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Vertical Separation in the European railway sector: recent insights

EVES-Rail study and recent developments

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EVES-Rail: Economic effects of Vertical Separation in the railway sector

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Study realised in 2012 for CER

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Effects of vertical separation on the rail sector's economic performance in the EU context

- **Quantitative research**: three measures of performance:
  - Efficient use of inputs to produce outputs
    → **cost modelling** (regression analysis)
  - Competitive performance against other transport modes
    → **rail modal share** (regression analysis)
  - Value-for-money for state budgets
    → **traffic volume per € of state funding** (data comparison)

- **Qualitative research**:
  - Rail sector value chain
    → description of the **fundamental transactions** in the railway sector
  - Incentive analysis
    → identifying **(mis)alignment of incentives** between RU and IM
  - Unbundling and realignment
    → description of **realignment mechanisms** and their limitations

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QUANTITATIVE RESEARCH

- Cost regression
- Modal share regression
- Value-for-money for state budgets

Quantitative research

REVIEW OF UNBUNDLING LITERATURE

- Many inconsistencies
  - No evidence that unbundling is better/worse
  - Most recent study: results vary with train density
- Many deficiencies
  - Correct and detailed data is a major problem
  - Mostly insufficient account taken of differences between reform options (VS, HC, VI)
  - Our database

OUR CONTRIBUTION

- More and better data:
  - 26 OECD-countries (1994-2010)
  - Adding British data
  - Updating from 2007 to 2010
  - Verified data by CER members
- More refined approach
  - Inclusion of structural dummies (VS/HC/VI)
  - Improved modelling of market opening dummies
  - Improved accuracy of timing of reforms
  - Inclusion of train density variable and share of freight revenue

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Cost regression: Model

- 26 OECD countries – 1994-2010
- Total rail industry cost = f (control variables, test variables)

Control variables (cost drivers not related to policy)	Test variables (policy variables that may affect costs)
Passenger output	Vertical separation dummy variable
Freight output	Vertical separation dummy variable * train density
Route length	Vertical separation dummy variable * freight revenue proportion
Technology index	Holding company dummy variable
Wage rate	Holding company dummy variable * train density
Energy price	Holding company dummy variable * freight revenue proportion
Materials price	Horizontal separation dummy variable
Capital price	Passenger competition measure
	Freight competition dummy variable

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Econometric model results

Variable name	Variable description	Parameter Estimate	
D_{VS}	Vertical separation dummy variable	0.0041	
VD_{VS}	Vertical separation dummy variable x density (V)	0.3760	***
RD_{VS}	Vertical separation dummy variable x freight proportion (R)	0.1222	***
D_{HC}	Holding company dummy variable	-0.0546	*
VD_{HC}	Holding company dummy variable x density (V)	0.0391	
RD_{HC}	Holding company dummy variable x freight proportion (R)	-0.0132	
D_{HS}	Horizontal separation dummy variable	-0.2718	***
CMP	Passenger competition (sum of dummies measure)	-0.0081	
D_{CF}	Freight competition dummy	0.0388	
	Break-even point train density ratio	0.99	
	Train density at the break-even point	62.7	
	R squared (cost equation)*	0.980	

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Cost regression: Summary of key findings

- At higher traffic densities, vertical separation increases costs
  - At mean traffic densities, vertical separation does not significantly change costs
  - → *[Higher traffic densities may cause more coordination issues in a separated environment]*
- At higher share of freight in total revenues, vertical separation increases costs
  - → *[Freight/mixed traffic may cause more coordination issues in a separated environment than passenger traffic]*

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Projected costs of vertical separation

Billions of Euros (2005 constant prices)	Current density levels	Current density levels + 10%	Current density levels + 20%	Current density levels + 50%*
Yearly cost of imposing vertical separation across EU (for those countries not already separated)	5.8	7.8	9.6	14.5

Note: * It is recognised that higher growth would at some point require increased capacity

- Re-running the model without Japan, South Korea and Turkey does not alter the conclusion significantly (7.4 billion Euro cost in place of 5.8 billion Euros above)

