

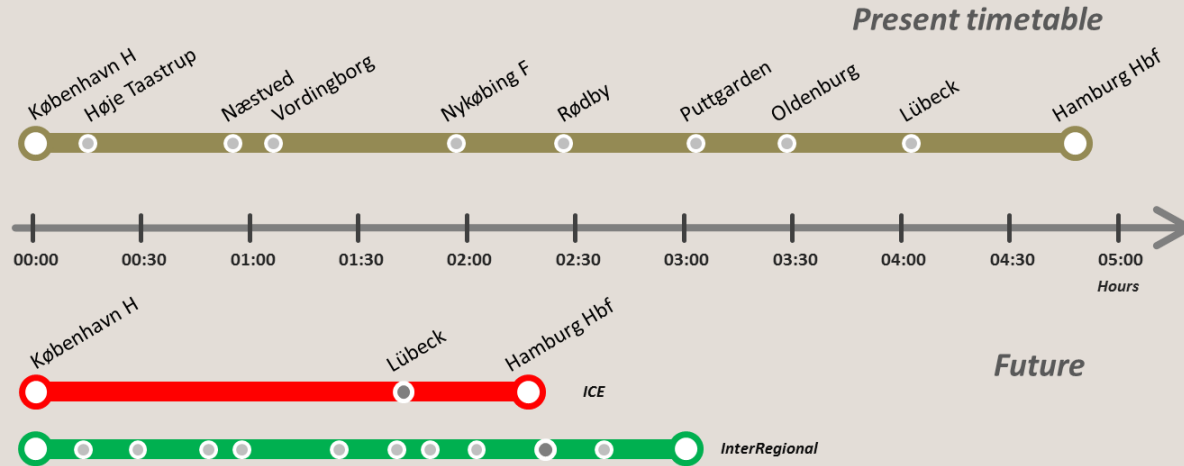
Market Study: Improved train service Öresund-Hamburg

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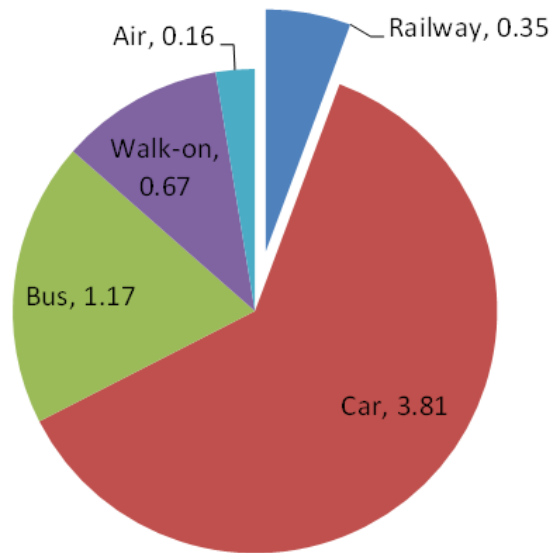


Improved train service

- > Improved travel time from current 4h57 to 2h30



Current passenger levels



> Passenger traffic 2012 by mode

(DSB, TRAP databases and COWI estimates)

	Low	Central	High
Railway passengers	0.30	0.35	6% 0.40
Car passengers		3.81	62%
Bus passengers		1.17	19%
Walk-on passengers		0.67	11%
Total Femern Belt by ferry		6.00	
Air passengers Copenhagen-Hamburg	0.12	0.16	3% 0.23
Total Fehmarn Belt by ferry and air		6.16	100%

Origin and destinations of passengers

(source: Danish Transport Authority)

Authority)

	Origin		Destination		Long distance
	Öresund region etc.	Local	Lübeck, Hamburg etc.	Local	
Million pass. in 2012					
Railway passengers	0.29	0.06	0.29	0.06	0.28
Car passengers	1.90	1.90	1.90	1.90	1.52
Bus and walk-on passengers					
	0.55	1.29	0.55	1.29	0.46
Total Fehmern Belt by ferry	2.75	3.25	2.75	3.25	2.26

