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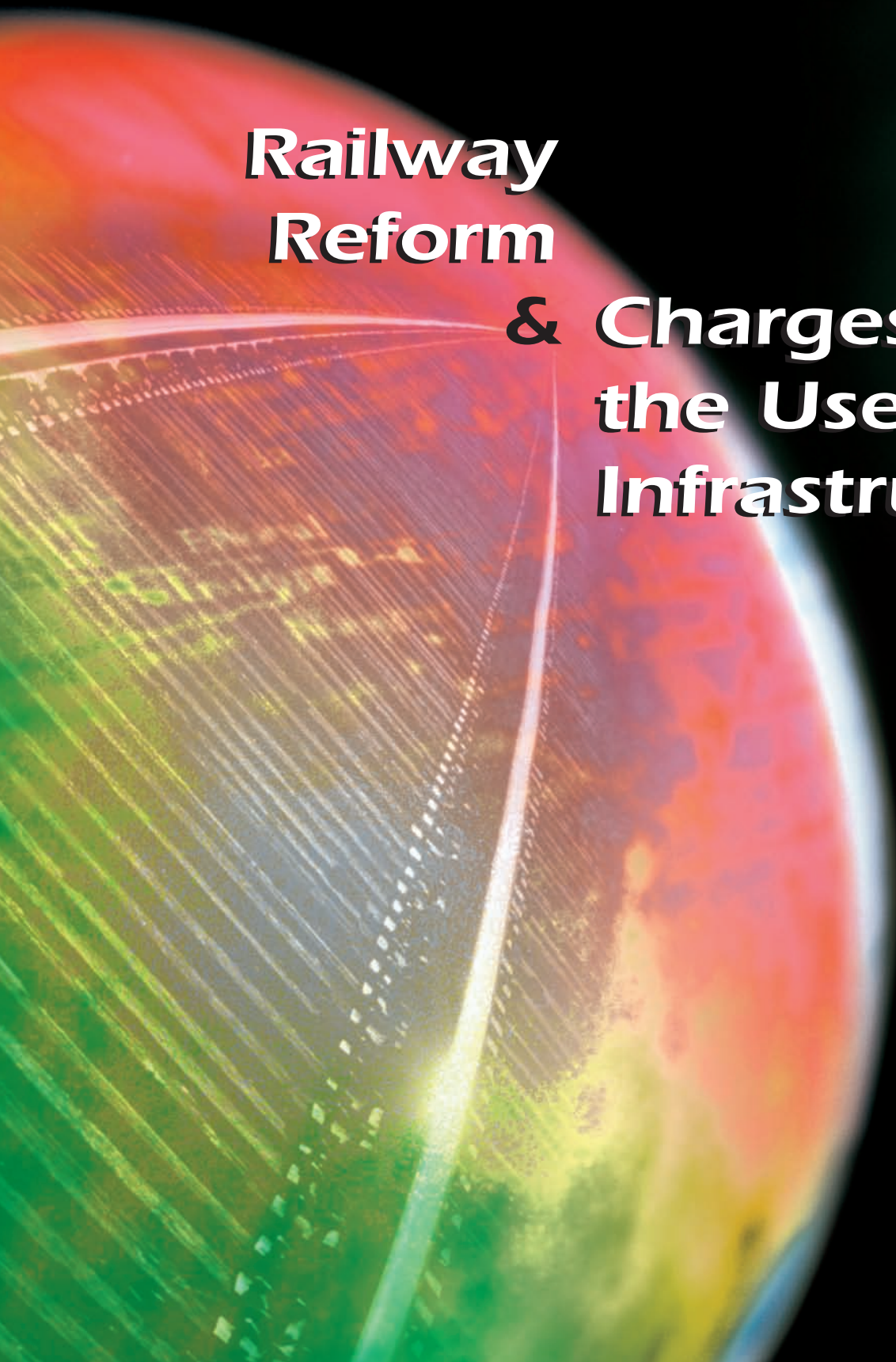
Railway Reform & Charges for the Use of Infrastructure



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EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

Railway Reform & Charges for the Use of Infrastructure

EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT (ECMT)

The European Conference of Ministers of Transport (ECMT) is an inter-governmental organisation established by a Protocol signed in Brussels on 17 October 1953. It comprises the Ministers of Transport of 43 full Member countries: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, FRY Macedonia, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom. There are seven Associate member countries (Australia, Canada, Japan, Korea, Mexico, New Zealand and the United States) and one Observer country (Morocco).

The ECMT is a forum in which Ministers responsible for transport, and more specifically the inland transport sector, can co-operate on policy. Within this forum, Ministers can openly discuss current problems and agree upon joint approaches aimed at improving the utilization and at ensuring the rational development of European transport systems of international importance.

At present, ECMT has a dual role. On one hand it helps to create an integrated transport system throughout the enlarged Europe that is economically efficient and meets environmental and safety standards. In order to achieve this, it is important for ECMT to help build a bridge between the European Union and the rest of the European continent at a political level.

On the other hand, ECMT's mission is also to develop reflections on long-term trends in the transport sector and to study the implications for the sector of increased globalisation. The activities in this regard have recently been reinforced by the setting up of a New Joint OECD/ECMT Transport Research Centre.

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Further information about the ECMT is available on Internet at the following address:

www.cemt.org

Foreword and Acknowledgements

European railways are in the middle of a process of far reaching reform to foster competition and promote the development of international freight and passenger services. Fundamental to this is a separation of infrastructure management from train operation, requiring the introduction of charges for the use of the network. Much progress has been made over the last few years in developing charges to ensure non-discriminatory access to, and efficient use of the rail networks but the European dimension is missing, particularly from the freight market. Integration of European markets should provide great opportunities for rail freight transport to grow. The purpose of this report is to set out how barriers to this growth arising from differences in the way trains pay to use national networks can be overcome. It recommends moving to a set of simple charges for freight that create similar incentives for the management and planning of train operations across national borders. The recommendations were welcomed by Transport Ministers meeting at the 2005 ECMT Council in Moscow and adopted.

Decisions on the structure of charges are constrained by the way in which competition, in both freight and passenger markets, is designed to develop under national and European transport policies. The analysis prepared for Ministers includes an examination of the way charges can be structured differently in different parts of the rail market, (suburban passenger services, inter-city services, high speed trains, domestic and international freight, etc.), to increase cost recovery and maximise the financial stability of infrastructure managers without damaging the development of competition. Political concensus over the different models discussed for competition in passenger markets has yet to emerge and was reflected in the discussions in Moscow but the recommendations agreed accommodate this and should prove durable.

The ECMT is grateful to Chris Nash and Bryan Matthews of ITS, University of Leeds and to Lou Thompson of Thompson, Galenson and Associates, principal authors of this report. The Secretariat is also grateful to the members of the ECMT Railway Group and to the experts from rail regulatory agencies and rail companies that provided and verified data and information for this report and made presentations to a series of workshops organised in 2004 and 2005 (see the ECMT website for details www.cemt.org/topics/rail/raildocs.htm*). The work was discussed extensively with the Working Group on Track Access Charges established by the European Commission, which will take forward the recommendations within the European Union.*

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Context

Ministers of Transport adopted Resolution 2002/1 on the Development of Railways at their Bucharest Council to promote the development of seamless rail services across Europe and to foster the development of competition in rail freight markets to improve the efficiency and quality of rail services. The Resolution supports the restructuring of railways driven by European Union Directives and focuses on three critical regulatory issues.

- An appropriate set of charges for the use of infrastructure is required to ensure non-discriminatory access to, and efficient use of, the network.
- Fair competition has to be supervised by independent, proactive regulatory bodies.
- The most effective approach to introducing competition depends on the market, thus.
  - Charges for the use for infrastructure need to be structured differently according to market (freight, main line passenger, high speed rail, commuter services).
  - Competition for markets, as opposed to competition on the tracks, is probably most effective for most passenger train operations and especially for regional and commuter passenger services, and it is important that the award of exclusive concessions for these services is made through competitive tenders.
  - In markets suited to competition between integrated track and train operators, such as in European Russia, serious consideration should be given to restructuring railways to achieve this kind of competition between evenly matched companies, as it imposes a lower burden on regulatory authorities than promoting competition from new market entrants, especially when the national train operator owns the national rail infrastructure or is part of a holding company that owns it.

Development of rational charges for the use of infrastructure is reviewed in the report that follows. Much progress has been made since adoption of the Resolution of 2002, but **the European dimension is missing** from the critical freight market. Ministers now need to focus on achieving a set of simple charges for freight that create similar incentives for the management and planning of train operations across national borders.

The way charges are determined is also crucial to the recurring issue all Ministers face: **how big a rail network and how many non-commercial passenger services should be supported by the public budget?** Undercharging trains threatens the long term financial sustainability of the network and deferring renewals can increase costs to crisis point in the long run. Undercharging subsidized passenger trains often results in over-charging freight, damaging its competitiveness with road haulage.

Conclusions

Existing infrastructure charging regimes are not fully consistent with Minister's objectives:

- For promoting financially stable infrastructure providers.
- For providing effective price signals to users of rail infrastructure.
- For promoting effective competition in the markets (especially international freight) where competition would be sustainable.

The divergence of current infrastructure charges is illustrated in Figure 0.1, showing cost recovery rates, and Figure 0.2, showing average charge levels. Some differences are to be expected. For example, the upper bound for cost recovery is a question for political decision at the national level. Also the mix of traffic (see Figure 3.1) and traffic densities vary greatly between countries and this has a strong influence on costs.

Some of the differences observed, however, create financial risks or undermine the competitiveness of rail services.

- Some countries charge at levels significantly below the rational lower bound represented by marginal costs, including renewals. It makes little sense to carry traffic that can not even pay the marginal costs it imposes on the network in terms of wear and tear and train planning.[1]
- Some charging systems result in freight trains covering some of the costs of passenger trains in order to push down the budget transfers required to pay for passenger service obligations. This is financially un-sustainable as it will destroy the competitiveness of rail freight.
- Differences in the way charges are structured by countries along international corridors can create barriers to international services. Freight train charges that are structured to provide incentives to consolidate loads and run fewer, longer trains in one country, and structured to promote operating short, light trains in a neighbouring country complicate train path planning and increase the costs of international paths. This will suppress international rail traffic.

There has so far been a failure to co-operate internationally to correct these distortions, seriously undermining international rail markets. Harmonizing the structure of charges for freight trains would:

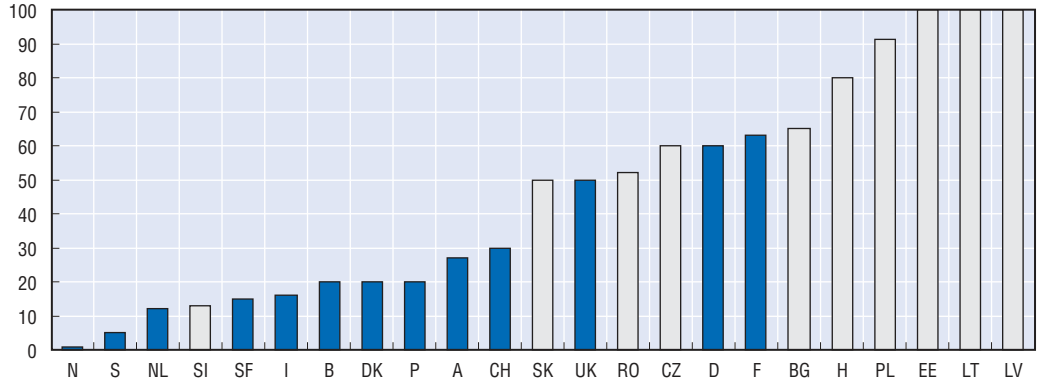
- Reduce the cost of international services, improving competitiveness.
- Facilitate the planning of international services.
- Enable railways to be more responsive in quoting prices to shippers.

Recommendations

Ministers need to cooperate to promote the development of more coherent charges for the use of infrastructure. For international rail freight services this is an urgent priority. Ministers will need to provide guidance to their national infrastructure managers and consult with rail regulatory agencies to facilitate this.

Independent[2] economic rail regulatory authorities can play an important role in ensuring many of the specific recommendations that follow are implemented, and could play a useful role in all member countries.

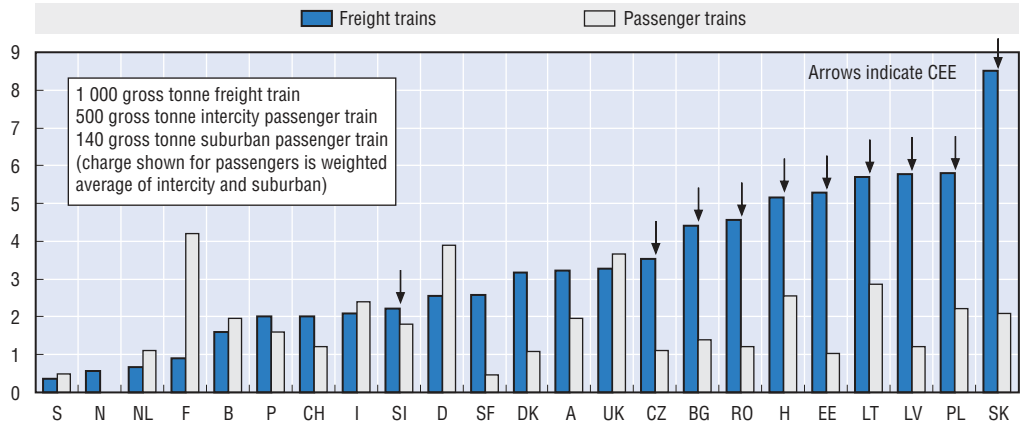
Figure 0.1. **Percentage of total cost covered by infrastructure charges in 2004**



Note: Cost recovery = Revenues from charges as a proportion of total expenditure on the network on operations, maintenance, renewals, interest and depreciation; Light shading indicates central and eastern European countries. Marginal costs can be expected to lie at roughly 15 to 20% of the cost figures reported.

Figure 0.2. **Average access charges in 2004**

€/train-km, excluding cost of electric traction



Note: Baltic freight trains are much larger than elsewhere. Baltic access charges are not directly comparable with those in other countries and have been adjusted here. In Estonia, for example, a typical 3 145 tonne train is charged € 11 per train-km. Data displayed for all countries for which reliable figures have been collected.

Harmonise charges for international freight trains

The structure of charges for freight trains should be harmonised, especially along key international corridors. Charges should be set on the basis of marginal costs, with simple mark-ups where required. There could be merit in adopting similar charges for domestic freight as well in many countries.

These charges need not be uniform in level but must be consistent in structure and should be based on a set of simple factors of use, at least outside of capacity bottlenecks and peak hours. Charges per gross tonne-km should be employed to reflect maintenance and renewal costs for track.[3] Where freight capacity is not constrained, such a single factor, simple charge may be sufficient. Where capacity for freight is constrained (and the marginal costs of freight traffic are significant) charges per train-km may also be useful.

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It should be accepted, however, that where rail freight is the dominant use of the network and its market position is strong (as in the Baltic States for example) an alternative approach based on full costs is appropriate.

Structure charges for passenger and freight trains to balance competition and financial objectives

National access charge regimes should be related to the complexity and intensity of the use of the rail network. Countries with intensive traffic and a multiplicity of users could best construct their access regime from a mix of approaches:

- Full cost based charges (with costs recovered as a two part tariff) for suburban and non-competing intercity passenger operators running on exclusive rights of way.

  It makes sense to recover full costs from these services where they are the dominant user of the system, generating most of the costs, which is almost always the case around major cities, and generally the case across the whole network in many member countries. Where passenger trains are a marginal user on freight dominated systems it may be appropriate to charge them only marginal costs.

  In the case of passenger services supported from public budgets under public service obligations, charging these trains the full costs they impose on the network makes the costs entailed more transparent for the public authorities that decide on the level of services that should be provided. This should help reconcile the demands for services from one part of government (for example transport local authorities) with the resources available from public budgets for rail infrastructure.

- Simple marginal cost based charges, plus a mark-up where necessary, for situations where intercity passenger trains will compete on the same tracks. Fixed charges need to be avoided as they almost always present a barrier to small operators seeking to enter the market.

Such a mixed approach, with simple marginal costs charges for freight, with a mark up where required for higher cost recovery, will permit the best balance among competition and financial stability objectives to be achieved.

Provide for renewals

Infrastructure managers should at least collect marginal costs, including accelerated renewals, from all trains. Variable, traffic-driven renewal costs, that is the increased present value of costs that result from having to undertake renewals sooner than if a train had not been run on the track, are not always charged for at present. As noted above, it makes little sense to carry traffic that cannot pay at least these costs. For rail freight to remain competitive with alternative modes it is important to achieving recovery of these infrastructure renewal costs also in other modes of transport.

Respect financial commitments

Transport policy determines the size of the gap between the revenues generated from access charges and the full cost of maintaining and renewing the infrastructure network. The key factors are specification of the services to be delivered under public service contracts and setting the framework for infrastructure charges. Filling the gap from public funds is essential for financial sustainability, with long term implications for the quality and safety of the network and the cost of maintaining it. Short term pressures inevitably lead finance ministries and parliaments to seek cuts in spending from time to time that are inconsistent with existing policy. The chief risk is delays to renewals that cause the condition

of the network to deteriorate and a backlog of expenditure to accumulate. Regulatory agencies with powers to set charges, and that are independent of government (at least in the short term), can play an important role in ensuring agreed funding is provided fully and reliably from State contributions. This represents the enforcement of agreements rather than an open cheque for the railways and can be complemented with duties to assess the efficiency of the rail infrastructure manager. Table 0.1 summarises the current regulatory arrangements in member countries.

Table 0.1. **Industry structure and regulatory arrangements**

	Industry structure	Overseen by independent rail regulator	Overseen by independent general competition authority	Overseen by Ministry of Transport
Austria	I	Yes	Yes	
Belgium	I			Yes
Bulgaria	S			Yes
Czech Republic	S			Yes
Denmark	S	Yes	Yes	
Estonia	I freight	Yes		
Finland	S		Yes	Yes
France	S			Yes
Germany	I	Yes	Yes	
Greece	I		Yes	Yes
Hungary	I	Yes		
Ireland	I		Yes	
Italy	I		Yes	Yes
Latvia	I	Yes	Yes	
Lithuania	I	Yes		Yes
Luxembourg	I			Yes
Netherlands	S		Yes	
Norway	S			Yes
Poland	I	Yes		
Portugal	S	Yes	Yes	
Romania	I	Yes		
Russia	I		Yes	
Slovakia	S			
Slovenia	S	Yes		Yes
Spain	S			Yes
Sweden	S	Yes	Yes	Yes
Switzerland	I	Yes	Yes	Yes
United Kingdom	S	Yes	Yes	

S. vertical separation, where the infrastructure manager (or affiliated company) is not allowed to operate services on that infrastructure.
I. vertical integration, where the infrastructure manager is allowed to operate services on that infrastructure, holding company structures are included in this category.

Use public service contracts with competitive tendering

Long term public service contracts are another important guarantee of financial sustainability. They should always be used for passenger services that are not fully commercially viable but are required of train operators by the State. These contracts should fund train operators to cover at least the avoidable costs of the services concerned, including infrastructure charges. As competition on the tracks is difficult and sometimes impossible to create for these services, competition for the market is to be preferred, through competitive tendering for exclusive public service contracts.

Ensure adequate public information on rail costs and accounts

Getting adequate data into the public domain is pre-requisite to full implementation of these recommendations. Data is currently insufficient to say with certainty which infrastructure managers charge below marginal costs or just how serious the practice, traditional in Eastern Europe, of covering passenger costs from freight charges is.

Ministers should require line of business accounts and a complete record of government support to be reported annually to public authorities by infrastructure managers and train operators, in a consistent format. Reports from infrastructure managers should include a discussion of any changes in the condition of the infrastructure from the previous year, and a statement of the degree to which income from users plus government support meets or falls short of the cost of maintaining the infrastructure including any required renewals. This should be included in the annual Network Statement that infrastructure managers are already required to produce in the European Union.

There is ample precedent in regulatory experience, for example in the USA and Canada, for requiring that railways report their annual results in a common format that permits analysis of individual railway performance and facilitates comparisons among railways. The burden this imposes on railways is negligible as they should already be collecting this information for proper management of their assets.

Europe's railways also need a common understanding of how to define and measure marginal private and external costs for use of rail infrastructure. Joint efforts are needed for a common approach and a consistent database. This has direct policy relevance and is not simply a research question.

Notes

1. Unless this is explicitly to correct for distortions on other modes and in that case the better course of action is to remove those distortions.
2. Independent of government as well as train operators and infrastructure managers.
3. Or per wagon-km, which is simpler but less accurately reflects gross weight.

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Chapter 1

Introduction and Regulatory Environment

1.1. Introduction

It is important for Europe's economy to develop a **seamless** transport network. While air, highway and water transport are more and more able to offer seamless, door-to-door transport throughout Europe, railways lag behind because of the remaining national barrier effects. Governments and railways are working to erase these barriers and to improve the competitive position of rail transport, led by the European Commission through a series of Directives that aim to open access for national train operators and new operators to offer seamless international services. The objective has been to encourage development of Europe-wide competition for international and domestic traffic.

In order to ensure efficient use of, and non-discriminatory access to, the rail infrastructure, the infrastructure businesses must establish an appropriate set of charges for infrastructure use. Commission Directives require that responsibility for access charge regimes be independent of any train operator, that they promote efficient use of the infrastructure, and that they do not discriminate among operators wishing to make comparable use of the infrastructure.

The economic principles behind an appropriate access regime are well established. Access charges should reflect the marginal cost ("directly related cost") that each user imposes on the infrastructure provider. To these marginal costs should be added the external costs (pollution, accidents, congestion, etc.) that each user generates. This is social marginal cost pricing and, if implemented correctly, will result in the most efficient use of the rail infrastructure. This approach is also conditioned on the assumption that Governments will fill the gap between marginal cost and the financial cost of the infrastructure business.

The issue has been made more complex, however, by the desire of some governments to charge users more than marginal cost in order to reduce fiscal demands on the State budget. European Union rules allow States to collect more than marginal costs from users, but require that the added funds be generated through mark-ups on marginal cost. These mark-ups are to be applied in a way that encourages efficiency (or rather, does as little harm to efficiency as possible) and that does not create discrimination among potentially competing users.

Governments have tended to follow one of three possible approaches: social marginal cost pricing as recommended by the Commission, with State compensation for the difference between marginal cost and financial cost (**SMC**); applying mark-ups to marginal cost in order to reduce (or eliminate) State compensation and the gap between marginal cost and financial cost (**MC+**); or, setting access charges to collect the difference between State contribution and full financial cost (**FC–**). In principle, the SMC approach yields the most efficient use of the infrastructure, but it puts the most pressure on State budgets. The MC+ approach, properly implemented, could yield the best trade-off between efficiency goals and budgetary needs, and may be completely consistent with achieving the goals of the FC– approach. The FC– approach protects the financial results of the infrastructure manager but puts less pressure on it to

reduce potential inefficiencies in the way it delivers infrastructure services, and may lead to unnecessary inefficiencies in use of the network. Though the three approaches reflect differences in philosophy and emphasis, each regime poses common problems, specifically the measurement of marginal costs, measurement of social costs, and assessment of the impact on users of the difference between charges and marginal costs.

The access charge regimes have generally been established either by using simple tariffs, which vary directly with use of the network (gross tonne-km and train-km are the most common measures of infrastructure use) or by using two part tariffs, in which one part is variable with use, and one part is fixed in advance in relation to expected capacity requirements (usually scheduled train-paths or train path-km). The simple systems are easier and less costly to implement, and are appropriate for less complex networks where capacity is not an issue and where the mix of use is less complex. Two-part systems are potentially more efficient in complex, mixed-use networks where more than marginal cost has to be charged. If used as part of a long run contract they may actually improve incentives by reflecting the long run costs of the incremental capacity requirements of a particular user, and in any case they may be less distorting in their effects on train operators' decisions than a mark up on the variable charge. But they can, depending on the size of the fixed component of the charges, engender discrimination between various sizes or classes of users. This is particularly the case where the fixed component of the charge is a pure access charge, unrelated to planned use of the system, or where there are large quantity discounts. Two-part systems can, in particular, act as a burden on international freight services if the fixed component of the charge is large.

This study compared the access regimes in over 20 ECMT countries. It finds examples of the SMC, MC+ and FC– approaches, and discusses both simple and two-part regimes in implementing these approaches. After reviewing the experience to date, and the theoretical issues in access pricing, the study reaches a number of conclusions:

- Because there is neither an agreed method for measuring marginal cost nor adequate data in a common format for quantifying marginal costs, it is not possible to say with certainty whether any access regime actually covers marginal cost. There are indications that some regimes – Sweden, for example – do not cover marginal costs, especially when the cost of accelerated renewals[1] is considered to be part of marginal costs. This report considers accelerated renewals (*i.e.* variable, traffic-driven renewals costs) to be a key element of marginal costs.
- Whatever the merits of the various individual country regimes in closing the gap between marginal cost and full financial cost (countries clearly vary widely in their objectives), the various national regimes are sufficiently disparate as to make international train operations more difficult. There are three main underlying causes:
  - To some extent it is due to attempts by some countries to load a high proportion of fixed costs onto freight operators in order to reduce charges to subsidised passenger operators.
  - Other countries have attempted in effect to tax transit traffic in order to reduce charges on domestic or import/export traffic.
  - The existence of a two-part charge in one country adjoining a country with simple charges also inherently creates a type of "seam" that retards international flows. Differences in the way simple charges are formulated can also create such seams if one part of a route is charged per train-km and the rest per gross tonne-km, and the train-km charge is high.

- Two-part systems potentially reduce competition between or among operators in the same market. They inevitably make the goal of international competition more difficult to achieve.
- International rail freight flows may be particularly burdened by two-part tariffs with a large fixed component and by the patchwork of tariff structures that make cross-border management difficult.

Based on these conclusions, the study has five recommendations:

1. It will be critical to develop improved data on infrastructure costs and to make infrastructure accounting data by line of business activity available to the public domain (two thirds of expenditure on infrastructure maintenance is funded directly from public budgets in western Europe).
2. An agreed approach to the measurement of marginal private and external costs is needed. At this stage agreement is needed on the basic approach to follow in estimating costs rather than detailed calculations as to the precise level of marginal costs. Most importantly this requires building a consensus on the importance of including accelerated renewals (*i.e.* variable, traffic-driven renewals costs) in marginal costs, clarifying the dividing line between renewals and enhancements, and clarifying how to treat expenditures that only recur at long, perhaps irregular, intervals.
3. International rail freight operations would benefit greatly from consistent SMC or MC+ infrastructure charging regimes, especially on key international corridors. These regimes should be based on simple factors (not two-part charges) and should be consistent in structure.
4. Governments should ensure that their infrastructure providers are at least collecting marginal costs, including accelerated renewals, from users subject to achieving this also on other modes of transport. Correspondingly, Ministers must ensure that the gap between access charges (however structured) and FC is met fully and reliably by State contributions. Independent regulators have an important role in this regard.
5. National access charging regimes in each country should be related to the complexity and intensity of the use of the rail network. Countries with intensive traffic and a multiplicity of users could best construct their access regime from a mix of approaches:
   - FC (recovered as a 2 part tariff) for suburban and non-competing intercity passenger users operating on exclusive rights of way.
   - Simple MC+ or two-part MC+ for situations where intercity passenger trains will compete on the same tracks.
   - Simple SMC or simple MC+ for freight.

Such a mixed approach will permit a better balance among competition and financial stability objectives.

The report begins with a short review of the legislative environment, created mainly by EU Directives, followed by a brief discussion of the theory of charging for the use of infrastructure. It then examines the access regimes developed by European railways to see how the theory and legislative requirements are being implemented in practice. It ends with a discussion of the economic issues for access charging systems and attempts to draw conclusions on the most appropriate charges for European railways and makes recommendations on areas where transport Ministers most urgently need to focus attention.

The discussions are based on information provided by Transport Ministries and rail infrastructure managers in response to a questionnaire sent to all ECMT Member countries in 2004. The questionnaire sought a general description of each access regime along with a number of detailed aspects of the charges and of the operation of the system (see Appendix A). These data were then combined with data available from publicly available sources to provide a summary comparison and typology of the regimes (see Appendix B). To deepen the understanding of the issues involved, meetings were held in Rome, Geneva and Paris in 2004 and 2005 at which many of the infrastructure agencies gave detailed presentations explaining their approach to charging. The presentations are available on the ECMT website at *www.cemt.org/topics/rail/raildocs.htm*. Discussions at earlier meetings in Maribor (TAIEX) and Budapest (IMPRINT) were also taken into account. The work was supervised by the ECMT Group on Railways and completed in close cooperation with the European Commission and its Task Force on Track Access Charges.

1.2. The legislative background

Ministers are concerned to enhance the efficiency and sustainability of rail transport across Europe and for many years ECMT has sought to promote competition in various forms as part of the means for improving the performance of the transport sector. The European Commission has played the leading role in developing an international legislative and regulatory framework to promote competition within the rail sector, while a number of Member country governments acted earlier, or have gone further in laying the groundwork for developing competition within their national rail systems. This report is particularly concerned with the development of charging systems for the use of rail infrastructure that will promote international train services across Europe. The framework developed by EU Directives is therefore the starting point for the analysis.

The Commission is concerned by the weak performance of the railways in the EU.[2] While the overall economy of the EU has grown strongly, freight traffic on the EU railways has stagnated and their market share has fallen significantly. A part of the railway decline is a natural result of structural changes in the economy, favoring higher service quality over lower transport tariffs. But another part of the poor railway performance is a result of national border barrier-effects. These persist in railways but no longer affect highways, waterways and airports. Within the national border "fortresses", the railways were cushioned by national budgets that permitted them to function as integrated monopolies, effectively isolated from domestic and EU-wide market pressures.

The Commission feared that the railways would become increasingly expensive and irrelevant, even detrimental, to the efficiency of the transport network. Its response has evolved over a number of years and has covered a very wide range of issues. This paper deals with one aspect – the requirement that the accounts for railway infrastructure be separated from the accounts for the operation of the railway, that the infrastructure be opened for access by competing operators other than the national operator, and the ensuing need for a system for charging all of the various operators for their use of the infrastructure in order to ensure that all users are charged on equal and non-discriminatory terms.

Abusive procedures for issuing licenses or safety certificates could potentially create more important barriers to competition than inappropriate charging systems. While EU Directives will ensure progress on the licensing issue, the widely differing safety approval

procedures in the Member States could function to defeat the interoperability and competition objectives. There are some localized aspects of safety regulation (inspection procedures in extreme weather conditions, for example) that will legitimately need to be accommodated: these pose no problem if done transparently and non-discriminately. Other aspects of safety, for example rigorous driver licensing and qualification on particular lines, are essential, but could be abused if oversight is not adequate. There are other areas of "safety", such as outdated equipment specifications or inspection procedures that can function to limit international traffic and competition.

Formally, this paper sets out to review implementation of ECMT resolution 2002/1. With regard to infrastructure charges the Resolution sets out the following requirements:

- Discrimination in the charges applied to different operators in the same market seeking the same kind of train path and infrastructure service is to be prevented.
- Conversely, price discrimination according to train characteristics (such as axle weight) is essential to cost effective infrastructure provision, and price discrimination between market segments is appropriate where infrastructure charges are required to remunerate past or future investment or otherwise cover more than marginal costs.
- Infrastructure pricing regulations designed to prevent discrimination between train operators seeking similar infrastructure services should not result in the elimination of incentives for efficiency in charging systems and in particular should not prevent the adoption of two part tariffs designed to promote efficient development of infrastructure.
- Elements in infrastructure charges related to marginal costs must provide incentives for train operators to reduce those costs (for example through improved design of rolling stock) and not simply match revenues to costs — this applies particularly to wear and tear and to costs related to the environment and accidents.
- Where train operations are separated from infrastructure management, regulatory frameworks, particularly in regard to pricing, should provide incentives for infrastructure managers to maximize efficiency, to invest cost effectively to meet the demands of all their customers, and provide infrastructure services that promote the competitiveness of train services with respect to other modes.
- Governments should co-operate to encourage companies across Europe responsible for rail infrastructure to develop transparent and non-discriminatory charges that facilitate the marketing of international train operations through a sufficient degree of harmonization in charging structures and by limiting international "cross-subsidy" through a degree of convergence in the level of charges.

The Commission's efforts in railway restructuring began with Council Directive 91/440/EC, which established the basic framework of separating the accounts of infrastructure management from train operations, while prohibiting the transfer of state aid from one operator to another. It allowed certain international operators the ability of competitive access on the national networks, and required that the manager of the infrastructure charge a fee for access. The fee was to be non-discriminatory and, could "… in particular take into account the mileage, the composition of the train and any specific requirements in terms of such factors as speed, axle load and the degree or period of utilization of the infrastructure".[3] Member states were not required to create separate **institutions** (only separate accounts) for infrastructure management versus operations, and competitive access to infrastructure was limited solely to international undertakings.

