

Knieps, Günter

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Competition and the railroads: A European perspective*

by Günter Knieps

Discussion Paper

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Abstract:

The reform of European railroads is a time-consuming process strongly characterized by its path-dependency. Firstly, a short outline of the historical roots of the controversial debates on the role of the state and the markets, and the organization of competition in European railroad industries is provided. Secondly, the opening of the market for train services in the context of the liberalization of European transport markets since 1985 is characterized and the regulatory pre-conditions for competition on the tracks are presented. Thirdly, the evolution of track access regulation in Europe during the last decades is analyzed, differentiating between the period of negotiated third party access since 1991, the introduction of ex ante regulation by the first railroad infrastructure package in 2001, and the danger of overregulation posed by the recent Draft Directive of July 2012 establishing a single European railway area. Fourthly, the role of competition on the markets for rail services and the reform process of interoperability requirements are considered. Finally, competition on the markets for rail services and public subsidies for rail infrastructures as well as subsidies for train services are evaluated.

Prof. Dr. Günter Knieps

Institut für Verkehrswissenschaft und Regionalpolitik

Universität Freiburg

Platz der Alten Synagoge, 79085 Freiburg i. Br.

E-mail: guenter.knieps@vwl.uni-freiburg.de

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1. Introduction

The relation between the state and the markets in governing the railroad industry has already had a long and controversial history in Europe. In Prussia, a legal framework to allow competition on the railway tracks was well established from the very beginning. During the initial phase of railway track construction, competition between lines, based on competing alternative routes for railway services, became important rather than competition on the track. Due to increasingly dense infrastructure networks integrated railroad monopolies evolved and competition among tracks owned by different companies lost relevance. Instead of allowing free entry on the tracks by means of adequate regulation, from the 1890s onwards railways in European countries became state-owned fully vertically integrated legal monopolies in Germany as well as in other European countries. The paradigm change of opening railroad markets for competition was initiated by the introduction of The Treaty of Rome in 1957 and since then the European Union has played a leading role in the process of entry liberalization and subsequent regulatory reforms.

Railroad infrastructures in European countries possess the characteristics of long-lasting natural monopolies in combination with irreversible costs, so that neither active nor potential infrastructure competition can work. Competition on the markets for train services thus requires non-discriminatory access to railroad infrastructure and therefore the development of an adequate regulatory framework. The reform of European railroads is a time-consuming process strongly characterized by its path dependency. The functioning of competition on European railroad markets is still considered unsatisfactory, due to insufficient track access regulation, interoperability gaps causing significant entry barriers, etc. A major challenge in the institutional reform process is the proper division of labour between the regulatory task of market power regulation, the political task of deciding about public subsidies and the entrepreneurial tasks of rail infrastructure providers and rail traffic service providers. The goal of this paper is to provide a network economic analysis of the progress and the failings of the reform process of European railways.

The paper is organized as follows. In section 2 a short outline of the historical roots of the controversial debates on the role of the state and the markets, and the organization of competition in European railroad industries is presented. Section 3 deals with the opening of the market for train services in the context of the liberalization of European transport markets since 1985, and the regulatory preconditions for competition on the tracks. Section 4 analyzes the evolution of track access regulation in Europe, differentiating between the period of negotiated third party access after 1991, the introduction of ex ante regulation by the first railroad infrastructure package in 2001 and the danger of overregulation posed by the recent Draft Directive of July 2012 establishing a single European railway area. Section 5 considers the role of competition on the markets for rail services and the reform process of interoperability requirements. Section 6 is devoted to competition on the markets for rail services and public subsidies for rail infrastructures as well as subsidies for train services.