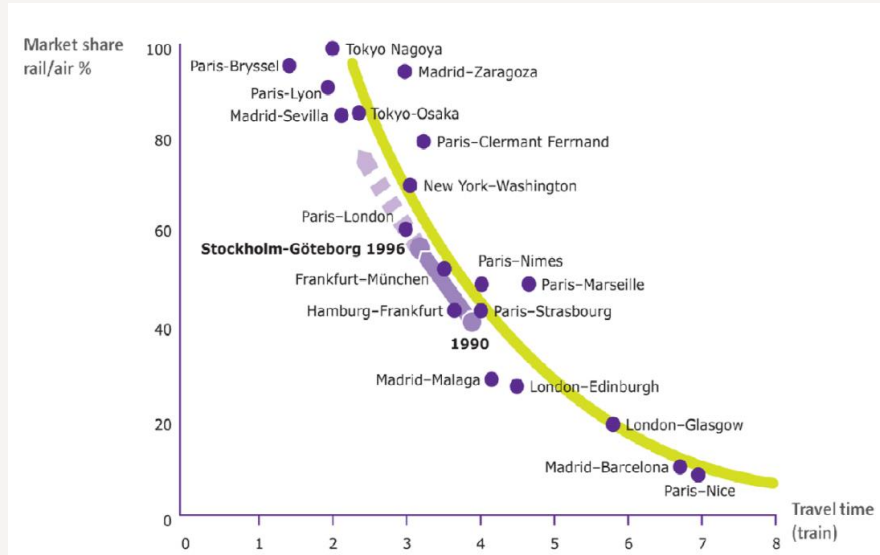
Based on this we assess that

- > 80% is long distance



Alternative routes etc.

> Other ferry routes, fixed links and **air**



Likely effects – elasticities

- › A relatively precise estimate with *marginal changes*
- › Less accurate for large changes
 - › However, using an adjusted elasticity calculation give size independent elasticities
- › Looking at other (similar) cases we use this as an estimate
 - › Includes discrete changes (trafikspring) and general demand responses
- › We apply a two step approach in the estimates:
 - › Step 1: Fehmarn Belt EUA/FTC 2015 forecast: 1h15 travel time reduction, approximately 4.00% elasticity
 - › Step 2: Increase speed; further 1h reduction; elasticity between -0.5 and -2.25