Four years later,[4] Directive 95/19/EC on the allocation of railway infrastructure and the charging of infrastructure fees[5] declared "… it is appropriate to establish a system for the allocation of railway infrastructure and the charging of infrastructure fees which is non-discriminatory and **uniform** through the Community [emphasis added]."[6] The Directive added several significant considerations (or, at least, changes in nuance) to 91/440/EC:

- "The accounts of an infrastructure manager shall, under normal business conditions over a reasonable time period, **at least balance income from infrastructure fees plus state contributions on the one hand and infrastructure expenditure** on the other [emphasis added]." (Article 6)
- "The infrastructure manager **may** finance infrastructure development including provision or renewal of capital assets, and **may** make a return on capital employed [emphasis added]." (Article 6)
- "After consulting the infrastructure manager, **Member States shall** lay down the rules for determining the infrastructure fees. These rules **shall** provide the infrastructure manager with the facility to **market** the available infrastructure capacity **efficiently** [emphasis added]." (Article 7)
- "The fees charged by the infrastructure manager shall be fixed according to the nature of the service, the time of the service, **the market situation** and the type and degree of wear and tear of the infrastructure." [emphasis added] (Article 8)

In summary, Directive 95/19/EC: established the concept of financial stability of the infrastructure provider; permitted the use of access charges to finance development of new capacity and renewal of capital assets; required States to establish the rules for an infrastructure access charging regime; established the concept that the infrastructure manager should positively market services, not merely and passively wait for user requests; and, highlighted the importance of "the market situation" (that is, the user's response to infrastructure access price and quality options) as a factor in establishing access charging regimes.

ECMT Resolution 95/3 was designed to extend the measures taken in Directives 95/18/EC and 95/19/EC to all ECMT Member countries and recommends that infrastructure fees:

1. Be determined by means that enable the infrastructure manager to market available capacity efficiently.
2. Be determined essentially according to the nature of the service, time of service, market situation, type and quality of infrastructure.
3. Be the same in identical circumstances.

The resolution was formally incorporated into the ECMT *acquis* in 2003 and thus applies equally to the countries that have become full members of the organization since 1995.

Reflecting the Commission's accumulated experience and concern with slow progress and problems encountered in railway restructuring, four new Directives were issued in 2001: 2001/12/EC, 2001/13/EC, 2001/14/EC and 2001/16/EC. The first three were proposed in the Commission's "First Package" of rail reforms.

Directive 2001/12/EC increased the independence of railway operators (undertakings), and specifically the infrastructure provider, from the budgetary accounting of the Member States.[7] It required the infrastructure manager to draw up a business plan that, among other things, would demonstrate a "financial balance" for the infrastructure business.[8] Moreover, it specifically required that the accounts of the operating businesses be segregated, with freight

shown separately from passenger operations, and further required that the accounts for publicly supported passenger businesses should be shown separately as well. The purpose of these separations was to ensure that State support provided for a socially significant service was not used to cross subsidize another service operated in competition with unsupported providers. Finally, the Directive defined a new Trans European Rail Freight Network (TERFN), on which railway freight undertakings were to be granted open access after March 2008, for providing international freight services.

Directive 2001/14/EC focused on the allocation of infrastructure capacity and development of access charges for infrastructure. It found that previous Directives had not "prevented a considerable variation in the structure and level of railway infrastructure charges and the form and duration of capacity allocation processes."[9] It concluded that efficient transport required further opening of the transport market, especially across borders and emphasized again the need for transparent and non-discriminatory access charges. The Commission also concluded "… any charging scheme will send economic signals to users. It is important that those signals to railway undertakings should be consistent and lead them to make rational decisions".[10] The Directive paid particular attention to the competitiveness of international rail freight. The following language, worth quoting in full, implements these intentions: "… in order to obtain **full recovery** of the costs incurred by the infrastructure manager a Member State **may**, **if** the market can bear this, levy mark-ups on the basis of efficient, transparent and non-discriminatory principles, while guaranteeing optimum competitiveness **in particular of international freight**. The charging system shall respect the productivity increases achieved by railway undertakings. The level of charges **must not**, however, **exclude the use of infrastructure** by market segments which can pay at **least the cost that is directly incurred as a result of operating** the railway service, plus a rate of return which the market can bear [emphasis added]."[11]

In summary at this point, the legislation strengthened the process of separating infrastructure from operators (and financially separating the various operators as well) and clearly established the intent in access pricing of making the infrastructure "business" financially stable, with revenues from users plus support from governments fully equal to long-term financial costs. In addition, the access principles recognized the status of access charges as price signals and clarified the ability of Member States (acting through the infrastructure businesses) to implement mark-ups above the "cost that is directly incurred as a result of operating train services." Significantly, though, the mark-ups imposed are not supposed to be so high as to discourage use of the infrastructure by users that can pay the direct cost but cannot pay their fully allocated share of total costs.

At the same time, it deserves emphasis that the related objectives of financial stability and rational pricing signals are only achievable when access charges are **no lower than the infrastructure manager's marginal cost** (MC). That is, neither the access regime nor the levels of state support should result in access charges to the user that are **less** than the infrastructure provider's MC, because this would lead to irrational use of the infrastructure (it would clearly not "lead them to make rational decisions"). Even assuming that the contributions from the State actually do fully and reliably make up for the difference between long-term full cost (FC) and access revenues, so that the infrastructure agency is financially stable, access charges that do not cover at least the wear and tear on the infrastructure (**including renewals and replacements of the existing facilities, which are, in effect wear and tear effects displaced in time**) are thus not efficient, and do not meet the test of the Directives.

A second-best argument can be made: if access charges for highway, airway and waterway facilities are below MC, then access charges for rail infrastructure might also be set below MC to restore balanced inter-modal competition and this is explicitly allowed for in Directive 2001/14. Ministers will want to ensure that all users pay at least marginal cost for **all** forms of transport infrastructure if they are to avoid this kind of compromise.

The Commission's continuing determination to promote international freight railway competition also led to the requirement that any mark up on international freight should have particular regard to the effect on its competitiveness. This language implies that international freight traffic should not be subject to the markups applied to other types of traffic, certainly not if, in any way, the mark-ups discourage a potential use of the system. To be precise, the language does not actually prohibit mark-ups on international freight traffic access charges, though it does appear to discourage this practice. **This said, it would be very difficult to reconcile the language with charging higher mark-ups on international freight traffic (export/import or transit) than on domestic freight traffic**.

The Commission's "Second Package" is implemented in Directives 2004/49/EC, 2004/50/EC and 2004/51/EC. Directive 2004/49/EC deals primarily with strengthening the licensing of railway undertakings to ensure that licensing will be compatible across Member States and will not be used as a barrier to entry, though it does contain one provision stating that the Commission may investigate cases in which there are disputes over infrastructure allocation or charging. Directive 2004/50/EC aimed at improving interoperability of high speed and conventional speed trains in the Union. Directive 2004/51/EC moved up the date on which the national networks will be fully open to licensed operators: by 2006, both the TERFN and the national networks must be open to licensed international operators; by 2007, access rights to the entire EU rail networks shall be available to all operators, including those engaged in cabotage (haulage purely within one country).

The Commission's "Third Package" was tabled in March of 2004. It has the objectives of: opening international passenger services for competition by 2010 (2004/0047 COD)); certification of train crews (2004/0048 (COD)); provision of international passenger rights and obligations (2004/0049 (COD)); and, provision for compensation in cases of non-compliance with contractual quality requirements for rail freight services (2004/0050 (COD)). The latter proposal includes provisions for the liability of the infrastructure manager in cases where freight quality commitments are not met through the fault of the infrastructure manager.

1.3. The potential objectives of infrastructure separation

The Commission has had to struggle with an immensely complex challenge. Part of the difficulty has been in formulating the reform process: the Commission has been leading a multi-country process on a reform path that has never been conducted anywhere outside the EU and it is not surprising that the approach has had to evolve with experience. Part of the challenge remains – developing a clear and agreed set of objectives for the reform. The objectives have also evolved with experience. It is important to restate the potential objectives in order to assess the ability of the existing access charging regimes to meet those objectives. Very briefly the objectives (not necessarily in order of priority) are:

- **Improved efficiency in national and international transport, and reflecting the social costs of transport.** These two appear to be the most basic to the EU's purpose, and are driving the Commission's actions in all areas, not just transport.

- **Clarifying government roles in supporting railways and promoting competition in railways**, especially on an international scale, while breaking up the old national boundaries as they applied to **operators** (infrastructure boundaries are not as important, so long as they do not act to limit cross-boundary operations). This led to infrastructure accounting separation at the outset and, over a longer period of time, to more and more open access. The required separation began on an accounting basis, but with a significant ambiguity because the initially required separation was only infrastructure versus operations and did not require full accounting separation by the various operating lines of business (LOB). Government roles and support differ greatly among the parts of the systems. The rules do not limit support to infrastructure but prevent it being provided in a way that could lead to restrictions on access to the infrastructure;[12] support to systems that perform social services is permitted, but must be restricted to these services. These parts of the system must be delimited in order to ensure that support for one function does not leak into others. As discussed below, however, the EU railways have not (yet) actually provided transparent, public reports along the lines of separation required, so it remains difficult to determine where State support is actually being targeted and spent.
- **Financial stability for the infrastructure provider**. The Commission has recognized the conflict between the socially optimum approach to access pricing (pure Social Marginal Cost (SMC) pricing) and the need for the infrastructure provider to be financially stable (with incomes covering all financial costs). The Commission also realized that some Member States would not want to pay from public funds the entire difference between SMC and full financial costs, which led to the allowed mark-up policy.
- **Enhanced business focus**. The Commission explicitly used the term "business" to describe the infrastructure provider as well as the operators. The separated structure of the railways greatly clarifies the performance of each of the parts, and should enhance the ability of each of the businesses to focus on the needs of its particular market.
- **Attracting private investment**. Though the Commission does not take any position on private versus public ownership, it is clear that the EU railways (especially in freight and long distance passenger transport) will face powerful competition from privately owned and operated trucking and inland water transport companies and from discount airlines. By breaking the railway sector into separated and smaller pieces, each of which is market focused, the ability of each piece to compete should be improved, and the opportunities for attraction of private investment in appropriate places should increase.

The Commission has faced very strong resistance to the Directives, and implementation has been slow and incomplete. Member State governments have, in some instances, resisted the changes because of a desire to continue to protect domestic markets (among other domestic issues). Member State railways have also fought against the changes, partly because of a concern for the costs of implementing the new, separated structures, and partly because of a fear of the potential effects of function-by-function financial transparency and entry of competitors. It is important in reviewing the progress to date in developing access charge regimes to note that many Member States have made only the narrowest construction (or less) of what was required; few have taken a proactive lead in developing charges suited to facilitating the development of a single, pan-European rail market. All have taken a national approach: few (if any) have tried to incorporate EU-wide objectives such as ease of access charging across boundaries. Collective results rarely exceed individual intentions, and this case is no exception to the rule.

Notes

1. That is the increased present value of costs that results from having to undertake renewals sooner than if a train had not been run on the track (note that renewals include both variable and fixed costs).
2. See, for example, "White Paper: A Strategy for revitalizing the Community's Railways," 1996, and "White Paper: European Transport Policy for 2010: A Time to Decide," 2001, for discussions of the Commission's attitude toward railway performance and the need for reform.
3. 91/440/EC Article 8.
4. A second directive, 95/18/EC was issued at the same time to provide a system of licenses for railway undertakings that are recognized in all member States.
5. 95/19/EC Title.
6. 95/19/EC Declarations.
7. Directive 2001/13/EC further developed the common approach in the Member States for the licensing of railway undertakings, and required that other States should recognize the licenses granted in one State. Directive 2001/16/EC dealt with improving interoperability in equipment and facilities among the railways of the member States.
8. 2001/12/EC Article 7, paragraph 4. It deserves emphasis that the term used by the Commission for the infrastructure provider is "business" and not "agency" or "administration," or "provider". This strongly suggests that the Commission intended the infrastructure provider to approach its "business" with a commercial attitude. See also 91/440/EC, Article 6, in which the word "business" was used.
9. Directive 2001/14/EC, Declaration 4.
10. *Ibid*., Declaration 35.
11. *Ibid*., new Article 8.
12. That is, support to the infrastructure must be in a form that will benefit all similar users equally and cannot be limited to national operators.

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Railway Reform and Charges for the Use of Infrastructure

Chapter 2

Rail Infrastructure Charges in Practice

This section considers in detail the measurement of the various elements of the costs of rail infrastructure use and how they are translated into charges. It first seeks to identify the principles behind the pricing structure and level in the various countries. It goes on to consider in detail the different cost categories and the way they are charged for. A summary is presented in Table 2.1. Finally it seeks to draw some conclusions on best practice in the economic arena.

2.1. Principles

It is clear from Table 2.1 that there are essentially three different philosophies behind the setting of rail infrastructure charges in Europe. The first, (MC), starts with the measurement of social marginal cost, as being the socially optimal pricing system in the absence of constraints such as budgetary constraints or distortions elsewhere in the economy. Marginal social cost represents the additional cost imposed on society as a whole from a marginal addition to train kilometres. To the extent that budgetary problems are perceived to exist, departures from pure marginal social cost pricing would be necessary, but these would then be made in

Table 2.1. **Rail infrastructure charges – Summary Table**

	Pricing principle	Fixed charges	Charges per gross t-km	Train-km	Path-km	Other
Austria	MC+		✓	✓		
Belgium	FC–					See Appendix A
Bulgaria	MC+		✓	✓		Charges per train path
Czech Republic	MC+		✓	✓		
Denmark	MC+			✓		Charges per train for bottlenecks and bridges
Estonia	FC-	✓	✓	✓		
Finland	MC+		✓			
France	MC+	✓		✓	✓	
Germany	FC-			✓		
Hungary	FC			✓	✓	
Italy	FC- (Traffic management only)	✓		✓	✓	Also charge per node
Latvia	FC			✓		
Netherlands	MC			✓		
Poland	FC			✓	✓	
Portugal	MC			✓		
Romania	FC	✓	✓		✓	
Slovenia	FC			✓		
Sweden	MC+		✓			Oresund bridge surcharge
Switzerland	MC+		✓	✓		Also charge per node
UK	MC+	Franchisees only		✓		Per vehicle km by type of vehicle

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the least distorting way possible. This approach to pricing may be referred to as marginal cost pricing with markups (**MC+**). This is of course the approach required by Directive 2001/14, and is applied in most countries of Western Europe, with target levels of cost recovery ranging from 5% (Sweden) to 63% (France). Most countries see this approach as meaning charging at least part of maintenance and renewal costs, sometimes also traffic management costs and sometimes a contribution to investment. Italy is unique in that maintenance and renewals costs are not charged for; only traffic management is included in the charges.

The second philosophy starts from the concept of the infrastructure manager as a commercial organization needing to recover its costs. Whatever costs are not funded directly by the state need to be shared out among users of the infrastructure in an efficient and equitable manner. This approach to pricing is referred to as full cost recovery after receipt of grants (**FC–**). The sole exponents of this approach in Western Europe are Germany (60% cost coverage) and Italy (40% cost coverage). In Germany, the approach is applied to all costs except some investment costs; in Italy it is only applied to train planning and operations. At privatization Great Britain also sought to cover full cost but mainly by the use of two-part tariffs, with the variable element of the tariff reflecting short run marginal cost. The situation now in Great Britain is that two part tariffs still exist for franchised passenger services (the majority) while open access passenger and freight operators pay marginal cost. However the full cost approach is widely followed in Eastern Europe, with the Baltic States, Hungary, Poland and Slovakia adopting it with cost recovery ranging from 50% to 100% and Slovenia regarding it as a target, although it only covered 9% of costs from charges in 2004.

While these may be presented as totally different approaches to the setting of charges, in practice there are strong commonalities between them. Firstly, even a purely commercial organization has an important reason to study its marginal private costs as these determine the company's pricing floor. Traffic unable to pay this price should not be carried. Given the presence of high fixed costs in rail transport, it will be necessary for an unsubsidized commercial body to charge traffic considerably above marginal cost on average, and a purely commercial organization will seek to discriminate between types of traffic according to their willingness and ability to pay, in order to achieve the highest margins possible.

But within Europe even commercial rail infrastructure managers are not unregulated profit maximizers. Rather they are public or regulated private organizations whose charges are limited to what is necessary to meet their financial requirements. To this extent, they face essentially the same budget constraint as that faced by an organization that starts with the philosophy of marginal cost pricing – there is no suggestion that pure marginal cost pricing is desirable if it leaves the infrastructure manager without the necessary funds to maintain and renew the system. EC legislation makes it quite clear that infrastructure managers must produce plans which balance receipts from charges and subsidies with necessary expenditure.

Thus there is no necessary contradiction between the two philosophies; full cost recovery after receipt of grants and marginal cost pricing with markups can be completely consistent with each other. Where the difference does appear to lie in practice is in the degree to which the full cost recovery after grants approach seeks to identify marginal cost as its pricing base, as opposed to allocating costs on other grounds, which may not involve calculating marginal cost at all. This may reflect differing perceptions of the relative importance of efficiency and equity in cost allocation. There is a common argument that the fairest way to finance infrastructure is to share out the total costs according to some set of indicators, reflecting cost causation when this is feasible, and simply reflecting use in the case of genuine joint costs. However, there is no reason to suppose that in general such

an approach is either efficient or equitable. In terms of efficiency it might exclude traffic that was willing to pay its marginal cost; in terms of equity there is no reason to suppose that the benefits from use of the system are distributed in proportion to use, and certainly this sort of pricing rule takes no account of either willingness or ability to pay.

Marginal social costs may be subdivided into marginal private costs and marginal external costs. **Marginal private costs** are the costs borne directly by the infrastructure manager. These generally comprise wear and tear costs (which may result in additional maintenance costs and accelerated renewal of some components), some train planning and operations costs and congestion or scarcity costs. Strictly, **congestion costs** (which are additional delays to other operators' trains resulting from higher capacity utilisation) are borne directly by train operating companies, rather than the infrastructure manager, so they are not part of the marginal private cost of the infrastructure manager. But they may directly affect the demand for track access by affecting the quality of service provided, and also there may be conditions requiring the infrastructure manager to compensate train operators for delays. In either case there will be a cost, or a loss of revenue, to the infrastructure manager.

In addition, use of rail infrastructure imposes **external costs** of noise, air pollution, global warming and possibly some elements of accident costs. Marginal social cost pricing requires these costs to be charged in the form of Pigovian taxes. But it is not appropriate that revenues from these charges should go to the infrastructure manager. To take a crude example, this might give an incentive for infrastructure managers to earn more money by attracting more polluting trains. Rather, the receipts from Pigovian taxes should go direct to the state.

Mention has already been made of the notion of **scarcity charges**, which are charges to be levied when demand exceeds capacity, and it should be noted that there are two competing philosophies of how to calculate these. In the pure short run, when selling slots on a spot market, it is the cost of pushing another service off the tracks, or into an inferior slot, that is relevant. In a longer term track access agreement which grants specific access rights, it may be more appropriate to think in terms of the costs of providing capacity for those additional slots. These two approaches are known to economists as short run and long run marginal cost pricing respectively. When capacity is optimally adjusted, and in the absence of indivisibilities, the marginal cost of additional capacity is equal to the value of the marginal additional train, so the two costs are equal. But given the long time scales of rail infrastructure investment that is often not the case, and a choice has to be made. Charging short run marginal social cost gives the correct incentives to train operators for the optimal use of existing capacity. Charging according to actual expenditure on increased capacity gives the correct incentives to the infrastructure manager to expand (or contract) capacity. (In both cases, this assumes that the revenue earned by the train represents its social value, so there must be appropriate taxes and subsidies in place to represent any external costs and benefits of the train in question for the incentives to be correct).

It is not possible with a single charge to get both sets of incentives correct. A choice has to be made as to whether to charge at short run marginal social cost, and rely on other measures to achieve optimal investment, or to sacrifice some benefits in terms of current infrastructure utilization to get the investment incentives right. The problem with the alternative long run pricing approach is that some traffic able to pay its short run marginal costs (and therefore productive from a socio-economic perspective) will be priced off the system. This problem is avoided if the costs of capacity are charged as a fixed element in a two part tariff, varying with long term capacity requirements but not with day to day changes in train service levels.

If charges are based on short run marginal costs, optimal investment can be promoted through regulation, where the Regulator has powers to require the infrastructure manager to undertake worthwhile investment. In Britain, for example, it is a license condition that Network Rail should undertake investment agreed as part of the Network Management Statement. Optimal investment can also be promoted through Government grants based on social cost benefit analysis.

Most of the planning of rail services and most decisions on the allocation of access rights relate to the **timetable period**. Thus it is costs that vary over this period of 1-2 years rather than a very short run approach to costs that is most relevant, even if a short run marginal social cost pricing approach is decided upon.

A common starting point in costing is the division of costs into **fixed and variable costs**, and a brief comment on this categorization may be useful at this point. Fixed costs are generally defined as those costs which do not vary with output. Which costs vary with output depends, however, on the time period over which we are looking. In the very long run, the only costs falling into this category are the sunk costs of past investments that do not need to be renewed. In the very short run, most costs other than power and wear and tear may be fixed. Different approaches between different railways may therefore arise because they have a different time period in mind when setting the charges and when defining fixed and variable costs (see Table 2.2).

The definition of fixed costs may also depend on the range of output changes under consideration. Rail costs may rise with output in a non-linear fashion, and indivisibilities may introduce steps into the function. Some railways consider any extra costs incurred when traffic is non-zero to be variable costs. In this case all maintenance and renewal costs would be variable costs, as well as signaling and train planning, since it is unnecessary to do these unless the system is to be used to move traffic. Other railways (for instance Network Rail and the rail Regulator in Britain) regard as fixed those costs which would be incurred regardless of traffic levels given that particular types of traffic are using the

Table 2.2. **Categories of costs included in variable charges**

	Maintenance	Renewals	Train planning and operations	Congestion and scarcity	Accidents	Environment
Austria	✓	–	–	✓	–	–
Czech	✓	–	✓	–	–	–
Denmark	✓	–	–	✓	–	–
Estonia	✓	✓	✓	–	–	–
Finland	✓	✓	–	–	–	✓
France	✓	✓	✓	✓	–	–
Germany	✓	✓	✓	✓	–	–
Hungary	✓	✓	✓	–	–	–
Italy	–	–	✓	✓	–	–
Latvia	✓	✓	✓	–	–	–
Netherlands	✓	–	✓	–	–	–
Poland	✓	✓	✓	–	–	–
Portugal	✓	–	✓	–	–	–
Romania	✓	–	✓	–	–	–
Slovenia	✓	✓	✓	–	–	–
Sweden	✓	–	–	–	✓	✓
Switzerland	✓	✓	✓	✓	–	Noise bonus
UK	✓	✓	–	✓	–	–

system, and possibly also within a certain range of existing levels. Consequently these railways treat as variable only those costs that vary when traffic varies beyond a certain range. Many, and perhaps most, elements of maintenance, signaling and train planning costs may then be considered to be fixed.

In general one would expect the latter approach to give an average variable cost which was a much better approximation to marginal cost than the former, although there is a risk of always failing to take account of the "steps" in the function, reflecting discrete changes in the resources needed when some discrete change in facilities or maintenance standards becomes necessary. These "steps" may be represented by the notion of **avoidable costs** – the avoidable costs of a particular type of traffic being the variable costs given that such traffic is running plus any fixed costs that would be avoided if the traffic in question ceased. For instance some costs of providing for high speeds may be fixed as long as high speed trains are using the system, but avoidable if only slower trains are running.

It is also worth mentioning the concept of **joint costs**, *i.e.* costs that are only avoidable if more than one type of service is withdrawn. For instance suppose that a particular double track route is used for local passenger, fast passenger and freight services, and suppose that it may only be reduced to one track if two of the three types of train are withdrawn. In this case the costs of maintaining a second track are joint, and will not enter into the avoidable cost of any single type of train.

The analysis of avoidable costs is very important for decisions about the desirable capability of the network, in terms of quality and capacity. Infrastructure necessary for particular types of service can only be provided if someone (be it government or users) is willing to bear the avoidable costs, and it is appropriate to charge these to the type of traffic in question as a fixed charge, which will only vary in the long run as decisions to change the quality and capacity of the infrastructure are taken. Likewise joint costs have to be borne by someone, but if charged to users this needs to be done in a way which does not distort their decisions as to what level of service to run. Again, this may be as part of the fixed element of a two part tariff, but the problems of two part tariffs where there is on-track competition, and especially for international services, have already been remarked upon and are discussed further below.

Where mark ups are necessary, it is necessary to give careful thought to how best to introduce them, to minimise the distortions to which they lead. A general principle will be to minimise the loss of traffic that is willing to pay marginal social cost. The degree to which traffic is willing to pay more than marginal social cost will normally vary by market segment, both in terms of broad market sectors (high speed passenger, regional passenger freight) and more detailed market segments (*e.g.* coal, containers) and therefore mark ups should vary as well.

One final comment may be made on matters of principle. If there were no costs attached to the setting and use of complicated tariffs, then it would be desirable for tariffs to reflect all the factors that cause each element of costs to vary – train weight, speed, type of rolling stock, etc. To the extent that complicated tariffs are seen to have an additional **administrative cost** (for instance in collecting the relevant data), and that train operating companies may fail to react appropriately to them, there may be a case for more simplicity. Moreover the balance of advantage between simplicity and complexity may vary with the **mix and nature of the traffic** on the system in question – a system that is very homogenous has less need of complicated tariffs than one with much greater diversity of traffic.

2.2. Implementation – simple and two part charges

The tools available to implement an access charge regime are basically of two types, "simple" charges and "two-part" charges.

- Simple charges are directly variable with measures of use: gross tonne-km, net tonne-km, passenger-km, train-km, kW and kWh of electric traction used, per cent of revenue,[1] etc. These can be weighted by: speed, axle loadings, types of rolling stock, the specific route (including the geometry requirements of the route), time of day, and freight commodity, among many others. Simple charges are probably more effective in collecting marginal (direct) costs, and they may be more effective in charging for social costs and externalities. They are more distorting in collecting allocated shares of fixed costs and they may not give effective signals to encourage the financing of added capacity. If used to collect fixed costs they may no longer give the right signals to use existing capacity to the full. Simple charges might be most appropriate for a relatively simple network, with few users and where traffic is not approaching network capacity (Norway, for example).
- Two-part charging systems have one or more parameters related directly to use, such as the variable parameters above. In addition, two-part systems have a second component based on the capacity forecast to be used or on some estimate of the fixed costs of the system to be recovered. This second component, sometimes called the "fixed" component, can be based on scheduled path-km, or scheduled train-km, among other options. The second component can also be weighted by factors such as path quality, scheduled speed, particular line, time of day, etc. It is significant that most of the second component factors tend to be passenger service-driven (particularly by commuter traffic) rather than freight-related: that is most freight users can adjust their usage to avoid peak time use (and thus do not have to burden capacity) whereas most passenger traffic must travel at times and at speeds that increase the need for capacity. Two-part regimes are more efficient at relating use to economic cost, but they raise an issue of potential discrimination among users. Two-part regimes also tend to be more complex and expensive to implement.

Two-part systems are often said to have a "variable" part and a "fixed" part. This may be somewhat misleading in the current context, since the so-called fixed part is often related to some measure of expected system use. In practice, the difference is that the variable part tends to be related to actual, measured wear and tear usage, whereas the fixed part tends to be related to the planned use of capacity. Where this simply reflects elements of marginal cost, in terms of train planning costs or use of scarce capacity, this cannot be regarded as discriminatory. However, a heavy loading of costs on to these elements combined with a requirement to reserve paths may discourage small operators, particularly freight operators, where actual capacity requirements are particularly uncertain.

When the fixed element of the tariff represents an access charge that is not related to planned use, or which varies with planned use in a way that gives large discounts for bulk purchase that are certainly not related to cost savings, in an environment in which there is actual or potential on-track competition, it is clearly discriminatory (and illegal under EU Directive 2001/14). Whilst such a fixed access charge might have the advantage of not affecting the choice of output level of the dominant operator, and might allow the recovery of truly fixed costs (such as vegetation control) or sunk costs (debt for facilities already constructed) or joint costs without changing the marginal infrastructure use incentives, it would be a very real disincentive to small entrants, and particularly to international operators facing such fixed charges in more than one country.[2]

Table 2.3. **Cost definitions**

Total cost	The entire costs imposed by the production of a certain amount of a particular good or service
Average cost	The cost per unit of output of a particular good or service (*i.e.* total cost divided by output level)
Marginal cost	The additional cost imposed by the production of an additional unit of a particular good or service (*i.e.* the change in total cost when one more unit of the good or service is produced; in practice it is often approximated as the average additional cost of a small increase in output)
Fixed cost	Costs which do not vary with the level of output (note that what costs are fixed depends both on the time period in question and on the scale of the output change considered)
Variable cost	Costs which vary with the level of output (as with fixed costs these costs vary with the scale of change and the time period considered)
Joint cost	Costs incurred as a result of production of more than one output and which will only be avoided if all those outputs are discontinued
Avoidable cost	The cost which would be avoided if a particular good or service ceased to be produced (particularly in the context in which other goods and services which share joint costs are still produced)
Private cost	Costs incurred by the provider of the good or service in question (*i.e.* for infrastructure, the costs incurred by the infrastructure manager)
External costs	Costs imposed on third parties by the provision of goods and services (*e.g.* environmental and congestion costs)
Social costs	The sum of private and external costs

Note: Many of these definitions may be combined; for instance we may talk of "total social costs" or "marginal private costs".

2.3. Practice

Having thus set the scene by means of a brief discussion of the principles on which track access charges may be based, we now proceed to examine the actual track access charges now in place in Europe and how they relate to these principles. We approach this by taking each element of cost in turn, discussing how it should in principle be reflected in charges and looking at how it is treated in practice.

2.3.1. Maintenance and renewals

Econometric studies of the marginal cost of track maintenance and renewals in European conditions (Thomas, 2002) generally show these to amount to between 10 and 30% of average maintenance and renewals cost. Evidence was produced in the workshops that for Finland, the marginal cost of maintenance and renewals is some 20% of average "variable" maintenance and renewal cost. (Note that under the Finnish definitions most maintenance and renewal costs are deemed variable.) Such studies typically use a single measure of output, gross tonne-km, so a simple charging system for these elements of cost would be a charge per gross tonne-km. In the presentation on the approach taken in Finland, it was suggested that, given the consistency of these results, a sensible first estimate of the marginal maintenance and renewals cost per gross tonne kilometre for any country would be 20% of the average maintenance and renewals cost. Of course it would be more reliable to undertake a fresh econometric exercise, but if data and resources do not permit this, then the above approach represents the best approximation in the current state of knowledge.

These costs also vary with the design of the rolling stock (*e.g.* axle weight, unsprung mass) and the maximum speed of the train, as well as the characteristics of the track, so it is appropriate to have a charge which is differentiated by these characteristics (as in Great Britain, where a simple engineering model is used to derive relative wear and tear costs for different types of rolling stock according to these characteristics). In this case, the differentiated charge could still be expressed per gross tonne-km, or alternatively per vehicle or train-km.

Britain uses average variable cost as an approximation of marginal cost of maintenance and renewals, but it is important to realize that this is in the context of a definition of variable costs which include only those costs thought to vary with output in the vicinity of current output levels; it gives a cost elasticity not greatly out of line with econometric evidence for other countries and appears to be a reasonable approximation to marginal cost, although more evidence would be useful.

In practice, Austria, Norway, Sweden, Finland and Switzerland levy charges per gross tonne-km and Great Britain per vehicle-km differentiated by vehicle type. Most other countries charge per train-km with varying degrees of differentiation by type of train and by track characteristics. Italy does not charge for track maintenance and renewals, this cost being borne entirely by the state.

Some countries that follow short run marginal cost pricing principles (Austria, Sweden, Norway) as well as certain new EU members (Romania, Slovenia) only charge for track maintenance and not for **renewals**. It is generally agreed that running more traffic over a particular stretch of track brings forward the date of renewal, and that therefore the cost of this is a part of marginal cost. Moreover, while the cost may actually be incurred some years into the future, it is part of the cost of maintaining the current capacity and quality of the infrastructure, as opposed to infrastructure enhancement. It is our view, therefore, that this should be charged for as part of short run marginal cost, unless a clear decision has been taken that the infrastructure concerned will not be renewed.

2.3.2. Train planning and operations

There is a greater diversity of views on the marginal cost of train planning and operations, some countries (Finland and implicitly Great Britain) regarding it as totally fixed. Where it is regarded as part of marginal cost, it seems appropriate to charge per planned path (as in Hungary and Italy), with some adjustment according to the complexity of the task of planning the path. The latter may relate to the distance the train travels (so a charge per path-km is another possibility), the number of connections that need to be planned or the number of congested nodes it needs to be fitted through. Switzerland levies a charge per train-km for train planning and operations; both Switzerland and Italy also have a charge per node, although this may be purely a congestion charge. Slovenia is proposing an additional charge for use of lines outside the normal hours of operation. The charge per train-km in Germany varies as to whether the path sought is express, regular interval or economy. Switzerland has a surcharge for dangerous goods.