2. Historical Roots: Railroads between state and markets

The division of labour between the state and the markets in governing the railway sector has already had a long and controversial history. Firstly, the question arose, whether and to what extent the railway sector could be governed by open competitive markets or whether it should alternatively be considered as a large technical system with a centralized state-owned and state-operated system. Although state-owned railroads played an important role in Europe during the 19th and 20th centuries, it is interesting to note that the Prussian railway law of 1838 already provided a legal framework in favour of a competitive supply of train services on the same track. Market entrants should be granted the possibility to compete with the incumbent railroad company owning the railroad infrastructure and providing train services. Adequate track access regulation should be applied if private bargaining on the access conditions between the entrants on the markets for train services and the owner of the infrastructure was not successful. Since the railroad network was in its growing phase, competition among lines instead of competition on the track could be observed in the following decades. As density increased the railway companies merged to form monopolies or en-

tered into collusions. In the late 1870s the Prussian government nationalized the railway system in total, including railway infrastructure as well as rail transportation services, so that the basic idea of the Prussian railway law, which was to establish competition on the track, never became relevant. A fundamental reason for this nationalization was that railroads at that time were highly profitable, generating large revenues for the Prussian state (Fremdling, Knieps, 1993, Knieps, 2006a, pp. 153f.).

During the debate on the nationalization of the railroads, opposing views emerged. Léon Walras (1875/1980), who became famous for the development of the theory of perfect competition with a large number of suppliers and free entry, argued strongly in favour of a state-owned monopoly. In his opinion competition on the tracks would not be workable, so that finally an integrated railroad monopoly would evolve. “With railways ... the track constitutes a natural monopoly and the actual transportation another which is essentially linked to the first, because ... an unlimited number of firms cannot have trains running on the rails. Here the fee for the track, the vehicle and its motive power, the toll and the freight fee, all go to one monopolist” (Walras 1875/1980, p. 91).

In contrast, according to Emil Sax (1879) there would be a large potential for the public regulation of railroad enterprises. However, he did not provide a well-founded regulatory framework. Thus, a second question arose, regarding the proper regulatory framework for disciplining the increasing market power of the owners of railway infrastructures by means of adequate regulation of access to the infrastructure. The vanishing role of competition among the lines could then be substituted by competition on the track.

Instead of introducing a framework of sector-specific market power regulation the nationalization paradigm for railway systems was applied. For a long period from the 1890s onwards until the 1990s nationalized state railways remained the dominant institutional form not only in Germany but also in other European countries.

3. Liberalization and preconditions for competition on the tracks

The strong traffic decline and the increasing deficits of European railroad companies had already led to a challenge to the vertical integration approach. Of particular importance, however, was the introduction of The Treaty of Rome in 1957 and the increasing role of competition on the European markets for goods and services. Since the European Court of Justice ruled¹ against the Council of Transport Ministers in 1985 for failing to ensure freedom to provide services in the markets for international transport, the paradigm shift towards full competition on the European transport markets has been initiated. The European Union has played a leading role in this process, and the benefits of free entry to transport markets throughout Europe are now largely unchallenged. Although the railroads were not at the forefront of the liberalization of European transport markets, competition on the railroad markets and subsequent regulation became an important issue on the reform agenda of the European Community.

3.1. Competition on the tracks and track access regulation

Railroads are technical systems which can be divided into the following related parts:

- tracks and stations (construction and maintenance);
- train traffic control systems (scheduling and operating);
- train services (transportation of goods and passengers).

There are obviously strong complementarities between the different parts of railroad systems. Train services can only be provided if access to tracks and stations is guaranteed and the operation of trains is coordinated, including ex ante scheduling as well as real time train control. For a long time these synergies gave rise

¹ Judgment of the Court of 22 May 1985. European Parliament v Council of the European Communities. Common transport policy - Obligations of the Council. Case 13/83. European Court reports 1985, p. 01513.

to the belief that vertical integration was the adequate organisational form for railroad systems. By now it is well known that third party access to railways is technically feasible. Indeed, the process of regulatory reform during the last decades would otherwise have been pointless.