Elasticity examples from literature

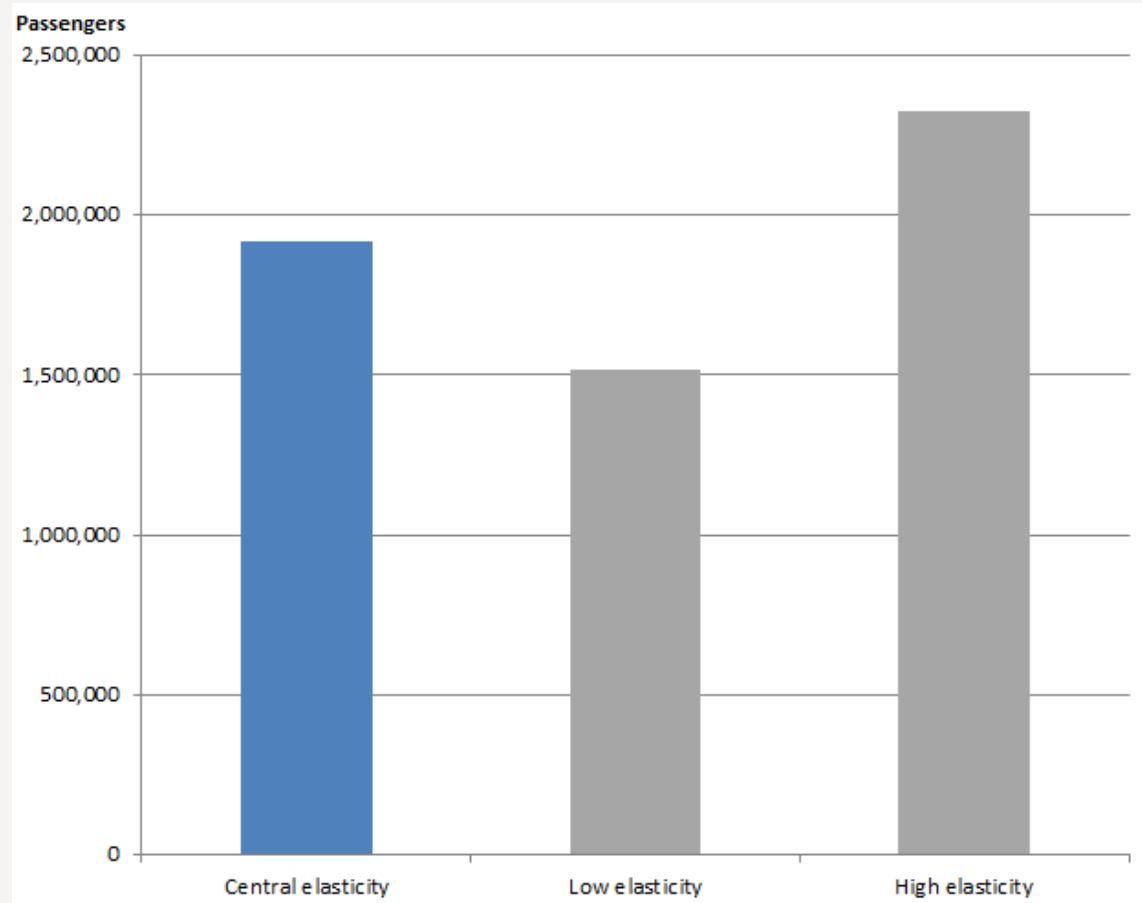
	In vehicle time (hours)		Passengers (million/year)		Elasticity
	Before	After	Before	After	
Fehmarn Belt, EIA/FTC 2015 forecasts	4.57	3.25	0.35	1.39	-4.05
Fehmarn Belt, IBU/OAN/TransTools	4.75	3.50	0.37	1.28	-4.10
Fehmarn Belt, IBU/OAN/TransTools	4.75	2.25	0.37	2.19	-2.40
Fehmarn Belt, Banedanmark, DB AG	4.75	3.00	1.00	3.80	-2.91
Fehmarn Belt, IBU/OAN/TransTools	3.50	2.25	1.28	2.19	-1.22
Fehmarn Belt, Banedanmark, DB AG	3.00	2.50	3.80	4.80	-1.28
Great Belt, 1996-1999, COWI	3.00	2.00	4.62	6.76	-0.94
Great Belt/Togfonden DK 2020, COWI	1.50	1.39	12.40	13.70	-1.33
Paris-Lyon TGV-line, HTC	n.a.	n.a.	12.5	22.2	-1.65
Cologne-Frankfurt, HTC	n.a.	n.a.	n.a.	n.a.	-0.82
Berlin-Hamburg (upgrade), HTC	n.a.	n.a.	n.a.	n.a.	-1.11
Madrid-Barcelona, HTC	n.a.	n.a.	n.a.	n.a.	-2.48
Paris-London, HTC	n.a.	n.a.	n.a.	n.a.	-0.82
Brussels-Paris, HTC	n.a.	n.a.	n.a.	n.a.	-0.52
Brussels-London, HTC	n.a.	n.a.	n.a.	n.a.	-1.61
Long distance business trips, TH-Aachen 1992	n.a.	n.a.	n.a.	n.a.	-0.82
Long distance vacation trips, TH-Aachen 1992	n.a.	n.a.	n.a.	n.a.	-0.44

Suggested timetables

	In vehicle travel time (hours)	Average travel speed (km/hour)	Door to door travel time (hours)	Frequen. (dep./day)	Fare (EURO)
Present timetable	4.57	73	n.a.	5	85.40
Femern A/S forecasts 2015/2025	3.25	103	n.a.	n.a.	n.a.
Green String Corridor. ICE	2.25	148	n.a.	n.a.	n.a.
Green String Corridor. Interregional	3.25	103	n.a.	n.a.	n.a.

