Economic Evaluation of Services of General Interest: The Example of Railway Infrastructure along the Baltic-Adriatic Axis in Austria

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Agenda

Preface: A simple Example

Suppose that three former classmates who are now living in different Austrian cities meet in Vienna.
They decide to travel there by train.

Georg from Graz

Linear distance: 145 kilometre | Travel time: 2:39 hours

Klaus from Klagenfurt

Linear distance: 235 kilometre | Travel time: 3:56 hours

Stefan from Salzburg

Linear distance: 252 kilometre | Travel time: 2:22 hours

Sources: Luftlinie.org, ÖBB Reiseportal

Preface: A simple Example

We can conclude from this simple example that the rail accessibility in Austria is quite unequally distributed at the present time.

In order to mitigate this disparity, major new rail lines will be constructed within the next ten years.
Let us now turn to these projects.

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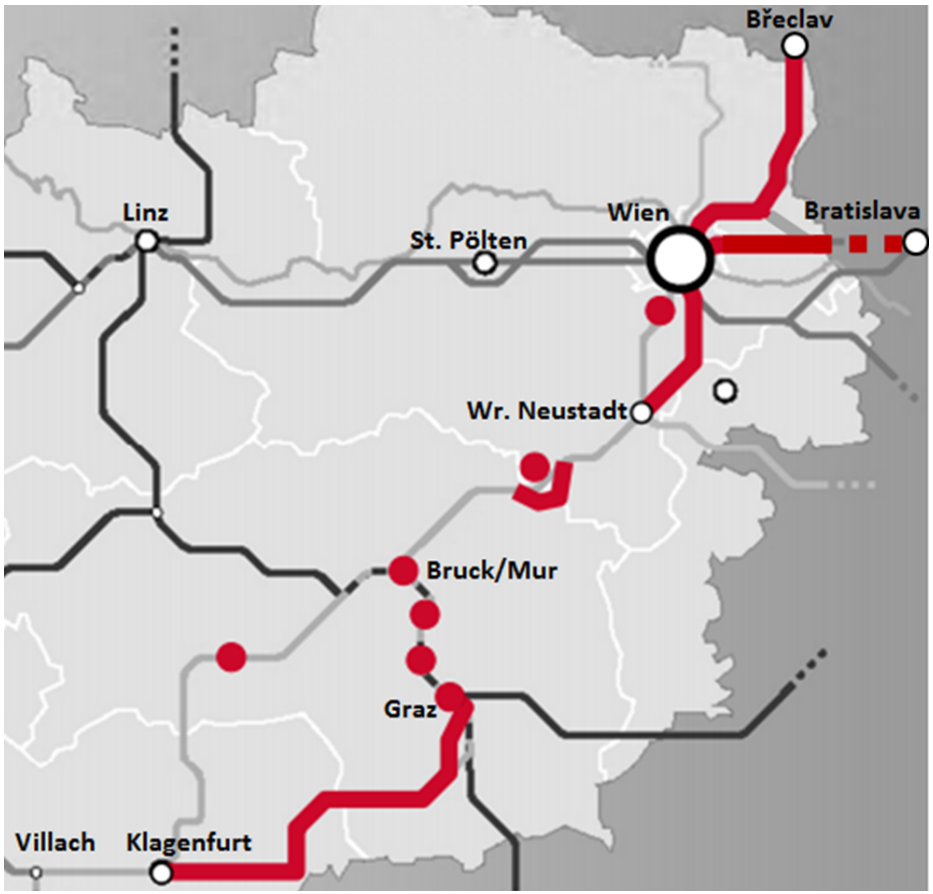
NUTS 2: The Austrian Dimension