France has a tariff incorporating a monthly track access charge that is designed to recover the costs of train planning. This is differentiated according to the number of paths requested, increasing much less rapidly than the number of paths. Although this charge only accounts for 4% of current revenues from infrastructure charges as a whole, and thus 4% of the charges paid by SNCF, it could amount to be a very much more significant element of costs for a small operator, ten times higher for a small number of train paths. While an appropriate system for reflecting the fixed and variable dimensions of train planning and operations management when there was only one operator on the network, the advantages are outweighed by the disadvantages as new freight operators are allowed to enter the market as it discriminates against small operators. The charge is to be modified from the beginning of 2006 with differentiation to be entirely linear.

2.3.3. Power

In principle this should simply be a case of passing on the charges levied by the power supply companies, which themselves are likely to be differentiated by time of day. In addition there is an argument for charging electric trains for wear and tear on the overhead catenary wires. This may be achieved by differentiating the basic charges between electric and diesel, as in Finland (there are other reasons for doing this too, such as air pollution costs), or by a supplement on an explicit charge for power. Such a supplement should nevertheless be separately identified from the charge for consumption of electric power. Currently there are large variations in charges for power across Europe, reflecting not only different sources of primary energy but perhaps also incorporation of charges for catenary wear and tear in some and not in others, and probably wide differences in the way catenary wear is estimated.

2.3.4. Congestion and scarcity

Congestion arises where one train delays another. In a planned system such as a railway the timetable is designed to prevent this from happening, but it remains the case that at high levels of utilization, the presence of an additional train on the tracks may lead to additional delays to other trains by reducing the ability of the system to recover from delays.

Scarcity costs arise where the presence of a train prevents another train from operating or requires it to take an inferior path, while congestion costs only arise when a train actually operates; scarcity costs are incurred whenever a path is reserved for its use. Thus there is a case for the latter to be charged for by means of a reservation fee, but which would only apply where capacity was tight. Obviously both forms of charge should be differentiated in time and space according to the level of capacity utilization, and according to the capacity the train itself requires, which depends upon how its speed relates to those of other trains.

Only Great Britain has a congestion charge per train-km explicitly related to estimates of congestion costs. However, charges per train-km in Italy and Germany vary by train speed and type of route. In Germany there is an explicit utilization factor, with a higher charge for heavily used lines. Italy uses a simple approach of setting standard speed profiles for each route designed to optimize the line, and charging higher prices for paths that deviate from the profile, either by seeking faster or slower paths that disrupt the optimal service profile. Slovenia is proposing an off-peak discount. There is also a charge per node in Switzerland and Italy that varies with the implicit amount of congestion at the node by categorizing nodes according to traffic levels.

As commented above, when charging for scarcity, it is appropriate to levy a reservation charge, regardless of whether the reserved path is used or not. France has such a charge. Switzerland has a train path cancellation charge. This seems a curious way of dealing with the issue, as it is likely to hamper rather than help the reallocation of paths to higher value uses. Germany (and the proposals for Slovenia) charges more for ad hoc paths than for regular paths, which is rather the opposite of a reservation fee, but may be justified in terms of costs of train planning.

Congestion charges should be distinguished from the costs of delays imposed by the infrastructure manager or by one train operator on another. Where these are charged for, they are part of a separate **performance regime**. Such regimes already exist in Great Britain and Finland, and other countries are examining them.

2.3.5. Other services

In addition to the basic track access charges, some systems have charges for the use of stations, depots and marshalling yards, or for other supplementary services (for instance there is a passenger information surcharge on passenger train gross tonne-km in Sweden). It appears that typically these charges are based on average rather than marginal cost and, although in most cases they do not appear to be a large part of the total charge, it is possible that they both distort traffic levels and discourage entry, particularly where the charge is for use of a facility that the incumbent operator provides.

2.3.6. External costs

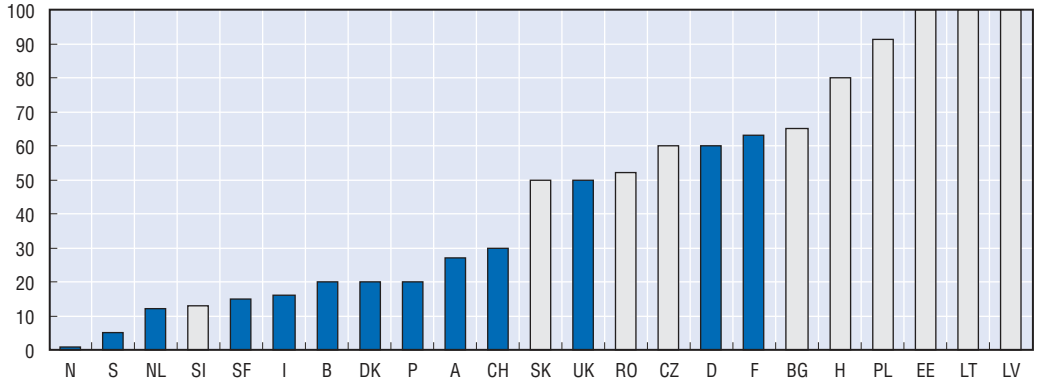
Environmental charges need to be based on gross tonne-km, vehicle-km or train-km, and differentiated according to the environmental performance of the rolling stock as well perhaps as location and time of day. There are some examples of emissions charges levied on diesel fuel for rail traction and paid direct to the government (*e.g.* Finland, Norway, Sweden). Obviously these charges do not vary in time and space, and are therefore only strictly appropriate for reflecting costs such as global warming, rather than local air pollution costs which do vary with these factors. Regarding other external costs, it is generally the case that train operating companies are liable for all accident costs they cause. However, there could still be an external element if an increase in train-km caused an increase in the risk of accidents for other operators or road users, or if some elements of the cost (*e.g.* pain and suffering, medical expenses) were borne by third parties. These costs are likely to be small and are rarely seen to require a specific element in infrastructure charges, although there is a charge for accident costs in the Swedish system.

2.3.7. Mark ups

The need for mark-ups on marginal social cost varies enormously within the countries examined. In Western Europe only a few countries recover more than 30% of total infrastructure costs from charges and none aim at 100%. By contrast in some Central and Eastern European countries, a 100% target is the norm (see Figure 2.1). Various operational definitions of total costs are used by infrastructure managers but to derive cost recovery ratios for this report we define total costs as expenditure on operation of the network, maintenance, renewals, interest on debt and depreciation. (Differences in the treatment of historical debts from country to country complicate matters but we have not attempted to account for this).

The actual **level of charges** differs widely among states (see Figure 2.2). The differences shown may partly reflect the overall cost levels in the different countries, and the different levels of efficiency with which rail infrastructure is constructed and maintained. It also reflects differences in local circumstances and different objectives concerning the government contribution to infrastructure costs. Differences in the level of charges can also reflect excess costs for some railways when the network is over-dimensioned for current demand. Severe cases of this developed in central and eastern Europe with the collapse of traffic in the late 1980s and early 1990s. Rationalisation of the network is underway in some cases, for example Romania; in some other countries the problem persists. All these differences condition the need for mark ups, as well as decisions on their application to passenger, freight and in particular international freight traffic.

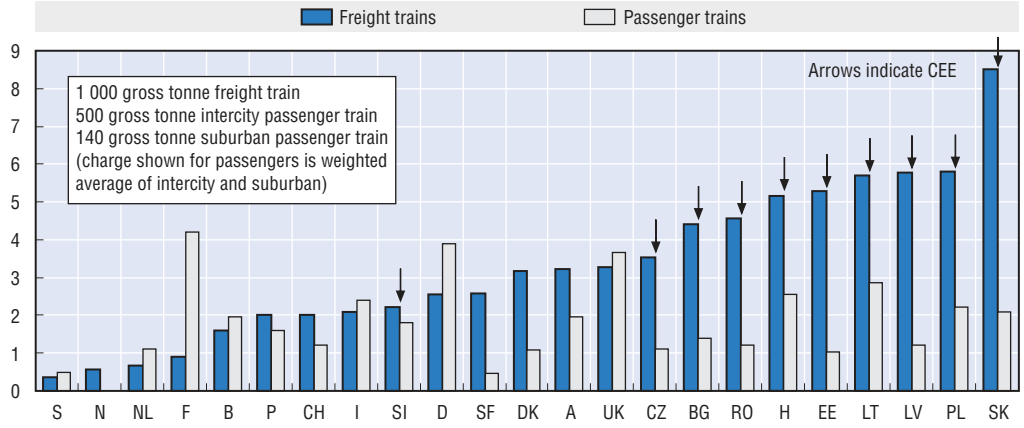
Figure 2.1. **Per cent of total cost covered by infrastructure charges in 2004**



Note: Cost recovery = Revenues from charges as a proportion of total expenditure on the network on operations maintenance, renewals, interest and depreciation; Light shading indicates central and eastern European countries.
Source: Appendix B.

Figure 2.2. **Average access charges in 2004**

€/train-km, excluding cost of electric traction



Note: Because Baltic freight trains are much larger than elsewhere in the EU, freight access charges for the Baltic States are not comparable with other countries; Switzerland shown both with and without electric traction costs.
Source: Appendix B.

Mark ups come essentially in two forms; fixed charges as part of a two-part tariff and mark-ups on variable charges. The latter will be a charge per train-km (or vehicle or gross tonne-km) varying with the nature of the traffic the train carries.

Great Britain, Italy, France, Bulgaria, Hungary, Lithuania and Romania have two-part tariffs. Where the "fixed" part of the tariff is in fact a charge per path or per path-km, it may of course simply reflect marginal costs of train planning or of scarcity, and a mark up applied to this is similar to a mark up per train-km. A true fixed charge will be a lump sum for access to the infrastructure (possibly related to the route length accessed, as with the two-part tariff that used to exist in Germany).

Fixed charges are attractive inasmuch as they permit mark ups without distorting the incentives to train operators regarding the number and types of trains to run. Unless the fixed element is designed carefully it **may** create distortions by preventing some operators from accessing the system at all and by biasing the terms of competition between large and small operators.

In Britain, the fixed element is charged only to passenger franchisees, and covers their avoidable costs (*i.e.* not just variable costs but also any fixed costs that would be avoided if the particular set of services were no longer running) plus a share of all remaining joint and fixed costs. This charge is simply reflected in the payment the franchisee receives for operating the franchise, and therefore there is no need for differentiation according to ability to pay at the level of individual trains or train types. The franchise system allows fixed costs to be passed on in a fixed charge without any distortion of competition.

In Italy the fixed charge varies according to the characteristics of the route used, being higher for higher quality infrastructure. It has to be paid by all operators and may deter some operators from entering the market.

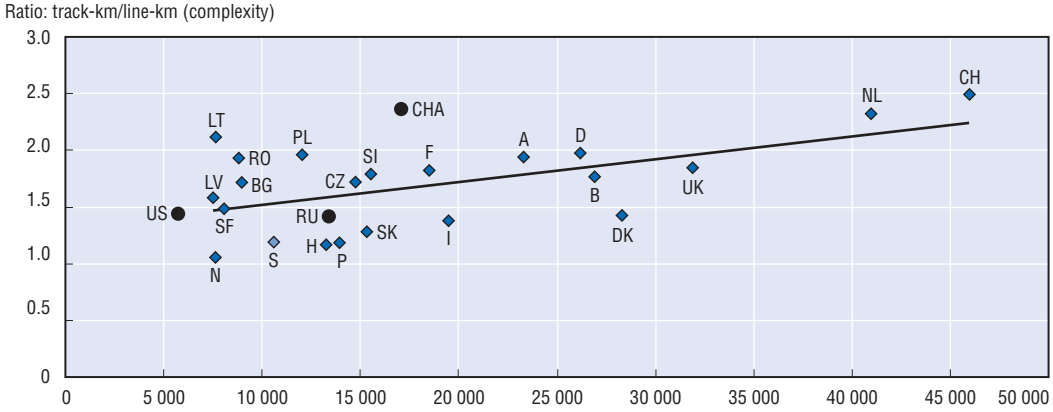
In France, the current pricing system collects 55% of its income from train path reservation charges, and another 16% from station stop charges, a total of 71 % of all charges. By comparison, only 4% is collected from track access charges and another 14% from running charges. Figure 2.3 and 2.4 suggest that the French network is not unusually intensively used. Traffic in France has actually been stagnant or slightly shrinking since 1990 (see Figure 2.5). It is not immediately clear why so much of the access revenues should be generated by prospective use charges, which can be regarded as a form of mark up.

The disadvantages of two part charges can be outweighed by their advantages for allocative efficiency in situations where competing train operators are roughly equally matched in terms of market share or control of access to essential facilities. Currently in Europe, however, competition is mainly developing between relatively small new train operators and large government owned rail companies, sometimes part of a holding company that also owns infrastructure. In these circumstances the fixed component of two part charges can be highly discriminatory. This argues for two part charges to be avoided in European markets where policy seeks to promote competition on the same tracks (as opposed to the urban commuter case where the objective is competition for the market).

Elsewhere (*e.g.* Germany, Switzerland) mark-ups take the form of variable charges and are generally related to the type of traffic. In some cases (Finland, Sweden, Switzerland, Denmark) mark ups are used on new routes to contribute to their financing costs. It is doubtful whether mark-ups on specific routes to help fund capital costs are efficient; there is no reason to suppose that elasticities are systematically lower on those routes than elsewhere, although some of these routes involve bridges where there is a toll on road traffic too, and there a mark up may be feasible without inter-modal distortion.

One example of incentives created by high mark-ups on new facilities is the approach in Denmark and Sweden to recovering the cost of the Øresund Bridge (connecting Denmark and Sweden) and the Storebælt Bridge (connecting the Danish islands of Zealand and Funen), furnishing the direct rail connection between Denmark, Sweden and Germany. The access charge to the Oresund Bridge is a fixed amount per freight train, € 286 on the Danish side and € 255 per freight train on the Swedish side, a total of 541 per freight train (the passenger charge in € 210 per train on the Danish side only). Access charges for the Storebælt Bridge are € 873 per freight train and € 941 per passenger train. Taking the bridge charges together, a freight train from Sweden to Germany would pay € 1 414: this is equivalent to almost 6 000 km of train charges at the current Danish main line access charge (excluding bridge and congestion charges). It furnishes a powerful incentive to run the longest possible freight trains, which will reduce bridge charges but at the cost of reduced service frequency for freight shippers. By comparison, a simple charge per gross tonne-km would have no effect on the length of freight trains, and would not affect service levels.

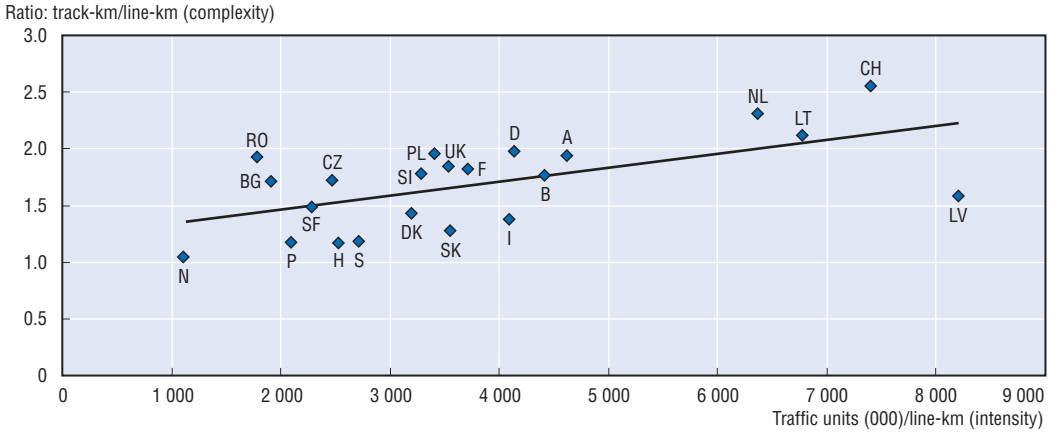
Figure 2.3. **Network complexity versus intensity of use, train-km per km of line basis**



Note: Russia, US and China added manually and do not affect the regression line.

Figure 2.4. **Network complexity versus intensity of use**

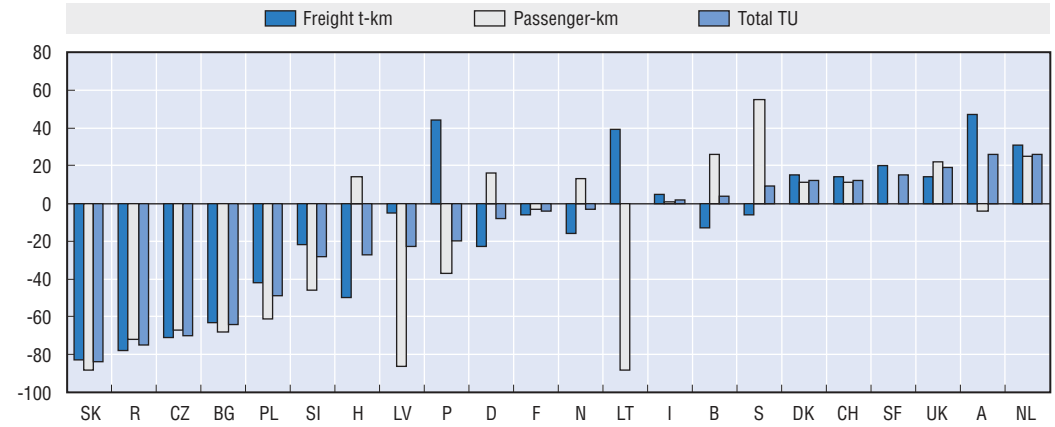
TU (000)/km of line basis



Note: The US, Russian and Chinese networks cannot be shown on this chart without distorting the scale. Traffic units are the sum of ton-km plus passenger-km.

Figure 2.5. **Traffic growth 1990-2003**

% t-km, p-km and total TU



Note: Over the 13 years, a 20% total growth would be the equivalent of about 1.4% compound annual growth.

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This example is instructive on the effect of charging access charges well above marginal cost: the high Danish and Swedish tolls, imposed in order to pay back the debt from building the bridge, clearly suppress rail traffic across the bridges and affect the structure and service levels of freight services for the transit traffic from Sweden to Germany and beyond.

Differences in charges between routes, areas and market segments may reflect differences in willingness to pay, and therefore raise the necessary revenue in the least distorting way, although they may also reflect other principles (*e.g.* the avoidable costs of the category of traffic, or the route, in question). It should be noted that the number of identified categories of train, and therefore the degree of price discrimination, is usually quite small. The infrastructure manager has much less ability to differentiate price, for instance between passengers or containers on a given train, than the train operator. Two-part tariffs may therefore distort prices less than mark-ups on the variable charge for infrastructure use, even when they require train operators to recover more than marginal costs in the final market.

There is a particular problem about **mark-ups on international traffic**. This is the so-called double marginalization problem;[3] if each country puts on a mark-up that is most profitable relating to its own costs and revenues, the net effect is a much greater mark-up than if a single operator designed a mark-up that was optimal for the flow of traffic over the route as a whole. This suggests a need for specific rules concerning mark ups on international traffic, if indeed they should be permitted at all. Ideally, if a mark up is required on international traffic it would be better that it should be negotiated by the infrastructure managers concerned amongst themselves, rather than simply be the result of adding domestic tariffs together regardless of the competitiveness of the resulting charge.

One final point should be made regarding mark-ups. There is always a fear that dominant operators will use their market power to secure favorable treatment, and this fear is particularly strong where the dominant operator is part of the same organization as the infrastructure manager. Straightforward discrimination between particular operators is of course illegal under EU legislation, but it is possible to design mark-ups that favor the dominant operator, for instance through two part tariffs or by unfavorable treatment of traffics in which the threat of entry is strongest. Similar effects may be achieved by manipulating the charges for individual services, and particularly services which the dominant operator provides for itself.

2.4. Conclusions on economic principles

As Table 2.2 (and Appendix B) show, a wide variety of structures of charges has been found in the countries examined, with some countries having a simple charge per gross tonne-km with little differentiation, and other countries highly differentiated charges per vehicle or train-km, sometimes as part of a two part tariff. A key question is whether it is possible to reach any conclusions on best practice, or whether these differences simply reflect different circumstances in the countries in question.

Some conclusions are straightforward. In countries where there is little or no competition (*e.g.* Finland), congestion and scarcity costs may be irrelevant to the charging system as they are already internalized to the single operator (who will nevertheless need to examine their magnitude to make sensible decisions). Moreover, in Finland, there is little mark-up on marginal social costs in the tariff – the state pays 86% of infrastructure costs. Thus it is not surprising to find a much simpler tariff in Finland than in, say, Great Britain or Germany,

both of which have many different operators and a requirement to fund a much higher proportion of infrastructure costs through access charges.

The majority approach is clearly to have a charge per train-km along with a charge per gross tonne-km, differentiated to a greater or lesser degree by type of train and type of track. This can be adequately differentiated to reflect differences in weight, axle load, speed and quality of track and thus can appropriately recover marginal maintenance and renewal costs. Appropriately differentiated by location, type of traction and time of day, it can also recover congestion and external costs. In general charges that accurately reflected short run marginal social cost would need to differentiate train-km charges by time, location, infrastructure characteristics (higher charges on lower quality track) and rolling stock characteristics (type of traction, gross weight, axle load and speed).

The only charges that cannot be appropriately represented by a differentiated charge per train-km and gross tonne-km are those which reflect costs that are incurred whether the train actually runs or not; namely train planning and, where a slot is reserved for the train, scarcity. For these costs it seems appropriate to charge per path-km. For scarcity charges, this would again need to be differentiated by location, time of day and possibly speed relative to the typical speed on the route in question, and could include a charge per node.

Where mark-ups are needed to boost cost recovery, there is a considerable problem. Fixed charges, so long as they reflect the ability to pay of the operator, are least distorting in terms of their incentives regarding train-kilometers run, but are likely to distort competition between large and small operators and this is the typical form of competition in Europe. They are therefore only likely to be acceptable in the case of monopoly franchises (which deliver competition for, rather than in the market). Elsewhere, the best solution is likely to be a mark-up per train-km and/or gross tonne-km based on market segment, although it is questionable whether these should be permitted on international freight trains (or whether there should be some kind of cap on the mark-up for international services). Surcharges may make sense where high quality service or market position make this feasible without significant loss of traffic, but it is not the case that simply because expensive new infrastructure is in place, that alone justifies a surcharge regardless of the effect on the market.

For ancillary services, such as the use of stations or marshalling yards, a charge per train or per wagon would seem appropriate, but again possibly differentiated by market segment, train length, and the length of time the train or wagon uses the facility if capacity is scarce.

It is clear that marginal social cost based charges could therefore appear quite complex even if based largely on a differentiated charge per train-km or path-km. To what extent such complexities are worthwhile in terms of the impact of the incentives they produce is an empirical question, and there seems to be little empirical evidence (although one example was quoted in one of the workshops in support of very detailed incentives: a charge on open coal wagons for the contamination of ballast by coal dust, which lead to the fitting of hoods on wagons). It also seems likely that the degree of differentiation that is optimal will depend very much on the characteristics of the network and the traffic using it; the simpler and less congested it is, the less the case for complicated tariffs. However, for international traffic, the existence of very different degrees of differentiation of charges in different countries along the route is certainly a complicating factor. This may support the idea of separate international tariffs, negotiated between or among the infrastructure managers concerned, at least on key international routes.

Notes

1. The Swiss access charges for passenger services include a "contribution margin" of 4% of revenues for long distance passenger traffic, and 14% of revenues for regional passenger traffic. In future, freight traffic may also pay a flat fee of 0.0034/net tonne-km, which would amount to roughly € 1.7 per train-km.
2. An infrastructure operator wishing to favour local operators might adopt a two-part system for exactly this reason.
3. See Bassanini and Pouyet, 2000.

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Chapter 3

Issues in the Choice of Access Charging Regimes

3.1. Basic choices in access charging

There appear to be three basic approaches to setting rail infrastructure access charges, as discussed above:

- The European Commission's preferred approach is that rail infrastructure users be charged only the Social Marginal Cost (**SMC**) of their use of the infrastructure, with member State contributions covering the difference between SMC and the full, long-run Financial Cost (FC) experienced by the infrastructure manager. For the purpose of this paper, SMC is defined in the Commission's terms as the cost that is directly incurred as a result of operating the infrastructure used by the rail services along with the social costs (pollution, accidents, congestion, noise, etc) that are generated by the use of the infrastructure.[1] This approach will produce the most socially efficient use of the infrastructure, but it requires full and reliable government funding of the difference between SMC and long-run FC.[2] If the government does not or cannot make up the full difference between MC and FC, two basic approaches are available.
- SMC plus mark-ups (**MC+**) intended to fill the gap between FC and the government contributions. Using this approach requires an accurate knowledge of: rail marginal costs; social costs associated with the rail operations; government support commitments; and, the objectives and impacts of the mark-ups to be employed. If the mark-ups are to be calculated in the most efficient way, usage elasticities for different segments of the market are also needed.
- FC minus government support (**FC–**). This approach has many of the same issues as MC+, but the emphasis is different because FC and government contribution are (in principle) known quantities. Infrastructure managers still need to know the MC base and the usage elasticities of the operators in order to prevent irrationally low charges, and to recover costs in the most efficient way. There is clearly a risk with FC– systems that, because they inherently attempt to recover all costs net of government contributions, they do not call attention to excess costs such as surplus track or employees that threaten the long term financial viability of the system; by comparison, MC+ systems, being effectively "bottom up" approaches, make it harder to charge for assets or functions that are not clearly related to direct user needs. Many of the new EU member States follow the FC or FC– approach for budgetary reasons and should pay particular attention to the risks associated with pricing infrastructure use in this way.

All three approaches require an accurate and consistent definition of how to measure and report marginal costs, as well as the ability to collect the data needed to support the calculations. All require that the social costs be calculated according to a defensible and common approach. In this respect, it is important to realize that the social cost calculation is inherently a government, and EU wide, issue: national infrastructure providers cannot be expected to do social cost determinations, nor should the receipts from the social cost component of access charges be retained by the infrastructure provider.

All three approaches pose the issue of how to calculate the MC base, and the MC+ and FC– approaches also require a decision on how to generate the remainder after government contribution is subtracted from FC. How can this gap be filled?

3.2. The major cost and policy drivers

Calculation of the marginal cost of rail infrastructure use, and of the response of each of the users to charges based on marginal costs and charges above the marginal cost base, is exceedingly complex. Translating these into an access charge regime is even more difficult, and necessarily is a mix of estimates and compromises. Some of the drivers are cost or operations-based; others are based on explicit (or implicit) policies of governments. The factors can be summarized below:

3.2.1. Network complexity and intensity of traffic

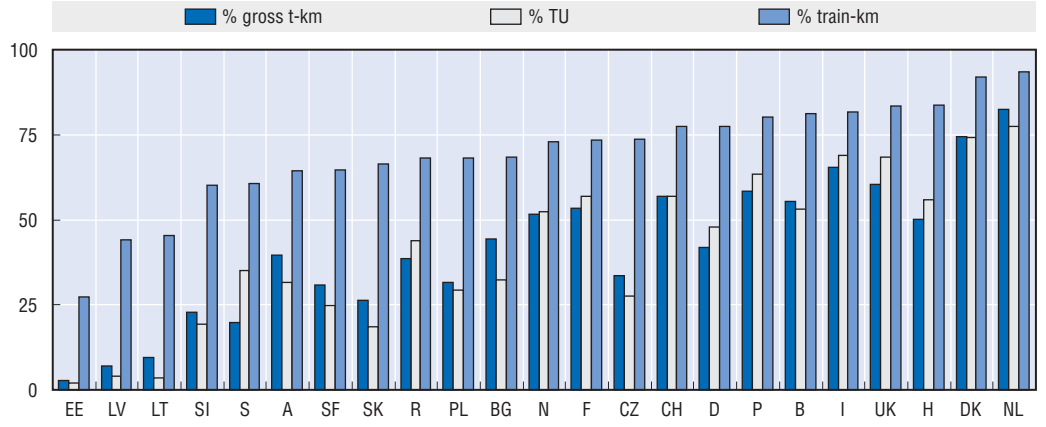
Complex networks with intense usage will normally require more complex systems of access charges if the cost response of the system to changes in use is to be accurately represented. This is because of the importance of congestion and scarcity in such networks, as well as likely diversity of types of trains, rolling stock, etc.

3.2.2. Differing mixes of traffic

Systems with a higher percentage of passenger traffic (especially dense, urban traffic or high speed passengers) are likely to be more sensitive to limits on infrastructure capacity at peak times and to service quality than systems based predominantly on freight. Figure 3.1 shows that there is a wide variation in European networks in their mix of passenger and freight traffic, though the range of variation depends on whether the mix is measured by percent of train-km, percent of traffic units, or percent of gross tonne-km. In a rough sense, the capacity-related demands on the infrastructure network and a significant portion of operating costs (dispatching and scheduling, for example) are likely to be driven by the mix of train-km whereas the annual wear and tear costs on tracks are more heavily influenced by traffic units or gross tonne-km.

As Figure 3.1 shows, the capacity requirements of most European railways are probably passenger generated (all but the Baltic States have more than 50% of train-km as passenger

Figure 3.1. **Traffic mix in 2003 (percentage passenger traffic)**



Note: TU = p-km + t-km.

traffic) whereas the wear and tear requirements are more evenly balanced between passenger and freight traffic. The mix of passenger versus freight is also likely to have a significant impact on other cost drivers such as average axle load, maximum speed on the line and adverse capacity interactions resulting from a mix of different train speeds.

The mix of domestic versus international traffic (see Figure 3.2 and 3.3) is also significant. Railways with high percentages of originating or terminating international traffic are likely to want to encourage such traffic, and will reflect this in their approach to infrastructure access charges. States with a high percentage of international traffic passing through the country without either originating or terminating – "transit" traffic – are likely to be tempted to "tax" the traffic in support of domestic priorities.

Interesting examples of the approach to charging transit traffic are found along three major transit flows in Europe: from Sweden to/from Germany via Denmark; from Northern Europe to/from Italy via Switzerland and via the Brenner Pass route in Austria. The tolls on the Øresund and Storebælt bridges weigh heavily on transit traffic through Denmark, and will suppress domestic Danish short haul freight except for the highest value commodities (see *Mark ups* section above). The highest tolls in the Austrian network are on the Brenner Pass route (€ 2.53 per train-km on the Brenner route versus € 2.02 on the Western line and € 1.41 and below for the remainder of the network). The ranking of Swiss freight access charges is more complex. Excluding the cost of electric traction, Swiss freight access

Figure 3.2. **Percentage of international freight traffic (2002-2003)**

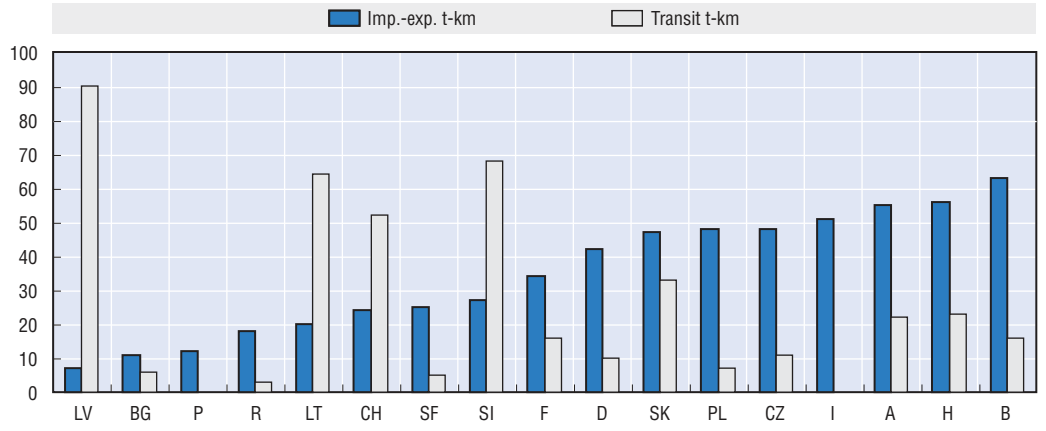
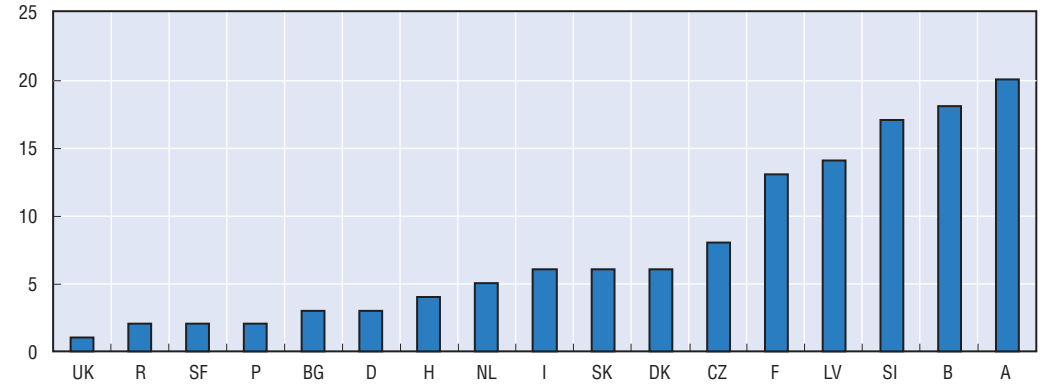


Figure 3.3. **Percentage of international passenger traffic (2002-2003)**



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charges (€ 1.98 per train-km) are comparable to those in the EU railways. Including electric traction (Switzerland is the only railway in Europe that is 100% electrified) would bring the Swiss access charges (€ 3.58 per train-km) above most Western European levels (see Figure 2.2). Moreover, bringing the freight contribution charge fully into force (currently reduced to preserve modal share until the new Alp tunnels open, with large productivity gains for rail operators) would add about € 1.7 per train-km, again bringing Switzerland to the higher levels of freight access charges. The Swiss freight access charges will act in combination with the fact that Switzerland has the highest percentage of rail freight transit traffic in Western Europe to make freight transit traffic an important source of revenue for the Swiss infrastructure manager: by comparison, Swiss passenger access charges, however computed, are comparable with those elsewhere in Western Europe.