Estimated ICE passengers

- > Yearly natural growth 1.7%
- > Low -0.5%
- > Central: -1.50%
- > High: -2.50%

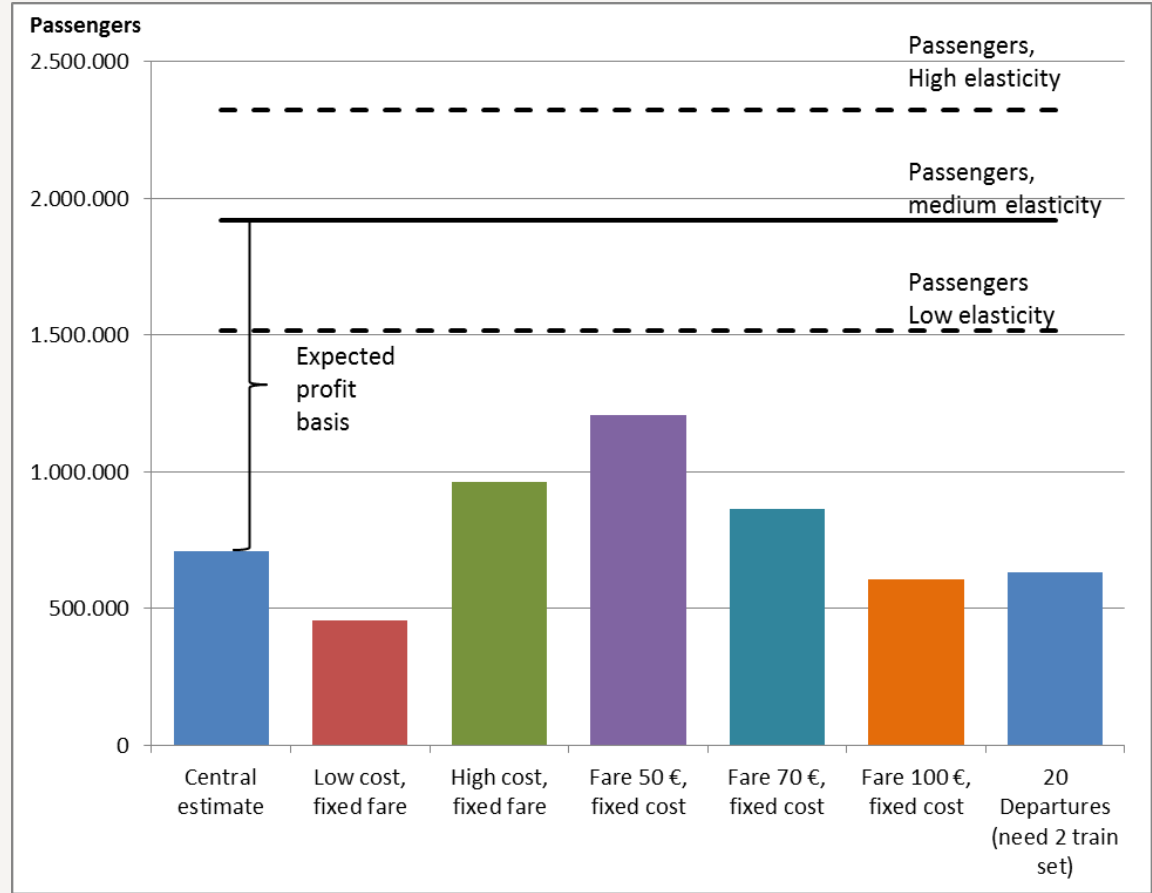


Assessing the commercial market

- > Approach: calculate the number of **passengers needed** to keep operator at break even (= 0 profit)
- > Vary basic cost variables to test validity
- > Based on cost to operate high speed train/international trains
 - > DSB accounts and train kilometres
 - > Include fares, fuel, depreciation, maintenance, service, etc.
 - > ADD direct tariff for passing fixed link
- > Capacity: modules of 200 pax per set
 - > Calculate number of modules needed; average capacity kept under 64%
- > 40 daily trains between Copenhagen and Hamburg