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Caveats

- Some data issues remain
  - Though the data is as (or more) reliable than previous studies
- Detailed projections by country
  - Should be undertaken before making specific recommendations for individual countries
  - Would require a detailed, bottom-up model, taking into account different mix of services across network
- Small/local railways excluded
  - Results should not be extrapolated to small, local railways (out of sample)

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Findings on modal share and market entry (competition)

- No evidence that vertical separation leads to higher rail modal share than holding company regime
  - Both in freight and in passenger transport
  - Confirmed by regression analysis

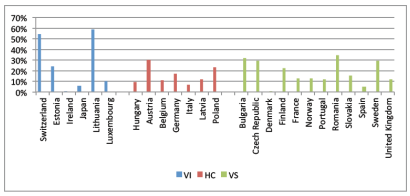


FIGURE 2 MODAL SHARE (2008) BY COUNTRY FOR NATIONAL FREIGHT

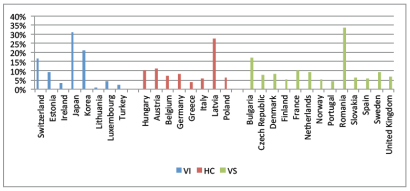
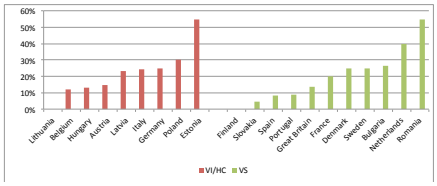


FIGURE 3 MODAL SHARE (2008) BY COUNTRY FOR PASSENGERS

- Market entry significant and growing
  - with vertical separation
  - and without vertical separation



Market share of new entrants (freight), selected countries, 2010 (RMMS, 2012)

Growth rate 2008-2010 of all but the largest operator:
statistically not different between VI/HC versus VS

- Competition does not appear to work better or worse under vertical separation

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Intermediate conclusions Quantitative part

- No evidence that vertical separation is unconditionally superior or inferior to other structural options
- Competition
  - Does not appear to work better or worse under vertical separation
  - Only weak effects on performance could be measured
- → Imposing vertical separation dogmatically to the whole European rail sector is likely to increase total costs
- So something happens to costs when there is vertical separation – something that is not explained by competition
- → Qualitative part

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QUALITATIVE RESEARCH:

- Rail sector value chain
- Incentive misalignment analysis
- Realignment mechanisms

Incentive misalignment:

Concept – actors – economic effects

- Misalignment of incentives (definition)
  - VS = fully separated IM alongside RUs
  - Each subject to set of incentives (by market and/or regulation)
  - Each optimises <u>own</u> economic position
    - Optimality for each individual actor…
    - *but not necessarily for rail sector as a whole!*
  - → Economic losses may occur due to sub-optimal choices compared better aligned (more cooperative) set-up
- Example of potentially resulting economic losses:
  - Additional capacity investment needs
  - Additional operational costs
  - Lost opportunities for revenue-making

