

Integrated timetables for railway passenger transport services

30 November 2012

Presentation at the CRNI conference

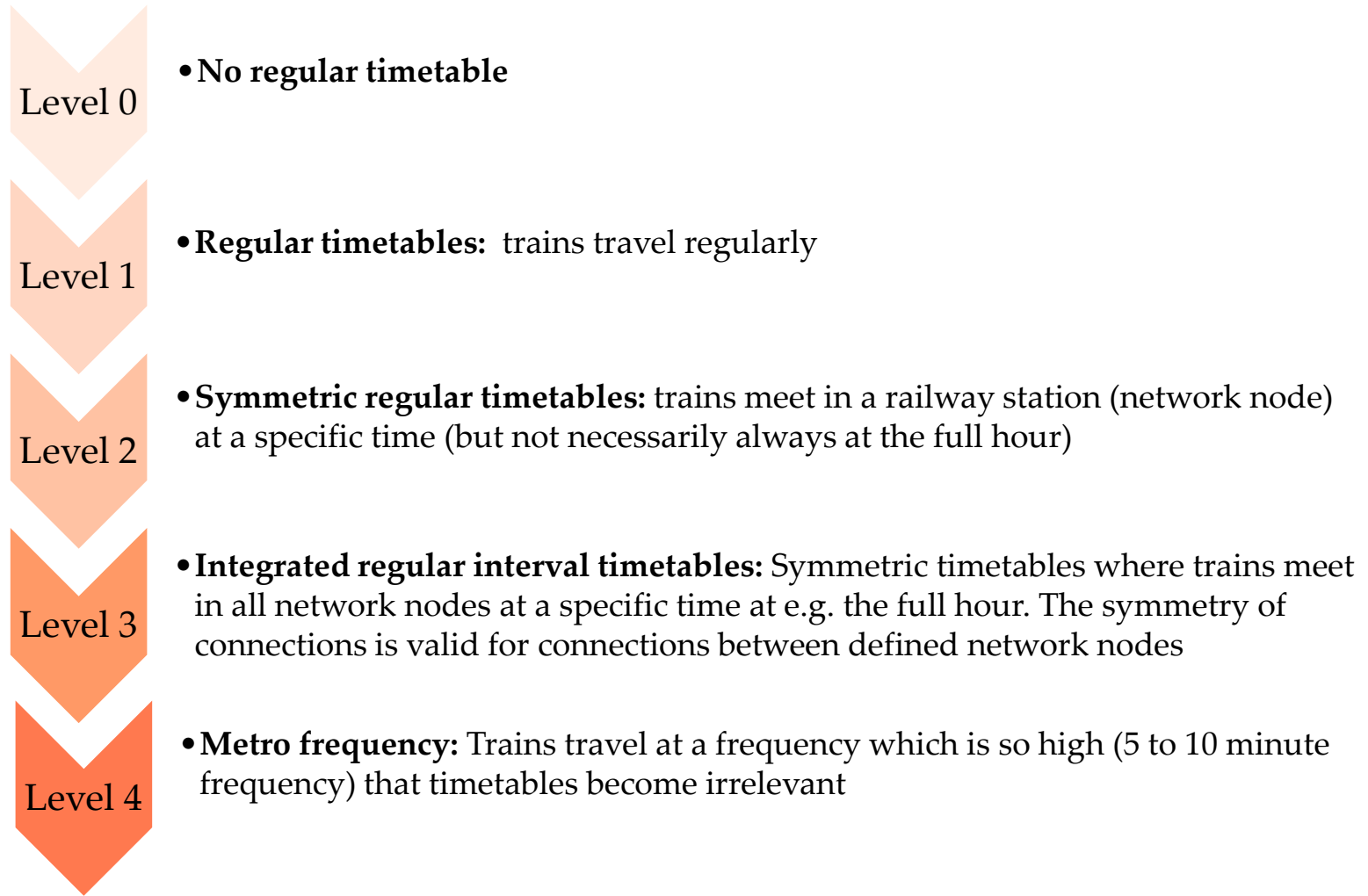
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Definition of integrated timetables



