

CER event: Unbundling in the railway sector: does one size fit all?
Brussels, 5 November 2012

EVES-Rail

Economic effects of Vertical Separation in the railway sector

Main results

Study carried out by:

Didier van de Velde (inno-V, Amsterdam)

Prof. Chris Nash & Andrew Smith (ITS, University of Leeds)

Prof. Fumitoshi Mizutani (Kobe University) & Shuji Uranishi (Fukuyama Heisei University)

Mark Lijesen – VU University (Amsterdam)

Frank Zschoche – civity management consultants (Hamburg)

RESEARCH GOALS:

- *Quantitative*

- *Qualitative*

Research Goals: Quantitative

- Effects of vertical separation on the rail sector's economic performance in the EU context
- We consider three measures of performance:
 - Efficient use of inputs to produce outputs
→ **cost modelling**
 - Competitive performance against other transport modes
→ **rail modal share**
 - Value-for-money for state budgets
→ **traffic volume per Euro of state funding**

Research Goals: Qualitative

- If vertical structure does influence performance, why is that?
 - Competition may work differently – this needs to be checked
 - There could be other changes in the incentives and costs of rail sector actors (besides competition). What about misalignment of incentives?
 - Can we identify and describe potential misalignments at various points in the value chain of the rail sector?
 - And if misalignments occur, how to overcome them?

Literature review: Findings

Authors (year)	Countries covered	Effect of vertical separation	Effect of competition	Combined effect
Jensen and Stelling (2007)	Sweden	Negative	Positive	Positive
Friebel et al. (2010)	Europe	Positive if appropriately phased	Positive if appropriately phased	Positive if appropriately phased
Cantos et al. (2010)	Europe	Positive	Positive	Positive
Cantos (2011)	Europe	Not significant	Positive	Positive
Wetzel (2008)	Europe	Not significant	-	-
Growitsch and Wetzel (2009)	Europe	Negative for most countries	-	-
Mizutani and Uranishi (2012)	Europe and Japan	Depends on train density	-	-

- Inconsistencies in earlier findings on separation and competition
- Data issues, treatment of structural options, and of competition

Econometric assessment of cost impact

OUR STARTING POINT

- Mizutani and Uranishi (2012), Journal of Regulatory Economics
 - “With high train density, vertical separation increases costs”
 - “With low train density, vertical separation decreases costs”
- Previous papers looked for a single effect, consistent between countries
- This paper ‘switched on the lights’
 - Challenging the implicit assumption of a single invariable effect of vertical separation
 - Density varies strongly between countries

OUR AIM: ADVANCE STATE OF KNOWLEDGE ON COST EFFECTS

- Improve, complete and extend data
- Check that Mizutani and Uranishi (2012) results hold with:
 - Improved data set
 - Proper control of competition effects
 - Testing impacts of more types of vertical structure (not only VI vs VS)
 - Europe-only sample
- Extend insight:
 - Testing for other factors that may lead to a differentiated effect of VS

RESEARCH FINDINGS:

Quantitative

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

Cost regression: Model

- 26 OECD countries – 1994-2010
- Cost = f (control variables, test variables)

Control variables (cost drivers not related to policy)

- Passenger output
- Freight output
- Route length
- Technology index
- Wage rate
- Energy price
- Materials price
- Capital price

Test variables (policy variables that may affect costs)

- Vertical separation dummy variable
- Vertical separation dummy variable * train density
- Vertical separation dummy variable * freight revenue proportion
- Holding company dummy variable
- Holding company dummy variable * train density
- Holding company dummy variable * freight revenue proportion
- Horizontal separation dummy variable
- Passenger competition measure
- Freight competition dummy variable

Cost regression: Findings

- At higher traffic densities, vertical separation increases costs
 - At mean traffic densities, vertical separation does not significantly change costs
 - Whereas a holding company model reduces them, compared with complete vertical integration (weakly significant)
- A higher share of freight in total revenues increases the costs of vertical separation
 - Freight traffic may cause more coordination problems in a separated environment than passenger traffic
- Note 1: Findings also hold for estimation on Europe-only sample
- Note 2: Findings based on national networks - not applicable to small regional or local networks