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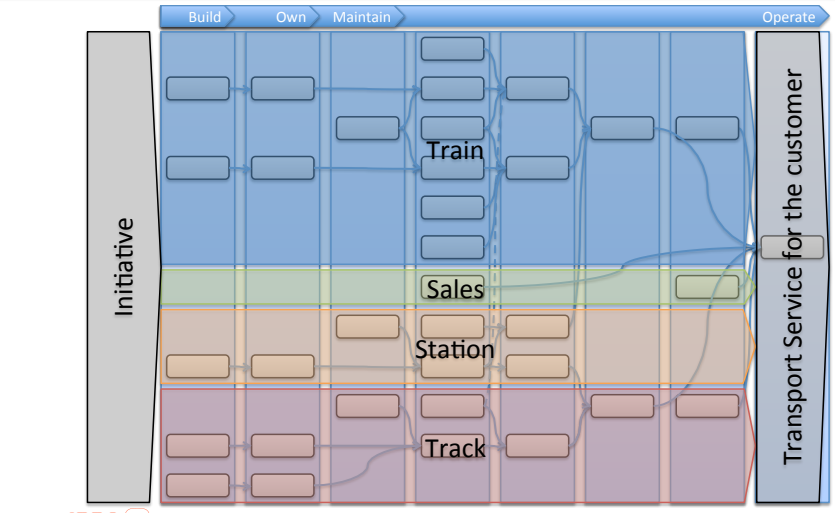
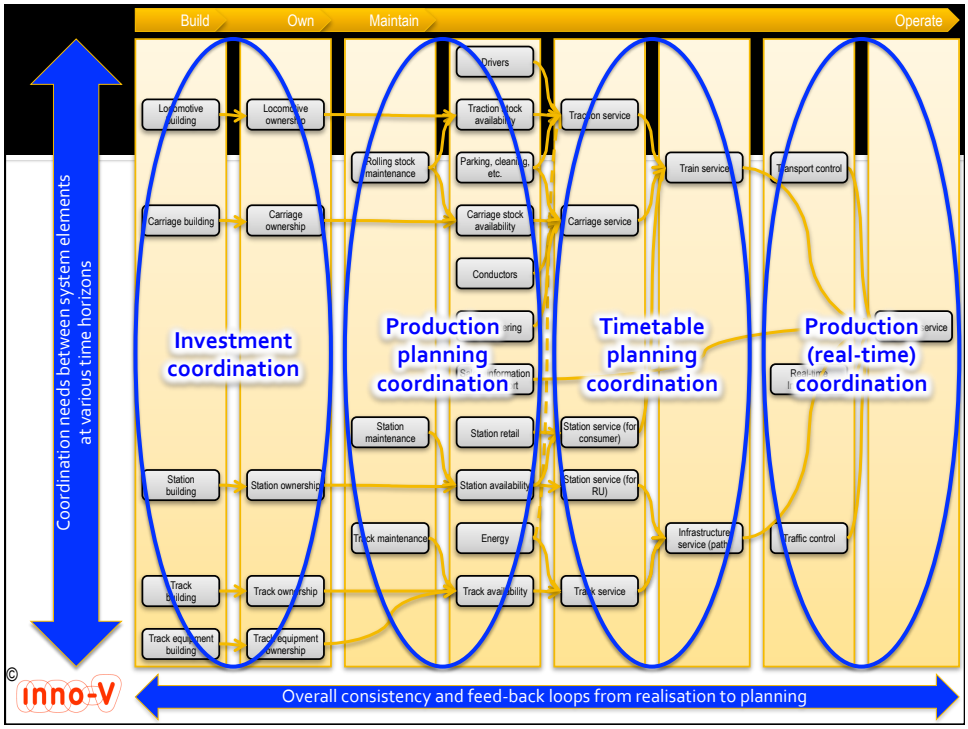
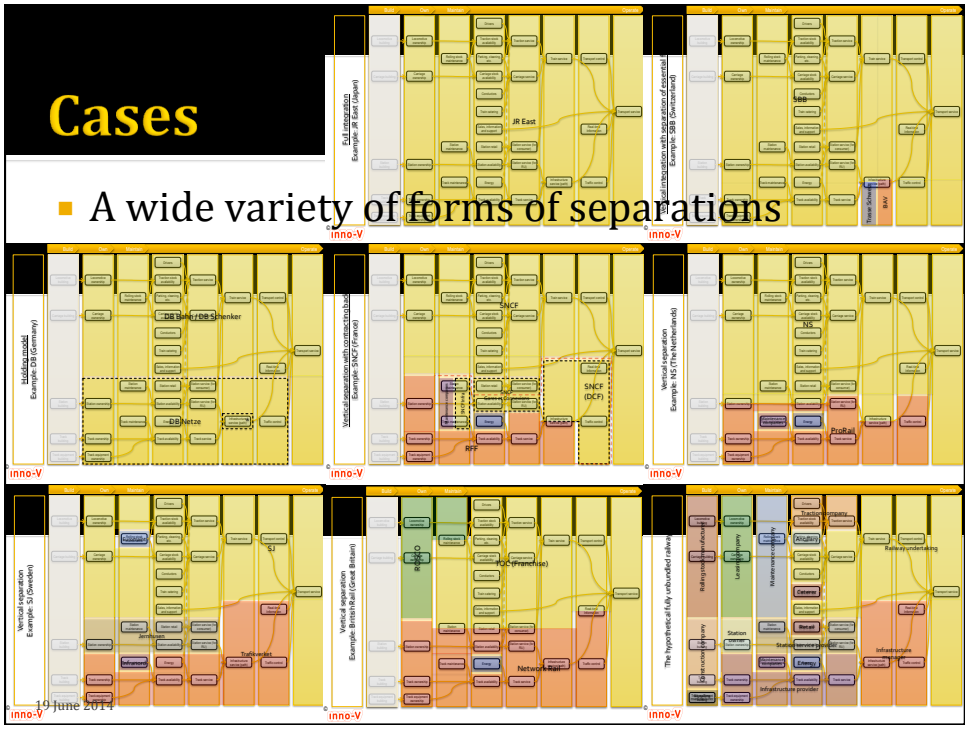
Qualitative research: Rail sector value chain