3.2.3. Traffic growth rates and impact on required capacity

Traffic trends are different among the EU railways, both in total and between different types of traffic. Rapidly growing systems, especially if the growth is on the passenger side, are likely to need to provide for financing capacity increases in their access charges (or their governments must finance the capacity increases). Systems with shrinking traffic will not have the same capacity concerns. Systems with a shift in the traffic mix may need to finance an increase in some parts of their infrastructure possibly matched by reductions in other areas. Figure 2.5 shows the variation in traffic growth trends for a number of railways. In general, traffic growth should not pose a capacity problem in most of the Western European countries (except for localized bottlenecks): traffic growth should pose no infrastructure capacity problem for the foreseeable future in the CEE railways.

3.2.4. Numbers and types of operators

Some systems already have a large number of different, and different types, of operators. Germany, for example, has 150 passenger operators and 157 freight operators. France, by comparison has, as yet, only one operator on the national system. The access charge regime to accommodate a large number of different kinds of users will almost certainly need to be more complex, and structured differently, than a regime with a limited number of users. In addition, as discussed on pages 80 and 81, the suburban (and high speed rail) markets generally are better suited to competition **for** the market, which suggests a single operator per market (though a single country can have a number of separate urban markets). By contrast, freight services may be better served by competition **in** the same market, which suggests a larger number of competing operators on the same line. In all cases, the number and types of operators will influence the structure and complexity of the access charge regime.

3.2.5. Competition goal

The types and level of competition (intra-modal, inter-modal, domestic, and international) will differ among freight, intercity passenger and urban passenger markets. The role of access charges as price signals (and the response thereto) can have an impact on the competitive position of the users of the infrastructure. Access charges thus cannot be established without clear objectives concerning the competitive position of rail operators *vis a vis* other modes and each other.

3.2.6. Politically motivated cost allocations among the users of the rail infrastructure

Countries may attempt to construct access charge regimes by allocating infrastructure costs to some classes of users in order to reduce the burden on others for policy or budgetary reasons. This could especially be true if some of the users appear to be commercially driven (freight) whereas others survive only on State support (urban and even intercity passengers): in this case, distorted allocations could appear to reduce the national budget. While this approach does not strictly constitute cross subsidy unless a particular favoured user or class of users is paying less than its avoidable cost, such allocations can constitute a heavy burden on the competitive position of the disfavoured users. This may be the true in some countries for freight services, and could be particularly true of international freight services.[3] Of course if the market position of such services makes it possible for them to bear all the fixed costs, this is not a problem, but experience suggests that such an approach often simply builds up further problems, as the services bearing all these costs themselves become unprofitable and lose their markets. Unfortunately, so long as railways do not report their results by line of operating business, with infrastructure financially separate, and with each passenger and freight activity shown separately, it will be difficult to assess the degree of distortion of cost allocations: and, of course, unless MC is being calculated using a consistent and common approach, it will not be possible even to determine whether marginal costs are being covered from user access charges. Initial analyses for railways in the CEE area indicate that attempts to reduce passenger budgets by taxing freight users through high freight access charges may already be a problem.[4]

3.2.7. Slot rigidity

Some operators – for example intercity and suburban passenger trains – must have a stable schedule for up to a year ahead of time. These users can, indeed must, reserve slots on a particular schedule for the entire one-year period of most timetables. By contrast, only some freight users (regularly scheduled, high value cargoes) operate on a committed schedule: even these shippers have some flexibility as to the time slots absolutely needed and few need to operate at average speeds comparable to those of intercity passenger trains. Other freight shippers can only plan their business weeks or even days (or hours) ahead of the shipment.[5] The access charging regime must be able to accommodate both types of users. Although stability of income and planning will be largely based on committed paths and schedules, the access charges should permit, and not discriminate against, the unscheduled users so long as this type of traffic does not need to move in conflict with established schedules.[6]

3.2.8. Price elasticities for the different users

Market-driven train operators, such as the various freight operators, can reasonably be said to have a price elasticity of demand with respect to the level and structure of access charges. They will respond to the cost signals that the access charges send. Train services supported by public funds, particularly those of suburban passenger train operators, generally see access charges passed on to their public sponsor and are relatively insensitive to the price signals infrastructure charges provide. In this situation the signals that charges provide to the political body determining service levels are important. If these services are provided under a franchise running for many years, the main responses to the pricing signals may only come on a much longer timescale than the 1-2 year timetable period. Long run marginal (or avoidable) cost may then be a more appropriate basis for charging

than short run marginal cost, although if there is some flexibility in timetables then a two part tariff with separate charges for capacity and for use will be the best way of doing so.

The infrastructure business may have an incentive to try to shift as much of its costs (especially fixed costs) as possible to the least sensitive customers. At the same time, public sector "customers" of the infrastructure manager tend to try to limit their payments by political fiat. This is unfortunate since the supported services have the most predictable and demanding capacity requirements, and probably should carry a large part of the cost burden. It is important to realize that State support to operators, unless carefully structured, can act to lessen or even defeat the function of access charges as price signals.

To restore the price elasticity of demand to access charges for publicly supported services the capacity costs need to be made the subject of a direct agreement between government and the infrastructure provider which lasts for a number of years. In this way the major element of price sensitivity will be assigned where the real responsibility lies. Under a franchising or competitive tendering system for these services, if the operator includes within his bid the variable access charges at his expected demand levels, and if the government support does not change with actual demand, then the operator will be sensitive to the variable part of the access charges. The issue of franchising such services is considered further in section 6.

Notes

1. As noted, the Directives do not use the phrase "marginal cost", though it is used in many Commission studies of efficient pricing.
2. It also requires that the government taxing system be efficient socially and financially. If the taxing system does not meet these tests, the pure SMC approach may not be the most efficient for the economy, and MC+ or FC– may actually be less harmful in their impact on the economy than an SMC approach financed by inefficient taxes.
3. Assume, for example, that two countries (Bulgaria and Romania) could compete for port traffic that is going to/from destinations farther into Europe. If Bulgaria decided to try to force freight users of the rail infrastructure to pay most of the fixed costs of the infrastructure, and Romania chose not to do so, then international traffic would be artificially diverted to Romanian ports.
4. See CER, "The Railways in an Enlarged Europe", 2004, page 19-22.
5. The contrast between the rigidity of rail and the flexibility of trucking is a critical factor in the favor of trucks. If freight railways are to be competitive, they will have to have much more flexible access to the use of the infrastructure.
6. In this regard, the prohibition in EU law on the resale of slots may deserve reconsideration. While it is understandable that resale of scheduled slots might need to be regulated, there is a separate question on the sale of slots that are not purchased as part of the annual schedule. For these unscheduled slots, it might well be efficient and equitable to permit a bulk purchaser of the unscheduled slots to operate a secondary market in these slots.

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Chapter 4

The Role of Regulation

The role of regulation is an important issue in the administration of infrastructure charges, and of access conditions more generally. This section considers the issue of rail regulation, in particular looking at:

- Why is there a need for regulation, what should a regulator do and how should they do it?
- What is the current situation in a selection of ECMT member countries?
- What lessons emerge from the range of experiences examined?

Before we consider these issues though, we will first briefly review European policy with regard to rail regulation and competition, as expressed, firstly, by the EU and, secondly, by the ECMT.

4.1. EC Directives

EU legislation (Directive 2001/14/EC) now requires each country to have a regulator independent of the infrastructure manager (though not necessarily of the government). The key role of the regulator within the new regime in Europe is in regulating and hearing appeals concerning access conditions and charges in order to ensure fair and non discriminatory access to the infrastructure to all operators.

4.2. ECMT Resolutions

The ECMT Council of Ministers meeting in Bucharest in 2002 adopted a Resolution on the development of European railways which calls on members to:

> "Consider creating independent national bodies with powers to take up issues of discrimination in relation to access to infrastructure on their own initiative and a duty to adjudicate in cases of dispute."

4.3. Why regulate?

There is typically a need for regulation when network industries are vertically separated and competition is introduced. The fundamental reason for this is that infrastructure is inevitably a natural monopoly, characterised by indivisibilities and economies of scale and scope.

However there are particular characteristics of European railways that affect the case for and form of regulation. Firstly, whilst there is a desire to promote competition – as means of promoting cost-minimisation/productive efficiency and of fostering innovation and traffic growth – usually there is still a dominant state owned operator, and in some cases this is still the owner of the track. Therefore the regulator's role in promoting competition is particularly important, not just in preventing monopoly exploitation but also in facilitating non-discriminatory access to the infrastructure. In practice this means not just regulating charges and access conditions but also the process of timetabling and the allocation of paths, as well possibly as access to other essential facilities such as depots and terminals.

A further crucial point about rail, which tends to make it different to most other regulated utilities, is that there is a prima facie case for subsidy in terms of economies of scale within the sector and in terms of the failure to charge appropriately on competing modes. For these and for other political reasons, European governments have typically intervened heavily in rail industry decisions, particularly in the passenger sector. However there remain debates as to how much to subsidise the industry and whether to channel the subsidy into the infrastructure or into the operations. In this situation, an essential role of the regulator may be to protect private entrants from arbitrary decisions by the government, for instance regarding the level of finance it will provide to the infrastructure manager, and therefore the capacity and quality of the infrastructure over which the private operators run. This brings the potential for conflicts between the regulator and the government, as seen recently in Britain.

Coen and Hetitier (2000) observe that "the design of regulatory regimes concerns two fundamental issues: governance and rules for behaviour". Governance relates to the institutions, their powers and the mechanisms for constraining regulatory discretion and resolving disputes about these constraints. Regulatory rules relate to the mechanisms for steering market behaviour. We now turn to consider, in terms of rules, what the regulators should do and in relation to governance, what is meant by independence.

4.4. What the regulator "should" do

In considering the arguments for regulating the access charges of the rail industry, there are three roles that a regulator might perform:

- Preventing the monopoly infrastructure manager from exploiting their market power to the detriment of the public interest.
- Facilitating non-discriminatory access to the infrastructure, in particular where the infrastructure manager is linked with one or more of the train operators.
- Protecting the train operators from arbitrary decisions by the government regarding the level of finance it will provide to the infrastructure manager.

In performing these roles, they will need to consider:

- The level and structure of infrastructure charges.
- Conditions governing the access to the infrastructure, including access to facilities such as depots and terminals.
- The process for timetabling and capacity allocation.

In considering the level and structure of charges, the regulator will need to take into account the incentives it wishes to put in place and the amount of revenue it judges that the infrastructure manager requires to sustain and develop the network. EU directive 2001/14 sets out rules in relation to this, but these leave a significant degree of flexibility. In relation to the revenue requirement specifically, the productive efficiency of the infrastructure manager, the amount government is prepared to subsidise the industry, and the degree to which the infrastructure is maintained and developed are all key factors. Hence, the flexibility within the rules and the variation of approaches when it comes to the key factors determining the revenue to be raised by the charges leave considerable scope for differing charging structures and levels in different countries.

Given that the rail industry is structured differently in different European countries, it is likely that the way these regulatory roles are applied will differ. If infrastructure is

completely separate from operations – in that no company linked to the infrastructure manager is allowed to operate rail services – then concerns about discrimination in access to the infrastructure may be less significant. Conversely, it has been argued (*e.g.* by Biggar, 2004) that where a company linked to the infrastructure manager is permitted to operate services on the infrastructure the infrastructure manager will have a greater incentive to maintain and develop the network, reducing any concerns about under-investment (which is linked to the revenue requirement and, thus, to infrastructure charges).[1] However, there could be a role for the regulator in protecting operators from arbitrary changes in the level of government support for the industry wherever governments have decided to subsidise the industry.

There is an argument that says if regulation of the areas described above can be made to work effectively, then determination of prices (fares and freight rates), quantity and quality of service to end-users can be left to the forces of competition.[2] However, in practice governments often see fit to also regulate the market for rail services via price controls, minimum levels of service and performance standards. Where competition takes the form of competition for the market through franchising, then unless the franchising body either controls charges directly or make charges part of the bid on which the franchise is awarded, then the franchisee will have an incentive to set charges to maximise profits to minimise the need for subsidy. Since franchises are typically exclusive there will be no competition within the rail market to control these prices. Regulation of prices is therefore frequently part of the franchise contract.

In considering how a regulator might best undertake its various roles, the UK Better Regulation Task Force (BRTF) have proposed a set of Principles of Good Regulation (BRTF, 2003). These are as follows:

- Proportionality.
- Accountability.
- Consistency.
- Transparency.
- Targeting.

In other words, the regulator's actions should be appropriate to the scale of the problem it seeks to correct, accountable to the public and stakeholders in the industry concerned as well as the government and not cause the industry any surprises. The reasoning behind them should be clear and public and they should be targeted to meet the desired end result.

A further distinction it might be useful to make in connection with how the regulator performs its role relates to whether its actions are ex-ante or ex-post in nature. That is, does the regulator focus on engaging in pro-active measures or does it wait to receive complaints or appeals from aggrieved parties and then react in response to these?

As mentioned above, Directive 2001/14/EC appears to envisage a regime whereby applicants may appeal to the regulatory body if they believe they have been unfairly treated, discriminated against or are in any other way aggrieved. In particular, appeals may be made against infrastructure managers' decisions concerning:

- The network statement and criteria contained within it.
- The allocation process and its outcome.

- The level or structure of access charges.
- Safety certification.

Upon receipt of such an appeal or complaint, Directive 2001/14 charges the regulatory body with determining complaints and any corrective action within two months of receiving all relevant information. Hence, it would seem that the main focus of the EU legislation is towards ex-post regulation.

However, the process of waiting for actual or potential competitors to complain before seeking to rectify faults in charges or access conditions will at best lead to delays in dealing with the issues. Moreover, the problem of overcoming such faults may deter entry, whilst small rail operators dependent on the co-operation of the infrastructure manager for their business success may be reluctant to file complaints. There is therefore a strong argument for the regulator to exercise proactive powers to investigate proposed charges and access conditions as well as to hear ex post complaints.

4.5. What is meant by independence?

Essentially, independence might be examined from two starting points. That is, independence might refer to the regulator's relationship with government – and in particular with the elected politicians of government – or its relationship with the other stakeholders in the industry it is responsible for regulating. The idea of regulators being independent of those it is responsible for regulating, and not succumbing to "regulatory capture", is a familiar and long-standing issue within regulatory economics. However, the idea of regulators being independent of government appears to be a relatively recent trend; one which Majone (1997) refers to as part of a shift away from the "Positive state" and towards the "regulatory state". In a regulatory state, a regulator independent of government "can obtain procedural legitimacy through more transparent and pluralistic policy-making and greater accountability than offered by state ownership and regulation by government" (Thatcher, 2002).

Perhaps because the concept of regulators being independent of industry stakeholders is a well-established one, recent definitions of independent regulators tend to focus more on the relationship with government. Three definitions are given below.

Thatcher (2002) defines an independent regulator as "a body with its own powers and responsibilities given under public law, which is organizationally separated from ministries and is neither directly elected nor managed by elected officials" (Thatcher, 2002).

The Better Regulation Task Force's (BRTF, 2003) definition of an independent regulator is:

"A body which has been established by Act of Parliament, but which operates at arm's length from Government and which has one or more of the following powers:

- Inspection.
- Referral.
- Advice to a third party.
- Licensing.
- Accreditation.
- Enforcement."

Chris Bolt (Chair of the Rail Regulation Board in Great Britain) has put forward the following five point definition of what is meant by "independence":

- Appointment and dismissal – although appointed by the government, the regulator cannot be dismissed until end of term.
- Although the Regulator may receive guidance, he cannot be directed by Ministers.
- Their statutory public interest duties should be set out clearly in legislation.
- They are accountable not just to Ministers but also to parliament and to interest groups with a duty to explain decisions clearly and transparently.
- Decisions of the Regulator are final and cannot be overturned by the Minister.

Hence, when analysing and assessing independent regulation, one might consider three questions:

1. To what extent are regulators independent of industry stakeholders.
2. To what extent are regulators independent of government.
3. To what extent are the regulator's decision-making processes transparent, pluralistic and accountable?

As mentioned above, Directive 2001/14/EC requires member states to establish a regulatory body, which is independent – in its organisation, funding decisions, legal structure and decision-making – from any infrastructure manager, allocation body or applicant for access. Hence, it is clear that current EU legislation on rail regulation requires the regulator to be independent from interested parties within the industry, but not necessarily from direct political control.

4.6. National regulators

An overview of the current position regarding the establishment of a rail regulator in a selection of ECMT countries is shown in Table 4.1, as well as a categorisation of the structure of that country's railway industry. We have sought to identify separately where countries:

1. Have established an "independent" rail regulator.
2. Have involved their general competition authority in the regulation of their rail industry.
3. Regulate their rail industry from within government.

Whilst it is hoped that the distinctions made in Table 4.2 are useful, it should be noted that each approach (or combination of approaches) will have often been implemented differently in different countries. That is, for example, the approaches in Austria, Germany and in Britain – where, in each case, responsibilities are shared between an independent rail regulator and a general competition authority – differ as to which organisation has responsibility for different aspects of regulation, and whether that regulation is generally ex-ante or ex-post in nature. The brief country profiles below seek to provide a little more detail on where responsibilities for different aspects lie.

In practice, the lines dividing a regulatory body from a Ministry are not always clearly drawn, and frequently there are links between the regulator and the same Ministry as is responsible for the finances of the infrastructure manager and the dominant rail operator. This is the case for instance in France, Finland and Italy. However, there are a number of instances where there is a right of appeal to an independent competition authority, as in the Netherlands.

Table 4.1. **Industry structure and regulatory arrangements**

	Industry structure	Overseen by independent rail regulator	Overseen by independent general competition authority	Overseen by Ministry of Transport
Austria	I	Yes	Yes	
Belgium	I			Yes
Bulgaria	S			Yes
Czech Republic	S			Yes
Denmark	S	Yes	Yes	
Estonia	I freight	Yes		
Finland	S		Yes	Yes
France	S			Yes
Germany	I	Yes	Yes	
Greece	I		Yes	Yes
Hungary	I	Yes		
Ireland	I		Yes	
Italy	I		Yes	Yes
Latvia	I	Yes	Yes	
Lithuania	I	Yes		Yes
Luxembourg	I			Yes
Netherlands	S		Yes	
Norway	S			Yes
Poland	S	Yes		
Portugal	S	Yes	Yes	
Romania	S	Yes	?	?
Russia	I		Yes	
Slovakia	S			
Slovenia	S	Yes		Yes
Spain	S			Yes
Sweden	S	Yes	Yes	Yes
Switzerland	I	Yes		
United Kingdom	S	Yes	Yes	

Notes:
S. vertical separation, refers to where the infrastructure manager is not allowed to operate services on that infrastructure.
I. vertical integration, refers to where the infrastructure manager is allowed to operate services on that infrastructure; holding company structures are included in this category.

4.6.1. Germany

In Germany there is an "oversight" regulator for rail, the Federal Railway Office, but this is mainly responsible for technical issues, and did not initially consider itself to be a regulatory authority. The approach was to give more emphasis to the rule of competition law, the Cartel Office and the Procedural Court. Hence, access contracts to the DB AG network have been concluded on a bilateral basis with the rail companies and have not needed to be submitted for confirmation to a regulatory authority, and charges have been set by DBAG without government intervention. However some discriminatory practices such as differential pricing for access to the infrastructure have been observed and brought before the Cartel Office (Heritier *et al.*, 2001) by competing rail operators. However the Federal Railway Office does now have an infrastructure access department which hears complaints about access issues (in 2003, it considered some 30 complaints, most of which related to pricing of additional services such as information, and minor access issues on secondary lines) (DB, 2004). Our understanding is that steps are being taken to extend the regulatory functions of the Federal Rail Office; in particular, an independent Train Path Agency is being established within it to deal with conflicts over train path allocation.

Table 4.2. **Regulatory responsibilities**

	Track access	Setting of infrastructure charges	Capacity allocation	Competition regulated by
Austria	Infrastructure division of the national rail company	Government (via the ministries of transport and of finance)	Infrastructure manager	SCG (see below)
Belgium	Transport ministry (until the railway office is operational)	Government (until the railway office is operational)	Government (until the railway office is operational)	Competition monitoring/ enforcement responsibility of the government and general competition authority
Bulgaria	Infrastructure manager	Government	Infrastructure manager	
Czech Republic	Infrastructure manager	Government, based on a proposal by the infrastructure manager (via the Ministry of Transport)	Infrastructure manager	
Denmark	Infrastructure manager	Government (via the Ministry of transport)	Infrastructure manager	An independent rail regulator and the general competition authority
Estonia	Infrastructure manager, which is also the freight operator	Infrastructure manager	Infrastructure manager (overseen by the ministry)	
Finland	Infrastructure manager	Government (via the ministry of transport)	Infrastructure manager (overseen by the ministry)	
France	Infrastructure manager	Government (via the ministry of transport)	Infrastructure manager	
Germany	Infrastructure manager	Infrastructure manager	Infrastructure manager	EBB (see below)
Greece	Infrastructure division of the national rail company	Infrastructure division of the national rail company	Infrastructure division of the national rail company	Competition monitoring/ enforcement is the responsibility of the Ministry of Transport and Communications and the Hellenic Competition Authority
Hungary	To be completed			
Ireland	Transport ministry	Infrastructure division of the national rail company	Government	
Italy	Infrastructure manager	Government (at the suggestion of the infrastructure manager)	Infrastructure manager, (overseen by the ministry)	Competition monitoring/ enforcement is the responsibility of the competition authority
Latvia	Infrastructure manager	Infrastructure manager (according to a method defined by the regulator)	Infrastructure manager	Independent regulator
Lithuania	Infrastructure manager	Infrastructure manager (according to a method defined by the regulator)	Infrastructure manager	Ministry of Transport
The Netherlands	Infrastructure manager	Government (via the ministry of transport)	Infrastructure manager	The economy wide regulator NMa (see below)
Norway	Infrastructure manager	Government (via the ministry of transport)	Infrastructure manager	
Poland	Infrastructure manager		Government	The Rail Transport Office
Portugal	Infrastructure manager	Infrastructure manager, subject to the approval of the regulator	Will be the responsibility of the infrastructure manager	INFT

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Table 4.2. **Regulatory responsibilities** *(cont.)*

	Track access	Setting of infrastructure charges	Capacity allocation	Competition regulated by
Romania	Transport ministry	Government	Infrastructure manager	
Russia	Is provided for by framework law but some key regulation remains to be put in place, including a schedule of cost-based charges for the use of infrastructure	National train operator under the supervision of the Federal Tariff Service		The economy wide Federal Antimonopoly Service
Slovakia	Infrastructure manager		Infrastructure manager (overseen by the ministry)	Competition authority
Slovenia	Infrastructure manager	Infrastructure manager	Infrastructure manager	Competition authority
Spain	To become the responsibility of the infrastructure manager	Infrastructure manager	Infrastructure manager	
Sweden	Infrastructure manager	Infrastructure manager	Infrastructure manager	Swedish Rail Agency
Switzerland	Integrated railway undertakings	Integrated railway undertakings		Is through the railway Arbitration Commission in the first instance.
United Kingdom	Requires approval from the regulator	**Regulator** (UK is the only example)	Is primarily the responsibility of the regulator	Office of Rail Regulation and the Office of Fair Trading

Two countries with a clearly independent rail regulator are Austria and Great Britain, and they are discussed in more detail below:

4.6.2. Austria

Austria began to open up access to its railway infrastructure in the late 1990s and in January 2000 established an independent rail regulator; Schienen-Control GmbH (SCG). The task of this regulatory body is to monitor all aspects of competition in the rail market. It has laid down the rights and duties of infrastructure managers and railway undertakings in detail.

Specifically, Section 54 of the Austrian Railway Act (Eisenbahngesetz, EisbG) defines regulation of the rail market as follows:

> "The purpose of the provisions contained in this section is to ensure the economic and efficient use of railways in Austria:

- By creating fair and effective competition between railway undertakings in the railway transport market on main and secondary lines.
- By promoting the entry of new railway undertakings to the railway transport market.
- By assuring access to railway infrastructure by those entitled thereto.
- By establishing competition regulation to protect companies entitled to access against abuse of dominant market positions.
- By promoting the integration of railway systems."

SCG consists of a team of six experts and has a four-member supervisory board. SCG also runs the Schienen-Control Kommission (SCK) – a commission responsible for taking a variety of decisions, mainly concerning conflicts of utilization. This body operates like an independent

administrative court, and the chairman is a judge. The members are independent, and are not bound by any government instructions. Appeals against SCK rulings go directly to the Administrative Court of Appeal. The regulator's activities are funded by contributions from the railways.

SCG's main Austrian partners are the railway authority of the Federal Ministry of Transport, Innovation and Technology, and the Austrian railway companies. SCG maintains ongoing contacts with these entities to discuss legal requirements and thus ensure that they are observed.

Railway undertakings wishing to enter the market frequently avail themselves of the services of SCG as an independent source of advice on the current legal and business situation. Moreover, SCG frequently acts as intermediary to iron out differences between transport companies and network operators as early as possible.

4.6.3. Great Britain

In Britain, the framework for rail regulation obeys the conditions for independence put forward above by Chris Bolt. The Regulator (or now the Regulatory Board) heads a substantial department, with responsibilities clearly defined in legislation. These amount essentially to the approval of access charges and the conditions embodied in all access agreements, and to licensing all railway undertakings. Although the Regulator is appointed by the Secretary of State for Transport, and receives guidance from that source, the Regulator cannot be dismissed before the end of the term of office or given instructions by the Secretary of State. Because the decisions of the Regulator have a major impact on the willingness of the private sector to invest, it is necessary that he should be free of direct political control, as is the norm for network industry regulation in Great Britain.

As noted above, a major role of the Regulator concerns access charges, where he/she has a duty to ensure that the infrastructure manager receives sufficient funding efficiently to carry out its duties. In other words, in Britain the Regulator provides protection from the state requiring a certain quantity and quality of rail infrastructure but failing to provide the funding necessary to secure this. This function became a major source of contention following the bankruptcy of Railtrack and the emergency program of rail renewals following the Hatfield train crash, when – as a result of an interim review of infrastructure charges – the Regulator concluded that the infrastructure manager required an increase in income of more than 50%. Since franchise agreements pass increases in track access charges back to the government for almost all passenger train operation, this resulted in a major unplanned increase in requirements for government funding, and led to calls for controls to be placed on the powers of the Regulator, on the basis that the government, not an independent regulator, should determine how much it was going to spend on the railways. This of course reflects a fundamental misunderstanding of the duties of the Regulator. The suggestions were resisted and the independence of the regulator preserved in the latest (2004) railways bill, although there is a proposal to require an iterative procedure between the Office of Rail Regulation and the Government in developing new charges, in order to respect Treasury funding limits. Current arrangements do place a duty of the ORR to inform government well ahead of publishing new charges but the government is not requirement to respond. This change in procedure is intended to ensure that the output required from the infrastructure and the levels of government funding available are consistent. In the future if spending limits and track access charges for passenger trains

can not be reconciled the Regulator will have to ensure that the government revises its demands for services from franchise holders.

The other form of regulation the Office of Rail Regulation has at its disposal is that all railway undertakings require licences from it. To obtain these they have to have a safety case in place and meet various other requirements such as regarding environmental policy. But it was in the case of the monopoly infrastructure provider, Railtrack, that the issue of licence conditions became contentious. Initially the licence conditions attached to Railtrack regarding planning and investment in the infrastructure were relatively weak; Railtrack was required to publish an annual network management statement, outlining their plans for the development of the network, but there was no requirement on them to actually implement any of the investment proposals discussed in it. This condition was progressively tightened to give the Regulator powers to require Railtrack (and ultimately its successor Network Rail) to carry out investment proposed in its management statement and to meet the "reasonable needs' of its customers.

Following the Rail Structure Review of 2004, the government is proposing to strengthen the role of the Regulator in a number of ways. It will take over the role of safety regulation from the Health and Safety Executive, and it will take over various statistical and passenger related functions from the Strategic Rail Authority. However, its major functions as explained above, and its independence, remain largely unchanged, although it will now have to take the amount of government finance available as a binding constraint in its decisions.

4.7. Conclusions on rail regulation

As explained above, the current EU legislation requires regulators to be independent of the infrastructure manager, but not necessarily of government.

In rail, as in other fields, "Europeanisation of economic policy has not harmonised reforms or created uniformity in the regulatory institutions in the member states" (Coen and Hetitier, 2000). In fact, the various actors within the industry have sought to define the regulatory debate and institutions, and different actors have had differing degrees of influence in different countries. Coen and Hetitier (2000) observe that incumbents tend to champion ex post regulation and competition rules, whilst new entrants tend to champion ex ante regulation by specialised regulatory bodies that understand pricing and costs of entry. This is most apparent when contrasting the approaches in Germany and the UK.

Only in a minority of countries, *e.g.* Britain and Austria, is there a specific rail regulator who plays an active role and is not part of a government department. Other countries have quasi-independent regulators that operate in a much more "hands-off" role, *e.g.* Germany, or incorporate rail regulation as a function of the government transport ministry, *e.g.* Finland. There is often also a right of appeal to a separate competition authority.

Where the rail regulator is part of a government department, and often the same one as is responsible for the state owned infrastructure manager and the state owned dominant operator (*e.g.* France, Italy), it is doubtful whether this really provides the necessary degree of independence. Given the complexity of the rail sector, and the desirability of ex ante examination of access charges and conditions, there is a strong argument for a specialist rail regulator.

A rail regulator independent of direct political control, with clearly specified powers and responsibilities and adequate resources offers many advantages. It may offer the infrastructure manager the guarantee that the required level and quality of infrastructure

will be consistent with the funding provided, and protect new entrants from arbitrary or discriminatory regulatory measures designed to protect the existing operator. Indeed, this degree of independence is even more important when – unlike in Britain – there remains a major state owned incumbent operator, and particularly when this operator is part of the same organization as the infrastructure manager. Given the existence of such a regulator it is doubtful whether the right of appeal to a separate competition authority is either necessary or helpful, of course, recourse to the Courts on matters of process (rather than substance) should be possible. At the same time it is important that general competition authorities have a strong role in developing government policy for the railways, for example in relation to the structural organisation of the sector, not least in order to guard against the dangers of regulatory capture.

Notes

1. Although this is not borne out by the experience of some of the vertically integrated US railways.
2. In fact, most rail freight tariffs are currently unregulated because of intense competition from highway modes. It seems unlikely that this situation will change in future, especially if more rail freight competition in the market is introduced.

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Chapter 5

Competitive Tendering

This chapter examines the use of competitive tendering for passenger services, asking: What is the argument for competitive tendering; What countries use it, and to what extent; How do they use it; What has been their experience?

In 2000, the European Commission launched a proposal to revise Regulation 1191/69 to require compulsory competitive tendering wherever public transport is either in receipt of subsidy or has exclusive operating rights (CEC, 2000). This proposal met a lot of opposition (European Parliament, 2001) and an amended version was then brought forward for consideration (CEC, 2002). This amended version has not yet been adopted and a modified proposal was tabled in spring 2005.

The ECMT has not brought forward any formal proposals for policy in relation to competitive tendering since a general resolution passed in 1968.

The principle argument for competitive tendering is that it permits the preservation of an integrated network of services, subsidised where necessary, whilst still introducing competitive pressures, leading to incentives to reduce costs and (depending on who bears the revenue risk and what other incentives are in place) improve quality of service.

Compared with the alternative of open access competition as a way of introducing competitive pressures into the rail passenger industry, competitive tendering has particular advantages, and is especially useful in cases in which competition in the market is not feasible:

- Relatively few passenger services are sufficiently commercially attractive to attract entry, whereas competitive tendering can introduce competition over the whole network (*cf.* Germany, which has had open access for passenger operators for many years, but very little open access entry. Admittedly high infrastructure charges are an issue here, but lower charges would imply a government commitment to subsidise the infrastructure if not the operations. Moreover on densely used networks new entrants may have great difficulty is securing paths, unless there is a requirement for existing operators to surrender paths to them).
- Where it does occur, open access competition is not necessarily socially beneficial, since it may worsen the overall pattern of fares and services and increase the need for subsidy. Preston, Whelan and Wardman (1999) simulate competition on a particular route and find that whilst consumers benefit from lower fares, these benefits are not enough to offset the increased costs. Reduced profitability of the incumbent reduces the scope for cross subsidy and leads overall to higher subsidy levels. This is, of course, always the argument of the incumbent against competition. But when the problem does arise it is likely to be the result of competition being introduced in a very partial way. A more comprehensive solution, like tendering combined with some on track competition, is indicated. Whilst there is evidence that, where it has occurred, competition between passenger services operating over the same route in Britain has reduced fares, this could be at the expense of duplication of services, increasing costs and leading to inefficient use of track capacity. Moreover, competition may lead to harmful changes in patterns of

service (*e.g.* the diversion of First Great Eastern services from Harwich to compete with Anglia at Ipswich).