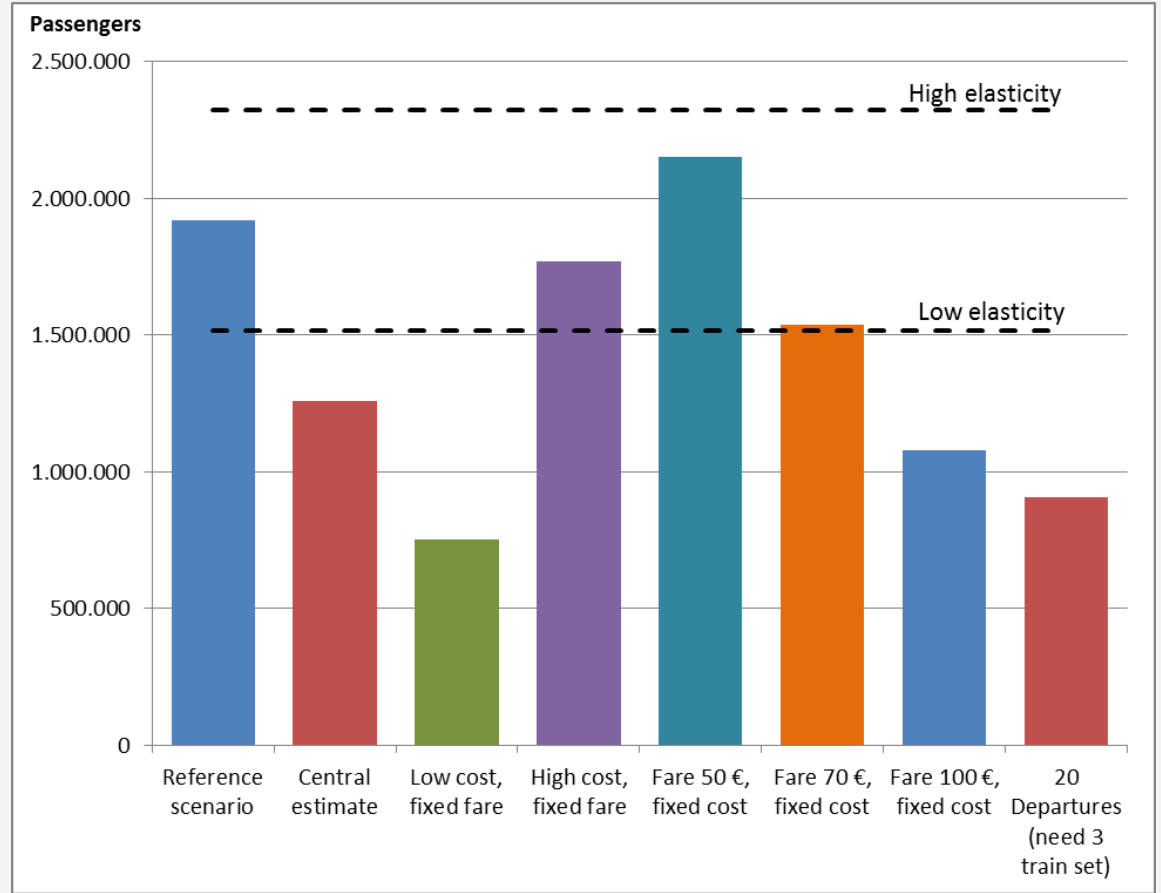
Commercial market base rather good

- > Assuming 1 train set used per departure
- > No demand effects by changing ticket fare



Commercial market base in most cases relatively good

- > Assuming **2 train** sets used per departure
- > No demand effects by changing ticket fare



Reservations about calculations

- > Elasticities as mentioned
 - > Could make assessments on direct "guestimates"
- > Knowledge about current passengers and travellers very limited
 - > Even current number of passengers on ferries is uncertain
 - > Air travellers: no official figures
- > Cost figures and ticket prices can always be assessed more in detail

- > HENCE: market assessment can easily be improved

Three proposed additional data collections

1. Mapping of travelers in the corridor
 - > Counts and OD information
 - > Mode choice
 - > No background information about travelers
2. Detailed mapping of travelers in the corridor
 - > Counts and OD information
 - > Background information
 - > Purpose and mode choice
3. Detailed mapping and Stated Preference analyses
 - > As above
 - > Impact of service on travelers' demand
 - > Insight to potential new travelers; who, why and numbers

Conclusions

- > High speed trains can significantly reduce the current travel time between Cph and Hamburg
 - > Relatively large expected increases in demand – a combination of earlier forecasts by Fehmarn A/S and use of elasticities for the "last" improvement
- > Uncertain whether the elasticities are credible hence, another method is used
 - > Calculate the number of passengers needed to cover costs
- > Based on the calculations seems that the service can be operated in an economically viable way

Thank you

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