Since dense rail infrastructure networks already exist owned by the national railroad companies the focus of competition in European railroad systems is on free entry and active competition on the markets for train services. In contrast to the growing phase in the 19th century competition among tracks owned by different companies has been of no practical relevance during the evolution of European railroad regulation in the last decades.²

The principles of competitive supply of railway services on the same track have been laid down in Council Directive 91/440/EEC³ of July 1991. Free entry of service companies on European markets for train services should improve the quality and variety of train services as well as provide incentives for a more cost-efficient provision of train services. Vertical integration is no longer considered to be the adequate organisational form for railway systems. Instead, EU policy has been to separate the supply of train services from the provision of infrastructure, with separation of accounts being compulsory and organisational or institutional separation being optional. If the track owner does no longer supply all transportation services himself, it is vital to distinguish between the service tariff the customers have to pay to the transportation firm and the access charge the transportation firm has to pay to the track owner. As precondition for competition on the track, non-discriminatory access charges to railway infrastructures were considered necessary.

² It is interesting to note that in the U.S. competition between railroad companies owning different tracks has proven to be of relevance to avoid rate regulation since the Coal Rate Guidelines in 1985 by the Interstate Commerce Commission (Baumol, Sidak, 1994, p. 44).

³ Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways, OJ L 237, 24.08.1991.

In Council Directive 95/19/EC of 19 June 1995 the basic principles of infrastructure allocation were established on the Community level.⁴ These principles do not allow discrimination between national and international services, discrimination between different users of railway infrastructure and excessively high access charges. Thus there should be no discrimination between trains for commodity transportation and trains for passenger transportation, between local passenger trains and long distance passenger trains, or between international passenger trains and national passenger trains. The design of the non-discriminatory allocation of track capacities, however, remained within the competence of the member countries.

3.2. The disaggregated regulatory approach

In the following it shall be shown that efficient competition on European rail transport markets is conditional upon the existence of non-discriminatory access to rail infrastructure for all active and potential train service providers. Whereas ex ante regulation of access to railroad tracks seems necessary, this should, however, not lead to over-regulation. The danger of overregulation may arise by choosing an oversized regulatory basis on one hand and by choosing inadequate regulatory instruments on the other hand.

In order to determine a network economically founded regulatory basis the theory of monopolistic bottlenecks has been developed.⁵ The conditions for a monopolistic bottleneck facility are fulfilled

- (1) if the facility is necessary for reaching consumers, that is, if no second or third such facility exists, i.e. if there is no active substitute available. This is the case if there is, due to economies of scale and economies of scope, a natural monopoly situation, so that one supplier can provide this facility at a lower cost than several suppliers; and

⁴ Council Directive 95/19/EC of 19 June 1995 on the allocation of railway infrastructure capacity and the charging of infrastructure fees, OJ L143/75, 27.06.1995.

⁵ For a short overview see Knieps (2011).

- (2) if at the same time the facility cannot be duplicated in an economically feasible way, that is, if no potential substitute is available. This is the case if the costs of the facility are irreversible.

Irreversible costs are no longer decision-relevant for the incumbent whereas potential entrants have to decide whether to incur these irreversible investments. Thus, irreversible costs in combination with a natural monopoly create a credible threat potential for the incumbent. If for example a potential competitor were to plan an entry with a parallel track, the incumbent railway owner could threaten to reduce his tariffs to the short-run variable costs, discouraging a second rail infrastructure provider. Once a railway network is completed, further entry with additional tracks cannot be expected. The decision-relevant costs of entry include the costs of track infrastructure, which cannot be covered by tariffs according to short-run variable costs. Since neither active nor potential competition can be expected the incumbent provider of track access possesses stable market power. The special focus of regulatory activity should be on the design of a symmetrical regulation of non-discriminatory access to monopolistic bottlenecks, combined with a regulation of access charges. Since competition among lines is lacking in European railroad infrastructure networks, unregulated access charges create the danger of the track owner exploiting his monopoly power.

In contrast the markets for train services are competitive and should not be regulated. An essential characteristic with respect to the supply of train services is its network structure. Incentives may exist for train companies for bundling traffic on a given line and in serving several lines jointly such that the market for train services may fulfil the characteristics of a natural monopoly. However, the investments to provide train services are not irreversible, because trains can be shifted from one market to another. Thus, if in a particularly sparsely populated area there is a lack of competition between active firms in the market, this may be replaced by efficient potential competition. The pressure of potential competition is sufficient to create incentives for the active supplier of train services to produce more efficiently. Thus the actual number of active competitors is of negligible relevance, as long as potential entrants can play the role of disciplining the active providers. However, the condition for the functioning of potential

competition in disciplining firms already in the market is that the incumbent firms do not have asymmetric cost-advantages compared to potential entrants regarding access to complementary track capacities. Therefore it is important to differentiate between the welfare improving instrument of price differentiation (optional two-part tariffs etc.) and anti-competitive discrimination unilaterally in favour of certain companies.