If it is decided to franchise passenger services, there are many issues about the best way to do it. Key questions are:

- What pattern of franchise length, control of services and fares and responsibility for investment is best?
- How large a network should each franchise cover?
- How may appropriate incentives be built into the contract?

As will be seen there are many different approaches to these issues around Europe.

5.1. Extent of competitive tendering

The following table summarises the current situation within Europe. Although structures are in place to facilitate market entry in most of the European Union countries, only the United Kingdom, Denmark, Germany, Sweden, and the Netherlands have been encouraging market entry extensively through the granting of concessions and the operation of open tender procedures for the provision of passenger services. Estonia split its railway system into a vertically integrated freight operator, and franchised passenger operators, but the passenger operations are relatively minor. Otherwise none of the new member states has yet implemented competitive tendering, although Hungary and Latvia have taken the first steps of entering into public service contracts with explicit subsidies for suburban services.

Table 5.1. **Status of competitive tendering for train operations**

	Extent of competitive tendering
Austria	Limited for regional
Belgium	None
Czech Republic	None
Denmark	Gradual introduction for regional
Estonia	All passengers
Finland	None
France	None
Germany	Some regional
Greece	None
Hungary	None
Ireland	None
Italy	Now being introduced for regional
Latvia	None
Lithuania	None
Luxembourg	None
Netherlands	Some regional
Norway	None
Poland	None
Portugal	One service franchised
Slovakia	None
Slovenia	None
Spain	None
Sweden	All subsidized services
Switzerland	Limited
United Kingdom	All domestic passenger services (with minor exceptions)

Switzerland has a long history of private passenger services, but only a few concessions have been competitively awarded. Quality of service is a responsibility taken seriously by the Government and any tendering will have to protect both this and the existing co-operation between the public transport service providers.

Norway is preparing for competitive tenders to provide passenger transport under public service contracts. In Finland there is a history of applying a tendering procedure for the contracting of public services, however this is not the case for rail due to the fact that there is only one railway operator active in the market.

Portugal adopted competitive tendering to award the franchise for the new trans-Tagus services in Lisbon, and this franchise was won by a new entrant, but otherwise competitive franchising has not yet been adopted in Portugal. The franchise on this route was originally for 30 years, but in the context of a shortfall in passenger numbers if being renegotiated for a total of 11.

The relatively small size of the market in Greece and Ireland, coupled with technical constraints, means that any market entry is expected to be very limited in the future. In Spain the legislative and institutional framework to allow market entry has still be constructed.

The other European Union countries appear to have done little to encourage competition.

5.2. Experience of competitive tendering

This section briefly reviews the experience of some of the countries where competitive tendering of passenger services has been most extensively used; namely Britain, Sweden, Germany and Denmark.

5.2.1. *Britain*

Great Britain has by far the most experience of competitive tendering in Europe, having moved to a situation where virtually all rail passenger services are competitively tendered over the period 1994-7. For this reason the British experience is covered in more detail than other countries. Separation of infrastructure from operations in 1994 was followed by outright privatisation of the infrastructure manager and the freight operators and by franchising of virtually all passenger services, whether short or long distance, profitable or not. Initially franchises were let for periods of 5-15 years, on a net cost basis, with a requirement to provide at least a minimum level of service but opportunities to run more services than that. Some fares are capped. Franchisees lease rolling stock from separate rolling stock leasing companies, so the level of investment required is very low, but there is an issue as to whether they have to pay a high price for short leases, given the risk to the rolling stock leasing company. The initial round of franchises is described in Table 5.2.

Until the Hatfield accident in October 2000, which set off a chain of events culminating in the bankruptcy of the infrastructure manager, Railtrack, the franchising process had been largely successful. Traffic had grown substantially (Figure 5.1). Whilst initially privatization raised the level of subsidy, since all the assets were sold and had to be leased back at commercial rates, by 1999-2000 subsidies were falling substantially (Table 5.3). In that year the overall level of subsidy had been reduced to some 3.4 p per passenger km, with a number of inter city and London and South east franchises paying a premium (money paid by the franchisee to the government). When franchises first started to come

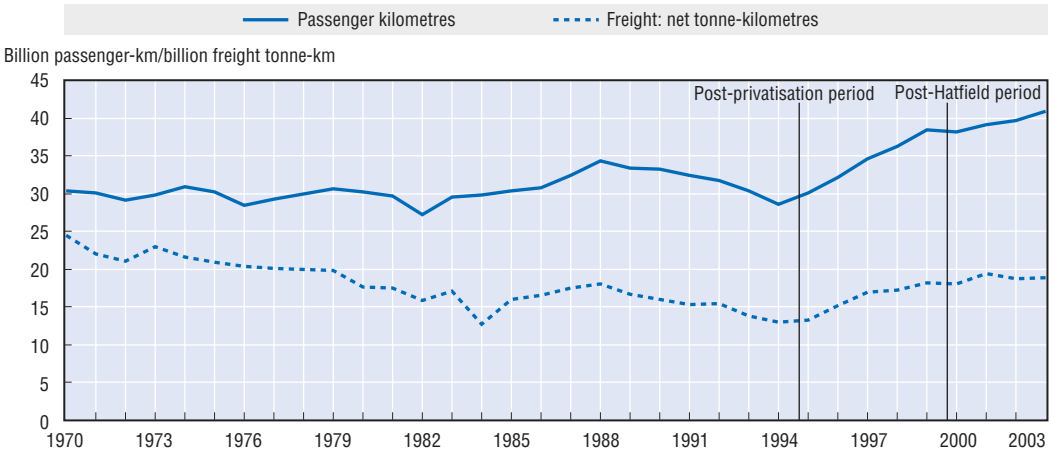
Table 5.2. **Rail franchises – First round**

Franchise	Owner	Length of Franchise (years)	Subsidy (£ M Feb. 1997 prices)	
			1996/7	2002/3
Great Western	MBO/Firstbus	10	61.9	36.9
South West Trains	Stagecoach	7	63.3	35.7
Great North Eastern	Sea Containers	7	67.3	1
Midland Main Line	National Express Group	10	17.6	–4.4
Gatwick Express	National Express Group	15	–4.1	–12.0
LTS Rail	Prism	15	31.1	19.3
Connex South Central	Connex	7	92.8	35.9
Chiltern Railways	MBO/Laing	7	17.4	3.3
Connex South Eastern	Connex	15	136.1	32.6
South Wales & West	Prism	7½	84.6	44.0
Cardiff Railways	Prism	7½	22.5	14.3
Thames Trains	MBO/Go Ahead	7½	43.7	3.8
Island Line	Stagecoach	5	2.3	1.0*
North Western	Great Western Holdings	10	192.9	129.7
Regional Railways North East	MTL Trust	7	231.1	150.6
North London Railways	National Express Group	7½	55.0	20.0
Thameslink	Goahead/Via	7 yrs 1 mth	18.5	–27.0
West Coast Trains	Virgin	15	94.4	–3.9
Scotrail	National Express Group	7	297.1	209.3
Central Trains	National Express Group	7	204.4	136.6
Cross Country	Virgin	15	130.0	50.5
Anglia	GB Railways	7 yrs 3 mths	41.0	6.3
Great Eastern	First Bus	7 yrs 3 mths	29.0	–9.5
West Anglia Great Northern	Prism	7 yrs 3 mths	72.6	–14.6
Merseyrail Electrics	MTL Trust	7	87.6	61.8

Note: Negative subsidies indicate payment of a premium; MBO stands for Management Buy Out.
* Assumes constant subsidy after year 5.

Source: OPRAF *Annual Report* 1996-7.

Figure 5.1. **Rail passenger and freight volumes (1979 to 2002/03)**



Sources: *Transport Trends*, 2002 Edition, Department For Transport and National Rails Trends, SRA (January to March 2003).

Table 5.3. **Government support to the rail industry**

	Central government grants	PTE grants	Direct rail support	Other elements of govt. support	Freight grants	Total govt. support
1985-86	849	78	0	61	7	**995**
1986-87	755	70	0	22	6	**853**
1987-88	796	68	0	–251	2	**615**
1988-89	551	70	0	–175	2	**448**
1989-90	479	84	0	232	1	**796**
1990-91	637	115	0	440	4	**1 196**
1991-92	902	120	0	562	1	**1 585**
1992-93	1 194	107	0	870	2	**2 173**
1993-94	926	166	0	535	4	**1 631**
1994-95	1 815	346	0	–464	3	**1 700**
1995-96	1 712	362	0	–1 643	4	**435**
1996-97	1 809	291	0	–1 044	15	**1 071**
1997-98	1 429	375	0	25	29	**1 858**
1998-99	1 196	337	0	53	29	**1 615**
1999-00	1 031	312	0	75	23	**1 441**
2000-01	847	283	0	84	36	**1 250**
2001-02	731	306	684	105	57	**1 883**
2002-03	935	304	1 166	183	49	**2 637**

Source: SRA (2004a), p. 47.

up for renewal the initial intention was generally to go for much longer franchises with obligations to invest heavily built into them.

Up to the year 2000, then, there was a widespread view that, although problems had been found, the British experience was overall positive. Passenger traffic had risen to its highest levels since before the major cuts to the rail network under Dr Beeching in the 1960s, and subsidies (excluding receipts from the sale of assets) were rapidly declining.

The big problems that emerged after the Hatfield accident in 2000 mostly concerned the infrastructure manager. However, there is also a problem concerning the financial difficulties some of the train operators were experiencing, particularly those in the less profitable parts of the industry which had built their franchises bids around big reductions in operating costs (Table 5.4). The result was doubt as to whether the reduction in subsidy was fully sustainable or whether in fact some franchisees would go out of business, meaning that some franchises would need to be re-let probably with higher levels of subsidy. Initially the Strategic Rail Authority renegotiated a number of franchises, although

Table 5.4. **Rail franchise profitability, operating profit, 1998/9**

Losses after subsidy in brackets

	£ M	% of turnover
Inter city operators	90.8	5.5
Network south east operators	93.7	4.7
Regional operators	(6.2)	(0.4)
Of which:		
North West Trains	(5.1)	(2.1)
Wales and West	(12.6)	(9.6)
Cardiff Railways	(4.9)	(18.8)

Source: TAS Rail Monitor, 2000.

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Table 5.5. **TOCs, passenger-km (million), track access charges and subsidies on main network (£ million)**

Train operator	Owner	P-km 2003/04	% of total	TAC 2004/05	TAC 2008/09	Δ in %	Subsidy 2003/04
C2C Rail Ltd	National Express Group (NEG)	836.2	2.06	10.88	22.31	105	20.1
Central Trains Ltd	NEG	1 363.0	3.35	46.11	104.14	126	147.1
Midland Mainline Ltd	NEG	1 330.0	3.27	16.57	37.11	124	–3.5
Gatwick Express Ltd	NEG	197.9	0.49	4.87	10.91	124	–13
ScotRail Railways Ltd	NEG (from 10/2004 First Group)	2 081.8	5.12	60.62	134.66	122	268.4
Silverlink Train Services Ltd	NEG	1 062.4	2.61	31.67	76.77	142	52
West Anglia Great Northern Railway Ltd (WAGN)/ (One West Anglia Ltd)	NEG	2 228.3	5.48	36.69	80.68	120	10.5
One Anglia Railways Ltd	NEG	860.2	2.12	14.34	30.74	114	4.4
One Great Eastern Railway Ltd	NEG	1 835.4	4.52	23.80	50.93	114	–31.9
Wessex (Wales & West) Trains Ltd	NEG	435.4	1.07	9.72	21.12	117	78
One Stansted Express Ltd	NEG	–	–	–	–	–	–
National Express Group		**12 231**	**300.9**	**2 552.7**	**5 693.80**	**123**	**5 321**
South West Trains Ltd	Stagecoach plc	4 290.4	10.56	56.79	131.97	132	116.2
Cross Country Trains Ltd	Virgin Trains (Stagecoach & Virgin Group)	2 666.3	6.56	67.87	157.61	132	246.1
West Coast Trains Ltd	Virgin Trains (Stagecoach & Virgin Group)	2 744.9	6.75	140.16	344.97	146	332
Stagecoach & Virgin Group		**9 701.6**	**23.87**	**264.83**	**634.54**	**140**	**694.3**
North Western Trains Ltd	First Group	803.7	1.98	36.19	80.71	123	191.7
Great Western Trains Ltd	First Group	2 610.0	6.42	56.63	124.68	120	31.9
First Great Western Link/ Thames Trains + Transpennine Express (+ Hull Trains)	First Group	1 124.3	2.77	–	–	–	25.1
First Group		**4 538**	**11.16**	**92.83**	**205.38**	**121**	**248.7**
Arriva Trains Northern Ltd	Arriva plc	1 424.3	3.50	43.59	92.22	112	241.4
Arriva Trains Wales Ltd (incl. Wales & Borders)	Arriva plc	785.7	1.93	26.93	58.78	118	123.6
Arriva plc		**2 210**	**5.44**	**70.52**	**151.01**	**114**	**365**
Southern (South Central) Ltd	Go-Ahead/GOVIA	2 726.8	6.71	40.93	92.51	126	90.8
Thameslink Rail Ltd	Go-Ahead/GOVIA	1 368.9	3.37	15.12	33.56	122	-41
Go-Ahead/ GOVIA		**4 095.7**	**10.08**	**56.05**	**126.07**	**125**	**49.8**
The Chiltern Railway Ltd	John Laing plc – M40 Trains	635.7	1.56	8.02	18.19	127	24.4
Great North Eastern Railway Ltd	Sea Containers	3 939.4	9.69	58.62	129.58	121	–22.4
MerseyRail Electrics 2002 Ltd on behalf of Merseytravel	Operated by Serco/Ned-Railways	–	–	9.14	18.71	105	–
South Eastern Trains (incl. Connex)	Administrated by SRA	3 296.4	8.11	53.91	119.78	122	134.2
All operators		**40 647.4**	**100**	**884.22**	**2 006.35**	**127**	**2 026.1**

Source: Merkert and Nash (forthcoming).

some of the franchisees did go out of business, but the resumption of competitive tendering is now well under way, on the basis typically of 7 year franchises with the possibility of short extensions; revenue risk is now being shared.

From the first, it was seen as necessary on the more heavily subsidized services to provide incentives over and above revenue risk for good performance. The franchise agreement specified penalties for unreliability in terms of services actually run, unpunctuality and for failure to provide the required capacity. Initially the quality of services improved, but later – perhaps because of the growth of traffic, it declined – it did so particularly sharply in the aftermath of the Hatfield accident, when temporary speed limits and work on the track rose to unprecedented levels, and has yet to fully recover.

The current situation in terms of franchises is shown in Table 5.5. Subsidies are again rising. The main cause of this is the increase in rail access charges, but other factors, including the cost of leasing new rolling stock and rapid inflation of driver's wages, are playing a part. It will also be seen that substantial concentration has taken place, with National Express holding no fewer than 11 of the franchises. However, almost all franchise invitations have been followed by strong competition between several players and only on one occasion has a franchise contest been halted because of lack of adequate competition.

The SRA has overseen the replacement of those passenger rail franchises that have expired or are about to expire. Initially SRA favoured longer-term franchises (up to 20 years) with the specific aim of providing TOCs with greater incentives to invest, with longer periods to gain a return on that investment. After a period of indecision following the problems caused by the Hatfield accident, current policy is to return to 7 years as the typical franchise period, with extensions of up to 3 years possible if justified by performance. The new franchises lay down much stricter conditions regarding a whole range of quality of service indicators, and share revenue risk – previously this was borne entirely by the franchisee.

Overall, despite the problems of the British rail network in recent years, the franchising process can still be seen as a success.

5.2.2. Sweden

All subsidised rail passenger services in Sweden are subject to competitive tendering, but unlike in Britain there remains a state owned operator which is allowed to compete. For regional services, it is the regional passenger transport authority that is responsible for franchising; it sets fares and timetables and retains ownership of the rolling stock and depots. Franchises are usually short (2-5 years). Typically, significant cost reductions of the order of 20-30% have been achieved, and services improved (Alexandersson and Hulten, 1999). As in Britain, new entrants are typically bus operators, notably BK Tag and Linjebuss. BK Tag, in conjunction with international operators Via and Go ahead, won the most important contract, that for Stockholm commuter services.

But the introduction of competitive tendering in Sweden has not been without its problems. Alexandersson and Hulten (2003) conclude that competitive tendering has generally achieved cost savings of the order of 20%, but where higher savings or rapid revenue growth have been assumed by bidders, problems have typically followed. Sometimes the motives may be purely predatory. When the state owned operator won back a contract from the private operator BK Tag in 1993, it was found guilty of using its dominant position to put in a loss making bid as a way of eliminating competition. This of course is always a fear when competition for contracts is between one major state owned operator and small

private operators. More recently a new entrant which is part of a major international group, Connex, was accused of using the same tactics when it put in a bid implying a 41% reduction in subsidies on a long distance service, as a way of breaking into the market.

In other cases it seems that the winning bidder simply was mistaken – the "winner's curse". An operator which won the contract for the West Coast Line on an assumption of greatly increased revenue went swiftly bankrupt, whilst the winner of the contract for the Stockholm suburban services assumed productivity increases which were not achieved, leading both to a shortage of drivers and consequent service unreliability and to losses for the operator. Nevertheless, when Nilsson (2002) reviews the overall experience of Sweden he seems to regard it as a moderate success.

5.2.3. Germany

In 1996, responsibility for regional passenger services in Germany was transferred entirely to the states. They may use competitive tendering, but are allowed to sign 6-15 year contracts with DB for the provision of services over their entire network provided that the contract provides for a "sufficient" proportion of services to be subject to competitive tendering. Link (2004) argues that states are encouraged to sign such contracts by the argument that DB will not invest in rolling stock and other facilities unless they do, and moreover that those services which are subjected to competitive tendering are usually the least attractive. By 2002 competitors to DB had won 8% of train-km in this sector, having secured some 60% of those contracts put out to competitive tender. Tenders very from 5 to 15 years; the state determines fares and service levels. Lehman (1999) concludes the outcome of tendering is positive, although there has been some experience of unrealistic bids, notably in the case of Flex AG, which won a contract for regional services around Hamburg in 2002, but became bankrupt only 8 months later (DB, 2004).

5.2.4. Denmark

Following the separation of infrastructure from operations in 1997, Denmark decided to introduce competitive tendering for passenger services on a progressive basis over a number of years. The first tender was let in 2003 and covered 15% of passenger traffic; it was won by Arriva, even though DSB submitted a lower bid (IBM, 2004). A further 10% of the passenger business will be franchised in 2007.

The Arriva contract covers a network of 8 routes in Jutland, runs for 8 years and includes the procurement of new trains (ACorp, 2004). Initially difficulties were experienced as not all DSB drivers transferred to Arriva, and a shortage of drivers meant bus replacement of some services (this problem, also experienced in Sweden, does not occur to the same extent in Britain, where control of a separate company, including its staff, automatically transfers to the new franchisee). However, it now appears to be running smoothly.

5.3. Conclusions on competitive tendering

Given that there is generally a need for subsidy and an argument for government involvement in the level of services and fares in the passenger sector, franchising rather than open access appears the obvious way of introducing competition into this sector. Experience of franchising so far has been generally beneficial with general reductions in cost and improvement in services, but also problems in some aspects of performance (particularly reliability), suggestions of predatory pricing and opportunistic attempts at renegotiations. There appears to be a choice between short franchises, in which public

authorities control service planning, fares and investment, and long franchises in which much more responsibility for these is given to the franchisee (Preston *et al.*, 2000). Generally, countries seem to have gone for the former, with only Britain leaving significant freedom over fares and service levels to operators, at least in the first round of franchises; timetables are now being more tightly defined in order to improve track utilisation.

But on balance however it is introduced there appears to be a link between the introduction of competitive tendering and improved performance. Whilst more research is needed on the best way to undertake franchising (competitive tendering of concessions) and to avoid the difficulties experienced in some countries, it therefore follows that there is a strong case for the rapid extension of franchising to all services not exposed to effective competition in the market.

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Chapter 6

Conclusions and Policy Recommendations

Many of the approaches in place today are still rooted in the initial response to the Directive 91/440/EC: local and national considerations are paramount, and Europe-wide concerns are simply not present. To be fair, time is needed to make changes of the magnitude required (especially in railways). Also, certain critical issues remain open – especially a decision on collecting and reporting the data and techniques to be used to calculate marginal costs – and it is not entirely reasonable to expect railways and infrastructure managers to resolve these issues without more guidance than they have received to date.

While some variation in approaches is clearly permitted within the limits of European Union Directives and is justifiable as a result of differing national conditions, other variations in access regimes will act to limit the entry of smaller and international competitors and are clearly harmful to the objectives of the ECMT and European Union, if not also national objectives.

6.1. Public and transparent line of business data

Access charge regimes are often complex and not based on publicly available and transparent information. It is an unfortunate heritage of many government accounting systems that they provide no information suitable for the analysis of business decisions. Ministers should seek much better data, especially public and transparent line of business data in an appropriate framework, to support analysis and to ensure appropriate balance among users. This will be vital to meeting the financial stability objective as well as meeting the objective of clarity in the governments' financing role.

6.2. Policy-based allocations of cost between freight and passenger traffic

Ministers should be concerned about the apparent differing objectives for the allocation of costs among various users, especially in Central and Eastern European countries where freight profits were traditionally used to support passenger losses. While the term "cross-subsidy" may not be appropriate for infrastructure use alone, policy-based allocations among freight, intercity passengers and suburban passengers will have an effect on national and international traffic. Attempts to shift passenger deficits into the freight account, by charging freight larger mark-ups over marginal costs, will inevitably be destructive, especially when the major part of the passenger losses are generated by uneconomic, low density, rural services and facilities. Lacking accurate line of business accounts, it is difficult to pinpoint countries in which this is a particular problem or measure its impact; there is, however, an indication that the new and prospective EU members may need to review approaches that were firmly embedded in their policies prior to membership accession.

Ministers may also wish to look more closely at the cases where transit traffic is being charged significantly more than comparable export/import or domestic traffic: this practice has the clear effect of limiting trade between non-contiguous countries.

6.3. Common approach and data set for the calculation of marginal infrastructure costs

Despite a great deal of research work, there is currently no general agreement on how actually to measure and calculate rail infrastructure marginal costs or external costs. There is an urgent need for a common approach to ensure that at least the basic wear and tear costs, **including accelerated renewals** (*i.e.* variable, traffic-driven renewals costs), are recovered from users in order to meet the basic financial stability and economic efficiency objectives. It would focus on an agreed and common approach and data set for the calculation of marginal infrastructure costs, and might also prescribe common values for many of the social costs (carbon emissions, for example, should have a standard value).

Acknowledging the difficulty of measuring MC (including renewals), there are a number of cases in which the access charge regime almost certainly has charges below MC, even without renewals. The Swedish access charge regime only collects 5.3% of its costs from users, an amount that falls well below the rule of thumb that the variable costs of maintenance and renewals are about 20% of average maintenance and renewals costs. Access charges in Norway and Denmark (except for the bridge tolls discussed elsewhere) are comparable in level with Sweden, and must also be well below marginal cost even before renewals are taken into account. Norway does not charge for passenger trains at all, an approach that is by definition below MC. A number of countries explicitly do not attempt to recover the cost of renewal in their access regimes, and have thus consciously or unconsciously chosen not to charge for the full effects of wear and tear on the track.

6.4. Track quality and the actual costs of maintenance and renewal

There is as yet no common approach to measuring and reporting track quality and the actual costs of maintenance and renewal. As a result, there is no reliable information available on whether the financial stability goal is actually being met while keeping the infrastructure in stable and acceptable condition. Moreover, there is no transparent method of comparing the cost and efficiency with which infrastructure is being maintained and thus there is no effective incentive for infrastructure providers to be efficient. Since infrastructure costs (minus government support) are in effect passed directly to users, an inefficient or ineffective infrastructure manager can be an obstacle to reaching the objective of improving the railway's share in international traffic, and can suppress the role of rail within its own country.

6.5. Government commitments

A related point is the difficulty in ensuring that government commitments, once made, are actually kept. Government railway budgets, however sincerely motivated, are subject to changing political priorities. Efficient and effective railway infrastructure, by contrast, can only be delivered if the sources of funding (be they user fees or government contributions) are sufficient, predictable and reliable. Within reasonable limits, the infrastructure manager, as a "business" executive, can be held responsible for forecasting and collecting the revenues from users: he or she cannot be held responsible for government performance against its commitments.

As well as line of business performance, it will be necessary to have adequate and transparent reporting on infrastructure condition and government commitments, if the financial stability of the infrastructure manager is to be ensured. For services supported by

public budgets it might be useful to consider the government contribution as corresponding to the fixed part of a two-part tariff. An independent regulator can play a useful role in ensuring that the government contribution is consistent with the quality and quantity of infrastructure the government demands for the services it expects to be operated.

6.6. Two-part charges

Where two-part tariffs are being used for services open to on-track competition, especially for path reservation, other than a small element related to administrative costs, the "fixed" part should be restricted to those places and cases in which there is actually a capacity shortage or bottleneck. This will act to restrict the price signal to the place where there is a need for a user response, and it will limit the anti-competitive effect of larger "up-front" charges.

6.7. Market differentiation

The most important conclusion is that **access charge systems can and should take a mixed approach**, as outlined in Figure 6.1, **with each type of use potentially facing a regime best suited to the needs and services of its market segment**.

- **Suburban passenger systems**. The suburban systems are the most likely to have capacity issues. They need to have all of their paths reserved well in advance. They are most suited to competition **for** the market, which generally suggests only one operator per conurbation. Under these circumstances, the infrastructure manager will function best with a direct FC **contract** with a two-part tariff based on avoidable cost with the operator and the supporting government(s) to provide infrastructure capacity and access services. The operators will be subsidized directly for their operating losses over and above their payments to the infrastructure provider. In this case, there is little elasticity of demand for infrastructure from the operator (and little supply response, either), which argues for an access charge regime which will cover both use and capacity costs so that the public authority will perceive the right signals as to the cost of the access services demanded, on the basis of a 2-part tariff. Where practicable, this might even argue for institutional separation of the urban infrastructure from the national system and integration of the urban infrastructure with the franchised urban operator.
- **Intercity passenger high-speed rail (HSR)**. HSR systems have quite limited interaction with other trains on the networks and, so far, no competing operators run trains on the high-speed lines. All paths are reserved. On the high-speed lines, there are no capacity issues associated with mixed services, and the interaction between track geometry and alignment quality versus rolling stock design and maintenance can be carefully controlled. For exclusive, high-speed lines with a single operator, there is little benefit in ostensibly public access charges, since there are and will be few potential operators. The infrastructure provider should have a full FC **contract** with operator(s), or an FC– **contract** if the government sees social benefits in HSR. Where the high-speed line stands essentially alone with a single operator, the option of integrated management also deserves consideration.

  There may be cases in the future where there are competing operators on the same high-speed line, or cases in which there are uses (*e.g.* freight and conventional passenger services) that compete for capacity, but not for customers, on the high-speed lines. Two-part, MC+ tariffs would be appropriate for the competing situation, whereas a non-competitive, tenant user would probably pay a simple MC tariff, assuming it will not

create capacity problems for the dominant users. Sustaining competing high-speed operations on the same tracks while achieving a high level of infrastructure cost recovery would be problematic; the resulting high infrastructure charges might well lead to inefficient use of the network.

- **Conventional intercity passenger services**. Virtually all of the intercity passenger paths are reserved for up to a year ahead of time. Conventional intercity passenger services generate most of the line quality issues where there is mixed use of the line, and are usually responsible for line capacity issues beyond those of providing for suburban passenger operators. If competition **in** a particular market is sustainable, then a simple MC+ approach to charging for infrastructure use would work best (because it would not act to exclude small or international entry). Large mark-ups should be avoided as they are likely to seriously undermine efficient use of the network. Elsewhere, franchising is likely to provide the best approach to competition, and the conclusions then align with those above for suburban and high-speed rail.
- **Freight**. Freight will normally not be the dominant user of a network (except on specific lines) and will normally not be a determinant of capacity needs because freight schedule needs are more capable of being shifted away from peak hours. Some freight paths may need to be reserved (not necessarily in peak hours), for shippers for whom logistical considerations are critical. Much of the normal activity of freight shippers will not require or even accept schedules developed a year, or even a month, in advance. However, freight may account for the highest percentage of international traffic, and may be the key market in which effective competition needs to be developed on the tracks.

  Rail freight services face intense competition from other modes, so they may be heavily affected by politically determined distortions between charges for freight and other users. Moreover, international rail freight operators face absolutely seamless competition from trucks and barges (which do not need to change companies, crews or vehicles at borders) so an access charge regime that creates "seams" will inevitably harm the competitive position of international rail freight.

  All of this argues for applying simple (rather than two-part) access charges to rail freight, and it argues for an MC or MC+ approach that is compatible with the simple access charge approach. **For international rail freight it would be appropriate to develop much simplified (single part), MC based, Europe-wide pricing, especially for key rail freight corridors.** These tariffs should be developed in the context of the market position of rail in the corridor in question, rather than simply being a summation of national tariffs. In fact, it is striking that none of the existing access regimes recognize or make allowance for separate, uniform or simple charges for the TERFN or the earlier Freight Freeways: it is hard to see how these supposedly seamless systems for rail freight can function properly without a seamless access charge regime.
- **The Baltic Countries.** Estonia, Latvia and Lithuania may well represent a distinct challenge, for several reasons: they are not well connected to the rest of the EU, they have a different gauge (1 520 mm versus 1 435 mm), they are freight dominant (Figure 3.1), and they operate markedly longer freight trains than elsewhere in the EU (see Figure 6.1). In addition, the freight operator in Estonia is a private company, which maintains and dispatches the main lines. In this case, it would be unrealistic to expect freight to pay only MC unless the governments are willing to meet the remaining costs of the infrastructure – an unlikely outcome when national budgets are strained. In the Estonian

Figure 6.1. **Average freight train size in 2004 (net tonnes): The Baltic States are different**

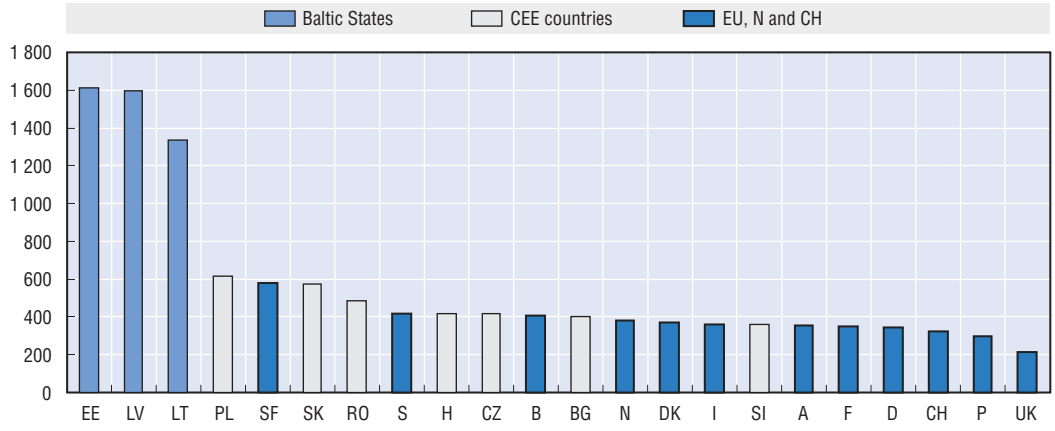

Table 6.1. **Access charge regimes for types of rail users**

	Pure SMC	MC+	FC–	FC contract with sponsor (if any)
Suburban				High requirement for scheduled slots, relatively low speed. Limited response to price signals, high public support.
High speed rail franchise			Use two-part tariff for operations on conventional lines.	Slots all scheduled, rigid quality requirements, number of competing operators limited.
Conventional inter-city passenger and HSR:				
With competition in the market		High capacity requirements. Two-part contracts appropriate, but fixed component should be minimized.		
Without competition (or with competition for the market)			High capacity schedule requirements. Suitable for two-part contracts.	
Freight	Low schedule and track quality requirements. High response to price signals. Use either SMC or MC+ simple tariff with minimum mark-ups. Mark-ups (if any) for freight in domestic, import-export and transit traffic movement should be uniform.			

case, in particular, it would be destructive to permit competing freight operators to pay marginal costs for significant amounts of line capacity while expecting the incumbent operator in effect to pay FC access charges for the entire system. Instead, it is likely that the passenger operators will pay SMC charges (except where they own and control the tracks) and the freight operators will have to pay a form of MC+, FC–, or even FC access charges. Much of the freight traffic depends on trade with Russia, and the impact of infrastructure charges on these markets is critical in determining their level. If these markets are insensitive to price, then FC pricing is not problematic in this particular case. In any case, all freight operators should pay the same access charges.