Investments in the Austrian railway infrastructure

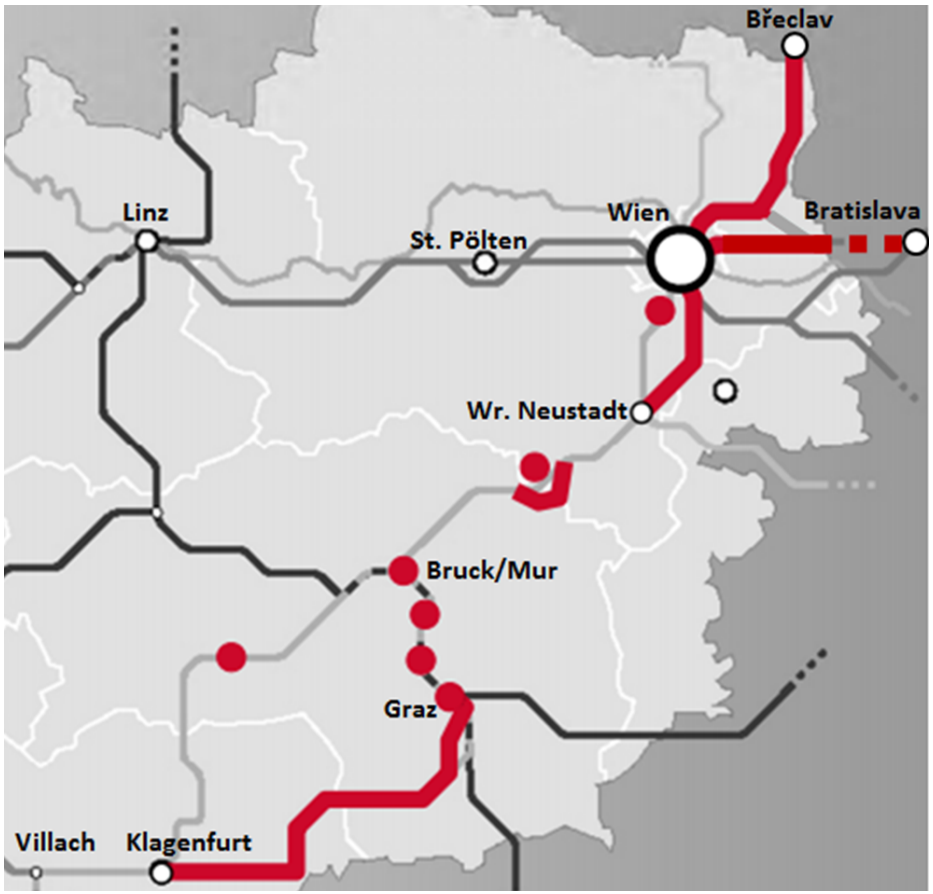


ÖBB Infrastruktur AG, own adjustments

- Expansion between the Czech Republic and Vienna (Wien)
- Expansion and electrification between Vienna (Wien) and Bratislava
- Expansion between Vienna (Wien) and Wr. Neustadt
- Right-hand-traffic in the wider area of Vienna (Wien)

NUTS 2: The Austrian Dimension

Investments in the Austrian railway infrastructure



ÖBB Infrastruktur AG, own adjustments

- Redevelopment of the "Semmering-line"
- Construction of the "Semmering Base Tunnel"
- Reconstruction of train stations in Styria
- Construction of the "Koralm-line" between Graz and Klagenfurt

NUTS 0: The European Dimension (Baltic-Adriatic Axis)

Baltic-Adriatic Transport Cooperation

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The formula:

$$\frac{\textbf{Present Value of Net Utility}}{\textbf{Present Value of Investment Cost}}$$

It should be noted that a coefficient of larger than one would recommend a specific undertaking in order to maximise Pareto-efficiency.

Preparation of an assessment scheme

Content of the analysis:

Economic dimension

Transportation companies:	Investment cost, maintenance cost, operating cost
Companies and households:	Accessibility, operating cost (trucks, cars)
Construction phase:	Economic value added
Operational phase:	Economic value added

Societal dimension

Human health:	Accidents, noise

Ecological dimension

Environment and resources:	Effects on nature

Preparation of an assessment scheme

Basics:

- Consideration of payment flows that are directly linked with consumption or conservation of resources
- Calculation of present values with a real interest rate (1.33%, 1.44%)
- Price basis: 2015-01-01
- Cautious estimation

Temporal dimension:

- Implementation of all considered railway infrastructure projects: 2026-01-01
- Period under review: 30 years after implementation

Spatial dimension:

- Direct impacts on Austria

Implementation of the assessment

Content of the analysis:

Economic dimension

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Ecological dimension

Environment and resources:	Effects on nature

Transportation companies

Investment cost:

- Calculation from depreciation during period under review

Maintenance cost:

- Calculation with markups on investment costs

Net terms of operating cost:

- Calculation with standard rates for additional passenger and freight trains

Additional revenue:

- Not considered in order to avoid double counts

Economic Evaluation of Railway Infrastructure

Rounded results:

Transporation companies	**Present value**
Investment cost	5.056.000.000 EUR
Maintenance cost	1.134.000.000 EUR
Net terms of operating cost	494.000.000 EUR

Implementation of the assessment

Content of the analysis:

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Consumers of mobility

Enterprises:

- Cost:
  - Not considered in order to avoid double counts
- Utility:
  - Enhanced accessibility and competitiveness
  - Conserved operational costs for trucks

  These effects are part of the *Erreichbarkeitsabhängiges Regionalmodell* which will be addressed in a couple of slides.

