

# Cost-Benefit Analysis HSL Portugal

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# Content

- What is CBA, why and when?
- Description of CBA approach
- Main assumptions
- Preliminary results (Lisbon-Porto)
- Comparison with other rail projects

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# What is CBA?

- Project appraisal method
- Systematic overview of advantages and disadvantages of a project for society
- Effects on (national) **welfare**: economic, financial, social and environmental issues
- As much as possible expressed in monetary values; otherwise in qualitative terms

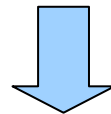
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# Why CBA?

- Insight in quality of projects for decision makers
- Select best projects for society
- Select best timing of projects for society
- Procedure for evaluating desirability of a project by weighing all socio-economic benefits against costs



**project justification**

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# When CBA?

- Large investment projects
- Required in case of state-funded national infrastructure projects in some countries, e.g. UK, Holland, Germany
- Required by EC for Cohesion Fund, ERDF, TEN-T and EIB loans (based on CBA guidelines EC)
- **Conclusion:** CBA needed for Lisbon-Porto and Lisbon-Madrid

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# Description CBA approach

1. Alternatives
2. Type of impacts
3. Discounting and internal rate of return
4. Sensitivity and risk analysis

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# Alternatives

## Reference:

- Reference or “without project” alternative is essential; forms basis for analysis

## Project alternative:

- Lisboa-Porto

## Rail travel times:

- Reference: LdN 2h20
- Lisbon-Porto: HSL 1h15; LdN 3h00

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# Alternatives

Other factors influencing demand:

- Economic growth
- Population growth & other demographic trends
- Transport policy (e.g. pricing)
- Spatial planning policy

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# Type of impacts

Type of impacts:

- **Direct:** relate to the project and occur within rail transport market
- **External:** impacts on markets not directly related to rail transport
- **Indirect/wider:** result of better accessibility of regions
- **Other:** non-priced impacts (qualitative assessment)

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# Type of impacts

## Direct costs:

- Capital expenditures HST incl. expropriation
- Operational costs HST
- Avoided ticket revenues conventional rail

## Direct benefits:

- Avoided investments in conventional rail infra
- Avoided operational costs conventional rail
- Ticket revenues HST
- Travel time benefits
- Residual value of the HST infrastructure
- Comfort and reliability (qualitative)