- **Freight access to urban facilities.** In some cases, freight rail shops or logistics depots are located in densely used urban areas. Where possible, the freight access should be in off-peak hours, which would permit simple, MC access charges. If access is essential during peak hours, then the freight operators may well need to pay fees for access to the congested infrastructure on a simple, MC+ basis. If the freight access is an actual capacity problem, then there is no reason why the freight operator should not pay a two-part tariff partly based on the slots committed during the peak hours.

6.8. Simplified access charges for freight especially on international routes

The simple access charges recommended for freight could be structured to include both charges per gross tonne-km and per train-km.

Gross tonne-kms (possibly weighted for speed and axle load) is probably the best single indicator of the annual maintenance demands of freight traffic (and passenger traffic as well). Thus gross tonne-km might be the best proxy for the marginal cost associated with annual ballast cleaning and replacement, track alignment and other effort required to maintain track condition. Most North American practice now estimates rail wear as a function of gross tonne-km and current estimates show rail life between 800 million and 2.5 billion gross tonne-km of total traffic. A properly formulated charge per gross tonne-km could therefore include at least part of the cost of renewals as well.

A charge per gross tonne-km focuses attention on the total weight of the train and on the ratio of the cargo weight to total weight, which in both cases is positive for productivity and efficiency. Unless weighted for axle load, the train operator will use the highest axle load permitted. If the axle load is factored for speed, the operator will have an incentive to run slow trains, since the speed factoring tends to be exponential with speed. Speed factored axle loading is a useful measure of the effect of axle load on maintenance and renewals on the track. A gross tonne-km measure, factored properly for speed and axle load, can give a reasonable measure for track maintenance and renewal costs.

Train-km (weighted by speed and locomotive power per tonne) is more closely related to use of capacity, because it is train-km (not wagon-km or net or gross tonne-km) that influences signaling, track doubling, dispatching and path planning, etc. Thus, a charge per train-km could probably be instituted that would be wholly variable with use but would more closely reflect capacity costs rather than maintenance and renewal costs.

A train-km charge factored for speed is a good measure for the time that a train occupies each signal block, which is the fundamental measure of use of capacity. Subject to the maximum length of a train (fixed by the passing siding length), all trains traveling at the same speed use the same amount of capacity. If starting and stopping are important for capacity (more important for dense traffic like suburban traffic but also important for freight when line capacity is approached), then acceleration becomes important (higher is better) and horsepower per tonne is a useful measure of acceleration. In principle, then, use of capacity is a function of train-km factored by speed and by acceleration. Speed is important in terms of signal block occupancy but also in terms of the need for faster trains to pass slower ones. For freight trains on a predominantly passenger railway, higher speeds are usually better in terms of capacity; although the occasional high speed passenger train traveling faster than the bulk of the traffic also consumes a disproportionate amount of capacity.

When faced with the tonne-km and train-km charges both differentiated by speed, a freight operator will have to balance his choice of speed between the increase in charge per gross tonne-km with speed against the reduction in charge per train-km. How the balance is struck between the two factors could be quite important.

Taken together, the result could be a set of simple (*i.e.* non two-part) charges that would more or less accurately reflect maintenance and renewals and use of some aspects of capacity. Austria, Estonia, Bulgaria, Czech Republic, Sweden and Switzerland all have regimes based on both train-km and gross tonne-km charges (though Bulgaria has an advance charge per path-km as well). Of course, these countries do not have the same charging factors and, as discussed, a wide imbalance in the weighting of the charges between gross tonne-km and train-km factors could create a "seam" that might cause problems. If the relative weighting of the two charges is roughly the same, then the absolute levels ought not to create a "seam".

Ideally, at least the international freight networks (TERFN) ought to have a set of consistent charges based on both gross tonne-km (weighted by axle load and speed) and on train-km (weighted also by speed and by horsepower per tonne dispatched). If only one factor is used for freight, gross tonne-km might be most appropriate since most of the really marginal costs of freight are maintenance and renewal related rather than use of capacity. Use of solely a gross tonne-km charge might well understate the marginal cost of freight where there are capacity problems, so this might argue for a per train-km emphasis where there are capacity issues. Of course, if all freight trains are of more or less the same weight, have the same acceleration, and travel at the same speed, then the two charges can be combined.

6.9. Recommendations

In overall summary, the existing infrastructure access regimes are not fully consistent with Minister's objectives for promoting financially stable infrastructure providers, for providing effective price signals to users of rail infrastructure, or for promoting effective competition in the various rail markets (especially international markets) where competition would be sustainable. To some extent, this reflects the current relatively early stage in the development of infrastructure charging in a process of fundamental change. It is partly a result of proposed changes that are better understood in theory than in application and of attempted implementation without consistent and transparent data. It is in part due to significant (and at least partly valid) differences among the Member countries in their policies toward direct support of rail infrastructure and (less validly) toward distorted allocations of cost from passenger to freight services. These issues cannot be addressed all at once. Instead, Ministers should consider focusing in the near term on the five following points.

1. Prescription of transparent data reporting in a consistent format from the infrastructure managers and the various operators to furnish line of business accounts, including a complete record of government support in publicly available statistics. The required reporting by the infrastructure manager should include a discussion of any changes in the condition of the infrastructure from the previous year, and a statement of the degree to which income from users plus government support meets or falls short of the cost of maintaining the infrastructure including any required renewals. There is ample precedent in regulatory experience elsewhere for requiring that railways report their annual results in a common format that permits analysis of individual railway performance and facilitates

comparisons among railways. In North America, for example, the Surface Transportation Board in the U.S. and Transport Canada both require highly detailed reporting of operating and financial statistics that permit analysis of costs in detail. Because these statistics have been reported consistently over many years, the performance of the railways can be evaluated over time. Many of the Latin American rail concessions (Argentina and Brazil in particular) have also required that the concessions provide detailed, public information on performance. In the European context, differences among infrastructure managers are likely to lead to minor differences in the data collected, however, the introduction of International Accounting Standards is likely to make development of the basic information readily feasible, and it should be possible to require reporting in a common (and useful) format. As an example, the Form R-1 required of all US Class I railroads furnishes consistent cross-section and time series data sufficient for detailed analysis of track maintenance and investment.

2. Renewed attention to developing a common understanding of how to define and measure marginal private and external costs for use of rail infrastructure. Marginal private cost measurement can be a country-by country task (using a common approach and a consistent database); external cost measurement must be a Europe-wide responsibility.
3. Using the data developed on costs (points 1 and 2) ensure that all countries are pursuing policies that yield financially stable infrastructure providers. This includes a stable contribution from government to the infrastructure provider, with full disbursement of budgeted financial commitments, and a set of access charges that:
   - Subject to achieving this on other modes as well, charge each user at least the marginal cost, including for renewals, of its use.
   - And in total, generate the difference between FC and the government contribution.

   The annual reports of infrastructure managers ought to include a statement on the fulfillment of these requirements and independent regulators should ensure these basic conditions are met as part of their remit. Track geometry vehicles are available and commonly in use in the UK, for example. Such vehicles and the related software can readily produce quantitative reports on the track conditions in each segment of a railway, and can compare conditions from time period to time period in a way the permits both summary and detailed reporting on infrastructure conditions. Such reports should be included in the annual Network Statement that infrastructure managers are now required to produce.
4. Encouragement of the development of long term public service contracts for passenger services, awarded by competitive tendering, in which railways are funded at least to the extent of the avoidable costs of the set of services concerned less revenues. The avoidable costs would include infrastructure costs, probably charged through a two part tariff.
5. Development of a set of SMC or MC+ access charges for international freight (possibly domestic freight as well), especially on key international corridors. These charges need not be uniform in level but must be consistent in structure and should be based on a set of simple factors of use (outside of capacity bottlenecks and peak hours). Charges per gross tonne-km (or per wagon-km, which is simpler but less accurately reflects gross weight) should be employed to reflect maintenance and renewal costs for track. Where freight capacity is not constrained, such a single factor, simple charge may be sufficient. Where capacity for freight is constrained (and the marginal costs of freight traffic are

significant) charges per train-km may also be useful. It should be accepted however that where rail freight is the dominant use of the network and its market position is strong (as in the Baltic states) an alternative approach based on full costs is appropriate.

6.10. Follow-up

To make progress with respect to the first two of these recommendations Member Governments should cooperate in three specific areas of research and data collection:

1. Research into the measurement and in some cases clearer definition of costs is required and in particular in relation to:
   - The variability of rail infrastructure maintenance and renewals costs with traffic levels.
   - The best way of dealing with scarcity and congestion in rail infrastructure charges.
   - The impact of various forms of mark-up on the pricing and service level decisions of train operating companies.
   - The quantification and valuation of the environmental costs of rail transport.
   - Better guidance on the transferability of results, in all the above areas, from one context or country to another, and on adjustments that might be necessary to ensure coherent outcomes.

   Work on these issues has already been undertaken as part of EC funded research projects (in particular UNITE) that will be further developed in a project called GRACE. An equally important task is to seek to build consensus on how to apply these results in practice; in this context the EC co-ordination action, IMPRINT-NET will be valuable and should inform the work of the DG TREN expert group on track access charges. It will be important to maintain close contact between these EU developments and the broader membership of ECMT.
2. Public reporting of infrastructure accounting data by line of business.
3. Collection of engineering data on infrastructure quality and condition, destined to be made publicly available as a compliment to existing network statements.

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APPENDIX A

National Infrastructure Charging

Austria

1. Background

In Austria, new entry first occurred in 2001; in the passenger market a franchise won by DB Regio and in freight VOEST (bulk cargo). There are now three passenger operators (including the "national" operator) and 12 freight operators (including the "national" operator) who pay infrastructure charges; and freight trains carrying materials for maintenance also pay charges. However the national operator – OBB – remains very dominant.

2. Charging principles

The basic approach taken to charging for both passenger and freight in Austria is described by OBB as being based on short run marginal costs plus mark-ups to increase cost recovery. Short run marginal cost is taken to only include track maintenance (estimated using econometrics as a function of gross tonne-km) plus a capacity charge on two capacity constrained sections near Vienna. There is also now an adjustment according to how track friendly the rolling stock is. In making this calculation, it is intended that the mark-ups partly cover the following cost components:

- Total cost of renewals.
- Total investment costs.
- There are no charges for external costs.

The financial target, set out in the financial plan agreed by ÖBB and the Ministry of Transport, is to raise € 355.5 million in 2004. To achieve this a mark up is applied, per train-km varying by line according to willingness to pay.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

OBB report that 27% of total infrastructure expenditure (including loans and grants) is covered by charges, and that this is equivalent to five times the marginal cost. There are separate charges for shunting, use of stations, etc.

3. Current structure of charges

OBB report the following kinds of charges as being levied:

A variable charge per train-km – applied to all traffic in the same way but varying by line according to willingness to pay and accounting for approximately 60% of charging revenue.

A variable charge per gross tonne-km – applied to all traffic in the same way and accounting for approximately 20% of charging revenue.

In addition, they report that other income from "additional services" accounts for the remaining 20% of charging revenues; these comprise services such as access to stations and shunting.

Freight, but not passenger, charges are differentiated by type of train (linked with "ability to pay"). Neither freight nor passenger train charges are differentiated by speed of train or weight of wagons. For the future, there are plans to introduce differentiation by quality of train path/service. As of 2006 charges will differ between "premium", "quality" and "economy" train paths.

There is currently a discount for pick-up freight trains.

4. Level of charges

There is a charge per gross tonne-km of € 0.001; the charge per train-km varies between € 0.6 and € 2.5, giving a total charge for an international freight train of 1 000 gross tonnes on the Brenner line of € 3.5 and somewhat less on other main lines. The surcharge on capacity constrained approaches to Vienna is € 0.5/train-km.

Belgium

1. Background

In Belgium there is one passenger operator (the "national" operator) and two freight operators (including the "national" operator) who pay infrastructure charges; freight trains carrying materials for maintenance do not pay charges.

2. Charging principles

The Ministry reports that revenues from charges are 20% of total infrastructure expenditure (including loans and grants). They do not report any operational cost recovery indicators, or the methodology by which charges are determined, but the charging system is described as FC–.

3. Current structure of charges

The Ministry reports that the only kind of charge levied is a variable charge per train-km, and that this is applied to all traffic (freight and passenger) in the same way.

Charges for both freight and passenger trains in Belgium are differentiated by:

- Quality of train path/service.
- Speed of train.
- Time of day.
- Weight of train.
- Other (not specified).

4. Level of charges

No information of the level of charges is given.

Czech Republic

1. Background

In the Czech Republic there are five passenger operators (including the "national" operator) and 55 freight operators (including the "national" operator) who pay infrastructure charges; but freight trains carrying materials for maintenance do not pay charges.

2. Charging principles

The basic approach taken to charging in the Czech Republic is described by the Ministry of Transport as being based on short run marginal costs, that is the marginal costs of using existing infrastructure including scarcity/congestion.

There is a financial target to collect approximately 210 million € (in 2004) through track charges.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

The Czech Ministry report that revenues from charges were, in 2003, 60% of total infrastructure expenditure (including loans and grants), and 100% of marginal costs.

They also report that charges are designed to partly cover the following categories of cost:

- Traffic management.
- Maintenance.

The charges do not cover renewals, investments, accident costs or noise costs. Those costs not covered by charges are covered by the central government budget.

3. Current structure of charges

The following kinds of charges are levied:

- A variable charge per train-km – applied at different rates to both passenger and freight trains and accounting for approximately 50% of charging revenue.
- A variable charge per gross ton-km – applied at different rates to both passenger and freight trains and accounting for approximately 50% of charging revenue.

There is no fixed access charge (independent of traffic intensity).

4. Level of charges

For a freight train of 1 000 gross tonne km, a typical charge would be around € 3.4; for a passenger train of 500 gross tonne km it would be € 1.1.

Denmark

1. Background

In Denmark there are 11 passenger operators (including the "national" operator) and six freight operators (including the "national" operator) who pay infrastructure charges; freight trains carrying materials for maintenance do not pay charges.

The national freight operator is now owned by Railion whilst the passenger operator is still government owned. There is open access for freight operation and some passenger services have been franchised to Arriva.

2. Charging principles

The basic approach taken to charging in Denmark is described by the Danish Rail Agency as being based on short run marginal costs plus mark-ups to increase cost recovery. In making this calculation, it is intended that the mark-ups partly cover the costs of investments, in particular those in relation to the Oresund and Great Belt crossings.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

In practice the charges in total do not even cover the total amount payable to the bridge companies for rail use of the two bridges.

3. Current structure of charges

The Danish Rail Agency report the following kinds of charges as being levied:

- A variable charge per train-km – applied to all traffic in the same way and accounting for approximately 20% of charging revenue.
- Capacity charges at bottlenecks – applied differently to both passenger and freight trains and accounting for approximately 10% of charging revenue.
- Øresund and Great Belt crossing charges – applied differently to both passenger and freight trains and accounting for approximately 70% of charging revenue.
- Domestic freight trains currently receive an environmental grant as a refund of access charges, but this is controversial and under review.

4. Level of charges

The level of the variable component of the charge, be it for passenger or for freight, for electric traction or for diesel, is € 0.24 per train-km. There are additional charges of € 941 for passenger trains and € 873 for freight trains for the Storebelt Bridge, and € 210 per passenger train and € 286 per freight train for the Oresund Bridge (in addition to the Swedish charges, in the latter case). There are also charges per train of € 40-110 for passing through three bottlenecks on key routes.

The average figures for charges across the network as a whole in 2004 were:

- Passenger trains € 1.08 per train-km.
- Freight: € 3.16 per train-km.
- All trains € 1.18 per train-km.

Estonia

1. Background

The state owned company Eesti Raudtee was founded in January 1992, its task was the management of Estonian railways. It was transformed into a public limited company in August 1997. The Estonian privatization agency (EPA) announced the privatization of 66% of the shares of Eesti Raudtee in April 2000. The privatization competition was won by Baltic Rail Services (BRS) in April 2001, and BRS paid for the shares and obtained controlling

interest in Eesti Raudtee in August 2001. The current ownership of the shares of Eesti Raudtee Ltd are held by: Baltic Rail Services (BRS) = 66% and the Republic of Estonia = 34%.

The Government sought to design the concession in such a way that the infrastructure is open to all upon payment of a non-discriminatory access fee.

Passenger services are franchised to three passenger operators (including the "national" operator) and there are two freight operators who pay infrastructure charges; and freight trains carrying materials for maintenance do pay charges.

Estonian railways are predominantly a freight railway; most of the Estonian traffic is export traffic from Russia.

2. Charging principles

The basic approach taken to charging in Estonia is described by the Ministry of Economic Affairs and Communications as being based on average cost principles. In calculating average costs, the following cost components are included:

- Total cost of borrowing (financial costs).
- Total maintenance and management costs.
- Total cost of renewals.
- Total investment costs.

No attempt is made to incorporate external costs within this calculation.

Thus the approach is clearly FC in terms of the categories outlined in the main report.

The Ministry report that revenues from charges were, in 2004, 100% of total infrastructure expenditure (including loans and grants).

They are also designed to partly cover noise costs, but not accident costs or air pollution costs. Accident costs are covered, instead, by insurance.

3. Current structure of charges

The Ministry report the following kinds of charges as being levied:

- A fixed access charge (independent of traffic intensity) – applied to all traffic in the same way.
- A train path reservation fee – applied to freight trains only.
- A variable charge per train-km – applied to freight trains only.

These two components together account for approximately 30% of charging revenue:

- A variable charge per gross tonne-km.
- A variable charge per net tonne-km.

The railway infrastructure access fee for basic services payable by rail transport undertakings to railway infrastructure managers consists of the following components:

- A part of fixed costs based on ordered train-kilometres.
- A part of variable costs based on actual gross tonne-kilometres (gross tonne-kilometres include also the weight of locomotive(s)).

4. *Level of charges*

The charge contains two components:

- Based on total train-km, the charge is 2.571 €/per train-km.
- Based on total gross-tonne-km, the charge is 0.002678 €/per gross tonne-km.

For example: for 1 400 tonne freight train the total charge is 6.32 €/per train-km.

Finland

1. *Background*

In Finland there is one passenger operator (the "national" operator VR) and one freight operator (the "national" operator VR) who pay infrastructure charges; and freight trains carrying materials for maintenance do pay charges. In other words so far no new entry has occurred in Finland. Nevertheless there is a separate infrastructure manager.

2. *Charging principles*

The basic approach taken to charging for both passenger and freight in Finland is described by the Ministry of Transport as being based on short run marginal costs plus mark-ups to increase cost recovery. Estimates of the short run marginal cost of maintenance and renewals are based on econometric analysis. Mark-ups partly cover the following cost components:

- Total maintenance and management costs.
- Total cost of renewals.
- External costs.

The aim of this approach is to achieve the financial target, to collect through track charges, € 56 million in 2004 (as set out in the annual budget statement), in an efficient way.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

The Ministry report that, in 2003, revenues from charges were 14% of total infrastructure expenditure (including loans and grants) in 2003, 22% of variable costs and 100% of marginal costs. They also report an operational cost recovery indicator for infrastructure maintenance costs of 44%, though this varies from year to year according to financing and the level of investment.

The Ministry explicitly state that charges are not designed to cover traffic management costs, or investments. These costs, as with the remainder of maintenance and renewals costs not covered by charges, are covered by the central government budget. In addition, accident costs, air pollution costs and noise costs are not covered by charges.

3. *Current structure of charges*

The Ministry report that the only kind of charge levied is a variable charge per gross tonne km, and that this is applied to both passenger and freight trains. This accounts for 100% of charging revenue. Charges for both freight and passenger trains in Finland are differentiated only by gross weight.

Freight, but not passenger, charges are differentiated by ability to pay and type of train.

Neither freight nor passenger train charges are differentiated by quality of train path/ service, speed of train or time of day.

4. Level of charges

Essentially, charges for passenger and freight are levied through an average variable charge. The level of that variable charge for electric traction is 0.1727 cents per gt-km for freight and 0.1289 cents per gt-km for passenger. For diesel the charge is 0.2227 cents per gt-km for freight; whilst no charge is indicated for passenger.

An indicative average level or range for the overall basic track access package charge for freight, be it electric traction or diesel, is 0.1227 € per gt-km. For passenger electric traction it is 0.1189 € per gt-km.

France

1. Background

The law 97-135 created RFF as a state owned company, being the owner of the French railway network and an independent infrastructure manager. RFF charges the national French railway SNCF for infrastructure use. SNCF as a railway undertaking operates passenger main lines, passenger regional services and freight. The French regional authorities are responsible for passenger regional services and are partly reimbursed by the state in the framework of the decentralization. RFF is responsible for capacity allocation since 2003. It allows open access to freight international traffic since 2003 to any European railway undertaking that obtains an operating licence and safety certificate but so far the state owned company (SNCF) is the only operator.

2. Charging principles

The basic approach taken to charging in France is described by RFF as being based on short run marginal costs; that is the marginal costs of using the existing infrastructure, including scarcity/congestion but excluding external accident, air pollution and noise costs.

The goals of the charges are:

- Contribution to covering the maintenance, operation and renewals costs.
- To provide an incentive to the use of rail transport.
- A microeconomic signal to the efficient use of the scarce resource of infrastructure capacity.
- Participation to the development costs of the network.

In financial terms, RFF report that it is their aim to achieve an operational balance – whereby it covers its operating and daily maintenance costs in full – by 2008. In 2003 they achieved an 80% coverage of operating and daily maintenance costs, and they envisage increasing this to 100% via increases in infrastructure charges. Thus the approach is clearly SMC+ in terms of the categories outlined in the main report.

RFF report that 63% of total infrastructure expenditure (including loans and grants) was forecast to be covered by charges in 2004. They also report an operational cost recovery indicator for infrastructure maintenance costs of 90% for 2004 (being income from charges in relation to the total costs of network operation, plus daily maintenance plus electricity).

RFF report that charges partly cover the following categories of cost:

- Traffic management.
- Maintenance.
- Renewals.
- Investments.

As indicated above, by 2008 the aim is to fully cover traffic management and maintenance costs. At present, those traffic management, maintenance and salary costs not covered by charges are picked up by the central government, whilst those renewals and investment costs not covered by charges are sometimes covered by central and sometimes by local government. Accident, air pollution and noise costs are not covered by charges or by any other means.

3. Current structure of charges

RFF report the following kinds of charges as being levied:

- A fixed access charge (independent of traffic intensity) – applied to all traffic in the same way and accounting for approximately 4% of charging revenue.
- A train path reservation fee (per path kilometre reserved) – applied differently to both passenger and freight trains and accounting for approximately 55% of charging revenue.
- A charge for reserving stops at passenger stations (per stop reserved) – applied to passenger trains only and accounting for approximately 16% of charging revenue.
- A charge for "additional services (transmission of electrical current, use of marshalling yards and use of intermodal terminals) – applied differently to both passenger and freight trains and accounting for approx 11% of charging revenue".
- A variable charge per train-km – applied differently to both passenger and freight trains and accounting for approximately 14% of charging revenue.

Variable charges for both freight and passenger trains in France are differentiated by:

- Time of day.
- Type of train.
- Itinerary.

Freight, but not passenger, charges are differentiated by:

- Quality of train path/service.
- Speed of train.

4. Level of charge

Table A.1. **Average level of charges**

Passenger national (per train-km)	0.806
Passenger regional (per train-km)	0.806
Freight (per train-km)	0.242

Table A.2. **Charges on the RFF Network**

Category		A (Urban and suburban lines, high traffic) Length = 287 km	B (Urban and suburban lines, average traffic) Length = 985 km	C & C[1] (Main interurban lines, high traffic) Length = 7 209	D & D[1] (Main interurban lines, average traffic) Length = 5 840	E (Other lines) Length = 12 738	N1 (High speed lines, high level traffic) Length = 718	N2 & N2[2] (High speed lines, average traffic) Length = 457	N3 & N3[2] (High speed lines, low level traffic) Length = 321
Track access charges (fee per km and per month)									
		373 124	373 124	3 110	0.000	0.000	4 475 912	4 475 912	4 475 912
Track use charges									
Charge for path reservation (fee per path km)	Off peak hours	1 550	0.662	0.010	0.010	0.000	4 800	1 142	0.816
	Normal hours	4 970	1 244	0.130	0.050	0.005	9 843	2 700	1 713
	Peak hours	14 300	3 280	1 250	0.050	0.005	11 710	5 100	3 250
Charge for stop in station (fee per stop)	Off peak hours	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Normal hours	5 500	5 500	5 500	5 500	5 500	5 500	5 500	5 500
	Peak hours	21 200	21 200	21 200	21 200	21 200	21 200	21 200	21 200

1. = 220 km pH.
2. = HSL Méditerranée.

Table A.3. **Examples of average charges in €/km**

Type of train	Route	Charge in €/km
High speed train (TGV)	Paris – Lyon	11.09
	Paris – Marseille	8.55
	Lille – Bordeaux	6.60
Intercity train (TRN)	Paris – Toulouse	2.06
	Quimper – Grenoble	1.34
Passenger regional train (TER)	Lyon – Vienne	15.43
	Bordeaux – Périgueux	2.40
	Rennes – St Malo	2.30
Passenger regional train (Ile-de-France)	Bibliothèque FM – Bd Victor	39.12
	Paris – Melun	11.36
Freight train	Sarrebruck – Vénissieux	1.00
	Gevrey Triage – St Pierre des Corps	0.27

Germany

1. Background

In Germany, DBAG is a federally owned company, with separate subsidiaries for infrastructure, passenger and freight operations. Whilst it remains by far the largest operator, there are a large number of other freight and passenger operations; there is open access for commercial services, and many regional passenger services are put out to competitive tender.

Infrastructure charging was introduced in Germany in 1994 as part of the institutional reforms that established DB AG. Since then, the level and structure of charges have undergone a number of changes, most notably in 1998, 2001 and 2003. Further change is envisaged during 2005 as part of the implementation of the infrastructure package into German national law.

The initial structure of charges, introduced in 1994, provided a detailed differentiated tariff which recovered the total cost of the infrastructure, excluding capital charges, from users on essentially a fully allocated cost basis as a charge per train kilometre. However, there were major quantity discounts, which posed problems in terms of the promotion of competition as they significantly benefited the encumbent operator over any new entrant. Moreover the relatively high charge per train kilometre also made new entry relatively unattractive; for instance, rail freight operators through the Channel Tunnel had previously expected through traffic to Germany to be a major market, but in the event they ran no through services to Germany, which was served by road from railheads in neighbouring countries.

The German regional governments, who had been given powers to tender contracts for regional passenger rail services as part of the 1994 reforms, objected to the level of charges that the initial structure led to if anyone other than DBAG provided services for them. The first reform was to provide a discount for regional services, but soon the entire tariff structure was changed.

In 1998 a move was made to a two-part tariff, with a fixed charge for using a particular stretch of track plus a charge per train kilometre run. This gave a greater incentive to expand services, and did not greatly disbenefit anyone running at a reasonably high frequency over that track, but it did of course mean that a new entrant running just once or twice a day would be at a disadvantage. However such entrants were offered the choice of a single charge per train kilometre similar to the average paid by DBAG taking account of the fixed element in their charge. In other words a new entrant would be required to make the same average contribution to fixed costs as that made by DBAG. This may seem a reasonable approximation to the efficient component pricing principle (Baumol, 1983) given the impossibility of a tariff taking account of the contribution made by each individual train. However, the commencement of an investigation by the German Anti-Trust Commission in response to complaints to it that the two-part tariff was anti-competitive, resulted in DB Netz reverting, in 2001, to a single differentiated charge per train kilometre.

2. Charging principles

The basic approach taken to charging in Germany is to allocate total cost (excluding those investment and renewal costs borne directly by Government) to market segments, and then to price at average cost. The aim of this approach is said to be to provide the resources necessary to sustain the railway system. There is no suggestion that estimates of marginal cost play any part in this process. Thus the approach is clearly FC– in terms of the categories outlined in the main report. It is said that 60% of infrastructure expenditure (including loans and grants) is covered by charges.

Charges are said to cover the following categories of cost in full:

- Traffic management costs.
- Maintenance costs.
- Salary costs.

Whilst they partly cover renewals, investments and noise, but do not cover accident or air pollution costs.

However, it is said that there is a degree of differentiation according to willingness to pay, and also in order to provide incentives for efficient use of capacity and for the use of track friendly rolling stock. In other words it is not a pure cost allocation approach.

3. Current structure of charges

The structure of infrastructure charges in place at present is essentially that which was introduced in 2001, except that in 2003 a number of "regional factors" were introduced which act as surcharges on regional passenger services.

DB Netz report the following kinds of charges as being levied:

- Variable charge per train-km (amounting to approximately 98% of all revenues).
- Variable charge per net TKM for freight traffic (amounting to approximately 1% of revenues).
- An axle load component for freight traffic (amounting to approximately 1% of revenues).
- A "tilting" component for passenger traffic (amounting to approximately 1% of revenues).
- A Train path reservation fee (for "on demand" paths).

From 2005 it is envisaged that freight traffic will switch from having a variable component based on net TKM to a component based on gross TKM.

The following table summarises the structure and how the different components of the charge are used to calculate the overall charge.

Table A.4. **Principles of the track access charging scheme in 2003**

Components of access charges	
1. Track category and utilisation	→ Base charge
2. Track products	→ Product factor
3. Surcharges/reductions	→ Special factors and surcharges
4. Regional factors	
Track charge calculation	
Base charge	
× product factor	
× surcharges/reductions (steam engines, trains with special dimensions)	
+ surcharges (weight classes, tilting trains etc)	
× regional factors	
= track access charge	

Source: DB Netz AG, cited in Link 2004.

Charges for both freight and passenger trains in Germany are differentiated by:

- Ability to pay.
- Quality of train path/service.
- Speed of train.
- Type of train.

Freight, but not passenger, charges are differentiated by weight of train.

Neither freight nor passenger train charges are differentiated by:

- Time of day.
- Weight of wagons.

4. *Level of charges*

Essentially, charges for passenger and freight are levied through an average variable charge. An indicative average level or range for the overall basic track access package charge for electric traction and for diesel is not given.

- Typical charges.

An indication of the approximate level of charge for a typical international freight train on a typical international routing would be 2.50 € per TRKM (in 2003).

Table A.5. **Base charges per track category in the access charging scheme in 2003**

Track category		Base charge (€/train-km)	Base charge for highly utilised tracks (€/train-km)
Long-distance tracks			
Fplus	Tracks with high traffic importance, maximum speed > 280 km/h	8.30	9.96
F1	Tracks for fast traffic with maximum speeds of 200-280 km/h	3.51	4.21
F2	Tracks for fast and mixed traffic, maximum speed 161-200 km/h	2.53	3.04
F3	Tracks for mixed traffic, maximum speed 101-160 km/h	2.28	2.74
F4	Tracks for inter-regional, fast traffic, maximum speed 101-160 km/h	2.20	2.64
F5	Tracks for mostly interregional, slow traffic, maximum speed < 120 km/h	2.03	2.44
F6	Tracks mainly for short-distance passenger service with maximum speeds of 101-160 km/h	2.00	2.40
Feeder tracks			
Z1	Tracks with a maximum speed up to 100 km/h	2.13	2.56
Z2	Tracks without or with low-standard signalling equipment and a maximum speed up to 50 km/h	2.20	2.64
Rapid transit tracks (S-Bahn)			
S1	Tracks where mainly or exclusively S-Bahn trains are operated	1.46	1.75
S2	S-Bahn networks Berlin and Hamburg	2.09	2.51

Note: Link, H. (2004) "Rail Infrastructure Charging and On-Track Competition in Germany", *International Journal of Transport Management*, Vol. 2, Issue 1 pp. 17-27.

Source: DB Netz AG cited in Link 2004.

Hungary

1. *Background*

In Hungary there are two passenger operators (including the "national" operator) and three freight operators (including the "national" operator) who pay infrastructure charges; and freight trains carrying materials for maintenance do pay charges. However the national operator (MAV) still has 98% of the rail market.

2. *Charging principles*

The basic approach taken to charging in Hungary is described as being based on average cost pricing (with full cost recovery). In making this calculation, it is intended that the charges fully cover the total cost of renewals and partly cover the total cost of borrowing (financial costs) and total maintenance and management costs. No attempt is made to charge for investment costs or external costs.

The aim of this approach is to cover that part of the total costs which arises because of operation. This is motivated out of a general shortage of financial resources. Thus the approach is clearly full cost minus grants in terms of the categories outlined in the main report.

MAV report that in 2004 revenues from charges were 80% of total infrastructure expenditure (including loans and grants), 100% of variable costs and 100% of marginal costs. They also report an operational cost recovery indicator for infrastructure maintenance and renewal costs of 20%

3. Current structure of charges

The following kinds of charges are levied:

- A train path reservation fee – applied at different rates to both passenger and freight trains and accounting for approximately 8% of charging revenue.
- A variable charge per train-km – applied at different rates to both passenger and freight trains and accounting for approximately 44% of charging revenue.
- Charges for both freight and passenger trains in Hungary are differentiated by quality of train path/service and type of train.
- Additional charges may be levied for capacity constrained sections and for extra services (electricity, stations, marshalling yards, etc.).

