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The Economics of EU Railway Reform

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** The author -currently employed by the European Commission- based the paper on his previous working experience within the Union of European Railway Industries (UNIFE). However, the views expressed in this article are those of the author and do not necessarily reflect the views of his previous employer.*

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Abstract

The EU began railway reform in earnest around the turn of the century. Two ‘railway packages’ have meanwhile been adopted amounting to a series of directives and a third package has been proposed. A range of complementary initiatives has been undertaken or is underway.

This BEEP Briefing inspects the main economic aspects of EU rail reform. After highlighting the dramatic loss of market share of rail since the 1960s, the case for reform is argued to rest on three arguments: the need for greater competitiveness of rail, promoting the (market driven) diversion of road haulage to rail as a step towards sustainable mobility in Europe, and an end to the disproportional claims on public budgets of Member States.

The core of the paper deals respectively with market failures in rail and in the internal market for rail services; the complex economic issues underlying vertical separation (unbundling) and pricing options; and the methods, potential and problems of introducing competition in rail freight and in passenger services. Market failures in the rail sector are several (natural monopoly, economies of density, safety and asymmetries of information), exacerbated by no less than 7 technical and legal barriers precluding the practical operation of an internal rail market. The EU choice to opt for vertical unbundling (with benefits similar in nature as in other network industries e.g. preventing opaque cross-subsidisation and greater cost revelation) risks the emergence of considerable coordination costs. The adoption of marginal cost pricing is problematic on economic grounds (drawbacks include arbitrary cost allocation rules in the presence of large economies of scope and relatively large common costs; a non-optimal incentive system, holding back the growth of freight services; possibly anti-competitive effects of two-part tariffs). Without further detailed harmonisation, it may also lead to many different systems in Member States, causing even greater distortions. Insofar as freight could develop into a competitive market, a combination of Ramsey pricing (given the incentive for service providers to keep market share) and price ceilings based on stand-alone costs might be superior in terms of competition, market growth and regulatory oversight. The incipient cooperative approach for path coordination and allocation is welcome but likely to be seriously insufficient.

The arguments to introduce competition, notably in freight, are valuable and many e.g. optimal cross-border services, quality differentiation as well as general quality improvement, larger scale for cost recovery and a decrease of rent seeking. Nevertheless, it is not correct to argue for the introduction of competition in rail *tout court*. It depends on the size of the market and on removing a host of barriers; it requires careful PSO definition and costing; also, coordination failures ought to be pre-empted. On the other hand, reform and competition cannot and should not be assessed in a static perspective. Conduct and cost structures will change with reform. Infrastructure and investment in technology are known to generate enormous potential for cost savings, especially when coupled with the EU interoperability programme. All this dynamism may well help to induce entry and further enlarge the (net) welfare gains from EU railway reform.

The paper ends with a few pointers for the way forward in EU rail reform.

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The Economics of EU Railway Reform

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Introduction

For almost two centuries railways have played a key role in the European economy in providing valuable transport backbones across the continent and facilitating, if not stimulating, great industrial revolutions. However, the last three decades have witnessed a continued loss in market share for rail passenger and especially for freight services in intermodal transport competition. To some extent this phenomenon can be explained by exogenous factors and trends. Nevertheless, one cannot fail to observe internal failures in the sector, causing it to be incapable to adjust and respond to market changes over a long period of time and to shift to new business models. Moreover, state subsidies to rail have become or remained very substantial: they are only second to agricultural expenditures.

After a lag, this unfortunate constellation has prompted a wave of national reforms aiming at:

- greater scrutiny of and changes in business models, such as incorporation or privatisation, targeted subsidies (better exposing inefficiencies), much greater price differentiation (peakload pricing, interregional differentiation, service quality differentiation), etc.
- introducing (EU-wide) competition, above all in freight services where the scope for doing so is considerable ; the idea behind the end of monopoly and exclusive rights is to generate powerful and lasting incentives for the improvement of structure and performance of the railways in the Union, hence its competitiveness and market share
- re-regulation the railways by focusing on market failures (such as natural monopoly, safety and asymmetric information) over the entire internal market, thereby replacing old, inefficient and fragmented regulation with its enormous costs to economy and society.

The paper discusses the economics of EU railway reform, currently in progress. After sketching the dramatic decline of rail, the basic case for reform is made in section 2. This case hinges on competitiveness, sustainability and (less) public money. We then proceed with the economic analysis of the sector, its market failures and its technical and economic barriers to entry in the incipient EU internal rail market in section 3. An economic understanding of the regulatory reform is facilitated by focusing first on vertical unbundling and the options for pricing (section 4) and, subsequently, on the introduction of competition (section 5). Directly linked to unbundling, we take a closer look at the considerable problems of effectively preventing cross-subsidisation (given a high share of common costs) and the (de) merits of marginal cost pricing, followed by a brief inspection of different options to obtain (full) cost recovery and cost transparency, and finally the coordination requirements for appropriate (cross-border) path allocation. In discussing the introduction of competition we focus on coordination costs, the prerequisites of welfare improving competition in rail and the nature of competition analysis derived from these considerations.

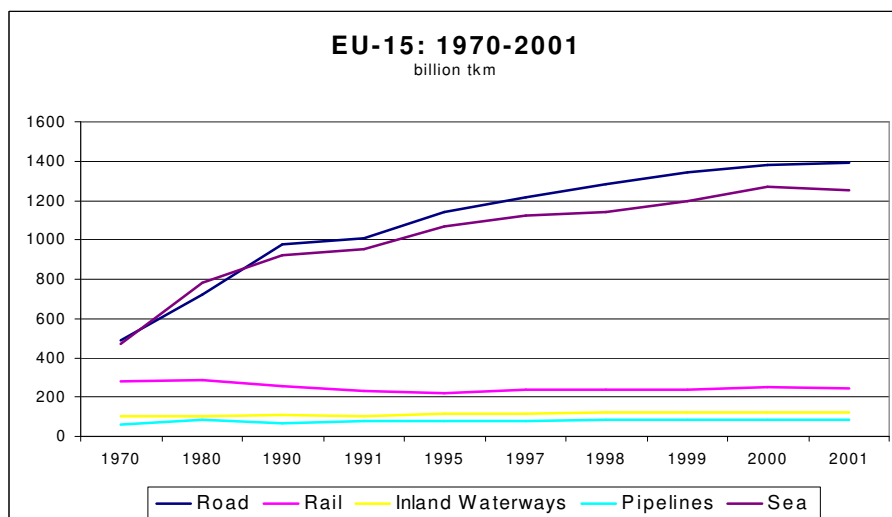
Section 6 summarizes the main conclusions and provides five additional pointers for the way forward in EU railway reform.

I – Highlights of EU railways decline

Railways in the EU are not at all doing well. The decline in market share is large and seems irreversible. Extrapolation would spell extinction for freight rather soon, and at best a static position in passenger rails, as a marginal player in transport. A few highlights exemplify the dramatic nature of these trends.

For the last 30 years, in the presence of steady passenger and freight transport growth of 2.5-3% annually in Europe, EU railway transport has been in steep decline. For the transport sector as a whole, growth was led by cross-border freight. The deepening of the internal market in the late 1980s and 1990s has reinforced this trend. However, the rail sector did not benefit from this development. In the case of freight transport, railways lost market share not only in relative but even in absolute terms. It is estimated that during the period 1990-2001, measured in tonnes/kilometres, freight transport in general rose by 25%, and road transport increased by 35% while rail freight transport *decreased* by 6%. During the period 1970-2001, rail's market share collapsed from 21% to 7.8%. (see figure 1)

Figure 1 - Growth and share of freight transport by modes between 1970 and 2001



European Commission - Energy & Transport in Figures 2003

The case of passenger transport is less dramatic but the trend is downward, too. During the period 1970-2001, rail's share in passenger transport decreased from 10% to 6%.

Table 1 - Passenger Transport Evolution in Europe.

	Passenger cars	Buses & Coaches	Tram + Metro	Railway	Air
1970	73.8	12.7	1.6	10.4	1.6
1980	76.1	11.8	1.2	8.4	2.5
1990	79.0	9.3	1.0	6.7	4.0
1991	78.8	9.3	1.1	6.8	4.1
1995	79.5	8.7	0.9	6.2	4.6
1996	79.3	8.8	0.9	6.3	4.7
1997	79.2	8.7	0.9	6.3	4.9
1998	79.1	8.6	0.9	6.2	5.2
1999	78.8	8.5	0.9	6.2	5.5
2000	78.1	8.6	1.0	6.4	5.9
2001	78.2	8.6	1.0	6.4	5.9

European Commission - Energy & Transport in Figures 2003

It is alarming to observe the incapacity of railways to absorb traffic demand in times of economic growth. The establishment of the Internal Market was accompanied by buoyant economic growth that only saw a halt in 2001. In the period between 1995 and 2001 the European economy's real GDP grew by a cumulative 16%. Over the same period, traffic units transported by rail grew by 11% for freight and 13% for passengers, pointing to the failure to capture potential markets¹.

The reasons for this loss (especially in freight transport) are diverse, some exogenous and some endogenous to the sector. Among the exogenous reasons, a long-run trend is the transformation of the European economy from an industrial to a service-based one. Within industry, a widespread adoption of just-in-time production processes has taken place, which inevitably entail flexible sourcing and adaptable transportation means. Besides these economic trends, one might consider as exogenous the impact of a strong policy preference (since World War II) and, later, individual preferences, for road-based transportation.

Endogenous reasons for rail not to perform adequately (see Table 2²) can be summarised in the almost total lack of adaptation to dynamic markets and changed customer requirements. Markets in the EU and their associated trade flows have increasingly become cross-border while rail services were always kept national. Agreements for international transshipments were concluded on an ad-hoc and bilateral basis, thus closely resembling the *bilateral agreements* that still characterise intercontinental air transport.³

¹ Study of the Financing of and Public Budget Contribution to Railways - NERA, December 2003

² EU-funded project RAILSERVE (EU Framework Programme 5th). In public hearings with established and potential rail customers and new entrants, the project identified a number of failures to comply with market demands due to the inflexibility and non-transparency of incumbent rail operators and to specific technological reasons.

³ A common quotation in the industry says that « once a freight wagon is outside the national border of the country of origin, it is technically lost ». Its management, punctuality and integrity rests under the responsibility of the other country's national railway. The result is a lack of incentives for a performant service. See also White & Pelkmans, 2000 (CEPS)

Table 2 - Reasons for the decline of rail transportation

Exogenous reasons	<ul style="list-style-type: none"> - Transformation of other industries <ul style="list-style-type: none"> ▪ From huge-stock-based to just-in-time production processes ▪ From low value/high volume to high value/small volume products - Policies and investments that favoured road transport instead of rail
Endogenous reasons	<ul style="list-style-type: none"> - Limited attention to customer care - Weak reliability and punctuality of shipments - Limited flexibility in trans-shipments - Fragmented cross-border services with delays at the frontiers (lack of interoperability) - Absence of cross-border cabotage - Lack of service integrators for optimised logistical chains - Traffic priorities allocated to passengers (unclear slot allocation management) - Lack of one-stop-shop in path allocation, cargo tracing and handling - lack of competition - non transparent cost structure on international corridors

Most of the complaints about rail services concern the lack of competitive pressure and the fragmentation of the EU railway market. The current market structure for railway services is indeed characterised by incumbent railway undertakings operating national networks and a number of regional and/or specialised shippers. Also, costs are seen as very high, hindering the intermodal shift to rail.

II - Addressing the rail crisis by deep EU reforms

The political agenda over the last decade has shifted towards encouraging a "revitalisation" of the railways as a transport option guaranteeing economic growth and sustainability. The rationale behind this reform consists of three objectives:

1. fostering the competitiveness of the rail transport system in Europe, while contributing to the Union's economic growth, and supporting and exploiting the internal market;
2. fostering a pattern of sustainable mobility.
3. reducing public expenditure by inducing better rail performance;

2.1 Will revitalised railways guarantee economic performance?

As in all utility sectors, among the main goals of railway reform is that of restoring competitiveness in the sector, in the form of reducing (X-) inefficiencies and introducing a higher degree of transparency in cost accounting as well as in business practices. Restoring competitiveness in the railways relies on two major *intermediate targets*: *a*) eliminating asymmetries vis-à-vis other transport sectors (thus, recapturing market share) through appropriate investment in necessary capacity and infrastructure and introducing a level-playing-field in access charging across modes; *b*) introducing reforms fostering liberalisation and competition where possible (so as to render the sector more efficient), and regulation where justified (thus, guaranteeing public service obligations and high safety standards).

