The EVES-Rail Study
Economic Effects of Vertical Separation in the rail sector

Questions and Answers

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What is the EVES-Rail study about?

The EVES-Rail study is a substantial study on the economic effects of vertical separation in the railway sector in the European (EU) context.

The study is designed in such a way as to assess the main questions that policy-makers ought to ask themselves from the economics viewpoint when considering whether EU legislation should be made more stringent with regards to separation requirements between infrastructure managers and railway undertakings. In particular, the potential effects of an EU-wide imposition of full vertical separation are assessed in depth using several research methodologies.

Rather than relying on a single methodological approach, the EVES-Rail study brings together **several lines of evidence** based on separate quantitative and qualitative research efforts. It is on the basis of these several lines of evidence that the study team reaches analytical conclusions and proposes recommendations for policy.

Who carried out the EVES-Rail study and who financed it?

EVES-Rail was carried out by an international research consortium headed by Inno-V (Netherlands) and including researchers from the Institute for Transport Studies at the University of Leeds (UK), the Free University of Amsterdam (Netherlands), Civity Management Consultants (Germany), and Kobe University (Japan).

The study was commissioned and financed by CER.

What research questions are assessed in the EVES-Rail study?

Quantitative assessments are made of the following **four core questions**:

- The effect of vertical separation on total **rail system costs**
- The effect of vertical separation on the **modal share** of rail
- The effect of vertical separation on **state spending** in the rail sector
- The effect of vertical separation on **intra-modal competition** and market concentration

Qualitative assessments are made of the following **four core issues**:

- What is the **value chain** of the rail sector?
- At what points is **coordination between infrastructure and operations** important?
- What **alignment mechanisms** can be deployed under different institutional set-ups?
- How can **competition** be upheld under different institutional set-ups?

How does EVES-Rail differ from other studies on this topic?

The scientific scope of EVES-Rail is both broader and deeper than any other study on this topic to this day. **EVES-Rail is unique in combining the assessment of <u>several</u> quantitative questions, using proper statistical (econometric) methodologies, with the development of in-depth qualitative insights into the actual functioning of national rail systems**. Two particular components of EVES-Rail stand out from a scientific perspective:

The modelling of rail system costs is an extension of the most comprehensive approach currently available from the economics literature, making it almost certainly the most advanced exercise of this type on a European sample.

The qualitative analysis of the rail value chain and of incentives and alignment mechanisms is likewise at the cutting edge compared to other available literature.

Last but not least, the contents of EVES-Rail enable **a quantitative simulation of the effect on total system costs of imposing vertical separation on all EU Member States** – thus allowing a direct, model-based assessment of whether that policy option should or should not be pursued.

Should the EVES-Rail study be used to inform the EU discussion, or national discussions?

The study assesses the potential effects of reforms **at the EU level**. It was never designed to provide country-by-country assessments in order to advise national governments on the best course of action for their national rail systems. Had that been a goal of the study, different methodological approaches would have been chosen, and the study would have been considerably larger in scale.

The methodologies chosen for EVES-Rail include, in particular, two econometric (statistical) assessments that process data covering a large number of OECD countries, all observed over a period of many years (1994-2010). In both cases (so for total system costs and, separately, for modal shares), a mathematical model is fitted onto the data.

The advantage of doing this, over a large and diverse set of countries, is that it is the best way to uncover what variables (what drivers) *typically matter, i.e. for most countries*. It is for this reason that economic studies covering the EU, or the OECD, or the whole world, for many different kinds of economic questions, very often rely on this kind of methodology (e.g. studying what drives growth, competitiveness, investment, job creation, whether at the country level or at the level of one chosen industry). So, for example in the EVES-Rail study, it was found that train density and traffic mix are important cost drivers for the group of countries (and years) that were analysed.

The disadvantage of such an econometric approach on many different countries is that one loses the ability to analyse individual countries in detail. When reviewing national policy, the best practice is to **start with some form of quantitative benchmarking** exercise (which *may* be based on quantitative approaches similar to those used in EVES-Rail), **and then deepen the investigation** by carrying out a highly detailed country case study, notably by relying on numerous expert interviews and other qualitative research methods. This structure is essentially what was applied for the McNulty study on the rail sector of Great Britain. With over 300 pages, the example of the McNulty report makes clear what is needed for a thorough assessment of <u>one</u> national case.

What is the meaning of the results on system costs and train density?