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# Type of impacts

## External benefits:

- Emissions
- Traffic safety
- Road congestion
- Noise

## Indirect benefits:

- Labour market benefits
- Attracting (inter)national business activities

## Other benefits:

- Clustering and economies of scale
- Second order impacts

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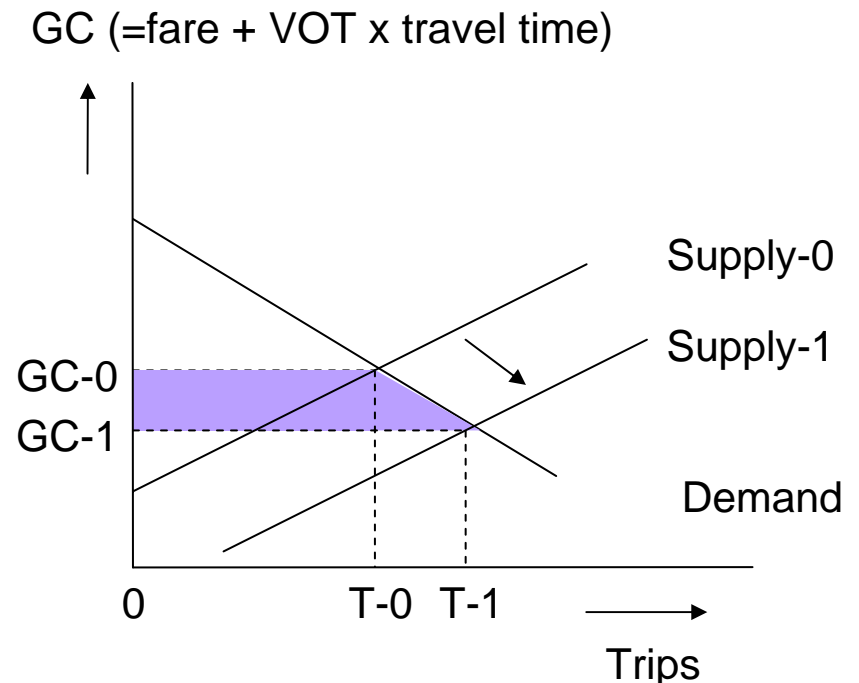
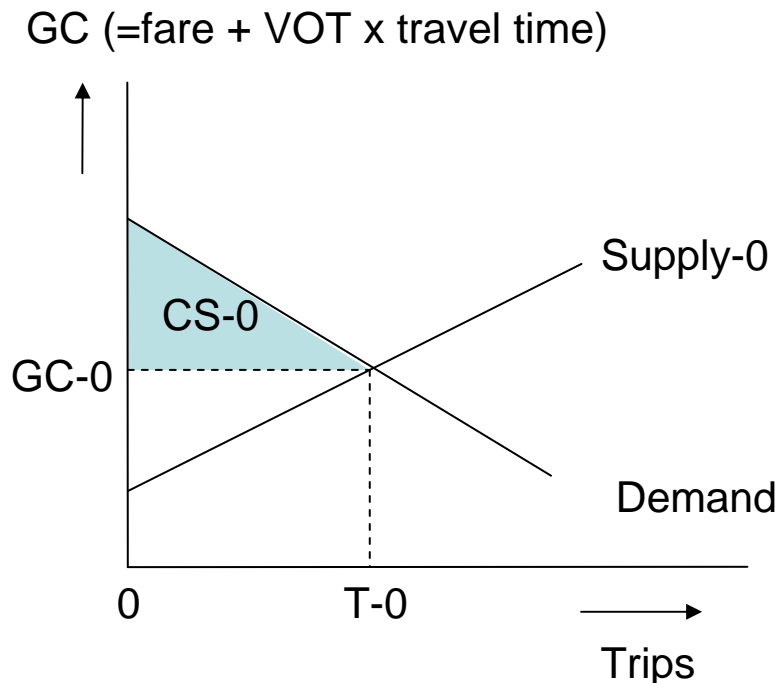
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# Type of impacts

Example: economic benefits through consumer surplus



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# Discounting and eIRR

- Cost and benefits occur at different periods in the project (e.g. construction and operation)
- Discounting cash flows
- Social discount rate in EU 5-10%; CBA guidelines EC recommend 5% for regions lacking behind

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# Risk and sensitivity analysis

Risk analysis – identification of:

- External risks (political, economic, demographic)
- Project internal risks (technical, organisational)
- Selection of important factors

Sensitivity analysis – impact on NPV & eIRR of variations in:

- Demand forecast
- Capital expenditures
- Operational costs
- Unit costs for monetarisation (e.g. Value of Time)

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# Main assumptions

## Capital expenditures:

- Estimates based on input external consultants and review THR

## Avoided capital expenditures in LdN:

- Provided by REFER
- Refers to doubling of track (capacity) and speed increase

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# Main assumptions

## Operational expenditures:

- Based on two sources: THR railway operational model and AT Kearney

## Avoided operational expenditures in LdN:

- Based on AT Kearney unit costs
- Based on reduction in paxkm demand forecast (VTM)
- Assumptions on average number of train-seats and average occupancy rate

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# Main assumptions

## Demand forecast:

- Provided by VTM

## External benefits:

- Based on VTM data

## Indirect benefits:

- Based on Catholic University of Portugal report
- Impact on additional GDP growth is partly taken into account
- Only welfare impacts, correction for direct effects has been made

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## HSL Lisbon-Porto (Preliminary results)

<b>Base case</b>	
<b>Total eIRR (%)</b>	<b>6,8 %</b>
<b>Sensitivity analysis (+10% capex, -10% demand)</b>	
<b>Total eIRR (%)</b>	<b>5,1 %</b>

## HSL Lisbon-Madrid (Preliminary results)

- Source: CBA evaluation done on the Market Study Madrid-Lisboa/Porto (1) -

<b>Total eIRR (%)</b>	<b>2,7 %</b>
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(1) Eypsa, Exacto, Tecninvest and Booz Allen Hamilton. Study commissioned by AVEP

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# Comparison rail projects

Comparison based on:

- Sample of projects in period 1993-2004
- Projects co-financed by Cohesion fund and/or EIB
- Only ex-ante eIRR

Conventional Rail	# projects
< 5%	2
5 – 8%	2
> 8%	2
<b>HSL</b>	
< 5%	0
5 – 8%	3
> 8%	2

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# Muito obrigado!

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