As far as the first intermediate target is concerned, several studies have analysed whether a transport policy favouring railways (and waterway), is detrimental to economic growth or simply not coping with the current market requirements.

In some cases⁴, these studies have come to the conclusion that -given existing economic trends- policies promoting environment-friendly modes of transport would slow down the economy.

However, some other streams of research show -by using more systemic approaches - that a *virtuous circle* can be established inducing railways to react dynamically to a changed regulatory environment, thus capturing market share, improving performance and prompting economic development and transport sustainability. These studies find that "although the demand evolution is clearly tending towards increasing individuality and flexibility, there exist large and growing market segments for railway transport, in particular within and between large agglomerations as well as in long distance traffic along European corridors"⁵. For these market segments to be exploited fully (intermediate target *b*), organisational structures of the railway companies in Europe have to be changed substantially and innovative transport policies aimed at rebalancing the current situation need to be introduced. These policies would include the establishment of a level-playing field in infrastructure charging and a transfer of investment funding from less environment-friendly modes to more sustainable modes through taxation and access levies⁶. The overall belief is that "a consistent common transport policy, fostering rail and limiting the public support for road, after a period of adjustment, will end up in a higher acceptance of the rail mode"⁷, thus reinforcing change.

It has been also argued that when a coherent set of policies is established so as to promote investments in rail and raise their acceptance and performance, many regions will enjoy positive impacts⁸.

2.2 Will railways deliver sustainability?

A more efficient rail sector in a properly functioning internal market could contribute to alleviate problems of congestion and meet safety and environmental concerns. The IWW/INFRAS study (2000) calculated that external costs of transport have reached a level of 7.8% of EU GDP. These are associated with high-risk accidents, environmental damage and massive energy consumption⁹. The revitalisation of railways as an alternative transport mode to more polluting ones is deemed fundamental for the future of Transport in Europe¹⁰. Railways are seen as a valuable resource once efficient use is stimulated by market reforms. In this context, railways could potentially resume their traditional role of backbone high-density transport system. If these presumptions prove to be correct, railways could help a development towards sustainable transport growth, while actively contributing to a modal shift from road to rail.

2.3 Reforming railways for the benefit of public budgets?

⁴ IAW (1997) or Baum (1997), quoted in Werner Rothengatter - *Ibidem*

⁵ Rothengatter, 2001

⁶ UNIFE, UIC, CER, UITP - *Ibidem*

⁷ Rothengatter - *Ibidem*

⁸ Rothengatter (*Ibidem*) calculated economic multipliers of investments in transport infrastructure with times horizons of 2016 and 2026 showing positive economic impact of investment in rail as compared to road, once a consistent set of regulatory reforms and measures ensuring level-playing field across modes are introduced. - One major development from the belief in the revitalisation of railways and their positive impact over the economy has been the High Level Group on the Trans-European Transport Network Report chaired by former Commissioner Karel Van Miert advising the European Commission to promote investment in railways in the revision of the TENs programmes. Its report was published on 27 June 2003. Source: http://www.europa.eu.int/comm/ten/transport/revision/hlg_en.htm

⁹ UIC, UNIFE, CER, UITP, 2002.

¹⁰ European Commission - White Paper on Transport Policy for 2010. Time to decide - [COM \(2001\) 0370](#)

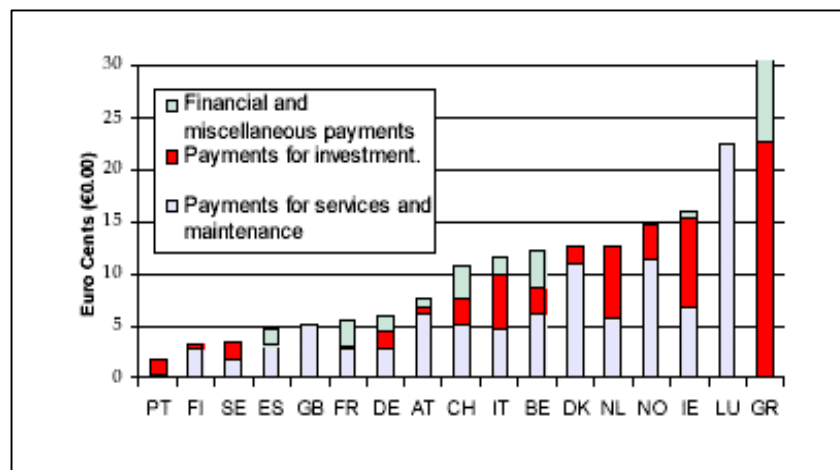
The third reason that has prompted a thorough reform of railway regulation in Europe is the heavy financial burden of railways on public expenditures. It is estimated that railways subsidies are second only to expenses related to agricultural policy.

A recent study for the European Commission¹¹ has improved the quality of information on the estimated size and destination of public budget contributions to railways by country for the year 2001. The problems of comparability and sourcing have proved difficult to overcome. Part of this budget is provided to railways in the form of state aids¹².

The details of the public budget country data are not of concern for this paper. Public Service Obligations (=PSO) subsidies differ enormously between countries (even if corrected for country size) dependent on the definition of the PSO, the geography and relative density of the country and other factors. Infrastructure costs and investments make up a considerable share in most countries (with Italy as a high out-lyer with euro 5 billion), often 30 %-50 % or higher. Seven countries still engage in debt restructuring in 2001 (and France and Belgium in special pension obligations).

The rationale for providing public support whether in the form of investment or state aids, is common to other utilities and is found in market failures or public service obligations (e.g. transport operators would provide only cherry-picking services if not funded in remote regions or via PSOs). These funds are also used to cover substantial investment costs (e.g. quality of infrastructure and safety), the private provision of which would not yield sufficient return on investment. State aids in the railway have an ambiguous effect on efficiency¹³. On the one hand state aids can induce an improvement of efficiency. On the other hand, if the intensity of state aids lowering operating costs, is too high, they will eventually reduce productive (or X-) efficiency by relieving operating costs. State aids are, therefore, best used when they catalyse private resources, when they are kept at low intensity levels and when they are combined with private funds while acting in a dynamic business environment.

**Figure 2 - Public Budget
Payments per traffic unit [passenger/tonne]
(2001)¹**



¹¹ NERA - Study of the Financing of and Public Budget Contribution to Railways - December 2003 available on: <http://www.europa.eu.int/comm/transport/rail/research/doc/nera2004-final.pdf>

¹² Part of the public budget is declared as state aids. The magnitude of these aids is deemed to be around €25 to€ 30 billion per year in the EU

¹³ H.W. Friederiszick*, L.-H. Roller and C.C. Shultz, 2003

The trend towards a rationalisation of public expenditures in railways is even better understood once due account is taken of the size of subsidies that national railways receive for the provision of required services. This often hovers between 50 % and 65 % of total turnover for passenger services. Hence, one observes a substantial pressure on governments to reduce budgetary expenditures, by seeking reforms promising to improve performance.

Conscious of the huge amount of public funding for railway services, combined with the overall decline of railway market-share, European policy-makers have reconsidered the effectiveness of these expenditures and favour a radically new framework aimed at better utilisation of public money. (more 'value for money')

Mixed results from early reformers (e.g. UK) induced the EU to pursue a step-by-step reform summarised as follows.

The three steps of railway reform

The European Commission has adopted a step-by-step approach, which has materialised through three stages of regulation and liberalisation. The first one has been established by Directive 91/440 on the accounting separation between infrastructure and operations. This Directive was complemented by a follow-up in 1995 (Council Directive 95/18/EC) on the licensing of railway undertakings and one on allocation of railway infrastructure capacity and the levying of charges (95/19/EC). The follow-up was a timid attempt to introduce open access in the limited forms of international access through "international groupings" of railway undertakings (mainly incumbents). A second step of reforms at EU level, which entered into force on 15 March 2003, goes under the name of the First Railway Package. The first railway package, though only referring to rail freight, represents an attempt of liberalising the sector through the introduction of open access and forms of head-on competition at least on the TERFN (50% of EU railway networks and 80% of traffic) and later on the whole network (by 2006 according to the recently approved Second Railway Package). However, a number of technical directives had to be added so as to eliminate technical and legal barriers. This has been accomplished with the Directives on Interoperability of High-Speed (96/48) and Conventional rail (2001/16). A third step of reforms was made with the second railway package (2004, see note 48): a directive for the harmonisation of safety requirements and certifications that are currently different in all Member States, and a regulation for the creation of a European Railway Agency for Safety and Interoperability (See Box 3). The completion of EU liberalisation and regulation is pursued with the (pending) approval of the proposed third railway package that includes passenger service liberalisation by 2010, harmonisation of train drivers' licenses, the inclusion of passenger rights requirements and freight service quality.

III - Market failures in European railways

An economic analysis of the emerging EU railway services market has to begin with a proper understanding of three main characteristics:

- a. the multi-service / multi-purpose nature of railway in Europe, giving rise to significant economies of scale and scope;
- b. railway service provision is depending on the existence of a fixed, costly and very specific infrastructure giving rise to *natural monopoly*, because these costs are largely sunk;
- c. the existence of numerous technical and legal barriers to entry.

These features discourage cost transparency and efficient allocation of resources, imply huge economies of scale and scope, put a premium on coordination based on vertical integration while greatly reducing the room for competition in the sector. We shall explain each characteristic briefly

3.1 - Economies of scope, and intermodality

Railway service provision in Europe is characterised by its *multi-product nature*. The major business lines for the railways are sub-divided in two categories:

- a. Freight
- b. Passengers

with a number of specific services. The demarcation is often clear, although modest degrees of substitutability or complementarity can be found in the business lines listed in Table 3.

In the freight domain, major business lines include the traditional transportation of bulky products (coal, raw materials, oil, chemicals, wood and derivatives, steel and metal profiles, cars and heavy machines). Originally the core of railway services, increasing competition and substitutability from other modes (pipelines, waterways, road) have gradually reduced profit margins and market share. Possible inter-modal complementarity still exists and is encouraged. However, without proper business plans inter-modal competition or complementarity failed to deliver efficiency¹⁴. Even more problems arose in the area of parcel / small volumes (fast deliveries, food stock), where flexibility and tailor-made solutions for customers are important competitive requirements. Thus far, railways have, more often than not, failed to respond to such customer demands. Thus, a broad consensus has emerged that in such railway markets, the introduction of intra-modal competition (between different railway competitors) might prove useful to increase efficiency and customer satisfaction.

In the passenger area, two major markets can be distinguished. On the one hand the long-distance services (intercity and high-speed services) with a degree of substitutability (hence competition) with other modes (road-air) and with some possibility to host degrees of intra-modal competition depending on the scale and density of the market. On the other hand, commuter line markets (urban and regional services) where a better complementarity with other modes of transport might result in *sustainable solutions*, but where intra-modal competition is likely to produce diseconomies of scale and scope.

The complex web of services is also subject to substantial network effects that increase the value of services the more interconnections can be guaranteed across hubs. Therefore, the railway system does not escape the *hubs-and-spokes* architecture that is common to other transport networks.

As we shall see, the fact that a complex bundle of services can be offered over the same network and potentially by the same companies has substantial implications for cost-accountancy, transparency and efficient functioning of railways.

¹⁴ "For a number of reasons, inter-modal competition is distorted and it does not exercise the same disciplinary force on the railway operator as competition within the same market. For instance, on the one hand, road transport is treated favourably in that at least part of the infrastructure is paid for by governments. On the other hand, given that they are permanently loss making, rail companies have a "soft budget constraint" as they can rely on being bailed out by the government". See Stehmann (2001)

Table 3 - Multi-product nature of railways

Freight Transport		Network effects
Types of transport	Substitutibility / Complementarity	
- Bulk (coal, raw materials, oil, chemicals, wood and derivatives, steel and metal profiles, cars and heavy machines)	<ul style="list-style-type: none"> ▪ Inter-modal substitutibility (pipelines, waterways, road) ▪ Possible inter-modal complementarity ▪ Intra-modal competition 	
- Parcel/postal (small volumes, fast deliveries, food stock)	<ul style="list-style-type: none"> ▪ Inter-modal substitutibility (waterways, road) 	
- dedicated (food; foodstock)	<ul style="list-style-type: none"> ▪ Intra-modal substitutibility 	
Passenger Transport		
Types of transport	Substitutibility / Complementarity	
- Long-distance <ul style="list-style-type: none"> ▪ Inter-city ▪ High-Speed 	Intra-modal substitutibility and inter-modal substitutibility (depending on elasticity to price and time)	
- Commuter rail <ul style="list-style-type: none"> ▪ Urban ▪ Sub-urban/regional 	Possible complementarity with other modes	

3.2 – Sectoral Market failures in railways

In discussing railways market failures in Europe it is necessary to distinguish market failures related to infrastructure, and those of railways network services, from the many entrenched barriers in the EU internal market (see 3.3)

3.2.1 - Railway infrastructure as an essential facility

High sunk costs for the establishment of a railway network result in the economic impossibility to duplicate or build alternative routes. Current benchmarks suggest that 1 Km railway track is costing between €6 million and €10 million depending on topographical conditions. The only case of railway network competition can be found on parallel routes in North America connecting the Eastern and Western Coasts whereby high capacity freight lines and large volumes seem to justify duplication. As a rule, however, railway networks de facto compete with alternative modes of transport (road, sea-shipping, airlines and waterways networks). It is justified to consider infrastructure in railways as an essential facility for the performance of railway services¹⁵.