Cost regression: Policy simulation

- Simulation result of imposing vertical separation EU-wide compared to status quo
 - Cost increase projection (EU aggregate): €5.8 bn/year
 - Effect different in every country
- Effect worsens with higher traffic densities
 - With densities 20% higher than today:
Cost increase projection (EU aggregate): €9.6 bn/year
- Higher traffic densities are a policy goal of the European Union (2011 Transport White Paper)

Modal share regression: Findings

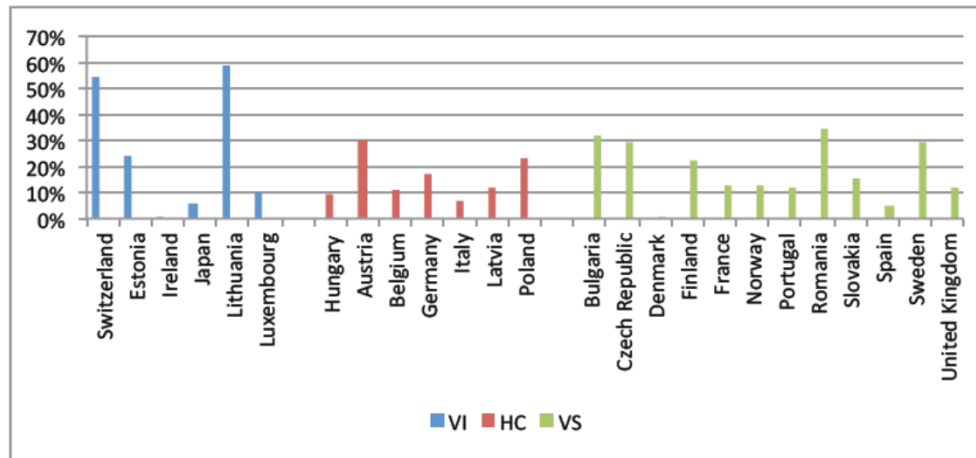


FIGURE 2 MODAL SHARE (2008) BY COUNTRY FOR NATIONAL FREIGHT

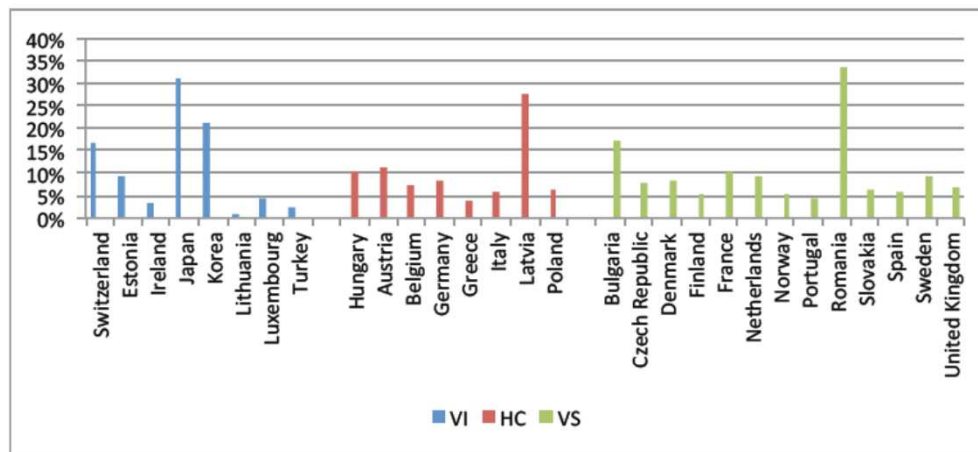