Cases

- A wide variety of forms of separations



Coordination issues: Incentive misalignment & realignment examples

Investment coordination	Production planning coordination	Timetable planning coordination	Production (real-time) coordination
• Extension / decommissioning • Upgrading / downgrading	• Quality of resources and reliability • Small/medium scale investments	• Maintenance/ renewal versus operations • Timetable robustness	• Disruption handling • Feed-back loops
• Rail2000 (CH) • High frequency rail (NL) • RUS/IIP (GB) • Prioritisation (FR) • Rolling stock and power supply (GB) • ERTMS/ETCS • Synergy real estate – rail	• Coordination of small scale / high impact investments (JP) • IM/RU cooperation/ misalignment (NL, FR, GB) • Trade-offs track maintenance / total system costs	• Timetabling and path allocation (CH, GB, FR, NL) • Track possessions and commercial consequences (FR, PL)	• Traffic control centres colocation (GB, NL, FR) • Passenger information (NL) • Feed-back loops (JP, NL)

Findings on incentive misalignment

- Vertical separation can generate substantial incentive misalignments between IM and RUs
  - Likely to be larger than transaction costs generated by vertical separation
- Misalignment issues increase in importance
  - When investments are required
    - In growing railways (e.g. growing demand)
    - For technical innovation
  - And especially with higher train densities
- Hybrid re-alignment arrangements have started to appear in unbundled railways to counter these effects
  - It is unlikely that these will be able to solve all issues
  - Especially those issues that would involve money transfers between IM and RUs

- → **Misalignment issues urgently require more attention and analysis in order to make sound choices between structural options**

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Overview of findings on the effects of vertical separation

- **System cost effects**
  - Depend on train density and share of freight
  - Negative aggregate effect for the EU if all switch to VS (costs increase)
- **Rail modal share effects**
  - No significant difference between VS and holding company model, also when looking at impact with competition
- **Value for money for state budgets** (analysis limited to 5 countries)
  - No pattern to suggest an advantage for VS
- **Market entry**
  - Can be significant and growing both with and without VS
- **Misalignment of incentives under unbundling**
  - Effects are important and require much more attention
  - Need for re-alignment mechanisms (see e.g. GB, NL)

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Contact and sources

- For further questions, please take contact with:
  - **Didier van de Velde**, inno-V (Amsterdam): dv@inno-v.nl
- Sources:
  - The main EVES-Rail report can be downloaded from CER's website (www.cer.be). The citation information for this report is:
    - van de Velde, D., C. Nash, A. Smith, F. Mizutani, S. Uranishi, M. Lijesen and F. Zschoche (2012), **"EVES-Rail - Economic effects of Vertical Separation in the railway sector"**, Report for CER - Community of European Railway and Infrastructure Companies, by inno-V (Amsterdam) in cooperation with University of Leeds – ITS, Kobe University, VU Amsterdam University and civity management consultants, Amsterdam/Brussels, 188 pp.
  - The rail value-chain analysis included in the EVES-Rail report is based on:
    - van de Velde, D.M. (2012), **"A transaction-based Transport Sector Model: Application to the railway sector to discuss unbundling and incentive misalignment"**, mimeo, Delft University of Technology, Delft.

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