¹⁵ Essential Facility is a facility or infrastructure, which is necessary for reaching customers and/or enabling competitors to carry on their business. A facility is essential if its duplication is impossible or extremely difficult due to physical, geographical, legal or economic constraints. Take for example a national electricity power grid used by various electricity producers to reach the final consumers: Since it

Costs of infrastructure amount to roughly 50 per cent of the railway business¹⁶. Duplication is not a reasonable economic option. Infrastructure managers in Europe spend annually around Euro 30 billion for their roughly 200000 km railway infrastructure.

A closer study of infrastructure shows immediately that one ought to take into account a range of characteristics and local or specific circumstances, before cost benchmarking is appropriate. First, one has to analyse the breakdown of overall costs into four cost categories.

- a. Tracks
- b. Signalling systems (ground-based, visual, electronic systems and related equipment)
- c. Overhead electricity grid
- d. Stations and marshalling points

The needs, hence costs, may differ per category, between countries, let alone continents, and depend (e.g.) on diversity, levels of safety and (desired) comfort; etc.. Second, the history, including depreciation of previous investments, of a network matters a great deal. The € 30 billion annual spending is used (in varying degrees) for (a) construction (some € 10 billion) & mortgage, (b) maintenance some € 6-7 billion and (c) renewals. Third, the construction costs for railway infrastructure varies depending on topographical conditions and the nature of traffic that is going to be performed on the network. A network which is dedicated to freight with lower safety requirements than passenger networks and little need for smooth travelling conditions is far less costly than a double service network (passenger and freight with different overlapping priority schemes as the European one), let alone a high-speed passenger network.

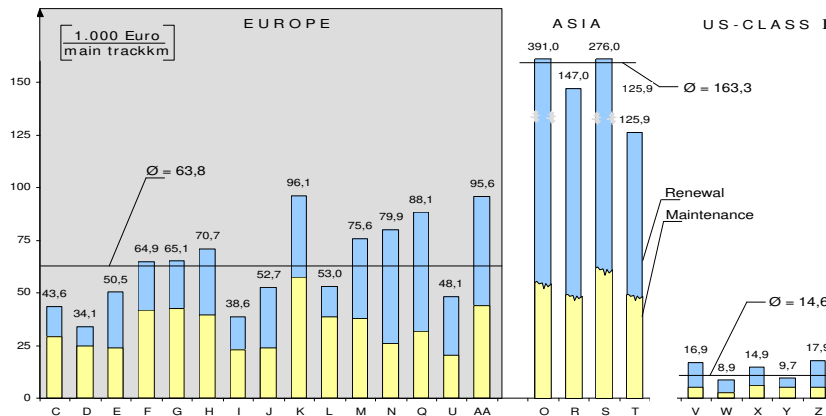
Only when carefully considering all these characteristics and determinants, can infrastructure costs be usefully compared. The enormous variation in infrastructure costs between countries and (three) continents can be read from Box 1. It is mistaken to conclude from such cost discrepancies that infrastructure competition would be economically justified. At the same time, it does show the major difficulties for regulators or governments establishing proper minimum-cost guidelines for infrastructure, and the access charges eventually derived from them.

(footnote 15, continue) would not be viable for these producers to build their own distribution network, they depend on access to the existing infrastructure. Denying access to an essential facility may be considered an abuse of a dominant position by the entity controlling it, in particular where it prevents competition in a downstream market. (http://www.europa.eu.int/comm/competition/general_info/e_en.html#t69)

¹⁶ According to Bente, 2003.

Box 1 - Benchmarking railway infrastructures

In the following graph from the INFRACOST study¹⁷ a benchmark was performed across several infrastructures world wide (indicated by random letters for confidentiality purposes) in terms of annual costs for maintenance and renewal costs per track/km.



It can be noted that the European average cost for maintenance and renewals amounts to an annual average of €63800 per track/km compared to the very low €14600 per track/km in the US.

The main reason for higher costs on infrastructure in the EU consists in the double nature of performed traffic (freight and passengers) and the inevitably higher technical requirements for combining both services. Besides, those costs are also linked to heavier social and public service roles that European railways traditionally fulfil. The lower cost in the US networks is mainly due to the almost exclusive priority given to freight in comparison to passengers and the huge economies of scale and scope recouped over a continental network. Higher costs are shown in Asia including heavy renewal investments in developing countries and very costly but highly performing passenger dedicated networks in Japan.

In most cases the variations around the average line are not only results of internal productivity or management choices, but also follow from outsourcing of non-core activities and proper contractual schemes.

3.2.2 - Rail services and market failures

We shall briefly point to network externalities, to economies of density, scale and scope, and to asymmetries of information.

Railway services tend to be subject to economies of density. When holding the route system or kilometres of rail line constant, unit costs of rail services decline as output increases. Thus, the size of the firm has little to do with it: a small firm only serving one or a few routes with high traffic density might well have lower average costs than a large firm, running a network including lines with low density traffic. The sources of economies of density are usually two: declining average capital costs per unit of service (with high turnover) and a fall in unit operating costs per route-kilometre (maintenance of way and of rolling stock, fuel and crew) with high

¹⁷ UIC INFRACOST - Improved Performance of Infrastructure by Benchmarking the Infrastructure Costs – Union Internationale de Chemin de Fer (UIC), 2001

turnover. In the extreme a route might become a 'natural monopoly', that is, it is cost-minimising if only a single firm serves it. Moreover, if high-density tracks are doubled, capacity substantially more than doubles and if traffic demand is high enough, the average costs of such a route are likely to fall. A similar cost-reducing effect (in passenger services) might be expected if double-deck trains replace ordinary trains, even if quality is likely to improve, in turn attracting even more traffic.

The existence of *indivisibilities in inputs and outputs* makes the expansion of networks and services for the railway industry efficient only if performed in absolute discrete order. Capital units (tracks, stations) can only be expanded in discrete, indivisible increments, while demand fluctuates *marginally* in much smaller units. Consequently, increases (decreases) in supply can exceed increases (decreases) in demand, resulting in excess or shortage of capacity on specific routes.

The expansion of a specific route adds value to the network only over distances of substantial lengths (e.g. 100-200km, unless smaller feeder lines are at stake)¹⁸.

"This feature has several important implications for investment and pricing. The transportation costs of an additional unit of traffic (freight or passengers) may be insignificant when capacity is idle, but they may become substantial when the capital is being used to its fullest".¹⁹

Further difficulties of marginally allocating costs to specific businesses, services or investments are linked to the costs and management of infrastructure maintenance and renewal. Especially renewal is very rarely done on the overall length of lines. This phenomenon, caused by the high burden of costs for renewal, leads to complications for the system by accumulating several layers of technological solutions, in turn increasing the level of sunk costs involved in the infrastructure.

These structural characteristics (network effects, high sunk costs, density effects) require appropriate regulation, incentive schemes and performance monitoring. Needless to say this is far from easy as sections 4 and 5 will show.

One of the major features for railway infrastructure is the high ratio of fixed to marginal costs. According to studies and industry sources fixed costs for infrastructure account on average for about 90 per cent of total infrastructure costs as reflected in average access fee structure.²⁰

This implies that:

- huge economies of scale are needed so as to recover costs efficiently (hence, for principal lines, this might serve as an argument to enlarge the scale of existing network operations through a pan-European dimension and the Trans-European Networks for rail)
- a certain degree of cross-subsidisation of routes could occur unless specific contracts are concluded for services of general interest or
- that a certain level of subsidy will also be needed for PSOs.

This has several implications from a regulatory and economic point of view. It may prompt understandable questions about privatisation and liberalisation of such a monopoly's very

¹⁸ This is also true for train-sets. Train-sets' capacity can only be increased on discrete units (by adding an entire wagon or coach) and not marginally.

¹⁹ Campos and Cantos, June 2000 (14721) p. 211

²⁰ Campos and Cantos - *Ibidem*

intrusive regulation. For instance in a principal/agent theoretical setting, one could argue what is the real meaning of privatising such a monopoly if it has to be heavily regulated in terms of safety and price caps and what is the role of the owner not being free of charging for his/her assets and combining his/her assets in the most appropriate way for profit maximisation (see also further)

*Asymmetric information*²¹ may hit rail consumers as well as rail regulators. The latter refers to the way *cost accountancy* is performed, thus, the risks of heavy *cross-subsidisation* given the traditionally integrated nature of networks and services. As we shall see, this has implications when attempts of separating infrastructures and operations are made. The technical complexities of the system and the management culture creates further hindrances to overcome the market failure. Full clarity is required, however, since separation of infrastructure from rail operations is known to cause considerable coordination failures. It is said that due to *knowledge accumulation* and safety concerns, railways would be better managed through a single vertically integrated company embracing the overall value chain.

But full integration would have the effect of foreclosing competition in services. Only by overcoming asymmetries of information can one properly assess the costs and benefits of competitive options for reform.

In the following table 4, a summary of market failures and intrinsic features of the railway system is presented.

Table 4 - Features and Market Failures of Railway Systems

Railway System	Typology	Effects
Features and Market failures		
<i>Natural Monopoly</i> (essential facility)	High Sunk Costs in Infrastructure – Construction	<ul style="list-style-type: none"> ▪ Non-duplication of infrastructure ▪ Non-competition among infrastructures (safe North America) ▪ If vertically controlled, risk of barrier to entry
	High Maintenance Costs	<ul style="list-style-type: none"> ▪ Costs have long-run perspective
	Renewal Costs	<ul style="list-style-type: none"> ▪ Renewal in discrete units ▪ Possible complication of the system
<i>Network Externalities and density affects</i>	Positive network externalities	<ul style="list-style-type: none"> ▪ Value increases with increase of routes length ▪ Doubling infrastructure substantially more than doubles capacity
	Asset indivisibility	<ul style="list-style-type: none"> ▪ Positive externalities in the value of carrying extra units of transport ▪ Negative externalities in non marginal adjustments of supply and demand (non <i>Marginal adaptability of capacity</i>) ▪ Excess capacity OR Bottlenecks
<i>Public good</i>	Safety aspects	<ul style="list-style-type: none"> ▪ Widespread benefit / non-marginal cost allocation

²¹ *Asymmetric information* refers to costs and benefits of a transaction that the parties to the transaction have not accounted for in the terms of exchange. It is about disparities in information customers and suppliers have concerning the quality, the price/quality combination and the characteristics of the exchanged good or service. The less informed party will make suboptimal choices, which results in an inefficient market allocation. Regulation may help if it obliges companies to publicly assess the quality and features of their products and to comply with some basic requirements. Asymmetric information also exists between the regulator and the regulated (the railway company), especially as to costs.

<i>Public good (continue)</i>	Safety aspects (<i>continue</i>) Public Service Obligations (PSOs)	<ul style="list-style-type: none"> ▪ Essential requirement. Acceptance of risks. Heavy technological burden for risk reduction ▪ non-appropriability and non-excludability (of consumption)
<i>Economies of scale and scope</i>	High level of fixed costs to total costs (roughly 90%) of infrastructure. Average cost curves flat on high volumes.	<ul style="list-style-type: none"> ▪ Fewness of market players ▪ Monopolistic behaviour ▪ Difficult entry into market ▪ Inflexibility
<i>Asymmetric information</i>	Presence of high share of common costs. Difficulty to assess “true costs”. Knowledge accumulation in the sector.	<ul style="list-style-type: none"> ▪ Difficult cost apportionment ▪ Possible regulatory capture

3.3 Additional Failures of the EU Internal Rail Market

Traditional railway undertakings have also enjoyed a monopoly position in the EU, because of existing high technical and legal barriers to entry. If such barriers were to persist they would greatly strengthen market power in a liberalised environment.