Consumers of mobility

Households:

- Cost:
  - Not considered in order to avoid double counts
- Utility:
  - Reduction in journey time
  - Reduction in operating cost for cars

  These effects will be covered in the following slides.

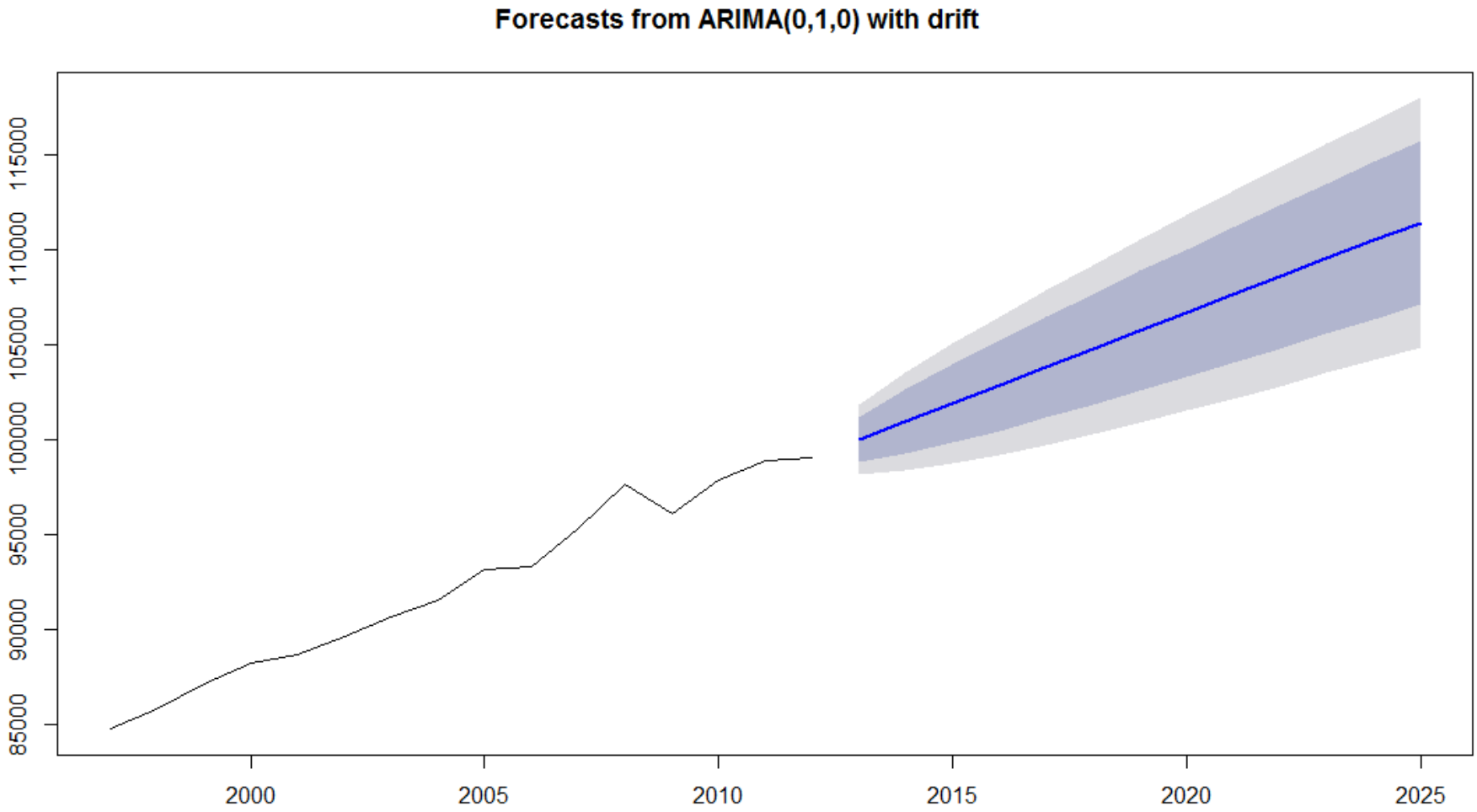
Households: Reduction in journey time

Primary reductions in journey time through realisation of "Semmering Base Tunnel" and "Koralm-line"

Quantification of utility:

- How many people will benefit in 2026 and afterwards?
  - Forecast of the Austrian traffic development necessary
  - Available data: passenger kilometres between 1990 and 2012
  - Setup of an ARIMA forecast model
  - Following the principle of cautious analysis, the amount of traffic is regarded as constant after 2026.

