



The challenges of high-priced oil for aviation

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What are the implications of a high-priced oil scenario for the aviation industry?

January 13 2006



Outline

- **Aviation industry's response to high fuel prices**
 - **Current practices**
 - Fleet renewal
 - Operational practices
 - **Future practices and effects**
- **Research agenda**



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Fleet renewal



Fleet renewal existing
aircraft types
with current fuel
(787, A380, A330 etc)



- advantages at high costs
- needed at most cash-strapped moment

Fleet renewal future
aircraft types
with current fuel
(Blended Wing Body etc)



- Not likely to be in service within next decade
- Efficiency gains probably not as large as industry predicts

Fleet renewal future
aircraft types with
alternative fuel sources



- Most alternative fuels do not deliver energy intensity needed
- Hydrogen: feasible, but not likely to be in service before 2025



Outline

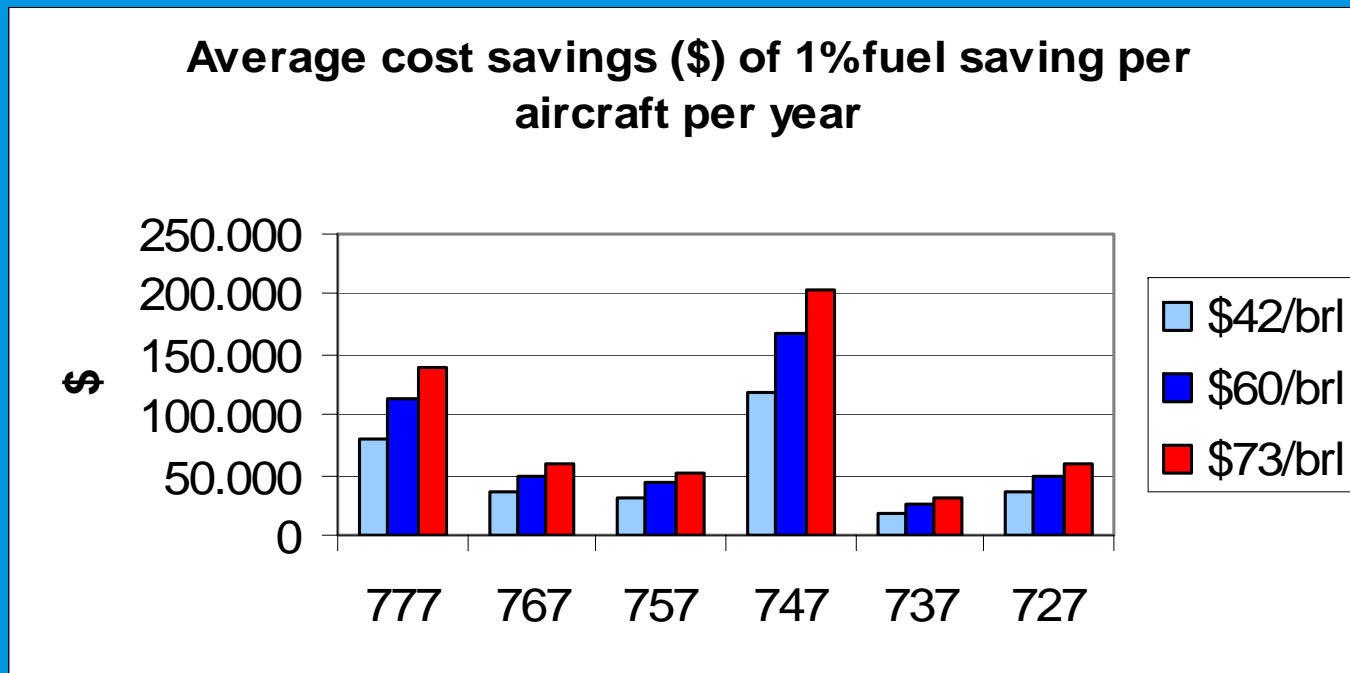
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Current practices to reduce fuel consumption

- Hedging: insurance to cope with volatility in oil prices.
 - Smooths out long term trends in fuel costs.
 - Does not reduce industry's dependency on oil
- IATA Fuel Action Campaign
 - 'Save 1 minute' initiative
 - Route optimisation, improved air traffic flows
 - Operational measures
- Fuel surcharges on ticket prices and cargo rates