Every single decision in a badly aligned system will be economically sub-optimal from a whole-system viewpoint (e.g. total system cost viewpoint) – for instance the infrastructure manager handling short-term maintenance decisions in a way that seems optimal for itself, but that is bad for operators and bad for the system as a whole. The total system-wide effect per route-kilometre of infrastructure is the sum of the economic loss (compared to a perfectly aligned system) from every individual decision of that nature. That total will depend on the intensity of use of the infrastructure, e.g. traffic volume per route-kilometre, or possibly number of train runs per route-kilometre. Furthermore, this effect is likely to increase more than proportionately with very high density levels, i.e. as one gets closer to full capacity, since the costs of poor decisions regarding timetabling and traffic control become greater. This would explain why 'train density' as used in the model of costs comes out as a strongly significant variable.

On the other side, the results suggest there is also a positive effect from vertical separation, which may or may not be proportional to traffic volume. This putative positive effect would dominate over the negative (cost-increasing) effect of misalignment at low densities, but would be overwhelmed by the misalignment effect at high densities. What this positive effect may be is not clear. Since EVES-Rail does not find that competition works necessarily better under vertical separation, the positive effect is presumably not related to competition. One possible interpretation could be that the positive effect corresponds to gains from greater transparency and more careful focus on costs. However we have no clear evidence on this. Further research at both the theoretical and empirical levels would help to verify these interpretations more closely.

What is the meaning of the results on system costs and share of freight revenue?

The result is that misalignment of incentives is more severe when there is more freight traffic. A possibly confounding issue could have been that it is merely heterogeneity of traffic that has that effect, but this was also tested in the model and did not yield persuasive results.

A plausible interpretation of this result is that competitive handling of freight traffic requires considerably more flexibility on the part of the infrastructure manager in terms of path allocation, traffic management, and other operational issues, as compared to the handling of timetabled passenger services. In a poorly aligned system it is likely that the infrastructure manager's responsiveness to the short-term needs of freight operators will be limited. This will engender whole-system losses, as compared to a well-aligned system, which one would expect to be roughly proportional to freight revenues, or possibly to freight operating costs. This being said, further research would help to assess this issue in more depth.

What is the basis for the estimate of EUR 5.8 bn per year for the scenario of imposing vertical separation on all EU countries?

It is a projection from the model that was estimated in Chapter 2 (Econometric assessment of costs). An empirical model of rail system costs was estimated on a sample of 26 OECD countries over the period 1994-2010. The model includes so-called 'control variables', which are those that would typically explain costs but that are not related to policy, e.g. traffic volume, cost of labour, cost of capital, cost of material inputs; in addition, the model includes 'test variables' (policy variables), in particular a binary variable that identifies whether a given country had vertical separation in a given year. By including the control variables, one can be more confident that the vertical separation variable is picking up effects on costs that are due to vertical separation itself, not to other phenomena. Once estimated, the model was then used to simulate the effect of adopting vertical separation in all countries based on the average effect that it had in those countries that did adopt it.

A comprehensive description with the explicit functional form used and the full list of variables is given on pages 32-33, the full list of countries and years covered is given in Table 2, and additional information about data sources, methodology, and statistical estimation results are given throughout Chapter 2 and also in the Annex, page 139. The presentation of the methodology, of the data sources, and of the results is in line with what is common practice in the academic literature.

Why were projections made that assume increases in train density?

CER also asked the consultants to make model projections under the assumption of higher train densities, as would result from higher traffic volumes combined with less-than-proportional increases in capacity. These scenarios, assuming increases in train density of 10%, 20%, and 50% compared to the current situation, are shown in order to highlight the implications of the European Commission's long-term transport policy goals as presented in the 2011 Transport White Paper. In order to achieve those long-term goals, traffic would have to grow substantially and – with few exceptions – infrastructure capacity use (train density) would also grow substantially.

The key finding here is that the total cost of having full vertical separation everywhere in the EU, as compared to the existing mix of structural models, would grow as well, making an even stronger case against a universal imposition of vertical separation.

Why does the report not present model projections for each individual country?
Should Country X opt for full separation? Should Country Y opt for a holding model?

The goal in EVES-Rail is to assess the potential effects of a change in EU policy, not of changes in individual national policies. Proper assessments at the national level would have required more detailed national case studies in order to do full justice to every country's specific circumstances. That would have required a far larger research project. In that context, recall that the McNulty report on rail's value-for-money in Great Britain is 320 pages long – for just one national case.

The more general methodology developed in EVES-Rail should be seen for what it is: an adequate assessment for EU-wide policy options, and a possible **starting point** for the development of more detailed country-specific assessments. What the study does find is that different national circumstances call for different structural choices. In that context it is logical to assume that, while some EU Member States may already have the right model for their individual circumstances, others might not and should therefore be allowed to reconsider. But it is up to national governments to do their homework and carry out their own economic assessments.