Forecast model of millions of passenger kilometres in Austria



European Union, own calculations

Households: Reduction in journey time

Procedure for passengers

- Projection of available data from 2005 to 2026
- Determination of entry and exit stations and calculation of specific reductions in journey time
- Quantification of utility with time value of 7.70 EUR per saved hour

Procedure for people who switch from cars to trains

- Calculation of these people with a standardized formula of elasticity: A 10% reduction in journey time leads to a 8% increase in passenger take-up.
- Quantification of utility with time value of 7.70 EUR per saved hour

Households: Reduction in operating cost for cars

Procedure

- Transformation of people who switch from cars to trains into concrete reduced car kilometres
- Calculation of savings with a standard value of 0.24 EUR per avoided car kilometre

Rounded results:

Utility for households	**Present value**
Pessimistic estimate	720.000.000 EUR
Intermediate estimate	1.006.000.000 EUR
Optimistic estimate	1.039.000.000 EUR

Implementation of the assessment

Content of the analysis:

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Societal dimension

Human health:	Accidents, noise

Ecological dimension

Environment and resources:	Effects on nature

Economic value added during construction phase

Application of the model *MultiREG*
(Austrian Institute of Economic Research, Joanneum Research)

Calculation of multipliers for every railway infrastructure building project (ranging between 1.2 and 1.6)

Controversial subjects:

- Crowding out of private investors due to increased price level possible
- Multipliers bigger than 1.0 would always favour projects that are as expensive as possible.

These arguments are addressed by the consideration of three different scenarios.

Rounded results:

Economic value added	**Present value**
Optimistic estimate (inclusion of whole economic value added)	12.630.000.000 EUR
Intermediate estimate (inclusion of the difference between economic value added and investment costs)	2.953.000.000 EUR
Pessimistic estimate (economic value added not included)	0 EUR

Implementation of the assessment

Content of the Analysis:

Economic dimension

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Ecological dimension

Environment and resources:	Effects on nature

Economic value added during operational phase

Application of the model *Erreichbarkeitsabhängiges Regionalmodell* (Institute for Advanced Studies)

Regression equation:

$$ln\, Y_{i,s} = ln\, A + \alpha_s * ln\, K_{i,s} + \beta_{1,s} * ln\, L_{i,s} + \beta_{2,s} * ln\, H_i + \varphi_s * ln\, EI_i + ln\, \epsilon_{i,s}$$

Y ... net value added
A ... technology
K ... capital
L ... labour
H ... human capital
EI ... accessibility indicator
i ... region
s ... sector

Rounded results:

Economic value added	
Year 2026	0 EUR
Year 2030	431.000.000 EUR
Year 2055	476.600.000 EUR
Present value	9.500.000.000 EUR

Implementation of the assessment

Content of the Analysis:

Economic dimension

Transportation companies:	Investment cost, maintenance cost, operating cost
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Ecological dimension

Environment and resources:	Effects on nature

Societal and ecological dimensions

External cost through increased rail traffic

External benefit through reduced road traffic

Procedure:

- Calculation of shifts in passenger and tonne kilometres on roads and railways
- Quantification of external cost and benefit with standard rates

Rounded results:

External benefit	**Present value**
Pessimistic estimate	265.500.000 EUR
Intermediate estimate	322.500.000 EUR
Optimistic estimate	328.600.000 EUR
External cost	115.600.000 EUR

All elements of the assessment scheme have been quantified:

Economic dimension

Transportation companies:	Investment cost, maintenance cost, operating cost
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Ecological dimension

Environment and resources:	Effects on nature

Calculation of the benefit-cost-ratios

$$\frac{\textbf{Present Value of Net Utility}}{\textbf{Present Value of Investment Cost}}$$

Optimistic estimate	**4.30**
Intermediate estimate	**2.38**
Pessimistic estimate	**1.73**

Economic Evaluation of Railway Infrastructure

Although the assessed coefficients vary in size, their qualitative implication is straightforward:

From an economic perspective, the realisation of the railway infrastructure projects under consideration will be beneficial for Austria.

Agenda

Reference page

This presentation is based on:

Kaloud, T. (2015). Volkswirtschaftliche Bewertung der Investitionsprojekte in die Baltisch-Adriatische Achse in Österreich. Wien.

See this publication for further references.