We shall briefly discuss six barriers.

3.3.1 Fragmented license scheme

Up to date about 360 railway licenses have been issued in the EU15²². Until the implementation of the first railway package, the only licensed railway undertakings for trans-European services were the incumbent national operators. Their operations on a cross-border basis were guaranteed by contracts resembling “bilateral agreements” in the airline sector or through the setting up of international consortia of national operators. The quoted directives²³ introduced in several steps a scheme whereby National Rail Regulatory Authorities release (freight) licenses which provide for the right to operate within the TERFN (Second Railway Package) and on the overall EU network with the possibility of cabotage (Third Railway Package, not yet adopted). Licenses are issued on the basis of professional, financial and safety related records of the licensee. However, once given, a license does not automatically lead to entry. Especially disparate safety rules and cultures may represent a hindrance to entry. Also fears are expressed in public hearings and publications²⁴ about issuing bodies being captured by existing railway undertakings.

3.3.2 Lack of interoperability

Interoperability refers to the ability of any railway undertakings to run their vehicles on any part of the European Railway network seamlessly. Existing railway networks were designed so as to satisfy national transportation needs. The upshot at the EU level is a patchwork of national systems, in turn increasing complexities and costs for seamless operations. Differences include: gauge width, electrical voltages, signalling systems, platform dimensions, loading parameters, operational rules and training. Directives 96/48/EC and 2001/16/EC respectively for high-speed and conventional rail networks have established a regulatory framework for the harmonisation of technical rules. Industry estimates reckon that total cost savings due to fully-fledged interoperability and a higher degree of technical harmonisation could be in the order of 30-40 per cent on the total value

²² European Commission – DG TREN - http://europa.eu.int/comm/transport/rail/countries/be/licence_en.htm. Some of the mentioned licenses also include urban, passenger and regional rail licenses.

²³ Esp. Directive 2001/13/EC

²⁴ Claeys, Santini & Vergamini, 2002

chain costs (equipment, operations, maintenance)²⁵. These huge gains will thus greatly facilitate the exploitation of the internal rail market²⁶.

3.3.3 Train drivers licenses

The Commission has recently proposed mutual recognition of train driver's licenses and the establishment of common training patterns²⁷. In the EU-15 there are 200 000 train drivers.

3.3.4 Locomotives and absence of leasing

There are a number of shippers that privately own freight wagons. However, they never competed with the established railway undertakings, since they had to use the incumbents' traction for providing shipment services. Traction is essential for the provision of railway services. It is provided in the form of railway locomotives whose purchase cost can be relatively high for a new entrant. Helped by ongoing technical harmonisation, - and despite some weaknesses in the leasing markets - interoperable locomotives are being increasingly leased from suppliers (Alstom Transport, Bombardier Transportation, Siemens Transportation, General Motors, General Electric) or from emerging rolling stock under availability contracts (HSBC Rail, Angel Trains etc.). However, at present, the market for leasing is still crippled by the lack of technical interoperability of locomotives and the need for multiple conformity assessment that reduces the opportunities from reselling the equipment in second-hand markets. Suitable second-hand locomotives are often not available²⁸. The purchase of a second hand locomotive from a foreign undertaking does not offer an option as the procedure to adapt the locomotive to the national technical standards and to obtain a "general admission" would cost almost as much as the locomotive itself. New locomotives are prohibitively expensive for a new entrant²⁹.

3.3.5 Priority allocation and safety systems

The European conventional railway system –with the exception of dedicated high-speed rail for passengers- is characterised by a *dual use* (for both passengers and freight). According to the principle that "passengers vote, goods don't", one of the major challenges for the revitalisation of freight transport on rail is finding the right priority allocation schemes in a plethora of multi-purpose services. Rail freight is often subject to a "second priority" allocation in slots on a national basis. One of the major challenges (to be addressed by the RailNet Europe initiative) is to improve the coordination of national infrastructure managers so as to provide for necessary train paths in a "one-stop-shop" logic. This procedure is combined with the possibility of monitoring train path allocation

²⁵ UNIFE - 2000

²⁶ A technological revolution in railway interoperability could be unleashed through the progressive instalment of ERTMS (European Railway Traffic Management System) that would allow for a common signalling and communication protocol, thus saving high costs in multi-signalling locomotives and increasing capacity on the network by 30 per cent. ERTMS is a European effort that parallels similar attempts to interface communication systems such as GSM (there is also a GSM application for rail GSM-R), Galileo and Eurocontrol. ERTMS and its different levels of integration could allow for automatic translations of ground-based radio signals and for automatic train control (safety braking, track clearance, dispatching) while carrying secondary information packages for tracing and tracking and providing for added value services for freight and passengers. Sources: Strategic Railway Research Agenda, ERRAC (European Rail Research Advisory Council), 2003; UNIFE, 2000; UNISIG (Grouping of European Railway Signaling Companies and developers of ERTMS)

²⁷ Together with proposed regulations, forms of [0]self-regulatory approaches are also introduced (e.g. in operational rules)

²⁸ For instance, most second hand locomotives only have Diesel engines. Such engines cannot be used for passenger transport as they cannot provide electricity for air-condition and heating.

²⁹ "Since locomotives have very high fixed cost, their acquisition makes economic sense only if the railway undertaking can benefit from economies of scale, i.e. if it can provide a sufficient number of services. Given the need for a back-up service in the case of repair, railway companies operate with a pool of locomotives. Such a pool offers the necessary flexibility to obtain a locomotive on short notice if a new service has to be provided. It also reduces significantly the overall cost of locomotives left idle to provide back-up. A company which operates a pool of locomotives may need 5 locomotives to provide back-up for 50 locomotives in operation. Thus, about 10 per cent of locomotives would be out of use. A new entrant which at the beginning operates only on one route would need one locomotive to operate and another one to provide the back-up. Thus, in its case 50 per cent of its investment into locomotives would remain idle. Similar reasoning applies as well to drivers. Thus, given important economies of scale in the railway sector, until they have reached a "critical mass" of services, new entrants depend on obtaining traction elsewhere". Stehmann - *Ibidem*.

following the potential capability identified in *Network Statements*. Such statements are compulsory under DIR 2001/14 and available for new entrants, too.

3.3.6 *Hindrances to cabotage*

Cabotage is the transport of goods or people wholly within one country by operators established in another country. This would allow domestic services performed by a foreign operator and would imply competitive pressure, presumably leading to higher efficiency of rail transport. Full cabotage was allowed for road haulage from 1 July 1998. After cabotage services emerged in road haulage, the sector reorganised itself to capture all possible goods flows over Europe, thus optimising capacity utilisation to the full. Nothing like this is yet happening in rail. It is said that almost 50 per cent of freight wagons are travelling empty with major economic losses and inefficiencies for the final user. The absence of cabotage is due to technical reasons (weakness in track and tracing solutions) and non-competitive practices.

Until these barriers are removed, entry costs for competitive service providers will remain high and final consumers will not often consider rail services as ‘value for money’. As a result, rail freight will not be able to recapture original market share, leaving goods traffic to be performed first and foremost by the direct competitor (road haulage).

IV - Regulatory reform I: vertical separation and pricing options

Not unlike in other network industries (Pelkmans, 2001b), vertical separation or unbundling was viewed by many as an inevitable first step of reforms pursuing greater efficiency. Vertical separation was deemed necessary to discover the “true” costs of running the railway business and the “necessary” subsidy level to allow safe and reliable infrastructure. By allowing for vertical separation, subsidisation between networks and operations should become clear thanks to cost transparency for incumbents. Removing and preventing cross-subsidisation, in turn, creates fair conditions for potential entrants. Ideally, too, vertical separation helps reducing the asymmetries of information in the railway business, traditionally prone to hide cost structures and discourage performance. Table 5 summarises the types of asymmetries of information that are expected to be reduced or overcome by introducing vertical separation.

Table 5- Typical asymmetries of information in the railway business

<i>Asymmetries of information</i>	<i>Infrastructure</i>	<i>Service provision</i>
Cost accountancy	<ul style="list-style-type: none"> - Cross-subsidisation between infrastructure and operation - Cross-subsidisation between highly and scarcely used routes - Lack of knowledge of asset values and cost structure - Rent-seeking [positions] - Multi-part access tariff 	<ul style="list-style-type: none"> - Cross-subsidisation between passenger and freight services - Cross-subsidisation between services based on PSOs and commercial services - “appropriate” marginal cost pricing
Knowledge accumulation	<ul style="list-style-type: none"> - Highly concentrated knowledge controlled by incumbents can impede entry - Possible regulatory capture (e.g. in issuing access rights) 	<ul style="list-style-type: none"> - Highly concentrated knowledge of the system in the hands of incumbents - Possible Regulatory capture of railway bodies in issuing licensing

4.1 - Introducing vertical separation and service unbundling

Opting for the separation of rail infrastructure from services has been controversial and, as experience shows, has not led to clear-cut conclusions. The railway sector, with its web of technological legacies and inter-dependencies, and given large *economies of scope*, can make a powerful case for tight coordination of its components (not least in the safety area!). Outside Europe, railway systems have opted for a structure whereby dominant operators also retain the control over infrastructure and separately charge for the “incremental users” (new entrants). This is the case for Amtrak (US), Via Rail (Canada) and the Japan Rail Freight Corporation.

In principle, the system might work effectively if fair conditions are applied to incremental users and if investment plans of the incumbents also include new entrants’ needs. As Thompson (200) puts it: "There are benefits to having the dominant user retain control over infrastructure. First, the performance of the incremental users [new entrants] is clarified and, assuming reasonable access fees, their operations strengthened. Second, the potential risk of disruption due to coordination problems between infrastructure provider and dominant operator is reduced – important when the dominant operator plays a significant role in the country’s transport. Moreover, the infrastructure investment program can potentially be better coordinated with the primary user. The disadvantage is that the incremental operators [new entrants] may not be fully integrated into investment planning, and they survive at the (sometimes questionable) mercy of the dominant operator – risking reduced service reliability, increased costs and possible safety hazards for the incremental operators".

Of course, how exactly the latter has to be operationalised, is far from easy to answer. The system might fail however, once the market is fragmented along national borders, when it is too small to allow for –at least- fringe competition and if access fees are imposed with unfair conditions.

Through Directives 91/440/EC and 14/2001, the EU introduced and reinforced the principle of separation between infrastructure and operations. The EU directives oblige national railway systems to implement *vertical unbundling*. This unbundling requires separate companies (Germany, Italy, France), but not necessarily separate ownership (UK and Sweden). Whether this choice implies gains depends on whether *allocational economies* from independent control of access are larger than *infrastructure economies of scope* deriving from vertically managing a system that has grown complex over the last two centuries.³⁰ The drive towards *unbundling* in the EU is meant to enable full transparency and understanding of the following cost lines:

- costs related to public services obligations
- sunk costs for construction of infrastructure
- costs for maintenance³¹
- costs of infrastructure management and paths allocation

These costs include a *fixed* component independent from the provision of services and associated with the mere existence of infrastructure (construction, preservation, amortisation costs) and a *variable* component that is linked to the provision of services and is incremental with the extra units of service provided (e.g. adding a new end-to-end freight haul will require some extra labour force, marshalling facilities and storage, handling machines utilisation, energy etc.). It is estimated that the *variable component* only accounts for about 9 per cent of total costs³². The other costs are of a fixed nature and refer to accumulated investments, necessary renewals and maintenance discounted over time.

³⁰ Joy, 2002

³¹ Maintenance services are still mainly in the hands of national railway incumbent and on safety and business grounds, national maintenance markets tend to be heavily protected with the outsourcing on a European scale, thus increasing costs and reducing opportunities for business optimisation on a larger scale.

³² Javier Campos and Pedro Cantos - *Ibidem*

The *multipurpose-multiservice nature* of railways does not allow to precisely allocate all costs to services generating them, because railway infrastructure generates a large share of common costs throughout the service chain.

The fact that most railway costs are *common costs* and have a major *fixed nature* has important implications for the structure of the railway industry and performance.

As far as the **structure** is concerned, the following aspects are at stake:

1. *Large economies of scale*

The fact that railways score high fixed costs and that variable costs are only a small portion of total costs, identifies an average cost curve that is flat towards high volumes of traffic³³. It also implies that decisions are taken on the basis of a long-run marginal cost curve, since a short-run marginal cost will never appropriately capture the apportionment of common costs for specific services³⁴

2. *Few market players*

The fact that costs can only be recouped on the basis of very large traffic volumes or long routes, implies that the number of players in the operations and even more so in infrastructure management, will be limited

3. *Pricing will be above marginal costs*

Given large economies of scale, price will not be set at the level of marginal costs, but at a higher level, [thus possibly leading to monopolistic behaviour]. However, how to determine mark-ups is crucial for efficiency and cost-recovering (see further).