Fuel efficiency savings per aircraft per year

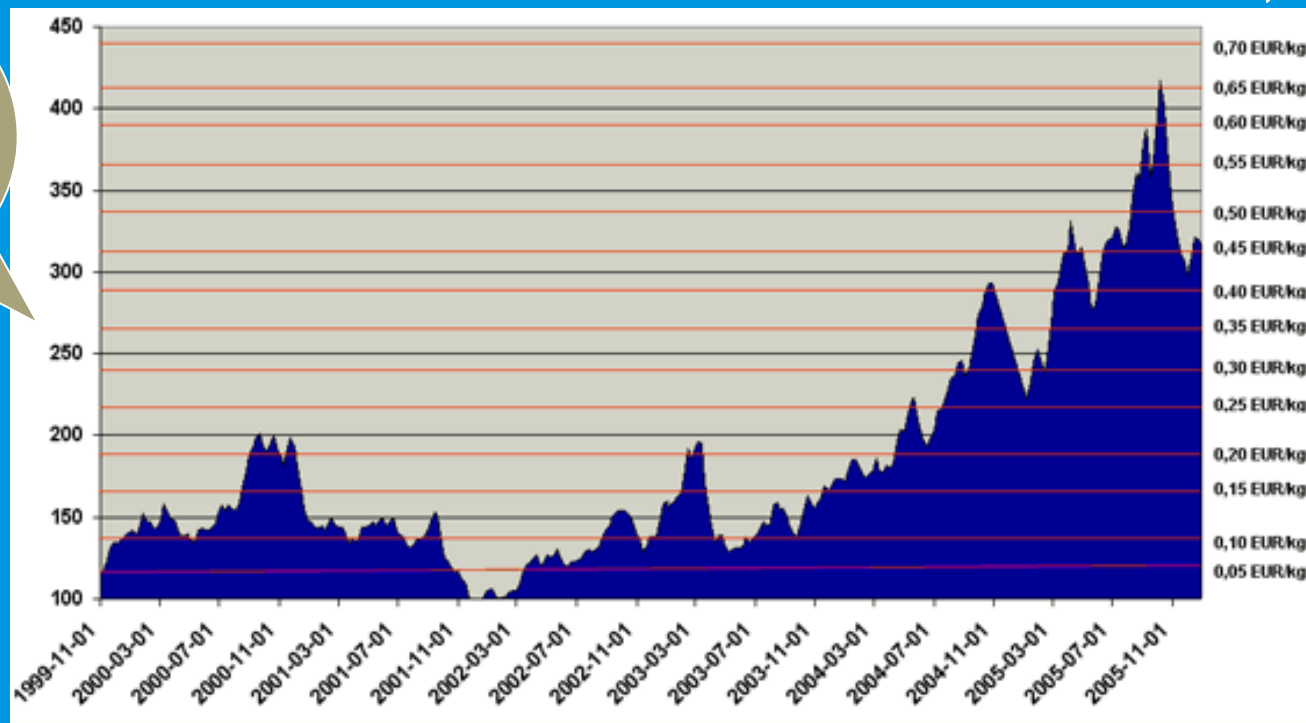


Source: Boeing 2004

Fuel surcharges in cargo industry: SAS Cargo

Fuel surcharge

Fuel price index



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What might be the future practices of and effects on the commercial aviation industry in a **high-priced oil scenario**?

High-priced oil scenario:

- continuous increases in jet fuel prices to above \$200/brl
- Jet fuel price remains high during consecutive years

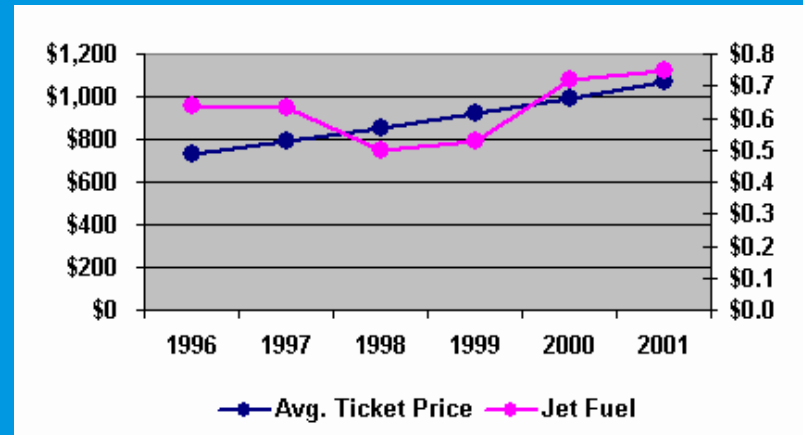


Future practices and effects

- Pricing
- Demand reactions
- Cost reactions
- 2nd order economic effects
- 2nd order network effects

Pricing

- Pricing:
 - Airlines will pass on (part of) fuel cost to consumers through ticket prices
 - Focus on weight-based pricing
 - Focus on distance based pricing: transfer trips charged twice