4. Level of charges

In the case of an ad hoc request the reservation charge is 13 200 HUF (approx. € 52.8) which is to be paid per train path, the charge for actually running the train differs by line category but international trains mainly use line category I, which costs 604 HUF/train-km (€ 2.5).

In this price the access to catenaries and current supply are not included. Service charges such as the use of shunting stations etc. are also not part of the basic charge. The locomotive – if it is not licenced in Hungary – and a driver or a pilot would also add a certain amount of cost to the total.

Italy

1. Background

In 2000 the concession for management of Italy's rail infrastructure was awarded to Ferrovie dello Stato SPA (FS), now Rete Ferroviaria Italiana SPA (RFI). The network comprises approximately 16 000 km of track.

Open access now exists, and franchising is being introduced for regional passenger services. Infrastructure charging was introduced in 2000 and currently, there are four passenger operators (including the "national" operator) and ten freight operators (including the "national" operator) who pay infrastructure charges; and freight trains carrying materials for maintenance do pay charges.

2. Charging principles

The basic approach taken to charging in Italy is described by RFI as being based on short run marginal cost (that is the marginal costs of using existing infrastructure including scarcity/congestion).

Charges are designed to cover only the costs arising directly from train movements, that is the cost of staff, a share of direct and indirect overheads relating to traffic movements, and the costs of electricity for electric traction. Hence, RFI report that charges are designed to partly cover the costs of traffic management and salary costs, but not the costs of:

- Maintenance.
- Renewals.
- Investments.

- Accident.
- Air pollution.
- Noise.

Those traffic management and salary costs not covered by charges, and the full costs of maintenance, renewals and investment, are covered by the central government budget.

Revenue from access charges covers 16% of total costs, which equates with approximately a third of routine maintenance costs (Marzioli, 2004), but does not cover renewals or investment costs. Thus the approach although said to be based on MC, actually fails to recover important elements of MC, namely maintenance and renewals.

3. Current structure of charges

Every slot on the network has a particular price, calculated using an algorithm set out in Ministerial decree 43T/2000. In drawing up this decree, the equivalence between revenue from charges and the costs of train movement was considered solely at the national level, and not with reference to portions of the network or individual lines. The result is that the charge for each slot reflects the characteristics of the slots and lines used, but does not necessarily cover the full traffic management costs relating specifically to those lines.

The following kinds of charges are levied:

- A fixed access charge (independent of traffic intensity) – applied to all traffic in the same way and accounting for approximately 40% of charging revenue.
- A train path reservation fee – applied to all traffic in the same way and forming part of the fixed access charge.
- A variable charge per train-km – applied to all traffic in the same way and accounting for approximately 48% of charging revenues.
- A variable charge per train minute spent at nodes – applied to all traffic in the same way and accounting for approximately 12% of charging revenues.

In the case both of passenger and freight, the fixed charge in Italy is differentiated only by quality of track. There are 50 track categories, divided as follows:

- 8 nodal sections (comprising approximately 700 km).
- 39 commercial track sections (comprising approximately 5 500 km).
- The secondary network (comprising approximately 7 300 km).
- The lightly trafficked network (comprising approximately 2 500 km).
- The shuttle service network (a sub-category of the secondary network, comprising approximately 250 km).

Table A.6. **Value of the section/node according to tariff area**

Typology of section/nodes (typology of tariff areas)	Price (€)
NODES	51.65
CORE – Double track sections – 250 km/h	64.56
CORE – Double track sections – 200 km/h	56.81
CORE – Other double track sections	54.23
CORE – single track lines	49.06
SECONDARY NETWORK (single tariff area)	46.48
Lightly trafficked lines	0.00
Shuttle service lines	1

Source: Marzioli, F. (2004), Annex D: "National Rail Infrastructure Usage Charges in Italy", in European Conference of Ministers of Transport, *Regulatory Reform of Railways in Russia*, OECD 2004.

The section/node portion of the access charge for shuttles lines is 50% of the charge payable on the basis of track section characteristics.

Variable charges for both freight and passenger trains in Italy are differentiated by:

- Quality of train path/service.
- Speed of train.
- Time of day.
- Weight of train.
- Traffic demand.

The variable charge is paid on all parts of the network based on the number of minutes spent in nodes where capacity is a key factor, and on km on the rest of the network.

For the secondary and lightly trafficked network categories, the charge is a constant 1.00 € per km. This also serves as a minimum charge on the commercial sections, with increasing increments based on traffic density by time of day, and the difference between the speed of the train and the speed that permits optimum use of the line.

Table A.7. **Unit value (€/km) of the km/min portion on the core network according to track characteristics**

	Wear			
Speed	D.2a – Low density lines			
	0%-80%	80%-120%	120%-200%	200%-above
0%-20%	0.67	0.77	1.02	1.60
20%-50%	0.75	0.85	1.10	1.68
50%-100%	1.33	1.43	1.68	2.27
100%-above	2.00	2.10	2.35	2.93
D.2b – Medium density lines				
0%-20%	0.90	1.00	1.25	1.83
20%-50%	0.98	1.08	1.33	1.92
50%-100%	1.57	1.67	1.92	2.50
100%-above	2.23	2.33	2.58	3.17
D.2c – High density lines				
0%-20%	1.07	1.17	1.42	2.00
20%-50%	1.15	1.25	1.50	2.08
50%-100%	1.79	1.83	2.08	2.67
100%-above	2.40	2.50	2.75	3.33

Note: "Speed" parameter: the percentage difference is calculated in respect of the standard speed specified in Technical Annex No. 8 to Ministerial Decree 43T/2000; "wear" parameter: wear is calculated in respect of the level specified for an average train in Technical Annex No. 12 to Ministerial Decree 43T/2000.

Source: Marzioli (2004) Marzioli, F. (2004), Annex D: "National Rail Infrastructure Usage Charges in Italy", in European Conference of Ministers of Transport, *Regulatory Reform of Railways in Russia*, OECD 2004.

Neither freight nor passenger train charges are differentiated by ability to pay, weight of wagons or type of train.

4. Level of charges

Average charges for freight trains are of the order of € 2/train-km; for regional passenger trains € 1-2 per train-km and for long distance passenger trains € 2-3 per train-km.

Latvia

1. Background

In Latvia there are four passenger operators (including the "national" operator) and three freight operators (including the "national" operator) who pay infrastructure charges; but freight trains carrying materials for maintenance do not pay charges.

2. Charging principles

The basic approach taken to charging in Latvia is described by Latvian Railways as being one of "full cost allocation", based on average cost principles. The allocation seeks to cover total maintenance and management costs and total cost of renewals in full, and investment and external costs in part. The calculation does not take account of the costs of borrowing (financial costs).

Thus the approach is clearly FC in terms of the categories outlined in the main report.

Latvian Railways report that revenues from charges are 100% of total infrastructure expenditure (including loans and grants). They do not report any operational cost recovery indicators.

Those investment costs not covered by charges are covered by central government and EU funds.

3. Current structure of charges

The only kind of charge levied on Latvian railways is a variable charge per train-km. This is applied differently to both passenger and freight trains and, naturally, accounts for 100% of charging revenue.

4. Level of charges

Essentially, charges for passenger and freight are levied through an average variable charge. The level of that variable charge varies by line category and type of operator. For domestic passenger operators using electric traction the charge is either 2.55 € per train-km or 3.42 € per train-km, whilst for domestic passenger operators using diesel traction there are three possible charges; 2.05, 2.74 or 4.57 € per train-km. For international passenger operators the charge is 0.07 € per train-km. For freight there are also three possible charges; 4.26, 5.71 or 6.59 € per train-km (there are no electric freight services). An indicative average level or range for the overall basic track access package charge for electric traction and for diesel is not reported.

An indication of the approximate level of charge for a typical international freight train on a typical international routing would be 6.22 € per train-km (in 2004). This figure relates to the first category of railway line and takes into account the discounts awarded to all freight forwarders according to train kilometres travelled.

Netherlands

1. Background

There are a number of open access freight operators in the Netherlands, and some passenger services have been franchised to independent operators. The national passenger and the national freight operator both pay charges, but there are no charges for freight trains carrying materials for maintenance.

The Netherlands railway structure is as follows. The ministry of transport sets the framework for charging, issuing concessions for passenger transport and infrastructure management. IVW division of the ministry is in charge of safety. NMa is the national competition authority and rail regulatory body which also considers appeals for infrastructure charges. Prorail is the infrastructure manager, it is a fully state owned company under private law and has access contracts with railway undertakings. On the basis of exclusive concessions, the main passenger transport network is directly awarded to NS. Regional passenger networks are gradually being tendered out. There is full open access for freight transport, with 8 railway undertakings active in the market.

In 1995, the independent railway operator NS, with daughter companies for railway infrastructure management were established. Infrastructure charges were introduced in 2000 and the need for phasing was recognised. There was a need for the charges to reflect those directly incurred by the train operators and to be transparent. The legislative act of 1999 provides the powers; the ministry sets yearly exact charging levels, it is based on Prorail budget proposal t + 1 for marginal costs, and no infrastructure charges are levied to regional decentralised passenger rail services. The framework was renewed with the new Railway Act 2005. The new Railway Act was adopted and published in 2003, was due to come into force early 2005, in parallel with concessions for passenger transport and infrastructure management.

The charging framework under the new Railway Act (planned 2005/2006) is based on directive 2001/14/EC and recommends the following:

- The infrastructure manager sets the charges within the 2001/14/EC framework.
- The minister has the right to issue secondary legislation with more detailed charging rules.
- The regulatory body will act as an appeal body if railway undertakings consider the charges not in line with the legal framework.
- NS is entitled in the public service contract to take increases from the infrastructure charges into account for its fare levels.
- Prorail and railway undertakings conclude access contracts and make arrangements to increase utilisation of the network and improve quality.

2. Charging principles

The basic approach taken to charging in the Netherlands is described by the MOT as being based on short run marginal social costs; that is the marginal costs of using the existing infrastructure.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

The Dutch Ministry of Transport reports that in 2005 20% of infrastructure expenditure (including loans and grants) will be covered by charges.

The Ministry reports that charges will, as of 2005, cover traffic management and maintenance costs in full. In the phase-in period up to 2005, charges have partly covered these costs, with central government covering the remainder. Charges do not cover the costs of renewals, investment, salaries, accidents, air pollution or noise.

3. *Current structure of charges*

The following kinds of charges are levied:

- A variable charge per train-km, applied differently to both passenger and freight trains.
- A charge per station stop applied to passenger trains only.
- Hence, there is no fixed component of the charge.
- Charges are differentiated by market segment and by type of station.

4. *Level of charges*

Essentially, charges for passenger and freight are levied through an average variable charge. The level of that variable charge is 0.67 € per train-km for freight trains and 0.96 € per train-km for passenger trains, plus 3.8 € per stop at a class I station and 0.85 € per stop at a class II station. The level of the charge does not vary between electric traction and diesel.

Poland

1. *Background*

In Poland there are 6 passenger operators (including the "national" operator) and 24 freight operators (including the "national' operator) who pay infrastructure charges. Freight trains carrying materials for maintenance currently do pay charges but, as of 2006 when the current charging rules are due to be revised, they will not. Of the six passenger operators, there are 3 from the PKP Group, and 3 foreign operators who provide special transit services (making no stops on Polish territory).

Unit rates of access charges for the years from 2000 to 2004 were determined according to the Act of 27 June 1997 on railway transport and Decree of Ministry of Transport and Maritime Management of 12 August 1998 on detailed principles and conditions for providing traffic operations on railway lines. These two acts are mentioned below as "old rules".

In 2006 unit rates of access charges will be determined in accordance with the new Act of 28 March 2003 on railway transport and Decree of Ministry of Infrastructure of 7 April 2004. These two acts are mentioned below as "new rules".

Under the "old rules" the unit rates of access charge were calculated on the base of last year costs and they included:

- Maintenance costs, traffic operation costs and costs of administration in connection with providing access.
- Investment expenditures on managed lines.
- Additional costs as a result of specific category of transport and costs connected with transport security.

The same range of costs is foreseen in new rules, but a new way of calculation is based on costs planned for next year.

Access charges do not include costs of electric traction. All RU energy expenses are being settled with PKP Energy Ltd. (PKP Energy Ltd. is a separate company).

Unit rates of access charge are determined for separate railway sections of line. An average unit rate for the whole network can be applied to certain railway undertakings.

The new rules change the parameters that influence the level of charges.

2. Charging principles

The basic approach taken to charging in Poland is described as being based on average cost principles. In calculating average costs, the following cost components are included:

- Total cost of borrowing (financial costs).
- Total maintenance and management costs.
- Part of the cost of renewals.
- Part of the investment costs.
- Part of the external costs.
- Total cost of "life and property protection on railway premises and trains".

Because of the difficult situation of the State Budget the aim is that the charges should cover the total infrastructure manager's costs that are justified within a process of making infrastructure accessible.

Thus the approach is clearly TC– in terms of the categories outlined in the main report.

The Ministry of Transport report that revenues from charges were, in 2003, 81% of total infrastructure expenditure (including loans and grants) and 91% of the infrastructure manager's operation costs. They also report an operational cost recovery indicator for infrastructure maintenance costs of 91.5%, though they note that the need to cover total costs means that this indicator is not applied.

3. Current structure of charges

The structure of infrastructure charges in place at present is essentially that which was introduced in 2000. Whilst the charging rules are scheduled to be amended in 2006, it is understood that the overall structure will remain.

The following kinds of charges are levied:

- A train path reservation fee – applied to all traffic in the same way.
- A variable charge per train-km – applied differently to both freight and passenger trains according to km actually run, taking into account the gross weight of freight trains.

There is no fixed charge.

4. Level of charges

Essentially, charges for passenger and freight are levied through an average variable charge. The level of that variable charge is the same for electric traction as for diesel and average unit rates for the years 2003 to 2005 are given in the following tables.

As an indication of the approximate level of charge for a typical international freight train on a typical international routing, the Ministry give the following details:

The average unit rate (PLN/1 train-km) in 2005 for the following service:

- Route: West border (Oderbruecke/Kunowice) – to Małaszewicze South. East border.
- Train type: Main line train (freight express).
- Total gross load of train: 1 300 t.
- Average unit rate for journey – 21.3 PLN/train-km.

Table A.8. **Average unit rates (PLN/ train-km) for basic services in years 2003-2005**

Type of traffic	Train type	Years		
		2003	2004	2005
Passenger traffic	Qualified: IC, EC, EN, E	13.08	13.33	13.06
	Inter-Regional	10.83	11.04	10.81
	Regional	7.19	7.33	7.18
	Rail-bus	2.64	2.69	2.63
	Passenger altogether	8.97	9.14	8.95
Freight traffic	Block trains	25.80	26.29	25.75
	Main line trains	22.74	23.17	22.68
	Shunting trains	14.65	14.93	14.62
	Local trains	24.23	24.69	24.17
	Altogether freight	23.55	24.00	23.50
Other	Service trains, light engines	3.78	3.85	3.77
Overall average unit		12.57	12.81	12.55

Table A.9. **Value of coefficient that takes into consideration total gross load of a train**

Lp.	Total gross load of a train m [t]	Value of coefficient
1	≤ 800	0.80
2	800 < m ≤1 000	0.90
3	1 000 < m ≤1 200	1.00
4	1 200 < m ≤ 1 500	1.10
5	> 1 500	1.20

Note: for passenger trains the value of the coefficient equals 1.

Source: Polish Ministry of Transport.

Portugal

1. Background

In Portugal there are separate infrastructure and operating companies; two passenger operators (including the "national" operator) and one freight operator (the "national" operator) who pay infrastructure charges; but freight trains carrying materials for maintenance do not pay charges. The second passenger operator is a private consortium which won the franchise to operate trans TAGUS passenger services in the Lisbon area.

2. Charging principles

The basic approach taken to charging in Portugal is described by the Instituto Nacional do Transporte Ferroviário (INTF) as being based on short run marginal cost principles; that is the marginal costs of using existing infrastructure including scarcity/congestion.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

INTF report that revenues from charges, in 2003, were 20% of total infrastructure expenditure (including loans and grants). They also report operational cost recovery indicators for infrastructure maintenance costs of 30% and for infrastructure maintenance and renewals costs of 26% (both for 2003).

They report that charges partly cover traffic management costs and maintenance costs, but do not cover the following cost categories at all:

- Renewals.
- Investments.
- Salary costs.
- Accident costs.
- Air pollution costs.
- Noise costs.

Those costs not covered by charges are covered by the central government budget.

3. Current structure of charges

The only kind of charge levied in Portugal is a variable charge per train-km. This is applied differently to both passenger and freight trains, with revenue from passenger train charges accounting for approximately 74% of all charging revenues, and revenue from freight train charges accounting for the remaining 26%.

Charges are differentiated by market segment or network section, the detail of which is set out in the railway's Network Statement 2005: *www.refer.pt*.

Charges are based on the average cost per path given the capacity of the network. Thus increases in capacity tend to reduce charges.

4. Level of charges

Essentially, charges for passenger and freight are levied through an average variable charge. The level of that variable charge for freight trains is 1.82 € per train-km for trains using electric traction and 2.40 € per train-km for trains using diesel. For passenger trains the levels are 1.51 € per train-km for electric traction and 1.68 € per train-km for diesel (all figures relate to 2005). As this is the only type of charge levied, these figures serve as indicative average levels for the overall basic track access package charge.

Romania

1. Background

In Romania there are nine passenger operators (including the "national" operator) and 22 freight operators (including the "national" operator) who pay infrastructure charges; but freight trains carrying materials for maintenance do not pay charges.

2. Charging principles

The basic approach taken to charging in Romania is described by the Ministry of Transport as being based on average cost principles. Average costs are calculated by class of line, and the following cost components are included in the calculation:

- Total cost of borrowing (financial costs).
- Total maintenance and management costs.
- Part of investment costs.

No attempt is made to incorporate cost of renewals or external costs within this calculation.

However, charges for temporary or experimental services are described as being based on principles of short run marginal social cost, that is the marginal costs of using existing infrastructure including external costs.

For 2004 the infrastructure use charges are 11 200 000 million lei, equivalent to € 273 M.

Thus the approach is clearly FC in terms of the categories outlined in the main report.

The Ministry report that revenues from charges were, in 2004, 52% of total infrastructure expenditure (including loans and grants). They also report an operational cost recovery indicator for infrastructure maintenance costs of 100%.

They report that charges are designed to cover the following categories of cost in full:

- Traffic management.
- Maintenance.
- Salary costs.

Charges are designed to partly cover investment costs, but are not designed to cover renewals, accident costs or air pollution costs. Renewals costs are covered by government grants, whilst accident and air pollution costs are not covered by charges or by any other means.

3. Current structure of charges

The Ministry of Transport report the following kinds of charges as being levied:

- A fixed access charge (independent of traffic intensity) – applied to all traffic in the same way and accounting for approximately 26% of charging revenue.
- Train path reservation fee – applied to all traffic in the same way.
- A variable charge per gross tonne-km – applied to all traffic in the same way and accounting for approximately 74% of charging revenue.
- A charge for electric current, based on measured usage.

The variable charges for both freight and passenger trains in Romania are differentiated by:

- Ability to pay.
- Quality of train path/service.
- Speed of train.
- Weight of train.

The fixed charge for both freight and passenger trains in Romania is differentiated by:

- Ability to pay.
- Quality of train path/service.
- Train-km planned and actual.

4. Level of charges

An indicative average level or range for the overall basic track access package charge is 1.4/train-km for passenger trains using electric traction and 1.2/train-km for passenger trains using diesel. For freight trains, the charge is 2.3/train-km for electric traction and 2.2/train-km for diesel.

As an indication of the approximate level of charge for a typical international freight train on a typical international routing, the charge for an international freight train of 950 tonnes from Curtici to Giurgiu (a distance of 685 km) would be 69 665 million lei; this equates with € 1 990, or € 2.9 per train-km and € 0.003 per gross tonne-km.

Slovenia

1. Background

As manager of public railway infrastructure, the Public Agency for Rail Transport of the Republic of Slovenia allocates train paths to train operators. The Agency prepares a rail network programme (Network Statement) in which it specifies general characteristics of the public railway infrastructure and the procedure for allocation of train paths.

In Slovenia there is currently one passenger train operator and one freight train operator. Infrastructure charges are set under a 2004 government decree. It is planned that until 2010 only freight trains will pay infrastructure charges together with international passenger trains. This explains the relatively low percentage of cost total cost recovery in Slovenia (13%).

2. Charging principles

The basic approach taken to infrastructure charging in Slovenia is based on average cost principles. In calculating average costs, the following cost components are partly covered:

- Maintenance and traffic management costs.
- Cost of renewals.

No attempt is made to incorporate the cost of borrowing (financial costs), investment costs or external costs within this calculation.

The approach is FC– in terms of the categories outlined in the main report.

Charges are designed to partly cover the following categories of cost:

- Traffic management.
- Maintenance.
- Renewal costs.

They are not designed to cover investments, accident costs, air pollution costs or noise costs.

3. Current structure of charges

Charges are levied as a variable charge per train-km – applied differently to freight and passenger traffic.

The charges for both freight and passenger trains are differentiated by:

- Quality of train path/service.
- Type of train.

The Slovenian infrastructure charges are intended to provide incentives for more efficient use of existing infrastructure.

4. Level of charges

The level of the variable charge for freight in 2004 was in the range of € 1.11-3.68 per train-km, whilst for passenger trains the level of the charge was € 1.11-2.45 per train-km (charges only levied on international passenger trains until 2010); no distinction is made between charges for electric traction or for diesel. The average charge for freight is estimated to be € 2.23, whilst for passenger it is € 1.8.

Sweden

1. Background

Sweden's railways have been vertically separated since 1988, with private or public sector train operators paying for the use of government owned railway infrastructure. The state owned monopolist was split into two parts; Banverket – the Swedish national rail administration with responsibility for infrastructure, and Statens Jarnvagar running railway services.

Track charges were introduced after the 1988 transport policy decision for the new model for Swedish railway traffic. The first version of the charges was a multi-part tariff. A fixed annual charge was levied per vehicle which varied by vehicle type, and in addition several variable components of the tariff generated revenues to reflect marginal costs, related to gross tonne-km or train-km run.

The charges were further revised in February 1999, where the fixed charges per vehicle were abandoned. This was in order to offset the consequences of a previous change of road user charges and to achieve balance between the modes. Currently, the charges only include components related directly to infrastructure use. The charges in principle are based on short run marginal costs, to provide an incentive for socially efficient use of the infrastructure.

2. Charging principles

The cost recovery target for infrastructure charges is 5% of total costs. Charges are based on a distributed average of short run marginal maintenance costs plus a mark-up to recover Oresund Bridge costs that is applied to passenger trains across the whole network. Freight trains pay a specific toll for use of the bridge. There is also a charge to cover the cost of provision of passenger information, and a supplementary charge for marshalling.

Charges are reported to partly cover traffic management costs and maintenance costs with the remainder being covered with the state budget. Costs that the charges do not cover include renewals, investments, and infrastructure manager's salary costs and pension liabilities, as these are covered by the state budget.

The principles may therefore be described as MC+, although the failure to charge for marginal renewals cost means that charges may actually be below marginal cost.

3. Current structure of charges

The following kinds of charges are levied:

- Variable charge per gross tonne-km for both freight and passenger traffic.
- Marshalling charge per shunted truck for freight traffic.
- Accidents per train-km charges for both freight and passenger traffic.
- Information to passengers per gt-km.

4. Level of charges

Charges for both freight and passenger transport are levied through an average variable charge, except for freight on Oresund Bridge.

The levels of the variable components for freight and passenger traffic in euros cents per gt-km are:

Freight

- 0.03 wear and tear.
- 255/bridge crossing.
- 44/wagon shunting.
- 6/train-km accidents.
- Electricity consumption.
- 34/litre for emissions.

Passenger

- 0.03 wear and tear.
- 0.06 Oresund mark up.
- 0.02 information.
- 12/train-km accidents.
- Electricity consumption.
- 34/litre for emissions.

Switzerland

1. Background

In Switzerland there are 27 passenger operators (including the "national" operator) and six freight operators (including the "national" operator) who pay infrastructure charges; but freight trains carrying materials for maintenance do not pay charges.

2. Charging principles

The basic approach taken to charging in Switzerland is described by the Swiss Ministry of Transport as being based on short run marginal cost, with mark-ups to increase cost recovery.

Thus the approach is clearly MC+ in terms of the categories outlined in the main report.

The Ministry report that revenues from charges are approximately 25% of total infrastructure expenditure (including loans and grants) and 100% of marginal costs.

No indication is given of which categories of cost charges are designed to cover.

3. Current structure of charges

The Ministry of Transport report the following kinds of charges as being levied:

- A variable charge per train-km applied in the same way to both passenger and freight trains to cover operation costs.

- A variable charge per gross tonne-km – applied in the same way to both passenger and freight trains to cover wear and tear costs.
- A charge for stops in traffic nodes – applied differently to large and small nodes and accounting for between 4 and 14% of earnings.

Charges for both freight and passenger trains in Switzerland are differentiated by:

- Ability to pay.
- Weight of train.
- Type of train.

There is a charge for train path cancellations, and a discount for low noise rolling stock. Currently freight train charges are subsidised but this subsidy is being phased out as charges on hgv's are increased.

4. Level of charges

Essentially, charges for passenger and freight are levied through an average variable charge. The levels of the components of that variable charge are:

- 0.4 (€ 0.26) per train-km.
- 0.0025 (€ 0.0016) per gt-km.
- 3.00 / 5.00 (€ 0.9/3.2) for stops in traffic nodes.

A typical charge for an international freight train is of the order of 10 Swiss Francs (or € 6) per train-km.

United Kingdom

1. Background

In Britain, during the mid-1990s, the rail system was completely broken up into around a hundred different companies and privatised. The industrial structure which emerged was one which was unique to Europe and which comprised:

- A privately owned infrastructure authority, Railtrack Plc (following the bankruptcy of Railtrack in 2001, this role was taken over by the "not for profit" company Network Rail).
- Privately owned passenger franchises, whereby all passenger services were operated on contracts for a fixed number of years.
- Privately owned freight operators.
- Extensive sub-contracting.
- An independent regulator, responsible for determining the rules for rail infrastructure charges, for the licensing of all rail companies and for approving all access agreements.
- And a franchising authority, which later became the strategic rail authority, and was also responsible for the long term planning of the network.

In 2004, the British government announced further changes; the Strategic Rail Authority is to be abolished, with its key franchising and strategic planning roles being taken over by the Department of Transport.

In Great Britain, there are currently 25 passenger train operators and 6 freight train operators paying infrastructure charges. There is a separate small vertically integrated and publicly owned railway network in Northern Ireland. Nothing said in this report applies to Northern Ireland.

The initial system of infrastructure charges implemented in Britain for passenger franchises relied on a two part tariff, which involved for allocated access rights a marginal cost based solely on wear and tear and where appropriate electric traction costs, and a large fixed element based on avoidable costs and an allocation of joint costs. The wear and tear element varied by vehicle type. Over 90% of the total pad by franchisees was in the form of the fixed charge. In addition, franchisees pay a share of the costs of the stations they use, and the franchise agreements contain "performance regimes" which specify penalty payments or bonuses according to specified performance criteria, such as punctuality and cancellations. Freight operators, open access passenger operations (of which little has been permitted so far) and freight operators paid a negotiated charge, as did franchisees who wished to secure additional access rights. The largest freight operator, EWS, secured a contract in the form of a two part tariff, leading to concern that this disadvantaged smaller freight operators.

The first regulatory review of access charges concluded that this structure was in need of substantial revision to improve the incentives to Railtrack. As part of this review, Railtrack brought forward evidence for a higher variable element in the charges. This was based on a number of factors:

- Engineering evidence that the wear and tear element of the charges did not fully recover these costs.
- Evidence on the impact on delays to other trains of adding additional services to the system.
- An argument that Railtrack needed an incentive payment to encourage increased use of the system, and that such an incentive payment would give it reason to undertake small capacity enhancing investments without costly negotiations over who will pay for them.

The regulator accepted the broad arguments put forward by Railtrack, whilst differing with them on many specific points regarding how the new system would be implemented. The final conclusion of the Regulatory Review was published in October 2000 and the new charging regime took effect from 2002.

For passenger franchisees the two part tariff system was retained, but the variable element increased in line with the higher estimates of wear and tear. Capacity charges, varying by service group, were introduced to recover the marginal congestion costs of track access. The charge was set to half the expected marginal congestion costs of track access, with Railtrack recovering the other half from the SRA through an adjustment to Railtrack's Regulatory Asset Base in 2006. The rail regulator decided it would be inappropriate for charges to fully reflect marginal costs as it was feared that higher access charges would reduce rail growth on the network and this would conflict with government growth targets. It was agreed that freight and (where permitted) open access passenger operations would only pay the variable element of the tariff, with the DRA picking up the bill for any fixed costs of providing for freight services. However, the government announced in 2004 that this would change again. Freight services would be required to meet their full avoidable cost, whilst a way of disaggregating the fixed element of the passenger charges to allow for devolution of financial responsibility for local and regional services to regional government would be developed.

2. Charging principles

The Office of Rail Regulation has a statutory duty to ensure that Network Rail has an adequate income to meet all its costs including a return on capital provided that it operates efficiently. Thus charges must cover whatever costs are not met directly by government grant. To that extent the charging principle may be labelled FC–. However, the variable element of the tariff is based on short run marginal cost. The fixed element of the charge now only applies to passenger franchisees, and is presumably an element in the size of the bid at the time of franchising; during the life of a franchise the franchise agreement specifies that the franchisee will be fully reimbursed for any increases in infrastructure charges. Thus the principle may also be characterised as MC+.

The cost categories that the charges are designed to cover fully includes traffic management costs, maintenance costs and renewal costs, although some Network Rail revenue comes from direct government grants. Investments may be funded directly by grants or charges, or they may be financed by borrowing and added to the regulatory asset base, in which case they will be remunerated by future charges (the regulatory asset base determines the level of remuneration of capital that Network Rail is permitted). Accidents, air pollution and noise are not covered by the charges.

3. Current structure of charges

ORR report the following kinds of charges being levied:

- Fixed access charge independent of traffic intensity (amounting to approximately 80% of revenue).
- Variable charges per train-km for passenger traffic (amounting to approximately 20% of revenue).
- Variable charge per gross tonne-km for freight traffic.

In terms of maintenance costs, fixed costs account for 77% whilst the remaining 23% is variable. For renewals costs, fixed costs account for 93% whilst the remaining 7% is variable.

Variable charges for both freight and passenger rail are differentiated by:

- Speed of train.
- Time of day.
- Weight of train.
- Type of train.
- Vertical forces applied to the infrastructure.

4. Level of charges

Current average charges for freight (excluding coal and iron ore) are € 2.912 per thousand gross tonne-km, and for coal and iron ore 3.43. The variable portion of passenger charges is typically lower, although in total (including the fixed element) passenger charges are substantially higher than this.