4. *A certain degree of cross-subsidisation of services and routes will always occur*

The fact that costs are largely common to a plethora of services and business lines, that the overwhelming part of the cost are fixed and that economies of scale can only be fully exploited with large traffic volumes, render a certain degree of cross-subsidisation between services and/or between assets unavoidable. Even strict accounting rules for the separation of accounts among the major business lines are unlikely to be sufficient to prevent this entirely.

5. *As soon as market forces are more prevalent in rail, focus will shift to high-density corridors while closing low density routes (unless used for niche purposes).*

Given the nature of costs (most of them fixed and common), the only way to improve the performance of railways from a cost perspective under competitive operations in contestable markets (where large scale/high volumes allow for that) is the closure or outright subsidisation through PSOs of low density routes. The reason is that the fixed costs of such routes add to fixed cost formation elsewhere in the network and produce a financial burden on the performance of potentially contestable high density segments.³⁵

In terms of **performance**, the intrinsic characteristics of the railway and its cost rigidities at the level of assets (especially infrastructure) generate the following effects:

1. *High degree of economic inflexibility and limited capacity to change and adapt.*

³³ Kessides & Willig, 1998, Annex 1

³⁴ It is however difficult to identify long-run marginal costs, i.e. what type of investment and renewal costs they might include and how to apportion them to the specific costs of running an extra service (or unit of service) or how to discount them.. Kessides & Willig - *Ibidem*

³⁵ Kessides & Willig, 1998,

Significant adjustments or reductions in costs are hardly linked to variable assets/costs but mainly to fixed assets and can only be achieved by lines closure or business outsourcing.

2. *Pricing services according to marginal costs* will be arbitrary, given their *common nature and the impossibility to apportion them correctly* to lines of business. Marginal costs (long run) setting requires some kind of ‘fully distributed cost’ rule, whether based on the relative output method (e.g. distributing common costs over all services according to gross ton-miles), the attributable cost rule (according to a key based on directly attributable costs) or the gross-revenue approach (e.g. overhead costs between freight and passenger). But long-run marginal costs obtained this way, may well be too high or too low, given demand and intermodal competition. If too high, traffic demand for service k_1 , will fall, hence, cost recovery will not work; if too low, demand for service k_2 will rise, but there is no way of knowing whether this will help cost recovery enough, and whether service k_2 can be expanded rapidly. Indeed, such arbitrary (long run) marginal costs can only be afforded by firms not actively responding or interacting with demand. As Kessides & Willig (1998) argue³⁶, it will also be sub-optimal for three reasons:
 - a. charging will occur at the level where price is higher than marginal costs, hence, generating a deadweight loss (*monopolistic behaviour*)
 - b. marginal costs will be supply-driven and not optimised according to market-driven demand if not accompanied by competition. Thus, decision-making on charging rates will incorporate necessary and unnecessary costs. If the infrastructure manager can afford not to be sensitive to costs, marginal cost recovery will hinder efficient charging by incorporating inefficient practices such as:
 - i. possible inefficiency in the field of maintenance (e.g. over-staffing);
 - ii. inefficiency in the allocation of excess capacity (sub-optimal utilisation of capacity);
 - iii. inefficiency in the procurement of infrastructure renewals (e.g. sub-optimal procurement policy, fragmented procurement market)
 - c. The temptation to explicitly cross subsidise services and routes will always remain given the common nature of costs and the difficulties in apportioning them to specific services.

4.2 Vertical separation and cost transparency

A major reason for the choice of vertical separation in Europe is the expected improvement of cost transparency and predictability.

In turn, this facilitates competitive entry (by pre-empting cross-subsidisation) and creates incentives for

1. efficient cost recovery;
2. improving capacity allocation and responding to users needs;
3. maximising cost-recovery for use of infrastructure,

which all imply considerable economic gains.

³⁶ Ioannis N. Kessides, Robert D. Willig - *Ibidem*

4.2.1 *Efficient cost recovery*

As noted, the high degree of *common costs* in the railway business might entail a high degree of cross-subsidisation if appropriate accounting separation is not in place. It is one thing to say that cross-subsidisation can never be fully prevented in railways, given that common (and fixed) costs are so high (see section 4.1), it is quite another to allow just any form of explicit or implicit cross-subsidisation to occur, with the lack of information, discipline and incentives which result! Economic theory requires that at least the incremental costs the activity imposes on total costs be charged to the business as a cost. If the business would not pay the incremental costs it would amount to a cross-subsidy³⁷.

Directive 91/440 introduces separation of accounts between infrastructure and operations. Directive 2001/12 goes further in requiring that railways also keep separate accounts (horizontally) for passenger and freight services. The latter Directive requires that funds paid for activities related to the provision of passenger services as public services must be shown separately in the accounts and may not be transferred to activities related to the provision of other transport services or any other business.

Forcing out cross-subsidisation as much as possible brings out in the open all sources of cost generation, failures and responsibility in the management of services. This creates incentives for good management: having identified the real sources of costs, a business entity would be able to minimise that source, eliminate practices which inflate costs, invest in innovative technologies aiming at reducing costs. Following the discovery of the "true" costs of providing a service [or at least, the discovery of what costs are excessive or a waste], optimal management decisions *focusing on core activities* or proper *outsourcing of non-core business* would be much more likely to come about.

4.2.2 *Improving capacity allocation and responding to users needs*

The second reason for vertically separating infrastructure from operations consists of fostering competition. The EU view reflected in the said directives suggests that a vertically integrated railway company would be a major obstacle for competition in service provision: incumbent operators would be preferred to new entrants in case of path allocation. Besides being a barrier to entry for newcomers, a vertically integrated railway will be prone not to respond to market needs when faced with requests for capacity. Furthermore, internal managerial frictions, rigid structure and non-market sensitive procedures could frustrate the optimal allocation of capacity requested by shippers or final users.

A vertically separated infrastructure manager using demand-sensitive tariffication schemes (see §4.2.3), could better allocate capacity by tailoring prices according to scarcity and usage of infrastructure. Doing so should optimise performance and capacity utilisation. On the other hand, a better tariffication responding to market conditions would be beneficial over the railway value-chain down to all final users (shippers, logistical operators, transport integrators) and final consumers.

Vertical separation will also be beneficial in that all infrastructure users face the same treatment and system of access pricing.

³⁷ NERA – *Ibidem*

4.2.3 Maximising cost-recovery for use of infrastructure through proper infrastructure charging

The vertical unbundling of infrastructure and operations creates separate infrastructure managers who will have to charge operators access fees. These fees being set independently from the incumbent operator, new entrants and the incumbent will face the same treatment. Different methodologies have been put forward so as to maximise the cost recovery for the use of railway infrastructure: a. linear single tariff, b. Ramsey pricing, c. Marginal cost tariff.

The first access charging system is relatively easy to understand and apply, since it is based on linear fees imposed according to tonnes/km or passenger/km. However, this system does not allow for marginally and transparently accounting the external costs (environmental impact, noise, maintenance costs, congestion and scarcity costs).

Ramsey pricing is rather more sophisticated. It “leads to demand differentiated prices (...), which apportion all unattributable fixed and common costs of the railroad among its services on the basis of the values of those services to consumers, mathematically expressed as their elasticities of demand. By providing that each service is priced at a markup over marginal costs, which is inversely related to the elasticity of demand for that service, economically efficient differential pricing combines cost and demand factors in an optimal manner. These principles result in lower prices for shippers generally by establishing a set of rates which encourages the purchase of more rail transportation services by more shippers than artificial fully distributed cost based pricing, thereby creating a larger traffic base over which unattributable costs can be apportioned. Ramsey pricing maximizes the opportunity for rail carriers to earn an adequate rate of return on capital, and they foster innovation and efficiency in the provision of rail transportation services by rewarding carriers who achieve cost reductions”³⁸. However, the application of this charging scheme would be rather difficult. It would require the precise knowledge of scarcity on specific networks³⁹ and complex models and parameters to calculate the social benefits of alternative uses of the slots (including opportunity costs for delays, congestion, choice of alternative modes). However, if there were sufficient intermodal and perhaps intra-modal competition, a combination of (unregulated) Ramsey pricing and price-ceilings based on stand-alone-costs is likely to be optimal. Incentives for rail companies to adopt Ramsey pricing – with ceilings to protect captive shippers – are strong. For elaboration, see op.cit., Kessides & Willig, pp. 12/13.

The EU in Directive 2001/14 opts for the application of *marginal cost principles* - the third access pricing system - whereby charges are based on the "cost that is directly incurred as a result of operating the train service". Charges would be added to the single linear tariff, the marginal utilisation costs of the network, thus including as well parameters such as scarcity of capacity, external costs (noise, CO2 emissions, potential accidents) and marginally attributed maintenance costs. This tariffication system would help solving excess capacity problems and optimising infrastructure management practices, although it is likely to be complicated, and almost certainly provides too much national discretion.

However, as C.A. Nash (2001) noticed, the multi-part tariff without transparent and appropriate state subsidies would result into a barrier to entry for new competitors. “The problem here is that the marginal cost of additional train paths is typically well below average cost, even when allowance for congestion and scarcity costs is included. The result is that efficient pricing requires government subsidies. If they are not forthcoming, then the second-best solution is almost certainly a two-part tariff, since this leaves the train operator free to recover the fixed

³⁸ Kessides, *Ibidem*

³⁹ " Capacity utilisation is measured by the number of train services operated, as a proportion of the maximum number of train services which could be operated without congestion, given the infrastructure and signalling systems. However, rail capacity cannot be unambiguously defined as it depends on the pattern of train services on a section of track, particularly the relative speeds of trains and the number of stops, and the infrastructure manager's flexibility to adjust train times. The difficulty in clearly defining rail capacity is a key barrier to designing means of dealing with rail scarcity and congestion". C.A. Nash, B. Matthews - 2003

element from final consumers in the most efficient way possible. However, two-part tariffs are a barrier to entry, since the new entrant almost inevitably ends up either paying a higher marginal charge per train kilometre, or a fixed charge that is much higher relative to the level of their business. In Germany for instance they have recently been found to be illegal. Any alternative which is non-discriminatory is likely to involve a high charge per train kilometre which is well above marginal cost and which therefore greatly restricts the growth of the industry”⁴⁰.

In line with these concerns, Directive 2001/14 does allow for a certain degree of flexibility where it states that national infrastructure managers’ are required to charge capacity and perform allocation procedures in a fair manner. It shall also provide infrastructure managers and train operators with appropriate incentives and to provide for flexibility in capacity allocation⁴¹. However, this flexibility will entail too much discretion in the interpretation and application of the Directive's requirements, with fragmentation and less competitive entry as a result.

4.3 - The recent EU approach to vertical separation

Directive 2001/14 on allocation of capacity and charging is a revision of Directive 95/19. The new Directive also contains the following requirements:

- allocation of infrastructure capacity is managed by an entity which is independent from any railway undertaking, as follows;
 - infrastructure managers when full separation between infrastructure and operations has been achieved; ;
 - an independently accountable entity of the incumbent when separation had not been opted for;
- allocation of infrastructure capacity is performed under fair conditions;
- obligation for Member States and infrastructure managers to publish clear information about their networks and the technical aspects thereof. This information is contained in so-called *Network Statements* and is necessary for any railway undertakings so as to evaluate the necessary technical, physical and business aspects to be considered while entering into the markets of other countries. The significance of Network Statements goes far beyond the meaning of the Directive since it provides:
 1. necessary technical information which is at the basis of future harmonisation of operating rules, improved technical standardisation, establishment of cost-effective migration towards uniform technical and operating systems (interoperability aspects);
 2. natural benchmarks for *best practices* in technical and managerial aspects of the networks hopefully *prompting emulation* among networks regulators with no harm to safety⁴².

**Box 2 - " EU-wide cooperation among rail regulators :
the Safety Agency & RailNETEurope"**

In EU network markets, the internal market requires cross-border liberalisation, competition (where economically sensible) and regulation. However, the EU (sticking to the old and probably now dysfunctional Meroni doctrine of 1958, forbidding independent EU regulatory agencies) has not established regulatory agencies. Nevertheless, coordination across borders is indispensable in most if not all network industries,

⁴⁰ Nash - 2001

⁴¹ Nash – *Ibidem*

⁴² Safety aspects are considered in a Directive on Railway Safety (See note 48). Safety aspects are critical to any railway network and high standards of safety are adopted within the Technical Specifications for Interoperability (TSIs) which are mandatory following the Railway Interoperability Directives for high-speed and conventional rail 96/48 and 2001/16

Meroni or not. Several network markets have set up cooperative structures and/or 'autonomous' agencies (e.g. in electricity, gas, telecoms and airlines) to address coordination needs.