FIGURE 3 MODAL SHARE (2008) BY COUNTRY FOR PASSENGERS

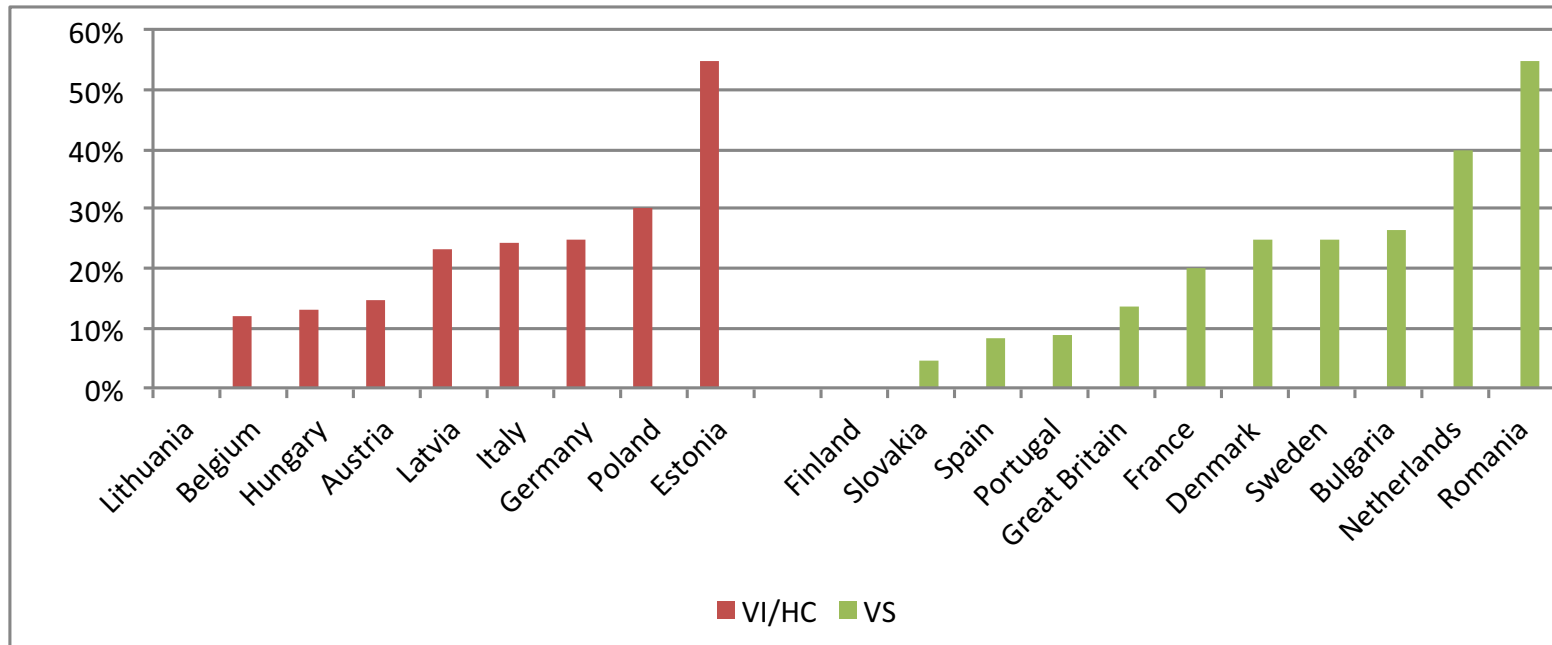
Data (graph):

- Rail modal share does not appear to be higher with vertical separation (VS)

Modal share regression

- 26 OECD countries – 1994-2010
- Controlling for possible confounding factors
- No evidence that one model leads to significantly higher rail modal shares than the other
 - Both for freight and passenger traffic
- No significant difference in the impact on modal share between:
 - Holding company model with competition *versus*
 - Vertical separation model with competition

Competition: Shares of new entrants (freight)

