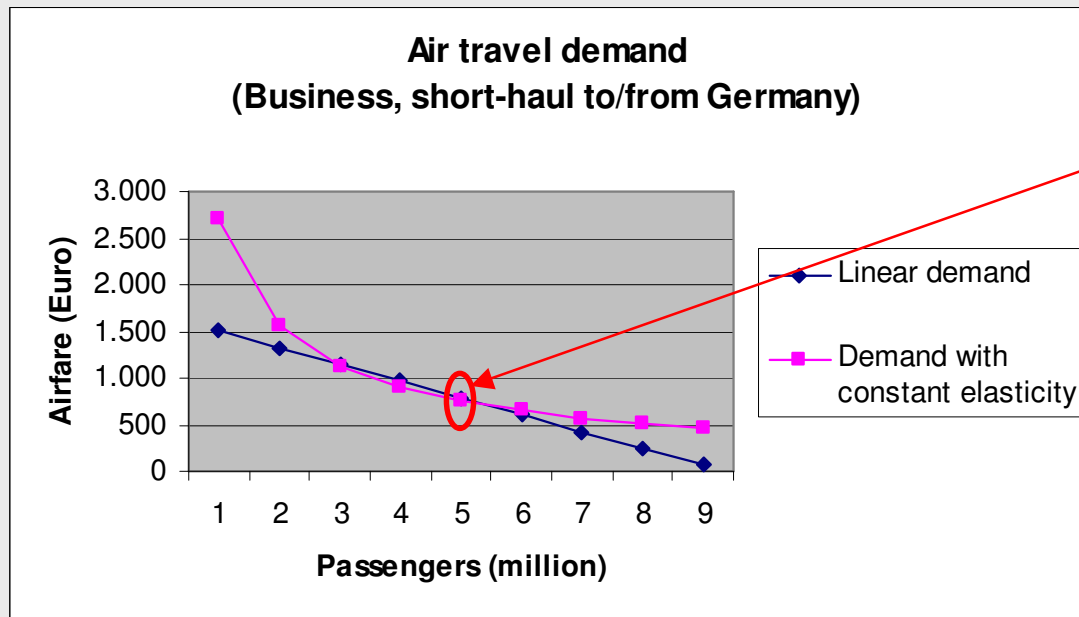
Low cost travel



Curvature of demand function

Only data on average (constant) price elasticities for different air transport markets is available

Demand curve with constant elasticity is non-linear, elasticity of linear curve changes from 0 to -infinity



Market equilibrium:

- 5.2 m passengers
- Average fare: 750 €
- Price elasticity: -0.8

→ Linear demand function leads to lower limit of consumer surplus

Specification of price elasticity estimates

- ✈ Average own-price elasticities
- ✈ Varying elasticities for different air transport markets according to degree of necessity and distance
- ✈ National level elasticities, no consideration of differences between outgoing and incoming air transport
- ✈ Only long-term elasticities
- ✈ Elasticity values taken from Ernst & Young 2007

Specification of quantities and prices

- ✈ Passenger round-trips (RT) possibly containing several legs. Source: Annual report of DLR German Aerospace Center (2009)
- ✈ Freight tonnage one-way (OW) to / from Germany. Source: Statistics provided by German Airports Association (ADV 2009)
- ✈ Shares of market segments:
 - Business / Leisure. Interviews with German airlines
 - Express freight / General cargo. Based on data provided by German airports
- ✈ Average airfares. Source: Interviews with German airlines
- ✈ Average freight rates: Interviews with German airlines

Inverse demand functions for air travel to and from Germany 2008

	Quantity	Price (Euro)	Own-price elasticity	Inverse demand function
12.1 m Long-haul trips		Ø airfare (RT)		
Business 20%	2.4 m	4,000 €	-0.8	$p = 9,000 - 0.0020833 \cdot x$
Leisure 80%	9.7 m	750 €	-1.0	$p = 1,500 - 0.0000773 \cdot x$
3.7 m t Airfreight		Ø freight rate (OW)		
Standard 67.3%	2.49 m t	1,800 € / t	-1.6	$p = 2,925 - 0.0004518 \cdot x$
Express 32.7%	1.21 m t	2,900 € / t	-0.8	$p = 6,525 - 0.0029959 \cdot x$

Consumer surplus for users of air transportation services to and from Germany 2008

	Revenues	Consumer surplus
Long-haul trips		
Business	€ 9.6 B	€ 6.0 B
Leisure	€ 7.3 B	€ 3.6 B
Airfreight		
Standard	€ 4.5 B	€ 1.4 B
Express	€ 3.5 B	€ 2.2 B

Conclusions

- ✈ The wider economic impacts of aviation – also called catalytic impacts – may exceed the direct, indirect and induced impacts
- ✈ Measuring these wider economic impacts is difficult
- ✈ Paper proposes the use of average price elasticities of air transport demand to estimate consumer surplus → Knowledge of price elasticities is essential
- ✈ Suggested approach also requires the specification of average price and sales volume in the air transport market under consideration
- ✈ Use of linear demand functions results in lower limit of catalytic impact
→ Other types of demand functions more adequate?

Thank You!

klophaus@fh-worms.de