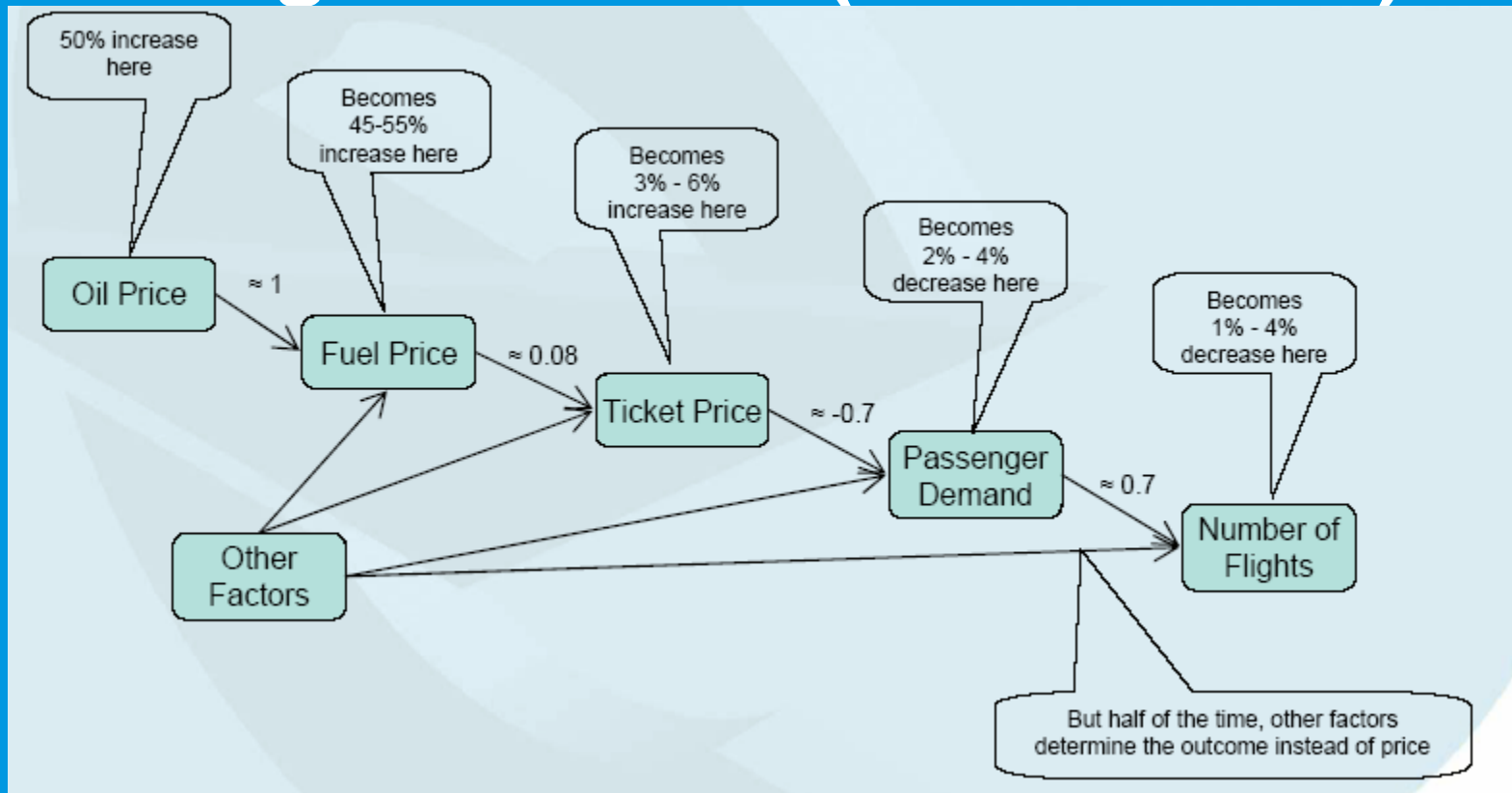
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Demand

- Demand:
 - Substantial demand reactions can be expected because of price increases
 - In particular affecting price elastic demand:
 - VFR, holiday, transfer demand
 - Shift towards direct routes as relative generalized costs of indirect versus direct routes increase
 - Hubs with large percentages of transfer traffic vulnerable
 - Short-haul travel: generalised costs air travel increase relative to rail and road modes. Modal shift.