In rail, these needs are at least as pressing as elsewhere. Two instances of cooperative solutions have now been agreed: cooperation of path allocation by rail infrastructure managers in RailNETEurope, and the European Agency for Railway Safety and Interoperability.

One of the major challenges that the implementation of *open access* in the EU railway area faces is *path coordination and allocation*. Directive 2001/12 revising Directive 91/440 only obliges (at least accounting) separation between operations and infrastructure and the provision of *open access under transparent, fair and non-discriminatory conditions to international groupings and licensed railway undertakings*. As previously mentioned, some problems might arise insofar:

- railway infrastructure managers might prefer existing incumbents if no proper separation and incentives schemes are realised so as to guarantee non-discriminatory access;
- infrastructure managers could face conflicting interests in allocating paths according to priority needs:
 - priority between passengers and freight trains;
 - priority between international and national track usage.

This situation could lead to conflicts and sub-optimal allocation.

On 24 September 2002, rail infrastructure managers from 16 European countries (EU15 except for Ireland and Greece, plus Norway, Hungary and Switzerland) established RailNet Europe to improve the international coordination of train paths and timetables through the progressive introduction of "one-stop-shops". RailNet Europe builds on the experience gained since 1998 on two rail freight corridors (BELIFRET from Belgium to Italy and Spain and the North-South Freight Freeways linking the Nordic countries, Germany, Switzerland, Italy and Austria). These experiences will further extend to other instances financed by the EU 6th Framework Programme for Research. Not unlike the Florence Forum (electricity) the coordination will be closely linked to infrastructure charging.

While, on economic terms, the voluntary effort of RailNet Europe seems to have gained grounds, on technical terms, a Single European Railway Area, including the establishment of a fully-fledged Internal Market for railway services and equipment, requires *sufficiently uniform and coherent rules for rail safety and interoperability as well*.

The need for a *European Agency for Rail Safety and Interoperability*⁴³ arises from the magnitude, the scope and the nature of the problems that the rail mode might face in a liberalised business environment with a pan-European dimension. The mere availability of safety rules and interoperability directives is a necessary, but not sufficient, condition for seamless cross-border rail services in the Internal Market. In the light of art. 5, EC, on Subsidiarity⁴⁴ the foreseen agency might be justified for reasons of scope, scale and cross-border externalities.

The rationale for the agency lies in the possible "coordination failure" that national safety bodies might suffer from in matters such as:

- Accident investigations
- Common safety targets
- Common safety methods
- Assessment of interoperability requirements

The proportionality (last sentence in art. 5, EC) is ensured by the fact that the agency proposes remedies to the European Commission and the Council of Ministers (therefore, any decision becomes politically accountable and finally lies in the interplay between the EU Commission and the Council of Ministers where Member States positions are voiced).

⁴³ See footnote 22

⁴⁴ The Community shall act within the limits of the powers conferred upon it by this Treaty and of the objectives assigned to it therein. In areas which do not fall within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and insofar as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community. Any action by the Community shall not go beyond what is necessary to achieve the objectives of this Treaty.

V - Regulatory reform II: Introducing competition

EC competition rules have always been, in principle, applicable to the railway sector. Regulation EEC/1017/68 specifies the application of Article 81 and 82 EC Treaty to the transport sectors rail, road and inland waterways. As it covers the rail sector, in principle the latter has been subject to EC competition rules for the last 35 years. This was confirmed by the European Court of Justice in 1986 when it stated in the *Nouvelles Frontières* case (Joined Cases 209-213/84 *Ministère Public v. Lucas Asjes*, ECR. 1986, 1425) that the general competition rules apply also in the transport sector. However, because of the fragmentation of the European railway market and since Member States had granted exclusive rights to their respective national (“flag”) railway companies, until the early 1990s de facto no competition existed in this sector. In order to create a common railways market the Community has since adopted several directives to foster competition in this sector, thereby limiting the exclusive rights granted by Member States to their respective railway undertakings⁴⁵. These post-1990 developments square with the modern interpretation of art. 86 (then 90) for all network industries (cf. Pelkmans, 2001-b)

Until recently, the market opening effect of directive 91/440 has been negligible. First, combined transport is by far the most difficult way in freight transport to make a profit and, second, traditional state-owned incumbents have so far not shown any interest into entering into groupings with newcomers. Instead they continue to co-operate among each other.

In the railway market the consideration of actual competition began in earnest with the introduction of subsequent legislation (Directive 95/16) and the first railway package (in force in national legislation since 15 March 2003). The introduced legislation is aimed at promoting open access and inducing *competition on rail* apparently assuming some degree of contestability⁴⁶.

5.1 Open Access as a prerequisite for competition

Since the first EU regulatory attempt (Directive 91/440) and its revision by Directive 2001/12 (1st Railway Package), the Union has opted for a system that triggers *open access on rail* by requiring (at least accounting) separation between infrastructure management and operations. This is not the only option. Several alternative approaches can be found. One is that of **vertical integration, with ownership and interconnections**. This model has been followed by Japan, New Zealand and the US. In Japan it has culminated in the creation of regional vertically integrated monopolies with interconnection and open access provisions. In the US and New Zealand, the model of vertically integrated private companies prevails.

Another option to consider is that of **vertically integrated long-term franchises**. This model has been followed by Argentina and Brazil and provides for the concessions to regional monopolies for long time spans (e.g. 30 years).

Why did the Union opt for open access in Europe instead of other models? A priori, no model is per se first- best, since experience shows positive and negative effects (e.g. Japanese Railways, restructured according to regional vertically integrated concessions, seem to perform quite effectively and successfully⁴⁷, but only after a full pension bail-out). The choice between alternative reform routes very much depends on the intrinsic characteristics of traffic, scale, density and market demands in the different regions and countries.

⁴⁵ Stehmann, 2001, *op.cit.*

⁴⁶ in the case *European Night Services (ENS)*, the European Court of Justice argues that potential competition would only exist if there was a realistic and concrete possibility of market entry. See case *ENS, Eurostar, UIC, NS and SNCF versus Commission*, joint cases n° T 374/94, T 375/94, T 384/94 and T 388/94.

⁴⁷ See Yoshiyuki, 2003.

As a matter of fact, there are certain aspects of the European transport context that improve the fit of open access. European rail reform is similar to that in other network markets in that it combines liberalisation and market integration.

Liberalisation responds to the need of revitalising entire sectors of the European economies and of radically improving their economic performance. Liberalisation is also deemed to be a driving force towards the creation of new markets, innovative industrial structures and business models through cross-border alliances and joint operations for a better exploitation of economies of scale and scope, while breaking the business logic based on national dimensions. Market integration is long overdue. Transport is critical for the Internal Market to work properly. Cross-border rail (esp. in freight) should perform efficiently, economically and reliably and exploit the proximity of urban and production centres in a “hub-and-spokes” pattern that could particularly fit the geographical distribution of production and residential clusters in Europe.

Worth mentioning is the fact that the EU Directives opted for a liberalisation of rail freight transport on the Trans European Rail Freight Network (TERFN - 50% of total EU rail network and 80% of traffic) as from 15 March 2003 with progressive extension to the overall network by the year 2006.⁴⁸

Passenger liberalisation will be proposed in the Third Railway Package. It was not a priority of the 1st Railway Package for two reasons. The first one is a purely political one since passenger services touch upon very national sensitive areas such as the justification of *services of general interest* and safety concerns. The second one is made up of several economic arguments.

Especially in the field of passenger rail traffic, *economies of traffic density* are crucial. Scheduled services operated by a single undertaking respond to increases in market demand by either longer/double deck trains or more frequent trains. Competition per se need not be the most efficient response to more demand as it might only duplicate the costs. The usual effect (Mohring effect) is likely to be that the revenues generated by the introduction of competition do not offset the costs of service duplication and the revenue losses on the incumbent operator, thus producing a sub-optimal allocation for society⁴⁹. This is particularly true in regional/sub-urban traffic (where, due to sub-optimal scale, subsidies are needed). However, on international routes with a European dimension and where the market could compete with alternative modal choices (high-speed rail vs. airlines on distances up to 500km-700km) duplication of services can eventually offset losses from economies of traffic density by gains due to the scale and differentiation of pan-European services (business services vs. economy; air-rail connections). Careful further research should show the case for such choice. Therefore, competition among individual entities might replace the concept of international groupings on these routes (e.g. Thalys, Eurostar services)⁵⁰ in the long run.

⁴⁸ "Official Journal L164 of 30 April 2004 (a) REGULATION (EC) No 881/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 establishing a European Railway Agency (Agency Regulation); (b) DIRECTIVE 2004/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive); (c) DIRECTIVE 2004/50/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system; (d) DIRECTIVE 2004/51/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 amending Council Directive 91/440/EEC on the development of the Community's railways"

⁴⁹ Nash - *Ibidem*

⁵⁰ Monti, 2002

5.2 Open Access and Vertical separation vs Vertical coordination

Some experiences (UK, to a lesser extent the Netherlands) have been presented as examples of the failure of vertical separation of rail infrastructure and service provision. Both cases are used to argue that only vertically integrated companies taking responsibility of the overall value chain can successfully manage a complex system (as the railway is).

There is no doubt that huge economies of scope apply in the railway system and that incentives for vertical integration are strong. Nonetheless, is e.g. the UK reform a genuine failure? It depends on what one focuses on.

Vertical separation combined with massive entry represented a success story in terms of reversing modal shift in the UK (34% increase in passenger, 40% increase in freight carried, 20% increase in train mileage run, from privatisation to 1999)⁵¹. In Sweden⁵² a similar performance of rail services can be observed..

This is primarily due to a better focus on core competences.

More precisely, the source of possible failures in the UK is on the infrastructure side: a private natural monopoly with large economies of scope.

This is mainly due to two reasons:

- Technical complexity, safety requirements, technical patchworks resulting from layered technology based on local requirements
- High costs of infrastructure, renewal, maintenance, necessary levels of investments on a network that stays a natural monopoly and where incentives need to be closely supervised and quality and safety parameters need to be monitored.

On the first point, Interoperability Directives should help simplifying and harmonising requirements over time. Once safety rules and essential requirements are set at a high level and detailed by means of EU Regulations on Technical Specification for Interoperability, *mutual recognition* should apply and hindrances to its application should be legally tackled. This will allow for a reduction in assets costs and, hence, *economies of scope* from vertical integration.

On the second point, the UK experience shows that substituting a public natural monopoly with a private one does not improve the system. Railway technology does not allow for duplication of networks and abatement of its sunk costs. Thus, a private natural monopoly will:

- Either transfer its dividends to shareholders (compromising necessary investments in quality and safety)
- Or be heavily regulated by a neutral authority (therefore, losing any incentive linked to ownership)

Therefore, addressing incentive and ownership failures and assuring a sufficient and coherent level of investments (for safety and capacity) as well as technical simplification in railway infrastructure and systems amount to major tasks for governments and regulatory authorities, on the one hand, and industry players, on the other.

As a prominent analyst noted⁵³: “To date, the extent and degree of success of competition (even for the market) has been mixed and often limited, not least because it has proved difficult to challenge the position of the incumbent national railway operators. In the UK where this problem was avoided through complete break-up of the incumbent (in an attempt to reproduce analogies

⁵¹ McKensey, 1999

⁵² Speech by Bylund, 2003

⁵³ Steer Davies Gleave – *Ibidem*

from energy and telecommunications), important losses in network synergies initially occurred as a result, and competition in the market had to be deliberately curtailed in order to protect successful bidders for competitively tendered franchises. It is therefore likely that any future liberalisation measures will need to be supplemented by complementary initiatives designed to preserve the benefits of an integrated rail network. Reconciling the dynamic evolution of a competitive rail market on the one hand and introducing administrative measures intended to simplify the experience of rail passengers on the other, will be a major challenge for EU institutions and the European rail sector alike”.

5.3 Is the market capable of hosting competition?

Arguing in favour of competition in rail can easily be justified if one focuses on current inefficiencies. Significant welfare costs are nowadays generated by monopolistic behaviour of incumbents in protected markets where the highly unionised railway companies tend to defend rent-seeking.