Research questions and methods

- Research questions in this paper
 - Pros and Cons of IRIT
 - Requirements for a successful introduction of IRIT
- Research methods
 - Quantitative model to assess the effect on passenger's utility
 - Case studies on CH, the NL and the UK based on desk research and interviews

Quantitative Model: Effect of IRIT on passenger utility

Description of the model

- Directed graph constructed from a given timetable
- Dijkstra's Algorithm to get shortest traveling routes and corresponding traveling times
- Delays underlie a certain probability distribution and do not occur at starting stations of a line
- Individual chooses mode of transportation by minimizing money costs P , opportunity costs K of elapsed time T and by maximizing reliability (measured as variance):

$$\tilde{\pi} = \alpha (P + K E[T]) + \beta Var(T)$$

- Equation captures value of time and reliability. Estimation of α and β allows statements on change of utility and demand as well as discussion of trade-off between prices and delays.

Quantitative Model: Effect of IRIT on passenger utility

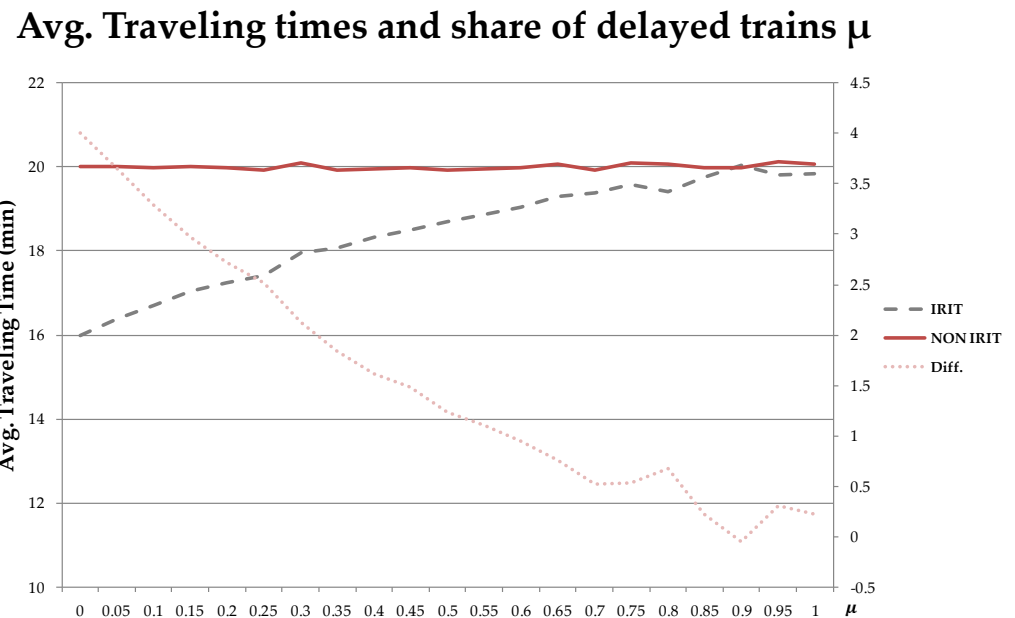
Description of the model

- Quantitative model to estimate passenger's utility under several time table regimes
- Model can be used
 - to compare traveling times between two timetable regimes
 - to discuss the effect of delays on traveling times
 - to assess overall welfare in different time table regimes
 - to address the financial viability of ITIF under market entry

Quantitative Model: Effect of IRIT on passenger utility

Illustrative example

- Example calculated for timetable with four different lines which all meet at one station in the middle
- Simulation results:
 - IRIT allows shorter traveling times on routes with transfers
 - IRIT is more sensitive to delays
 - Effect of delays on overall traveling times:



Pros and Cons of IRIT

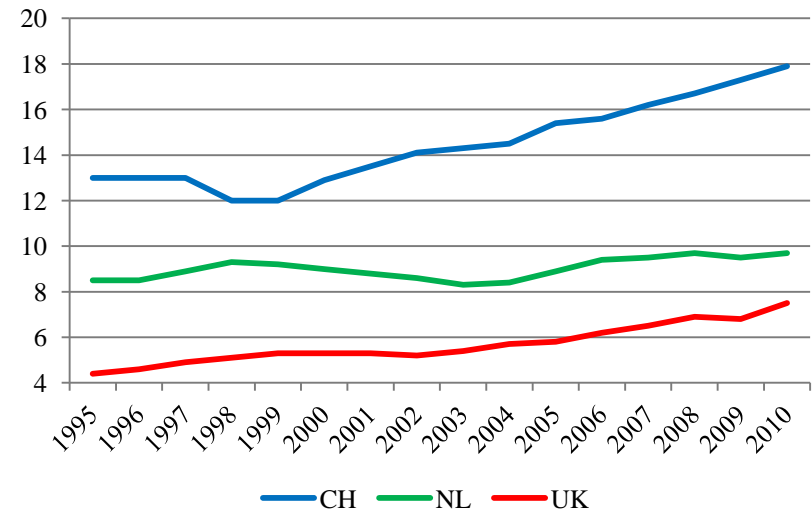
Pros

- Improvement of quality concerning
 - services
 - transfers/total travelling time
 - direct connections
 - Punctuality
 - easy to memorise timetables
- Strengthening of rail transport in modal split
- More efficient infrastructure investment and capacity usage

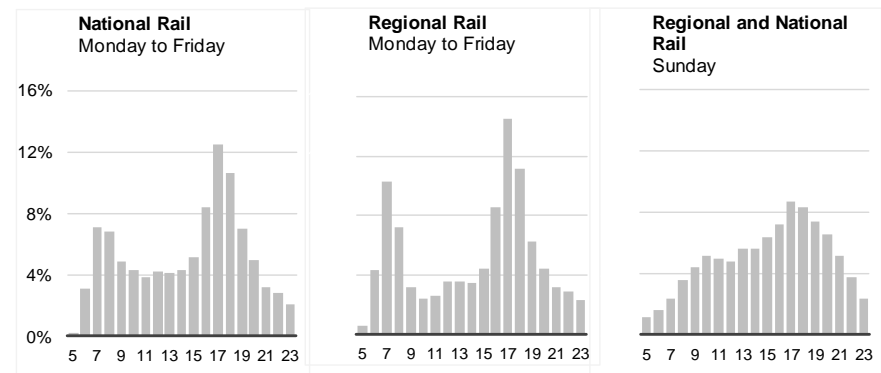
Cons

- Scarce capacity
- Slower freight transport
- Barriers to entry vs. Cherry picking