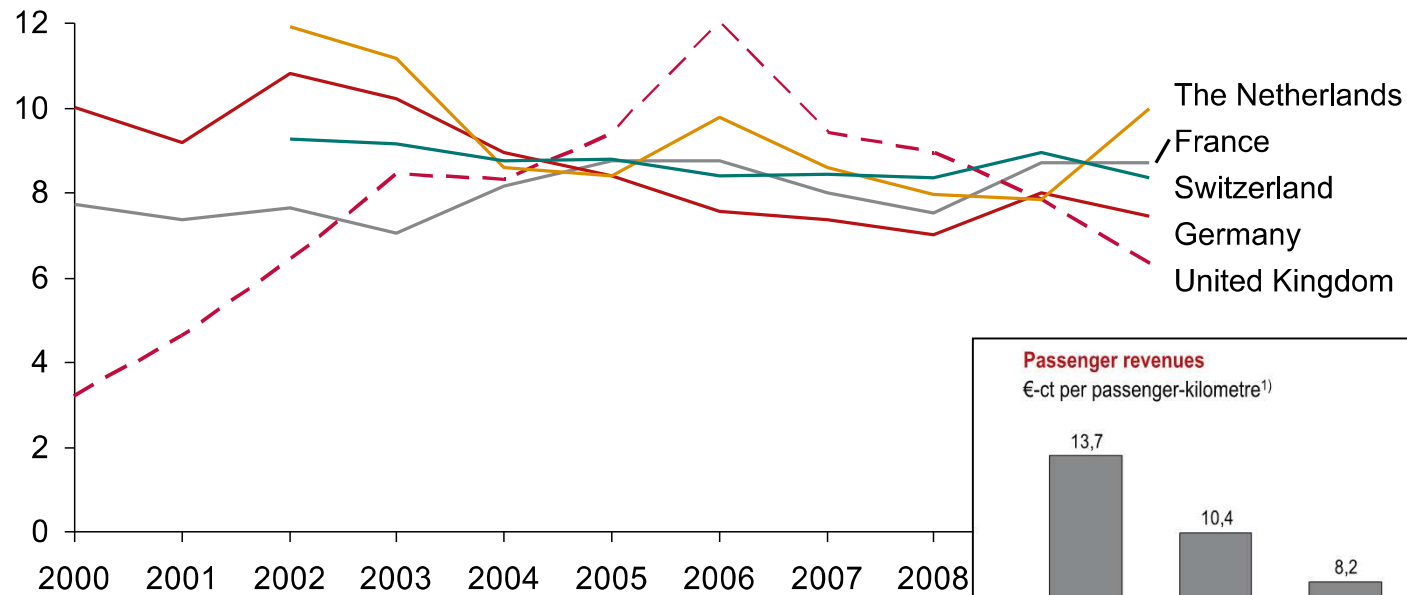


- Graph: Market share of new entrants (freight), selected countries, 2010 (RMMS, 2012)
- Growth rate 2008-2010 of all but the largest operator: statistically not different between VI/HC versus VS

Value-for-money for state budgets:

State funding

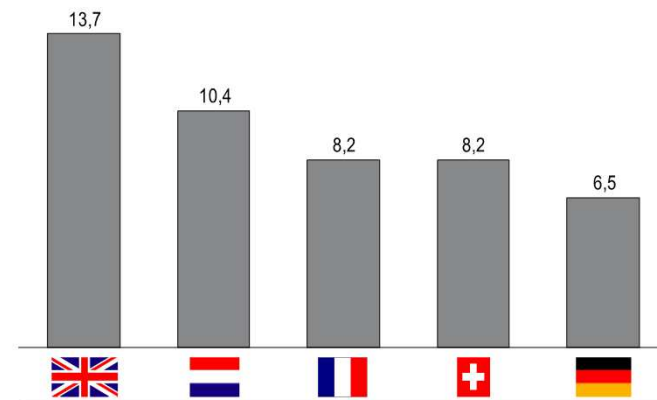
€-ct per transport unit¹⁾



1) Price level 2011, normalised by purchasing power parities

Passenger revenues

€-ct per passenger-kilometre¹⁾



1) Data of 2010, normalised by purchasing power parities

Intermediate conclusions

Quantitative part

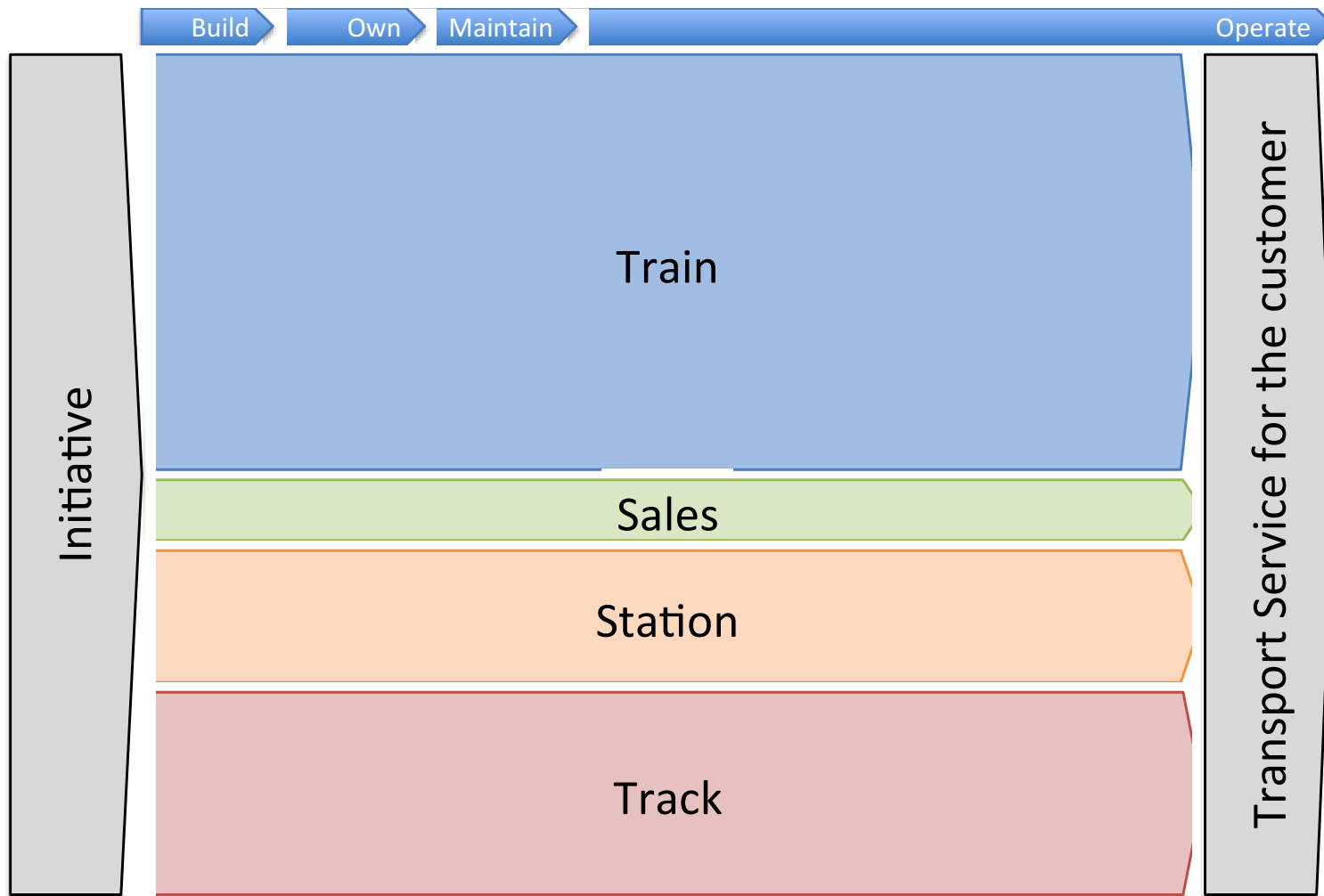
- Costs improve / worsen in case of vertical separation with
 - Lower / higher traffic density and
 - Lower / higher share of freight in revenue
- Competition itself seems to have very weak effects on performance
- Competition does not appear to work better or worse under vertical separation
- So something happens to costs when there is vertical separation – something that is not explained by competition
→ Qualitative part