There are however, also good reasons to control liberalisation and avoid outright break-ups of former monopolies. *Pacing reforms* could be a valuable option so as to avoid overly costly restructuring and adaptation, quality loss, social problems and instances of knowledge loss that are extremely costly for the knowledge-intensive railway sector. This should not be read as an argument against liberalisation. Most of the arguments against liberalisation of rail in the EU⁵⁴ tend to fall in the category of abusing public-interest motives for private interest protection. Objections such as the supposed threat to the provision of ‘services of general interest’ (cf. art. 86, EC), cream-skimming on high value routes, the ‘deterioration’ of working conditions of rail for workers (shielded for more than a century against market pressures) and fears of higher ticket prices (in passenger) are either well-recognised in EU network liberalisation or (within reasonable limits) quite defensible as a superior way to serve the public interest. Controlling liberalisation must not be mixed up with such campaigns⁵⁵. Indeed, the case for EU rail reform (section 2) is strong and the arguments in favour of liberalisation are many: optimal cross-border services, quality & service differentiation, quality improvements, larger scale for cost recovery, better response to customers, a decrease of rent-seeking and an increase in overall rail efficiency. Some of these arguments become stronger if coupled (as they are in the EU) to interoperability programmes.

As table 6 underscores, services competition in the railway very much depends on the size of the market. In tiny markets, competition does not improve services, it erodes revenues for the incumbent and does not allow them for entrants and hence fails to enhance consumer surplus. On the other hand, when the scale of operations allows for entrants and market shares with sufficient turnover to be contested, competition engenders positive effects.

⁵⁴ For political reasons and national resistance, liberalisation on rail passenger traffic was not dealt with in the first railway package and the issue seems to have attracted a certain interest in the approved second railway package, though no precise commitment to deadlines has been when drafting this paper

⁵⁵ Also, sequencing could be part and parcel of such controlled liberalisation. “We find that reforms have efficiency-increasing effects but that the effect of reforms depends on sequencing: The introduction of multiple reforms in a package has at best neutral effects, but sequential reforms improve efficiency”. Friebe, Ivaldi and Vibes – 2003

Table 6 – Introducing competition in rail is complicated

Passenger Rail	Economic characteristics	Type of possible competition	PSOs
Short-distance rail	Mohring effect –inefficient duplication of service	Concessions (<i>for track</i>)	Necessary for passenger rail
Long-distance	Needed scale and traffic density that allow for efficient duplication of services	<ul style="list-style-type: none"> - Concessions (<i>for track</i>) - Open access (<i>on track</i>) <ul style="list-style-type: none"> o service differentiation o valuable routes 	Necessary for passenger rail <ul style="list-style-type: none"> - on feeder/secondary routes - under specific contract
Freight Rail	Economic characteristics	Type of possible competition	PSOs
Short-distance rail	Mohring effect –inefficient duplication of service vis-à-vis alternative modes (road haulage) with rare exception of specific feeder services or specific shipments (e.g. dangerous / bulky goods)	Concessions (<i>for track</i>)	Not necessary for freight rail <ul style="list-style-type: none"> - It might be an option to encourage transport of dangerous goods by rail
Long-distance	Needed scale and traffic density that allow for efficient duplication of services	<ul style="list-style-type: none"> - Open access (<i>on track</i>) - Value added services on corridors (peak-slots vs. off-peak; timeliness vs. time flexibility; traceability of shipments) 	Not necessary for freight <ul style="list-style-type: none"> - It might be an option to encourage transport of dangerous goods by rail

Where the scale, density and value of railway routes allow for efficient duplication of services *on track* and higher service differentiation (quality aspects, such as peak /off-peak services, on-board comfort, value-added services), head-on competition *on track can be an option*.

The crux of the matter is however to show that duplication of services on a specific route by a new entrant adds revenues that offset any incumbent losses. Therefore, a market analysis will be necessary to identify the points summarised in table 7.

Table 7 - Railway markets -competition analysis

Market demand	Static analysis	<ul style="list-style-type: none"> - Is market demand sufficient to allow for at least two operators (is there a residual market demand for a second player?)
	Dynamic analysis	<ul style="list-style-type: none"> - Is market demand likely to increase following to new entry and improved choice under competition? - Is market demand likely to react to eventual price competition?
Cost structure	Static analysis	<ul style="list-style-type: none"> - What is the cost structure of the incumbent? - Does its profit margin leave space for new entrants? - Is it possible to disentangle services subject to PSOs from profitable services?

Cost structure	Dynamic analysis	<ul style="list-style-type: none"> - Can competition be expected to lead to cost-cutting and rationalisation? - Does cost-cutting leave opportunities for new entry? - Does technology help reducing fixed costs for assets and variable costs for services (in the long run)? - Does the separation between services under PSOs and services under competition help to increase performance?
Barriers to entry	Evolution of technical and legal aspects after the introduction of competition	<ul style="list-style-type: none"> - Licenses - Safety requirements - Operational rules - (introducing) integrated computer reservation system - Multi-language operations - Interoperability problems - Transfers of know-how + training schemes - European technical standardisation of equipment

The static and dynamic criteria will have to relate both to the size of the relevant market and to the cost structure of incumbents. The static analysis should reveal the potential for the market and assess whether there residual demand which allows a new entrant to establish itself without endangering the final social outcome (decrease in incumbent's revenues not offset by consumer surplus). A static analysis can also scrutinise the actual cost structure of the incumbent and assess profit margins, competitive and non-competitive sources of costs (subject to PSOs).

Of course, competition in rail requires a dynamic analysis by introducing change (as a reaction to competition). The likely or actual introduction of competition might indeed lead to the optimisation of capacity use and allocation, thus allowing for increased frequency and / or differentiated services. If correct, demand might expand thus sustaining a new entrant to come into the market.

Dynamic effects may also include a change of cost structures. Credible and sustainable competition is expected to induce management changes and create lean structures. By introducing competition, one can expect proper outsourcing strategies, elimination of redundancies and innovative investments encouraging performance. The dynamic effects of competition on costs will play towards the discovery of true costs and the elimination of non-essential ones. Technical efficiency should be expected to improve significantly.

5.4 Competition for track and Public Service Obligations.

Competition may lead to 'inefficient entry' in the sense of inefficient duplication of services when *the scale of operation and market demand are not large enough* so as to allow for cost-recovery and profitable operations. In these cases, the revenue gained by the new entrant does not offset the revenue loss of the incumbent and most likely will not provide sufficient cash to the new entrant. Both the incumbent and the new entrant suffer from the establishment of competition and service will not necessarily improve. This is typically the case of regional, suburban and urban railway passenger services. Experiences demonstrate that these markets are better served by a single operator under a concession regime or public service obligation.

The following question is how to establish the right incentive scheme for the service to be performed effectively and with the highest quality. The answer in most cases lies in *tendering for limited concessions* of the provision of railway services. *Tendering procedures* for temporary concessions should include quality and service aspects (based on set benchmarks and key

performance indicators by the concessioning authority) and are revised at the end of every concession period.

A key issue for this type of *competition for tracks* is the duration of the concessions. Experience in the UK shows that too short concessions (5-7 years) do not entail “*ownership incentives*” necessary for an asset to be efficiently operated and qualitatively improved. Long concessions (e.g. 30 years) imply too much monopoly power for the operator leading it to avoid quality and service improvements. In this regard, markets for concessions are orientating themselves towards concessions periods that are much longer than 5-7 years with intermediate revisions on the grounds of key performance indicators.

Competition for track for regional, urban and sub-urban rail passenger services can work because elements that induce service differentiation for long hauls (e.g. peak-time/off-time services, frequency, comfort, on-board facilities) are not important for consumer choice. Indeed, the arrival of a competitor is likely to reduce the levels of performance and the overall service frequency without this being offset by larger revenues for the operators.

5.5 Competition in long-distance rail for freight and passenger services

The case of long distance rail is different because economies of scale, density of traffic together with dynamic effects of competition might allow for new entrants to conquer market shares. However, the interplay of these elements varies between passenger or freight rail.

Recent studies based on development of scenarios confirm once again ⁵⁶ that the scope of competition on railways is depending on route densities and the length of corridors. If corridors are long enough (so as to guarantee sufficient economies of scale) and the density potentials are relatively high, competition is expected to be effective. This is particularly the case for rail freight using trans-European corridors with high-density potentials.

Competition might be frustrated by other elements such as priority allocation mechanisms. The European railway system is characterised by the *dual use* of the infrastructure for both freight and passenger. This setting penalises freight services that are always second in priority in slot allocation. Models of access charges for both passengers and freight might solve this problem while efficiently allocating slots.

From an EU internal market perspective, however, the lack of harmonisation of charging methodologies, the fact that they might work differently in each Member State and in respect to different services, and the general discretion provided in the EU rail directives, are likely to create distortions preventing well functioning competition on rail.

The dual use of infrastructure entails other restrictive effects for the competitive exploitation of rail freight services, mainly because stand-alone freight lines would be less costly on all these accounts. Cost-increasing factors for passenger rail include: stringent safety requirements, complex operational rules and more costly equipment connected to passenger service provisions; public service obligations for passenger services possibly distorting slot allocations.

⁵⁶ Steer Davies Gleave – *Ibidem*; NERA - *Ibidem*

Box 3 - Frustrated hopes of IKEA Rail freight operations

IKEA, the Swedish furnishing company, is one of the first companies to have bought train paths across two countries (Sweden and Germany) with original expectations to enlarge operations in wider continental Europe. IKEA has about 40 logistical Platforms and 180 sales points in Europe. Every year, something like 12 million m³ are moved between the platforms and the sales points. Transport represents 20 per cent of company's costs. In an interview with the Italian magazine "L'Espresso (N.34, 21 August 2003)", Mr Anders Malmström (responsible for distribution in Northern Europe) revealed the company's objective to lower logistical costs to 15 per cent. Therefore, the company aimed at moving 40 per cent of its production by rail by 2008 while enlarging operations of IKEA Rail to Italy and Poland. IKEA Rail was operating until November 2003 between Sweden and Germany on a track length of 1044 kilometres, five days a week on an average speed of 65 km/h (much higher than the often denounced slow average speed of international rail freight traffic (18 km/h⁵⁷). In November 2003, IKEA Rail declared the closure of its operations. This failure might well be related to market barriers and high entry costs, although IKEA has not acknowledged this.

One of the key issues in passenger services is the provision of *services run under a public service obligation scheme* versus them run under competition. Incumbents claim that passenger services have to be operated under public service provision. On the other hand, supporters of liberalisation stating successful examples for the UK and some promising value added high-speed rail services, maintain that liberalisation of passenger services will be beneficial for the sector provided that PSO schemes will be adopted for non-profitable lines on a contractual-franchise basis.

Those contracts will impose a well-specified exercise of services and might entail subsidies when the scale of operations or the size of the market does not allow for cost recovery and a reasonable mark-up. As matters stand today, it would be difficult and somewhat arbitrary to calculate the costs for PSOs, so as to identify markets where competition will be possible and where burdens of responsibility (and subsidies) for the provision of PSOs will lie⁵⁸. Unlike in other networks, rail PSOs are often still too general.

A draft regulation has been proposed by the European Commission relating to public service contracts for passenger transport in the rail, road and inland waterway sectors. If adopted, this regulation could clarify more specifically the conditions for appropriate allocation of temporary exclusive rights in the provision of railway services under regulated competition (e.g. concessioning), thus reducing risks of possible market fragmentation and limited contestability that could result by arbitrary allocation of exclusive rights⁵⁹.

Another element discouraging head-on competition for passenger services is the relatively low level of fares on the continent. In many cases, they still appear to be regulated thus having a chilling effect on incentives and reducing actual and potential profits. However, as the high-speed rail market suggests, in the presence of high quality services, railway undertakings are able to extract consumer surplus (e.g. sometimes by replicating the highly flexible reservation

⁵⁷ European Commission – White Paper on Transport Policy for 2010. Time to decide.

⁵⁸ "It follows that, unless there was greater specification of PSO services at the European level, the viability of liberalised international services will be directly affected by the PSO decisions of the individual countries, according to their domestic policies". EU Passenger rail liberalisation: Extended Impact Assessment - Draft Final Report, January 2004, Prepared for the European Commission by Steer Davies Gleave

⁵⁹ COM(2002) 107 final – 2000/0212(COD), OJ C 151E, 25.6.2002

systems, based on ‘yield management’ adopted by airlines) and obtain profit margins that might encourage competitors to enter the market.