Relationship between oil prices and passenger demand (Eurocontrol)



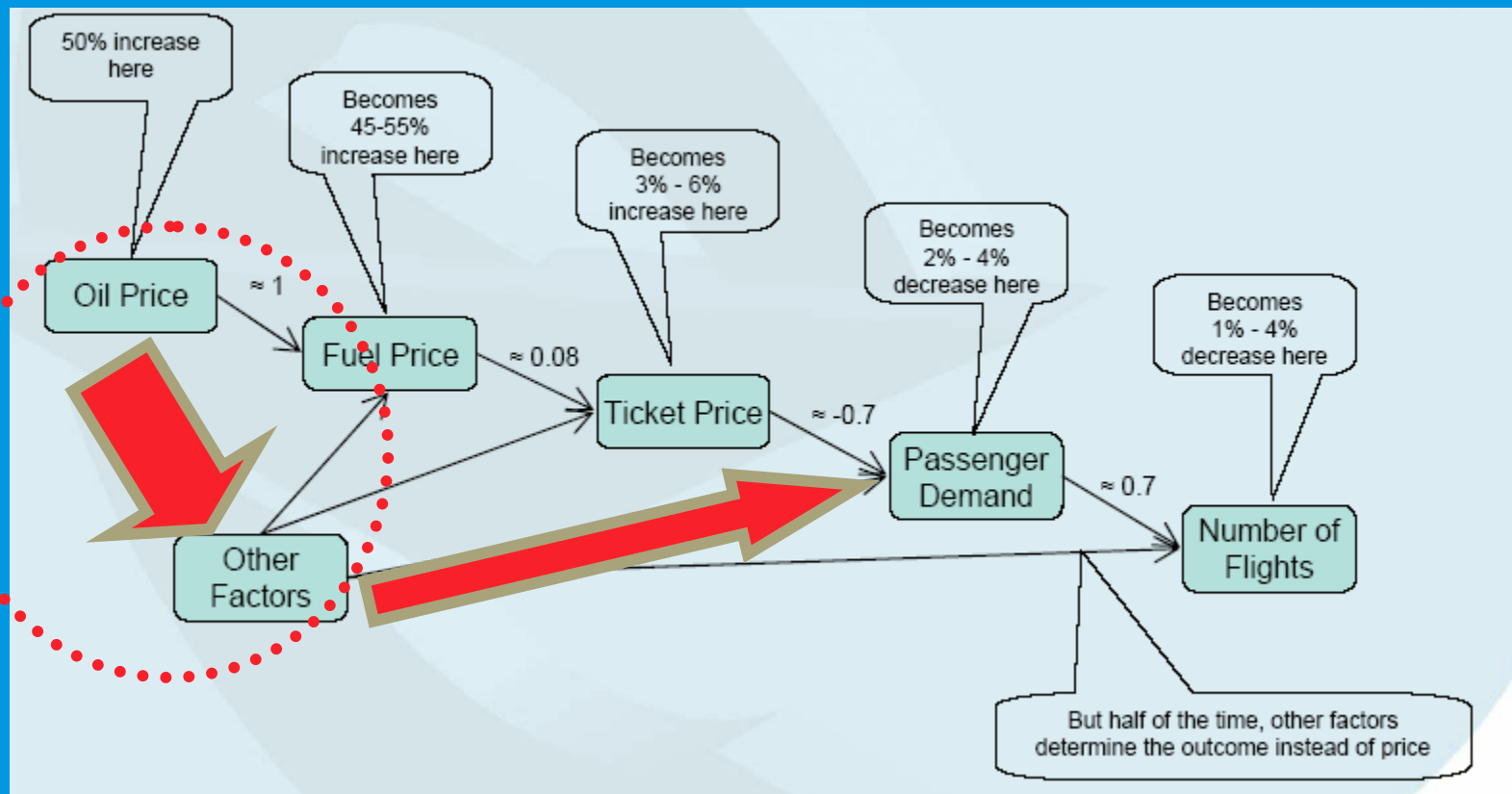
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Cost effects

- Fuel costs per passenger lower for larger than for smaller aircraft: focus on capacity instead of frequency growth
- LTO-cycle large % of total fuel costs of a short-haul flight. Rising fuel prices will affect short-haul routes most
- Revival of the turboprop?
 - Hub-and-spoke network thrives on regional jets feeding the hub from small cities.
 - Regional jets fuel inefficient compared to turboprop aircraft
- Concorde-effect: early retirement of fuel inefficient aircraft

2nd order economic effects



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2nd order network effects

- Transfer demand heavily affected by high-oil prices
- High-oil prices work against regional jets
- High-oil prices work against short-haul flights
- High-oil prices work against hub-and-spoke systems



Conclusions

- Commercial aviation will be fully depending on oil in the short and medium term
- A high-priced oil scenario will therefore pose significant risks and challenges to the aviation industry
- Management innovations likely to precede technological breakthroughs in aircraft technology
- There is a lot we don't know

Research agenda

- To what extent do airlines pass on rising fuel costs to consumers?
- How would these costs affect demand, airline revenues and network development?
- To what extent is a high-priced oil scenario sufficiently included in scenario analyses for Dutch aviation?
- How can airlines, airports and governments anticipate a high-priced oil scenario?