The results of the study match CER's pre-existing policy position…

In reality the exercise was rather risky for CER and CER members: the consortium is mostly made up of academics who care about their personal scientific reputations, and respect for scientific standards was an important component of the Terms of Reference and of the contract between CER and the consultants. There was no guarantee that the results would come out as they did – and this was a risk that CER member companies accepted – in some cases with limited enthusiasm.

The results of the study are convenient for CER's large members such as DB and SNCF

Not really. The study openly discusses the fact that vertical separation has certain advantages and that it should be preferred to a holding model under certain circumstances. It would be much safer for proponents of the holding model to have a result that says that the holding model is always better – but that is not what the research finds, so the study doesn't say that. Another example

concerns transaction costs. Some CER members would have liked to 'play up' that argument, but members of the research team had recently conducted independent research on this topic and had found that transaction costs are not particularly large. These findings are clearly stated in the study.

The study implies that one should return to the old model of vertical integration

On the contrary, the study finds that, in many respects, both vertical separation and the holding model perform better than old-style vertical integration. Besides, returning to full integration is not seriously considered in the context of EU policy, so that scenario is not developed in the conclusions. What is more relevant is to look at the difference between the holding model and full separation. On that question the study finds that, in terms of total system costs, the holding model outperforms full separation under some circumstances, but full separation outperforms the holding model under other circumstances. **Instead of a simplistic yes/no answer, the study offers new depth by showing that the effect of separation depends on structural characteristics which vary between countries.**

The study implies that competition within the rail sector doesn't work

The study is not about the effects of competition, but about the effects of separation. To the extent that competition is addressed, it is only as a "control variable", i.e. the methodologies applied account for the extent of competition in order to isolate the effect of vertical separation itself. That said, where findings about the effects of competition are reported, these are to be interpreted within the broader context of transport economics and policy. In that broader context, intra-modal competition by itself may have only a small impact compared to other structural drivers such as state funding for infrastructure and public services, conditions for competition between transport modes, and differences between countries in terms of economic geography and rail market attractiveness. Had EVES-Rail been designed to assess the effects of competition in the rail market, slightly different methodological approaches would have been applied, in order to properly isolate the effects of intra-modal competition from other, possibly confounding factors.

The data for the value-for-money chapter on state spending is not comparable between countries

Considerable efforts were made to achieve a high degree of comparability. Each country applies somewhat different standards in terms of spending categories and investigations were made in each case to correctly identify those. A relatively long time period was chosen – rather than one individual year – in order to enhance comparability too. Also, the data was corrected for differences in price levels between countries by applying PPP adjustment (Purchasing Power Parities), which is a standard approach in economic studies.

The study does not use recent data / deliberately does not use recent data

This is incorrect. The study uses the most recent data available, up to and including 2010 data, for all countries both in the modal share analysis and in the analysis of market concentration (based on the European Commission's most recent RMMS publication). The system costs analysis, which required a much more demanding data collection exercise, relies on data up to 2009 or 2010 for as many countries as was possible in the context of the project.

The study does not go back far enough in time to assess the effects of past reforms

This is incorrect. The study uses data sets starting in 1994 for both the system costs and modal share chapters so as to capture developments both before and after major reforms in each country. This time-frame is sufficient from a statistical perspective in order to pick up significant effects from given reforms, if such exist. For the market concentration analysis, a comparison is made between 2008

and 2010 because RMMS data is only collected for every second year, and the freight market was only open to competition EU-wide from 2007.

Why does the study include Japan? Japan is not comparable to Europe

First of all, the sample of countries analysed covers all of Europe, plus Korea and Japan. The results are not primarily driven by Japan, but by European cases that account for an overwhelming share of the data in the sample. This was verified mathematically by the research consortium: the model's parameters were re-estimated on a sample without Japan and Korea, and the findings and projection results were essentially unchanged.

Second, there is no serious argument *against* including non-EU countries in an econometric assessment of a question that concerns EU countries. Inclusion of other OECD countries, such as Japan, is very common in both academic research and policy studies carried out by international organisations such as the OECD and by national governments across a wide range of policy questions.

Third, the positive performances of the rail sectors of some non-EU countries of the OECD such as Switzerland and Japan are well-documented and may potentially hold useful lessons for policy-makers in the EU. There is no reason why such positive experiences should not be analysed.

Why did the team not gather data from members of EIM?

The study includes data for all the main infrastructure managers of Europe, including all the members of EIM, based on what they officially report to UIC. The consultants did not assume that EIM members make mistakes when reporting data about themselves to UIC.