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APPENDIX B

Typology of Rail Networks and Access Charging Regimes

Interaction with the State

	Austria	Belgium	Bulgaria	Czech	Denmark
% of total cost covered	27	20	65	60	20
FC– Support or MC+ markup	MC+	Neither	MC+	MC+	MC+
Forms of state support	Direct contribution from federal budget for ops and maint. Infra charges are to cover investment.	Direct contribution	State budget covers renewals and investments	Costs not covered by user charges come direct from State Budget	Direct contribution from State budget
Access charge regime characteristics					
Type of regime	Simple	Simple	2 Part	Simple	Simple
Summary of approach	Variable charge/train-km (capacity) and per gt-km (maint.). Added charges for stations and terminals	Variable charge/train-km. Added charges for stations and terminals	Train path reservation fee plus charge per train-km and per gross ton-km	Charge per train-km for operations control and charge/gross ton-km for maintenance. Adjustments for electric traction versus diesel	Variable charge/train-km and per train operated
Distinction between passenger and freight users	N	N	Y	Y	Y (limited)
Congestion considered in charges	Y	Y	N	N	N (future)
Distinction by type or speed of line	Y	Y	Y	N	N
Capacity or slot reservations charged	N	N	Y	N	N
Charges for delays by operator or IM	N	N	N	N	N
Basic Access Charge (excludes station and terminal use)					
Freight	0.6 to 2.53 €/train-km, and 0.001 €/gt-km	0.471 to 10.33 €/train-km	€ 0.65/train path plus € 1.9/train-km plus € 0.0020/gross ton-km	€ 1.58/train-km plus € 0.00195/gross ton-km	€ 0.24/train-km plus peak € 41 to 109/train in cong. Sections plus € 210 to 941/train for bridges
Passenger	same	same	€ 0.21/train path +€ 0.85/train-km +€ 0.0012/gross ton-km	€ 0.29/train-km plus € 0.00163/gross ton-km	€ 0.24/train-km plus peak € 41 to 137/train in cong. sections plus € 286 to 873/train for bridges
Average access charge:					
€/freight train-km from various sources	**2.7**/**2.82**/3.53/*3.6*	**1.63**/*1.5*/**3.15**	**2.6**/4.5/*9.5*	3.27/3.38/**5.0**	0.3/**2.86**/*3.4*/3.16
€/passenger train-km from various sources	1.19/1.6/**1.64**/2.52	**1.64** to **2.4**	0.6/1.4/ 2.7 (int'l)	0.56-1.0	0.3/**5.05**/1.08
Computed average 2003 freight (without electricity)	3.22	1.61			0.79/2.45/2.80*
Computed average 2003 passenger (without electricity)	1.96	1.95			1.10/1.70/1.87*
Example freight (1 000 gross tonnes)	1.60 to 2.29 (2.5 Bren)	0.89	4.39 to 4.63	3.53	
Example Intercity passenger (500 gross tonne)	1.81 to 2.39	1.81 to 2.07	1.46 to 1.56	1.11	
Example Suburban passenger (140 gross tonne)	1.47 to 2.07	2.45 to 3.12	1.078 to 1.148	0.52	
Used for freight	3.22	1.61	4.4	3.53	3.16
Used for passenger	1.96	1.95	1.4	1.10	1.08

Interaction with the state *(cont.)*

	Estonia	Finland	France	Germany	Hungary
% of total cost covered	100 (objective)	12 to 16	63	60 (objective is 100)	80
FC– Support or MC+ markup	FC	MC+	MC+	FC–	FC
Forms of state support	No state support	State pays Traffic Mgt and Investment, users pay share of maint. and renewals	RFF to cover maintenance and operation, State to cover investment	Federal and local support for investment	Direct contribution by the State
Access charge regime characteristics					
Type of Regime	Simple	Simple	2 Part	Simple	2 Part
Summary of approach	Fixed charge per ordered train-km, variable charge per actual gross tonne-km. Local passenger companies do not pay fixed part	Variable charge/gt-km	Monthly track access charge plus path reservation charge (path-km) plus running charge (train-km)	Charge based on line quality and service priority then multiplied by severity factors. Added charges for stations and terminals?	Access charge by line-km by type of line, then train path fee with 3 pass and 1 frt categories, then running fee by speed, axle load, electrification, line type, etc.
Distinction between passenger and freight users	Y	Y	Y	Y	Y
Congestion considered in charges	N	N	Y	Y	N
Distinction by type or speed of line	N	N	Y	Y	Y
Capacity or slot reservations charged	N	N	Y	N	Y
Charges for delays by operator or ISM	N	N	N	N	N
Basic access charge (excludes station and terminal use)					
Freight	2.5839 € per ordered train-km plus 0.0027 € per actual gross tonne-km	€ cents 0.1727/gt-km for electric and € cents 0.22227/gt-km for diesel	~€ 1.11/train-km	2.43 to 4.49 €/train-km	1.42 to 2.50 €/train-km + 15.4 to 17.75 €/train
Passenger	0.0027 € per actual gross tonne-km	€ cents 0.199/gt-km (electric)	~€ 3.71/train-km	1.92 to 7.29 €/train-km	0.56 to 2.46 €/train-km + 18.96 €/train
Average Access charge:					
€/freight train-km from various sources	10.91 €	**1.90**/**2.4**/2.58/*3.5*	(0.27-1.0)/**2.24**/*1.2*	1.46-8.30/**3.30**/4.06	3.4/*2.5*/**2.5**
€/passenger train-km from various sources	0.58 €	**0.25**/**0.32**/0.50	**1.84**/(2.06-11.09)	4.03/**4.10**/1.46-8.30	2.5-3.0
Computed average 2003 freight (without electricity)		2.58	0.80 to 1.15	3.83	5.53
Computed average 2003 passenger (without electricity)		0.46	4.18 to 4.51	5.05	2.92
Example freight (1.000 gross tonnes)	5.28				6.39 (dom)/6.16 (int'l)
Example intercity passenger (500 gross tonne)	1.35				3.69
Example suburban passenger (140 gross tonne)	0.38				4.94
Average used for freight trains	5.28	2.58	0.9	2.55	5.16
Averaged used for passenger trains	1.03	0.46	4.2	3.9	2.55

Interaction with the state *(cont.)*

	Italy	Latvia	Lithuania**	Netherlands	Norway***
% of total cost covered	16	100	100	12	0.82
FC– support or MC+ markup	FC–	FC	FC	MC ("VC")	MC
Forms of state support	State pays maint, renewal and investment. User pays some of infr. operating costs	State budget and EU pay for part of investment	State Budget and EU funds to cover investments	Direct budgetary support to Pro rail to cover non-marginal costs. Does not cover renewals, and is not charged to regional passenger users.	Direct budgetary support to balance support for roads
Access charge regime characteristics					
Type of Regime	2 Part	Simple	2 Part	Simple	Simple
Summary of approach	Fixed reservation fee based on line type plus variable operating fee (speed, weight, density on line, length of line used, and time in node section)	Variable Charge per train-km	Train path reservation fee for freight, plus charge/ gross ton-km for freight and passenger	Charge per train-km and per station stop (by type of station), no access charge for regional passenger users	Variable charge per pass-km or gt-km (freight)
Distinction between passenger and freight users	Y	Y	Y	Y	Y
Congestion considered in charges	Y	N	N	N	N
Distinction by type or speed of line	Y	Y	N	N	N
Capacity or slot reservations charged	N	N	Y	N	N
Charges for delays by operator or ISM	N	N	N	Y	N
Basic access charge (excludes station and terminal use)					
Freight	€ 2.02 to 2.14/train-km	€ 4.26 to 6.59/train-km depending on line		0.68/train-km	€ 0.00143/gt-km for axle load < 22.5 tonnes, € 0.00223/gt-km if axle load > 22.5 tonnes
Passenger	€ 1.00 to 3.32/train-km	€ 2.55 to 3.42/train-km (ET), € 2.05 to 4.57 dep. on line (diesel). Int'l € 0.07/train-km		0.97/train-km plus € 3.8/train stop (main stations) or € 0.85/train stop (secondary stations)	€ 0.0/pass.-km
Average access charge:					
€/freight train-km from various sources	**2.39**/*1.8*		*8.5*	**0.1**/0.68/*0.5*	**1.3**/*1.75*/**1.75**
€/passenger train-km from various sources	**2.77**			**0.2**	0
Computed average 2003 freight (without electricity)	2.08 to 2.41	5.77	5.67	0.61	0.58
Computed average 2003 passenger (without electricity)	2.41 to 2.74	1.21	2.86	1.01	0
Example freight (1 000 gross tonnes)	1.33 to 1.83	6.36		0.68	1.42 to 2.22
Example Intercity passenger (500 gross tonne)	3.04	3.3		1.11	0
Example suburban passenger (140 gross tonne)	1.33 to 3.76	1.61		1.19	0
Average used for freight trains	2.08	5.77	5.7	0.68	0.58
Averaged used for passenger trains	2.41	1.21	2.86	1.1	0

Interaction with the state *(cont.)*

	Poland	Portugal	Romania	Slovenia	Slovakia
% of total cost covered	91.4	20	52	13	25 to 50
FC– Support or MC+ markup	FC– or FC	MC	FC (old)/MC+ (new)	FC objective	FC
Forms of state support	State budget for part of renewals and investments		State pays for renewal and investment, users pay for operations and maintenance	State budget for maintenance and renewals	Direct support
Access charge regime characteristics					
Type of regime	Simple	Simple	2 Part	Simple	Simple
Summary of approach	Variable charge per train-km adjusted for type of train and line segment used	Variable charge/train-km	OLD: fixed charge/pass and for freight train-km. New: fixed charge/path-km by line type, variable by weighted ton-km by type of line	Variable charge per train-km adjusted for type of train and length/ quality of line used	
Distinction between passenger and freight users	Y	Y	Y	Y	
Congestion considered in charges	N	N	Y	N	
Distinction by type or speed of line	Yes in future	N	Y	Y	
Capacity or slot reservations charged	N	N	N	N	
Charges for delays by operator or ISM	N	N	Y	N	
Basic access charge (excludes station and terminal use)					
Freight	€ 5.6 to 6.35/train-km	€ 1.82 to 2.40/train-km	€ 0.392 to 0.689/train-km plus 0.416 to 0.686/ (000) gross ton-km plus fixed charge/path-km	€ 1.11 to 3.68/train-km	
Passenger	€ 1.77 to 3.22/train-km (averages)	€ 1.51 to 1.68/train-km	€ 0.392 to 0.689/train-km plus 0.416 to 0.686/ (000) gross ton-km plus fixed charge/path-km	€ 1.11 to 2.45/train-km (charging only for international trains until 2010)	
Average access charge:					
€/freight train-km from various sources	4.2/*5.5*/6.19	3.62/*1.9*	*3.6*	*4.1*/2.23	9.09/*8.4*
€/passenger train-km from various sources	2.14 to 3.9	1.3-1.87		1.8	1.49-1.6
Computed average 2003 freight (without electricity)	5.80	1.86 to 1.98	4.56 to 5.289		
Computed average 2003 passenger (without electricity)	2.21	1.60 to 1.73	1.2 to 1.79		
Example freight (1 000 gross tonnes)	5.60		2.9		
Example intercity passenger (500 gross tonne)	2.67				
Example suburban passenger (140 gross tonne)	1.77				
Average used for freight trains	5.80	2	4.56	2.23	8.5
Averaged used for passenger trains	2.21	1.6	1.2	1.8	2.1

Interaction with the state *(cont.)*

	Sweden	Switzerland	United Kingdom
% of total cost covered	5	30	50-100
FC– support or MC+ markup	SMC	MC+	MC frt, MC+ pass
Forms of state support	Direct support to Banverket, which is a State Agency. Users pay part of maint and traffic mgt, BV pays renewals and investments.	Direct support to infrastructure manager	Capital and operating contributions from government to network rail
Access charge regime characteristics			
Type of regime	Simple	Simple	2 Part pax, simple frt
Summary of approach	Variable charge based on train-km and gtkm	Variable charge/train-km plus charge/ton-km plus station fees. Note deduction for quiet rolling stock	Fixed access charge plus variable charge/vehicle-km for pass, variable charge/gt-km for frt.
Distinction between passenger and freight users	Y	Y	Y
Congestion considered in charges	N	N	Y
Distinction by type or speed of line	N	N	N
Capacity or slot reservations charged	N	N	N
Charges for delays by operator or ISM	N	N	Y
Basic Access Charge (excludes station and terminal use)			
Freight	€ 0.00031/gt-km plus € 0.0609/train-km	€ 0.26/train-km + € 0.00163/gross ton-km plus contribution margin of € 0.00339/gross ton-km. Contribution margin suspended, but may be implementd progressively between 2006 and 2008	€ .00237 to € .00310/gt-km
Passenger	€ 0.000951/gt-km plus € 0.1218/train-km	€ 0.26/train-km + € 0.00163/gross ton-km plus contribution margin of 4% rev for intercity pax, 14% for regional pax.	
Average access charge:			
€/freight train-km from various sources	0.37/**0.42**/**0.49**/*1.7*	3.84/**6.78**/*4.0*	**2.23**
€/passenger train-km from various sources	**0.21**/**0.3**/0.28-0.7	0.48-1.05/**2.18**	**4.41**
Computed average 2003 freight (without electricity)			3.27
Computed average 2003 passenger (without electricity)			3.66
Example freight (1 000 gross tonnes)	0.371	1.982 to 3.583	2.37 to 3.10
Example intercity passenger (500 gross tonne)	0.597	1.202 to 2.206	
Example suburban passenger (140 gross tonne)	0.2549	0.82 to 1.39	
Average used for freight trains	0.371	2	3.27
Averaged used for passenger trains	0.483	1.2	3.66

Notes:
* For Denmark first number is domestic access charges/total train-km, second is domestic + Storebaelt bidge charges, and third is domestic + Storabaelt + Oresund Bridge charges.
** Passenger access charge is train-km weighted.
*** Norway information excludes Oslo airport line (Gardemoben), that aims at full cost recovery and has an average charge of € 1.68/train-km.
Source of average access charge/train-km:
If shown in **black bold**, Reka Nemeth, Maribor Presentation.
If **blue bold**, source is Gustaffson presentation to World Bank, April 2000 based on 1999 data.
If light-blue underlined, source is Gerstenauer, October 2004.
If (blue in brackets), source is Remond, Geneva Presentation, slide 20.
If black double underlined, calculated average by author (Lou Thompson).
If *black italics*, source is CER (1 400 ton train), "The Railways in an Enlarged Europe, 2004, pg 21.
If black, non-italic, non-bold, source data provided by railways or railway presentation, adjusted for train weight and average conditions.

Interaction with the state *(cont.)*

Austria: External costs can be charged, but must be paid to State budget until comparable charges are instituted on other modes.
France: basic access charge estimated using ratio of reservation charge (59%) to running charge (16%).
Germany: data from 2001 Train Path Pricing System.
Italy: note that the variable charge is speed and line density related. Also, use ot the nodes (station areas) is based on occupancy minutes.
Sweden also imposes a charge of SEK 0.31 per liter of diesel fuel as a pollution charge proxy.
Hungary: has separate capacity allocation and charging authority.
Conversion from BF to € 40.339.
Conversion from DM to € 1.95583.
Conversion from Romanian Lei to € 40.814.
Conversion from Hungarian Forints to € 244.472.
Conversion from Czech Koruna to € 30.7537.
Conversion from DKK to € 7.42689.
Conversion from UK to € 0.7027
Conversion from Polish Zloty to € 4.06086.
Conversion from NOK to € 8.27131.
Conversion from Lats to € 0.7028.

Network characteristics

	Austria	Belgium	Bulgaria	Czech Republic	Denmark	Estonia	Finland	France
Number of operators								
Freight	12	2	2	55	3	2	1	1
Passengers	3	1	1	5	7	3	1	1
Traffic growth								
Traffic growth %: 1990 to 2003								
Freight t-km	47	–13	–63	–71	23	33	20	–6
Passenger-km	–4	26	–68	–67	20	–88	0	–3
Total TU	26	4	–64	–70	21	12	15	–4
Traffic growth %: 1998 to 2003								
Freight t-km	23	–4	–14	–7	5	60	2	–11
Passenger-km	3	12	–47	–7	9	–23	–1	–4
Total TU	16	4	–28	–7	7	57	1	–7
P-km 2003 (CEMT short term trends) in millions	8 249	8 264	2 517	6 483	5 826	182	3 338	61 857
P-km 1998 (UIC) in millions	7 971	7 354	4 740	7 001	5 369	236	3 377	64 186
P-km 1990 (UIC) in millions	8 575	6 539	7 793	19 395	4 855	1 510	3 331	63 761
T-km 2003 (CEMT) in millions	17 836	7 297	5 274	17 069	2 013	9 283	10 047	46 835
T-km 1998 (UIC) in millions	14 487	7 600	6 115	18 294	1 925	5 786	9 885	52 662
T-km 1990 (UIC) in millions	12 158	8 370	14 132	59 370	1 637	6 977	8 357	49 677
Per cent TU passenger (2003)	31.6	53.1	32.3	27.5	74.3	1.9	24.9	56.9
Traffic density								
Line-km (2002)	5 647	3 518	4 073	9 477	2 273	967	5 850	29 186
Track-km	10 935	6 228	7 024	16 300	3 240	1 563	8 736	53 184
Tonne-km/km line	3 158	2 074	1 295	1 801	886	9 600	1 717	1 605
Passenger-km/km line	1 461	2 349	618	684	2 563	188	571	2 119
Total (t-km + p-km)/line-km	4 619	4 423	1 913	2 485	3 449	9 788	2 288	3 724
Frt train-km/km line	8 309	5 088	2 830	3 889	2 288	5 989	2 857	4 931
Pass train-km/km line	14 967	21 845	6 151	10 849	26 018	2 241	5 208	13 597
Total train-km/km of line	23 276	26 933	8 980	14 738	28 307	8 230	8 065	18 528
Ratio track-km/line-km	1.94	1.77	1.72	1.72	1.43	1.62	1.49	1.82
Train-km passenger (000)	84 518	76 850	25 051	102 817	59 140	2 167	30 467	396 840
Train-km freight (000)	46 922	17 901	11 526	36 855	5 201	5 791	16 713	143 910
Per cent train-km passenger	64.3	81.1	68.5	73.6	91.9	27.2	64.6	73.4
Gross tonne-km passenger (000)	27 446	23 557	7 148	17 169	11 828	496	8 921	151 651
Gross tonne-km freight (000)	41 660	19 041	8 994	33 855	4 076	17 124	20 053	132 246
Per cent gross tonne-km passenger	39.7	55.3	44.3	33.6	74.4	2.8	30.8	53.4
Season ticket passengers (000)	120 003	94 579	–	61 589	68 623	–	42 426	586 105
International passengers (000)	7 705	14 094	277	2 339	5 570	105	240	29 398
Domestic passengers (000)	49 387	56 263	33 442	111 048	76 931	5 077	11 531	273 058
TOTAL passengers (000)	177 095	164 936	33 719	174 976	151 124	5 182	54 197	888 561
Season ticket pass.-km in millions	3 216	3 601	–	1 312	1 679	–	686	13 191
International pass.-km in millions	1 680	1 470	70	524	332	20	65	9 451
Domestic pass.-km in millions	3 404	3 189	2 528	4 726	3 517	157	2 531	50 586
TOTAL pass.-km	8 300	8 260	2 598	6 562	5 528	177	3 282	73 228
Per cent international passenger-km	20	18	3	8	6	11	2	13
Avg trip season tkt in km	26.8	38.1	–	21.3	24.5	–	16.2	22.5
Avg trip intl in km	218.0	104.3	252.7	224.0	59.6	190.5	270.8	321.5
Avg trip domestic in km	68.9	56.7	75.6	42.6	45.7	30.9	219.5	185.3
Passengers/pass train	98.2	107.5	103.7	63.8	93.5	81.7	107.7	184.5
Wagonload tonnes (000)								
Domestic	20 426	18 821	15 322	32 359	1 725	4 008	24 695	71 630
Export/import	47 365	32 202	2 494	42 179	3 000	3 081	13 523	44 077
Transit	14 748	6 175	684	7 033	2 914	35 529	3 461	11 930
TOTAL tonnes	82 539	57 198	18 500	81 571	7 639	42 618	41 679	127 637
Wagonload tonne-kilometers (in millions)								
Domestic	3 898	1 513	3 838	6 263	353	336	6 695	25 208
Export/import	9 213	4 595	522	7 440	602	467	2 453	16 968
Transit	3 661	1 189	267	1 711	986	8 527	516	7 859
TOTAL tonne-km	16 772	7 297	4 627	15 414	1 941	9 330	9 664	50 035
Per cent import-export freight t-km	55	63	11	48	31	5	25	34
Per cent transit tonne-km	22	16	6	11	51	91	5	16
Avg frt lead domestic in km	190.8	80.4	250.5	193.5	204.6	83.8	271.1	351.9
Avg frt lead ex/im in km	194.5	142.7	209.3	176.4	200.7	151.6	181.4	385.0
Avg frt lead transit in km	248.2	192.6	390.4	243.3	338.4	240.0	149.1	658.8
Gross tonnes/frt train	887.9	1 063.7	780.3	918.6	783.7	2 957.0	1 199.8	918.9
Net tonnes/frt train	357.4	407.6	401.4	418.2	373.2	1 611.1	578.2	347.7
Ratio: gross/net	2.5	2.6	1.9	2.2	2.1	1.8	2.1	2.6
Gross tonnes/pass. train	325	307	285	167	200	229	293	382

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Network characteristics *(cont.)*

	Germany	Hungary	Italy	Latvia	Lithuania	Netherlands	Norway	Poland
Number of operators								
Freight	157	3	10	3	1	5	5	28
Passengers	150	2	4	4	1	2	4	4
Traffic growth								
Traffic growth %: 1990 to 2003								
Freight t-km	–23	–50	5	–5	39	31	–16	–42
Passenger-km	16	14	1	–86	–88	25	13	–61
Total TU	–8	–27	2	–23	0	26	–3	–49
Traffic growth %: 1998 to 2003								
Freight t-km	5	17	–10	35	–41	7	–11	–22
Passenger-km	20	54	9	–28	–40	–7	–8	–4
Total TU	11	35	3	31	–40	–4	–9	–18
P-km 2003 (CEMT short term trends) in millions	70 785	10 285	45 221	762	432	13 848	2 381	19 643
P-km 1998 (UIC) in millions	59 184	6 659	41 392	1 059	715	14 879	2 590	20 553
P-km 1990 (UIC) in millions	61 024	9 060	44 709	5 366	3 640	11 060	2 104	50 373
T-km 2003 (CEMT) in millions	76 950	8 108	20 295	17 604	11 457	4 026	2 158	47 394
T-km 1998 (UIC) in millions	73 613	6 916	22 454	12 995	19 258	3 778	2 421	60 923
T-km 1990 (UIC) in millions	99 914	16 214	19 372	18 538	8 265	3 070	2 559	81 637
Per cent TU passenger (2003)	47.9	55.9	69.0	4.1	3.6	77.5	52.5	29.3
Traffic density (000)								
Line-km (2002)	35 755	7 267	15 985	2 237	1 753	2 806	4 077	19 618
Track-km	70 810	8 474	22 180	3 542	3 725	6 518	4 324	38 476
Tonne-km/km line	2 152	1 116	1 270	7 869	6 536	1 435	529	2 416
Passenger-km/km line	1 980	1 415	2 829	341	246	4 935	584	1 001
Total (t-km + p-km)/line-km	4 132	2 531	4 099	8 210	6 782	6 370	1 113	3 417
Frt train-km/km line	5 908	2 164	3 590	4 198	4 176	2 705	1 740	3 849
Pass train-km/km line	20 290	11 095	15 886	3 320	3 467	38 275	5 560	8 230
Total train-km/km of line	26 198	13 259	19 476	7 519	7 643	40 980	7 300	12 079
Ratio track-km/line-km	1.98	1.17	1.39	1.58	2.12	2.32	1.06	1.96
Train-km passenger (000)	725 483	80 625	253 940	7 427	6 077	107 400	22 667	161 452
Train-km freight (000)	211 231	15 727	57 388	9 392	7 321	7 591	7 095	75 512
Per cent train-km passenger	77.4	83.7	81.6	44.2	45.4	93.4	76.2	68.1
Gross tonne-km passenger (000)	137 611	15 011	56 690	2 025	1 948	31 000	5 730	45 420
Gross tonne-km freight (000)	191 699	14 960	29 904	27 192	18 488	6 659	5 376	98 527
Per cent gross tonne-km passenger	41.8	50.1	65.5	6.9	9.5	82.3	51.6	31.6
Season ticket passengers (000)	894 695	52 413	278 807	–	2 195			112 614
International passengers (000)	7 246	1 891	6 930	429	1 462		398	2 404
Domestic passengers (000)	755 336	71 055	206 139	21 531	3 560		50 314	129 131
TOTAL passengers (000)	1 657 277	125 359	491 876	21 960	7 217	314 394	50 712	244 149
Season ticket pass.-km in millions	16 739	1 425	9 283	–	50	–	–	3 171
International pass.-km in millions	2 344	330	2 723	101	269	734	55	598
Domestic pass.-km in millions	50 765	5 632	33 950	643	179	13 554	2 509	13 541
TOTAL pass.-km	69 848	7 387	45 956	744	498	14 288	2 564	17 310
Per cent international passenger-km	3	4	6	14		5	2	
Avg trip season tkt in km	18.7	27.2	33.3	–	22.8	n.a.	n.a.	28.2
Avg trip intl in km	323.5	174.5	392.9	235.4	184.0	n.a.	n.a.	248.8
Avg trip domestic in km	67.2	79.3	164.7	29.9	50.3	n.a.	n.a.	104.9
Passengers/pass train	96.3	91.6	181.0	100.2	81.9	133.0	113.1	107.2
Wagonload tonnes (000)								
Domestic	173 118	13 186	27 628	2 314	6 481		5 894	90 070
Export/import	83 717	21 099	48 116	4 155	9 374		14 534	64 161
Transit	10 090	4 265	14	33 631	20 795			5 534
TOTAL tonnes	266 925	38 550	75 758	40 100	36 650	–	20 428	159 765
Wagonload tonne-kilometers (in millions)								
Domestic	34 344	1 395	10 153	428	1 571		1 686	21 148
Export/import	30 593	3 700	10 521	1 014	1 932		1 002	22 246
Transit	7 487	1 486		13 578	6 264			3 066
TOTAL tonne-km	72 424	6 581	20 674	15 020	9 767	–	2 688	46 460
Per cent import-export freight t-km	42	56	51	7	20	n.a.	37	48
Per cent transit tonne-km	10	23	0	90	64	n.a.	0	7
Avg frt lead domestic in km	198.4	105.8	367.5	185.0	242.4	n.a.	286.1	234.8
Avg frt lead ex/im in km	365.4	175.4	218.7	244.0	206.1	n.a.	68.9	346.7
Avg frt lead transit in km	742.0	348.4	–	403.7	301.2	n.a.	n.a.	554.0
Gross tonnes/frt train	907.5	951.2	521.1	2 895.2	2 525.3	877.2	757.7	1 304.8
Net tonnes/frt train	342.9	418.5	360.2	1 599.2	1 334.1	–	378.9	615.3
Ratio: gross/net	2.6	2.3	1.4	1.8	1.9	n.a.	2.0	2.1
Gross tonnes/pass. train	190	186	223	273	321	289	253	281

Network characteristics *(cont.)*

	Portugal	Romania	Slovenia	Slovakia	Sweden	Switzerland	United Kingdom
Number of operators							
Freight	1	22	1		6	5	6
Passengers	2	9	1		6	26	25
Traffic growth							
Traffic growth %: 1990 to 2003							
Freight t-km	44	–78	–22	–83	–6	14	14
Passenger-km	–37	–72	–46	–88	55	11	22
Total TU	–20	–75	–28	–84	9	12	19
Traffic growth %: 1998 to 2003							
Freight t-km	1	–38	24	–14	22	7	5
Passenger-km	–22	–37	20	–26	34	–2	15
Total TU	–15	–37	24	–16	26	2	12
P-km 2003 (CEMT short term trends) in millions	3 585	8 514	777	2 316	9 400	12 256	40 400
P-km 1998 (UIC) in millions	4 602	13 422	645	3 116	6 997	12 485	35 200
P-km 1990 (UIC) in millions	5 664	30 582	1 429	19 395	6 076	11 049	33 191
T-km 2003 (CEMT) in millions	2 072	10 918	3 273	10 117	17 363	9 285	18 600
T-km 1998 (UIC) in millions	2 048	17 582	2 633	11 753	14 249	8 680	17 668
T-km 1990 (UIC) in millions	1 442	48 540	4 191	59 370	18 435	8 127	16 300
Per cent TU passenger (2003)	63.4	43.8	19.2	18.6	35.1	56.9	68.5
Traffic density							
Line-km (2002)	2 692	10 882	1 229	3 507	9 857	2 908	16 652
Track-km	3 216	21 040	2 195	*4 500*	11 726	7 234	30 763
Tonne-km/km line	770	1 003	2 663	2 885	1 761	3 193	1 117
Passenger-km/km line	1 332	782	632	660	954	4 215	2 426
Total (t-km + p-km)/line-km	2 101	1 786	3 295	3 545	2 715	7 407	3 543
Frt train-km/km line	2 762	2 817	6 203	5 148	4 197	10 385	5 285
Pass train-km/km line	11 203	6 014	9 329	10 148	3 826	35 626	26 621
Total train-km/km of line	13 965	8 831	15 532	15 296	8 023	46 011	31 906
Ratio track-km/line-km	1.19	1.93	1.79	1.28	1.19	2.49	1.85
Train-km passenger (000)	30 159	65 448	11 465	35 590	*37 714*	103 600	443 300
Train-km freight (000)	7 435	30 655	7 624	18 053	*41 370*	30 200	*88 000*
Per cent train-km passenger	80.2	68.1	60.1	66.3	47.7	77.4	83.4
Gross tonne-km passenger (000)	6 199	21 360	1 660	7 941	*9 912*	25 472	59 135
Gross tonne-km freight (000)	4 426	33 765	5 603	22 163	*40 000*	19 265	*39 000*
Per cent gross tonne-km passenger	58.3	38.7	22.9	26.4	19.9	56.9	60.3
Season ticket passengers (000)	88 707	25 678	6 044	–		91 500	414 000
International passengers (000)	308	564	926	2 312		12 400	*6 600*
Domestic passengers (000)	53 585	69 376	7 549	57 118		141 400	555 400
TOTAL passengers (000)	142 600	95 618	14 519	59 430	–	245 300	976 000
Season ticket pass.-km in millions	1 514	741	191	–			11 300
International pass.-km in millions	91	162	128	161			506
Domestic pass.-km	2 169	7 599	430	2 521			28 400
TOTAL pass.-km	3 774	8 502	749	2 682	–	12 332	40 206
Per cent International passenger-km	2	2	17	6	n.a.	–	1
Avg trip season tkt in km	17.1	28.9	31.6	–	n.a.	–	27.3
Avg trip intl in km	295.5	287.2	138.2	69.6	n.a.	–	76.7
Avg trip domestic in km	40.5	109.5	57.0	44.1	n.a.	–	51.1
Passengers/pass train	125.1	129.9	65.3	75.4	–	119.0	90.7
Wagonload tonnes (000)							
Domestic	8 476	53 913	587	10 438		22 650	88 900
Export/import	806	13 368	7 082	30 099		*15 000*	
Transit	–	663	7 270	9 327		17 300	–
TOTAL tonnes	9 282	67 944	14 939	49 864	–	54 950	88 900
Wagonload tonne-kilometers (in millions)							
Domestic	1 939	11 754	146	2 035		2 327	18 900
Export/import	258	2 683	727	4 928		*2 300*	
Transit		430	1 862	3 420		5 081	–
TOTAL tonne-km	2 197	14 867	2 735	10 383	–	9 708	18 900
Per cent import-export freight t-km	12	18	27	47	n.a.	24	0
Per cent transit tonne-km	0	3	68	33	n.a.	52	0
Avg frt lead domestic in km	228.8	218.0	248.7	195.0	n.a.	102.7	212.6
Avg frt lead ex/im in km	320.1	200.7	102.7	163.7	n.a.	153.3	n.a.
Avg frt lead transit in km	–	648.6	256.1	366.7	n.a.	293.7	n.a.
Gross tonnes/frt train	595.3	1 101.5	734.9	1 227.7	966.9	637.9	*443.2*
Net tonnes/frt train	295.5	485.0	358.7	575.1	*419.7*	321.5	214.8
Ratio: gross/net	2.0	2.3	2.0	2.1	2.3	2.0	2.1
Gross tonnes/pass. train	206	326	145	223	263	246	133

Source: Of traffic data: ECMT Short Term Trends Survey (*www1.oecd.org/cem/stat/trends/west.htm*), and UIC, International Railway Statistics, 2003. indicates estimate based on earlier data taken from UIC, Railway time-series data 1970-2000, or author's estimate.

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APPENDIX C

Rail Regulators and their Web sites

Austria: Schienen-Control Österreichische GesellschaftfürSchienenverkehrsmarktregulier-ung mit beschränkter Haftung(GmhB) & Schienen-Control Kommission
Web site: *www.scg.gv.at*

The Czech Republic: The Track Authority
Web site: *www.du-praha.cz*

Denmark: Jernbaneklagenævnet

Estonia: Raudteeamet
Web site: *www.rdtamet.ee*

Finland: Ministry of Transport
Web site: *www.mintc.fi*

France: Mission de Contrôle des activités ferroviaires

Germany: Eisenbahn-Bundesamt(EBA)
Web site: *www.netzzugang-eba.de*

Hungary: VPE
Web site: *www.vpe.hu/*

Lithuania: State Railway Inspectorate

Latvia: State Railway Administration

The Netherlands: Nederlandse Mededingings autoritet (NMa)
Web site: *www.nmanet.nl*

Poland: Office for Rail Transport

Portugal: Instituto Nacional do Transporte Ferroviário (INTF)
Web site: *www.intf.pt*

United Kingdom: Office of Rail Regulation
Web site: *www.rail-reg.gov.uk*

Norway: Statens Jernbanetilsyn/The Norwegian Railway Inspectorate
Web site: *www.jernbanetilsynet.no* and Samferdselsdepartementet
Web site: *www.odin.dep.no/sd*

Sweden: Swedish Rail Agency
Web site: *www.jarnvagsstyre/sen.se*

Switzerland: Commission d'arbitrage dans le domaine de chemin de fer/ Schiedskommission im Eisenbahnsverkehr/Commissione d'arbitrato in materia ferroviaria/Arbitration commission for rail traffic
Web site: *www.ske.ch*

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Railway Reform & Charges for the Use of Infrastructure

Over the last few years, much progress has been made in developing rail charges to ensure non-discriminatory access to, and efficient use of national rail networks. But in Europe the international dimension is still missing, particularly in terms of the freight market.

Integration of European markets should provide great opportunities for rail freight transport to grow. The purpose of this report is to set out how barriers to this growth – arising from differences in the way trains pay to use national networks – can be overcome. It recommends moving to a set of simple charges for freight that create similar incentives for the management and planning of train operations across national borders.

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