The introduction of high-speed rail has been successful and service provision for high-speed seems to be profitable. The market demand for passenger transport where efficient high-speed systems exist seem to give priority to high-speed rail below distances of 500km connections from and to city centres.

Figure 3 - Air/ (high speed) rail substitution ⁶⁰

(decline of air transport shares (from Paris) in %

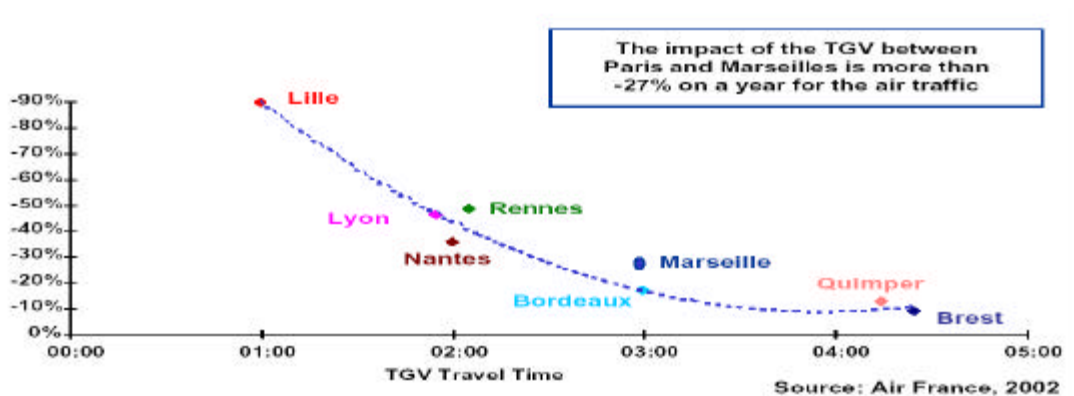


Figure 3 shows, for example, that the stretch from Paris to Lille has been practically entirely shifted to high-speed rail (=HST). Of course, this is a relatively short distance, where trains always have advantages. But even the Paris-Marseille route is subject to strong intermodal competition: a reduction of 27 % of air transport market share is considerable.

Similar patterns could reveal that a certain degree of substitutability is more (for economy) or less (for business) a function of price. A high degree of substitutability seems to exist between high-speed rail and airlines, sometimes replacing air traffic by rail (e.g. Paris-Brussels, Brussels-Amsterdam) or engaging in seasonal discounts and fares competition (e.g. Paris-London; Brussels-London)

In a recent study for the Commission (Steer Davies Gleave, 2004) on-rail competition is regarded as feasible for passenger rail services on distances over 500 km.

In the study distances between 200 and 500 km support 15 trains a day with 60 minutes frequency, and journeys between 500 km and 800 km. The market can support 6 trains a day, with 120 min. frequency. Beyond 800 km air travel takes over, except for night trains. Three ‘load factor’ levels are taken into consideration. Clearly, they are relatively long journeys (with either cross-border services or efficient cabotage possibilities) where passenger rail competition could be defended in a EU perspective.

⁶⁰ Air Rail Intermodality Study - IATA's Air Transport Consultancy Services, 2003

VI. Conclusions and the way forward

Over the years, railways have lost ground to alternative transport modes in a business environment and national regulatory frameworks protecting them from domestic and international competition. The heavy costs of investment in technology and substantial operating costs, increasing in a setting of *soft budget constraints*, undermined financial soundness. From the point of view of customers and consumers, market responsiveness and prices have been disappointing. Sustainable (freight) transport is not supported if rail fails to exploit the opportunities for diverting freight from road to rail.

The EU strategy for the revitalisation of the railways is opting for a step-by-step process of change and gradual introduction of regulatory and business reforms. Recent regulatory reforms and industry efforts – if properly managed, paced and implemented - could lead to a Copernican revolution of the sector and contribute to its revitalisation. But the difficulties are numerous and the costs of mistaken strategies are high. Therefore, there can be no doubt that the EU process of rail reform will take much longer than the adoption of 2 or 3 rail packages since 2000. The reflection behind policies will require much more economic analysis and EU regulation will have to become more detailed for the internal rail market to open up effectively.

Let us summarize eight more specific conclusions from this survey:

- i. Rail does not allow infrastructure competition (with one unique exception in the US). International benchmarking of the cost of infrastructure (an imperfect substitute for infrastructure competition, with respect to cost revelation) is exceedingly hard due to the multitude of specific variables.
- ii. Rail markets suffer from several significant market failures including natural monopoly (very large sunk costs), economies of density, proper regard of safety and asymmetries of information.
- iii. The internal rail market does not yet exist, although in freight some progress has recently been made. The potential of the internal market is frustrated by at least seven technical and legal barriers. Given the practical inexistence of the internal market, EU competition policy cannot exercise more than a very marginal discipline either.
- iv. The EU has opted for vertical separation as a pre-condition to open markets and introduce competition, no different from other network markets. Whereas the benefits are probably similar in nature to other network industries, the costs of such separation are difficult to foresee and may well be far greater than in other network sectors. The principal reason is found in (costly) coordination failures. It is not clear, however, that the badly needed opening up of the internal market could be accomplished with alternative models of reform as applied in other parts of the world. For a start, it might require, initially, a much greater degree of central (political) decision-making than can realistically be expected for rail in the EU for a long time.
- v. Pricing issues turn out to be problematic on economic grounds and, if not harmonized far more extensively than at the moment, also on practical grounds (e.g. different systems in many Member States). The same goes for cost transparency, central to the emergence of effective cross-border competition. The adoption of marginal cost pricing as a basic rule for EU (freight) rail may be so problematic in actual practice that a combination of Ramsey pricing (given the incentives freight rail providers have to keep market share in a

competitive market) and price ceilings based on stand-alone costs may yield more competition, more business for freight rail and fewer regulatory problems.

- vi. Capacity constraints on rail are incomparably more problematic than e.g. in electricity transmission or airlines, let alone, telecoms. The modest beginning of cross-border cooperation on path coordination and allocation in RailNETEurope is probably no more than a welcome first step, yet unlikely to be sufficient - even after workable arrangements have been formulated - for the internal market to function properly.
- vii. Introducing (cross-border) competition in rail, especially in freight, is long overdue. There are powerful arguments in favour, such as optimal cross-border services, quality & services differentiation, quality improvements, larger scale for cost recovery, better response to customers and a decrease of rent seeking. Nevertheless, it is not correct to conclude that competition in rail is always economically beneficial. It depends on the size of the market and on removing a host of barriers. Of course, PSOs must be carefully defined and costed. Coordination failures possibly emerging from vertical unbundling ought to be preempted (which requires regulation and close supervision). For passenger rail services the scope of competition – dependent on route densities and the length of corridors – is clearly more limited.
- viii. It goes without saying that all these issues, difficult as they are already, have to be considered in a dynamic perspective. Conduct and cost structures are likely to change given potential or actual reforms, and presumably even more so under potential or actual competition. Also, infrastructure investment and technology - for infrastructure, rolling stock and safety & signaling – have the potential to generate enormous cost savings, especially when coupled to the EU interoperability programme, which, in turn, may well induce (more) entry and competitive conduct. Profitable highspeed passenger rail – partly substituting for air travel – forms an extreme example of what can be accomplished, even though this higher quality has required much higher prices and only prompted sharper *intermodal* competition. New technology, both available and in the pipeline based on ongoing R & D, for conventional rail, including freight, as well as investment to overcome bottlenecks in infrastructure can be of significant help to support the EU reform process.

Having set into motion a ‘deep’ reform process, the EU should realize that the way forward ought to take into account a range of other elements, not having been dealt with in this paper. We mention five:

- *Competition policy* would need to ensure *level-playing-field* in the market for new entrants and incumbents (e.g. through effective supervision of access charging processes, abuse of dominant positions or concerted actions). In so doing, it will need to monitor national and local authorities as well in setting the limits to competition (e.g. in the name of the provision of public services, which could limit the contestability of the market). The introduction of competition goes hand in hand with thorough static and dynamic analysis of markets for railway services and their actual contestability. In this view, a necessary redefinition of markets and axes on a pan-European scale and the impact that technology can exert in eliminating technical barriers and lowering entry costs, will be crucial.
- The establishment of national railway regulatory authorities (NRRAs) overseeing capacity allocation⁶¹, regulatory pricing (e.g. price caps on use of infrastructure), subsidy levels, safety

⁶¹ Infrastructure managers provide for the path and capacity allocation and they are supervised by NRRAs and competition authorities

and technical requirements and the provision of railway licences is seen as a step to *overcome possible asymmetries of information*. However, in a European dimension, different institutional set up and competence portfolios for regulatory authorities can cause fragmentation of the internal market and hinder the one-stop-shop logic for new entrants.

- The *niche nature* of the sector with very specific knowledge and information flows is one of the greatest barriers to liberalisation. Know-how and information is a prime resource for incumbents. This prime resource is not only an element of asymmetry vis-à-vis the market and its customers but also vis-à-vis its regulators. The concentrated technical knowledge in the hands of few players, might involve phenomena of *regulatory capture* (e.g. in the definition of PSOs, licensing and access charging schemes), thus potentially distorting the necessary level-playing field. On the other hand, phenomena of *knowledge loss* (as the one produced by sudden liberalisation in the UK after the break-up of British Railways), might imply serious consequences in terms of safety and management. Reinforcing pan-European networks of knowledge in the field is one of the major goals of the European Union policies in the railway sector through RTD projects and networks of excellence, gathering and sharing expertise Europe-wide;
- A positive reaction of the sector itself in *discovering new business opportunities and models* and restructuring the way it currently operates is also necessary. The deepening of the internal market and the eastern enlargement prompt radical changes in infrastructure and services. Relocation effects in manufacturing industries and modifications in industrial processes (just-in-time) involve a considerable push factor in the transport industry, not to speak of additional trade flows and exchange of people. A number of business changes are already under way (e.g. acquisition of road-haulage logistical companies to increase the value chain; integration with airlines service; streamlining of value-chains; division of activity lines in core businesses and in order to respond to competitive pressure and new market conditions). Some of these changes are still far from being materialised and regulatory measures are still insufficiently transposed on a national basis⁶². Besides business moves, other initiatives could set the conditions for a rebirth of railways as a leading transport mode. Innovative lines of research are and will need to be pursued on the positive *scale and scope effects of managing networks on a pan-European dimension (trans-European corridors vs national systems)*, so as to better respond to transport needs with a trans-European dimension and better reorganise infrastructure management along trans-European axes⁶³. Further scenarios for reform have been anticipated in studies commissioned by international organisations (ECMT/OECD)⁶⁴ foreseeing several competitive outcomes (interpenetration of markets by incumbents; mergers or joint ventures of infrastructure managers by corridors; mergers, consortia, code-sharing for freight and passenger lines among railway operators; emergence of specialised freight operators; emergence of transport integrators [ensuring control of shipments over transport value chain]; diversification of services);
- **Eastern enlargement.** The expansion of the EU railway networks with 8 more systems (Cyprus and Malta not having one) creates great opportunities in the long run for rail freight, given the extra capacity on east-West axes, very high growth rate of east-west trade in the

⁶² On 9 July 2003 the Commission launched legal proceedings against 10 EU countries failing to notify the EC of any transposition of the 1st Railway Package to be implemented on 15 March 2003. European Commission IP/03/378

⁶³ First industry estimates perceive the possibility of completely changing the railway landscape and its profitability through the introduction of 10000-15000km dedicated rail freight connecting major hubs for dispatching of shipments into dual-purpose conventional rail. Such first estimates have to be assessed by feasibility studies. These must verify effective cost-recovery for such an infrastructure in a reasonable amount of time that might encourage private public partnership schemes and guarantee relatively fast pay-back periods - ERRAC (European Rail Research Advisory Council) - European Strategic Rail Research Agenda - 2003 available on www.errac.org

⁶⁴ ECMT (European Conference of Ministers of Transport) - Summary of Principal Questions on Regulatory Reform and the Development of Rail Freight Markets - CEMT/CM(2000)19/FINAL

Union and the higher market share of rail freight in the East. However, the new member states will have to be incorporated in what is already an ambitious and complex reform programme, with major restructuring. There may also be significant implications for EU-wide infrastructures.

In the light of past experiences and given some lingering resistance to change, the revitalisation of railways in Europe can only be achieved if a coherent mix of policies, forward-looking investment plans, regulatory reform and appropriate supervision is promoted. As previous European experiences show, *pacing reforms in a step-by-step approach* is as important as introducing them. This will allow business actors to better absorb them and pro-actively adapt to them without incurring the risks of knowledge loss while creating the conditions for competitive markets.

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