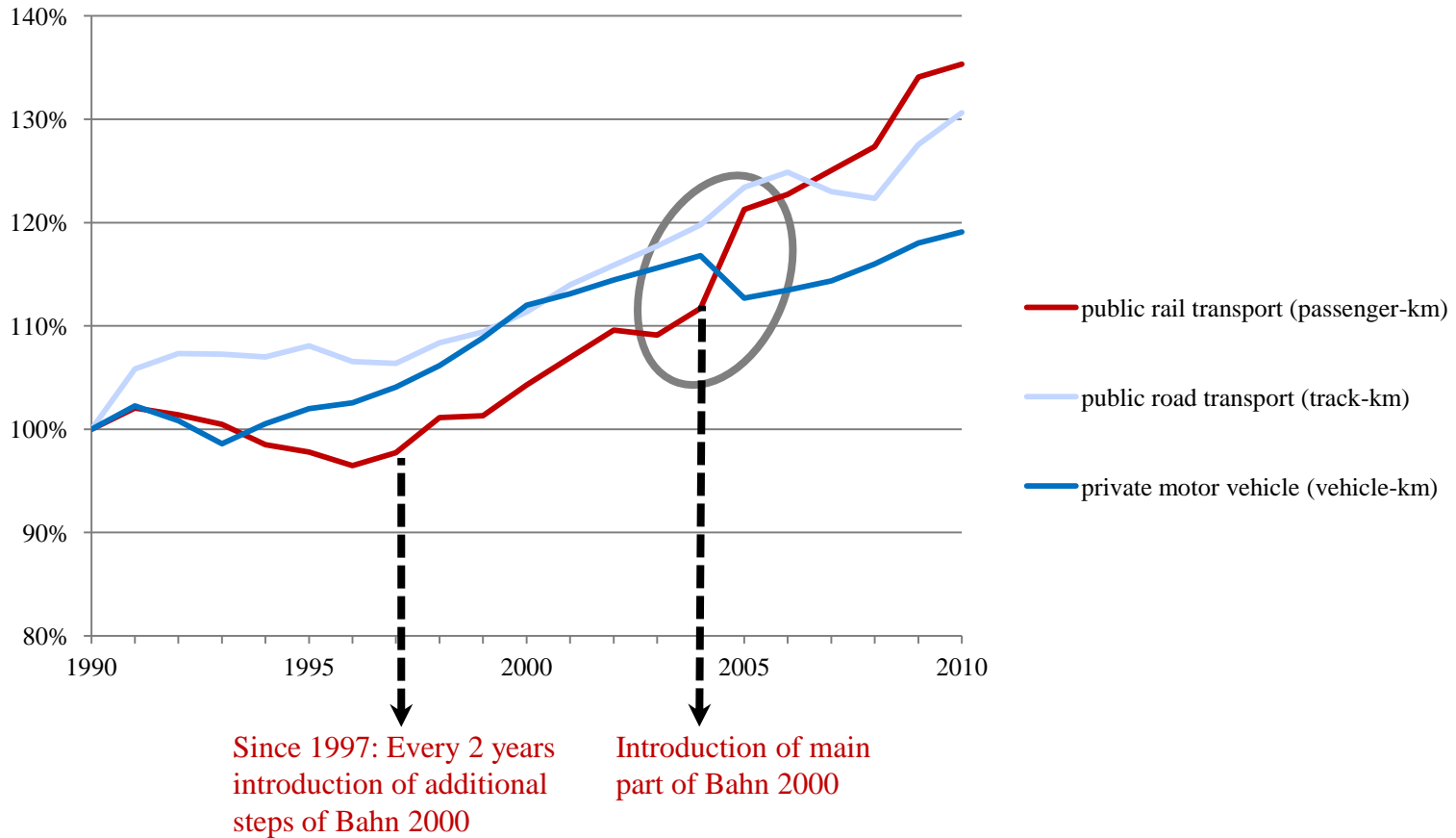
Development of modal split



Traffic volume at rush hour at Zurich railway station



The success of Bahn 2000 in Switzerland



Regulatory implementation of IRIT in the UK, CH and the NL

	CH	NL	UK
Priority of IRIT in capacity allocation	✓	✓ (indirect)	-
Obligatory coordination in line with IRIT	✓	✓	-
Licensing regime	<p>Exclusive license for national passenger rail services for SBB.</p> <p>Tendering of regional transport services is possible but not obligatory</p>	<p>Exclusive license for national public transport for NS</p> <p>Direct licensing of private transport services, tendering is possible.</p> <p>Open acces in cross-border rail transport.</p>	<p>Franchising by tendering licenses for regional rail networks</p>

Requirements for a successful introduction of IRIT

- **Infrastructure investment and financial resources**
 - Planning according to demand
 - Infrastructure and trains are planned according to timetable (service offer)
 - Time schedule of the introduction depends on needed infrastructure and available resources
 - Priority list
- **Regulatory implementation**
 - Priority rule
 - Coordination obligation
 - Licensing regime
 - Compatibility with EU framework

Thank you for your attention!

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