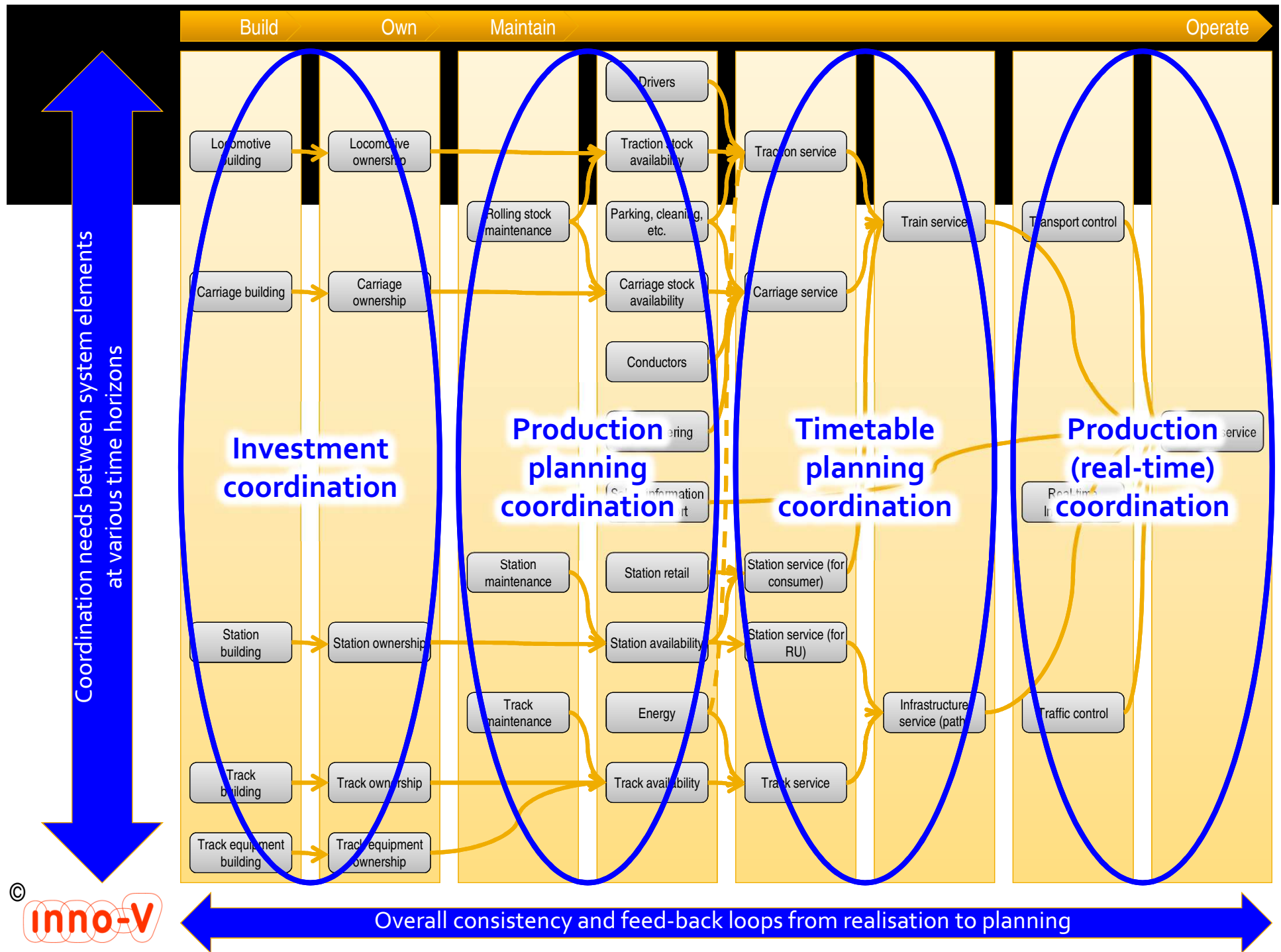
RESEARCH FINDINGS:

Qualitative

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

Rail sector value chain





Incentive misalignment:

Concept – actors – economic effects

- VS leads to the existence of a fully separated IM alongside RUs
 - Each subject to a set of incentives given by the market and/or by the regulatory context
 - Each actor makes choices that optimise **its** economic position
 - These choices may well be optimal for each individual actor...
but not necessarily for the rail sector as a whole
 - **Misalignment of incentives** is when economic losses occur due to choices that are sub-optimal compared to what would occur in a more cooperative set-up (better aligned)
- Types of economic losses that may arise due to misalignment:
 - Additional capacity investment needs
 - Additional operational costs
 - Lost opportunities for revenue-making

Incentive misalignment: Misalignment & realignment examples

Investment coordination	Production planning coordination	Timetable planning coordination	Production (real-time) coordination
<ul style="list-style-type: none"> • Extension / decommissioning • Upgrading / downgrading 	<ul style="list-style-type: none"> • Quality of resources and reliability • Small/medium scale investments 	<ul style="list-style-type: none"> • Maintenance/renewal versus operations • Timetable robustness 	<ul style="list-style-type: none"> • Disruption handling • Feed-back loops
<ul style="list-style-type: none"> • Rail2000 (CH) • High frequency rail (NL) • RUS/IIP (GB) • Prioritisation (FR) • Rolling stock and power supply (GB) • ERTMS/ETCS • Synergy real estate – rail 	<ul style="list-style-type: none"> • Coordination of small scale / high impact investments (JP) • IM/RU cooperation/misalignment (NL, FR, GB) • Trade-offs track maintenance / total system costs 	<ul style="list-style-type: none"> • Timetabling and path allocation (CH, GB, FR, NL) • Track possessions and commercial consequences (FR, PL) 	<ul style="list-style-type: none"> • Traffic control centres colocation (GB, NL, FR) • Passenger information (NL) • Feed-back loops (JP, NL)

Incentive misalignment: Findings: size

- Literature review:
 - Induced costs from misalignment (up to +20%)
 - Vertical separation also leads to additional transaction costs, but these are limited (+1%)
- Misalignment issues increase in importance
 - In non steady-state railways (demand increase, investments, reconfigurations)
 - In systems with higher train densities

Incentive misalignment: Findings: realignment options

- How to solve misalignment issues?
 - Track access charges and performance regimes are important but cannot solve all misalignment issues
 - Regulators cannot either solve all misalignment issues (compared to holding or vertical integration steering)
 - Various hybrid arrangements have started to appear
 - Joint ventures, sharing of surplus/loss from joint actions
 - Non-financial cooperation, joint facilities
 - Remark: Easier to reach where a single operator carries a large part of the traffic
- Can re-alignment mechanisms solve all problems?
- How do re-alignment mechanisms perform compared to alternative arrangements?

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**
 - No pattern to suggest an advantage from VS
 - (Analysis limited to 5 countries)
- **Market entry**
 - Can be significant and growing both with and without VS
- **Alignment of incentives**
 - **Effects are important and require much more attention**
 - New trend towards re-alignment (e.g. GB, NL)

Policy recommendations

- **Free choice of structural model**
 - Subject to providing non-discriminatory access
 - Allows for competition between structural models
 - Allow switching from a holding model to vertical separation
 - Allow switching from vertical separation to a holding model
- **Where vertical separation is adopted**
 - Efficient setting of track access charges and performance regimes is necessary but not enough
 - Enable (re)alignment of incentives between IM and RUs
- **For any structure**
 - **Need for coordination mechanisms must be recognised**