The study focuses on the effects of separation for incumbents, not on country-wide effects

This is incorrect. For the modal share, state spending, and competition analyses, only total national data is used. For the analysis of system costs, infrastructure costs are included alongside operators' costs, and data for new entrants was included where available, with particularly detailed efforts on those countries that have a more atomised market structure (Great Britain and Sweden in particular). Further improvements can and should be made to the data sets, as is commonly done in any area of economic research. However the current research effort relies on considerably better data-sets than pre-existing studies and should rightly be seen as a step forward in the scientific understanding of the effects of vertical separation in the rail sector.

There are some data problems therefore the study should be ignored

The study's findings are wide-ranging and, overall, very resilient to individual data issues. Instead of relying on just one analytical exercise, the study investigates *four* different quantitative questions, in addition to reviewing a large body of pre-existing studies, and in addition to the development of a detailed qualitative analysis of the sector's value chain and of misalignment issues in the sector. Taken together, the findings from all of these different parts, and the findings from previous studies, point towards a clear and credible general conclusion: vertical separation is no silver bullet.

The study should be taken with a grain of salt because it was commissioned by an interested party

You might be surprised. The authors of the study intend to use the contents for purely academic publications in peer-reviewed scientific journals. Such an approach would be impossible in the context of most policy-related reports, and is testimony to CER's resolve to allow open and genuine inquiry on these important structural questions.

By focusing on "costs", the study neglects the "benefits" side of the equation – the exercise is incomplete

The mathematical modelling of costs accounts for size and scale effects, and is thus in effect an assessment of <u>**cost efficiency**</u>, which is a highly relevant measure of performance. Looking at *revenue per unit* as well is of course a sensible question, but this is much more problematic in the rail sector as compared to other industries due to significant differences between countries in terms of **price regulation**. Therefore this analysis was not carried out and is generally not carried out in other studies of the rail sector either, for the same reason. However, beyond the important question of cost efficiency, the study also looks at modal share performance, value-for-money for state budgets, and competition, so the overall performance of European rail sectors is assessed rather comprehensively – more so than in other studies.

Your result on density is really an argument about the number of interactions. Extending it, I would conclude that market opening is also bad because it multiplies the number of interactions between operators and the infrastructure manager

The finding is not primarily about transaction costs in the narrow sense but first and foremost about misalignment costs. So while total transaction costs may well be proportional to the number of interactions and therefore to the number of actors in a system, total misalignment costs is more likely to be proportional to traffic volume, or to revenues, or to costs.

The point is that every single decision in a badly aligned system will be economically sub-optimal from a whole-system viewpoint (e.g. total system cost viewpoint) – for instance the infrastructure manager handling maintenance decisions in a way that seems optimal for itself, but that is bad for operators and sub-optimal for the system as a whole. The total system-wide effect per route-kilometre of infrastructure is the sum of these economic losses (compared to a perfectly aligned system) from every individual decision of that nature. That total will depend on the intensity of use of the infrastructure, e.g. traffic volume per route-kilometre (**train density**, as used in the study), or possibly number of train runs per route-kilometre. It will not depend directly on the number of operators per se: there are rail systems with very few operators but a lot of traffic, and others with more operators but less traffic. The finding on density says that problems of misalignment may start to add up in a worrying way when there's more traffic on a given network, regardless of how many operators are contributing to the total level of traffic.

Since the study shows that vertical separation doesn't really matter, it's fine to do it anyway, it might help competition

EVES-Rail doesn't find that vertical separation doesn't matter. EVES-Rail specifically looks at what would likely happen if vertical separation were imposed throughout the EU and concludes that this would be a sub-optimal policy choice. Allowing each Member State free choice between a holding company model and vertical separation, on the other hand, would clearly be a superior policy. Furthermore the study also shows that competition does not function significantly better in fully separated systems as compared to holding model systems and that rail's modal share also doesn't fare better under either system when competition is made possible. Imposing vertical separation on an EU-wide basis would therefore lead to an increase in rail system costs, but for no added benefit.

As you cannot be certain about how and why density and share of freight drive costs differently under vertical separation, the results are probably spurious and should be ignored

On the contrary, the results are a wake-up call for the research community as well as for the policy-making community.

From the scientific perspective, EVES-Rail has tested the hypothesis that vertical separation affects rail system costs identically regardless of potentially relevant structural characteristics, and has found that this hypothesis should clearly be rejected. The burden of proof is now on those who may be sceptical of these results.

From the policy perspective, EVES-Rail provides serious evidence that a universal imposition of vertical separation would be sub-optimal compared to a policy of free choice between vertical separation and the holding company model. Those who are responsible for proposing structural change have a duty to carry out detailed cost-benefit analysis before reaching a decision. This approach would avoid adopting a policy that may raise costs in a given sector of the economy without any likely prospect of achieving benefits that could outweigh those extra costs.

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