The competitive reference point for the regulation of charges should be the coverage of the decision-relevant total costs, so that viability is not hampered by regulatory interventions. Thus, not only incremental costs but also market-driven mark-ups are required (Baumol, Sidak, 1994, p. 102). It is therefore important to differentiate between the price level of access charges, which has to be regulated, and the pricing structure, which must be left to entrepreneurial flexibility. Regulators should neither be allowed to prescribe pricing rules that focus on tariff structures within monopolistic bottlenecks, nor to forbid per se the implementation of non-linear tariffs. Price cap regulation in the monopolistic bottleneck areas and accounting separation are necessary for disciplining the remaining market power and ensuring non-discriminatory access. Detailed input regulation contradicts the spirit of a price cap regulation. Not only in competitive subparts of networks, but also in the monopolistic bottleneck areas pricing structures should be flexible und the result of endogenous market processes. The welfare-increasing effects of price differentiation should not be impeded by asymmetrical regulatory intervention (Pittman, 2003).

4. The evolution of track access regulation in Europe

4.1. Negotiated third party access: Council Directive 91/440/EEC, 1991

In Council Directive 91/440/EEC⁶ of 1991 no ex ante regulation of access charges was laid down. Thus, the first phase of German railway (de-)regulation initiated by the German railroad law⁷ enacted in 1994 has been characterised by the requirement of non-discriminatory third party access without ex ante sector-specific regulation. The basic concept was based on negotiations between applicants and the rail network provider in its function as infrastructure manager.

The market power involved in railroad infrastructures fundamentally disturbs the bargaining processes between infrastructure provider and competitive train service companies on track access conditions. The extreme alternative of (vertical) foreclosure of competitors on the markets for train services is obviously not feasible after legal rights for market entry are provided. However, other more subtle ways of abusing market power within the bargaining process on access conditions may evolve, for example the provision of insufficient network access quality or the raising of excessive access charges. For example in Germany reproaches regarding discriminatory elements in the track access charges of Deutsche Bahn (DB) have increasingly come under consideration by the German cartel office, in particular the accusation that the optional two-part access tariffs contained elements unilaterally in favour of DB (Knieps, 2006a, pp. 154f.). The shift towards sector-specific ex ante regulation of access to the track seems necessary in order to discipline the impact of market power on the bargaining for access conditions. If non-discriminatory conditions of access to railroad infrastructure facilities are specified in the context of the disaggregated regulatory approach, competition on the tracks is workable.

⁶ Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways, OJ L 237, 24.08.1991.

⁷ Gesetz zur Neuordnung des Eisenbahnwesens (BGBl. I. p. 2378, 27. Dezember 1993).

4.2. Ex ante regulation: First railroad infrastructure package in 2001

The shift towards market power regulation of rail access, which was initiated by EU Directive 2001/14 of the railroad infrastructure package⁸ of February 2001 introduces several regulatory obligations for the provider of track access and requires a regulatory body to be set up in each member state. In Germany, a new regulatory authority, the Federal Network Agency (Bundesnetzagentur) has been established, responsible for sector-specific regulation of the telecommunications and postal sector, the electricity and gas sector, and for the railway sector. According to article 3, detailed statements of the infrastructure provider are required, including details of the charging system and the principles and criteria for capacity allocation (Annex I). Train service companies have the right to appeal to the regulatory agency against decisions of the track provider (Art. 30). The railroad package does not prescribe tariff structures, nor enforce a specific form of access charge regulation. It leaves a large scope of discretionary power to the regulatory agencies of the member countries.

Based on the EU Directives of the first railroad infrastructure package, a set of detailed requirements has been specified in order to improve the transparency of the principles and criteria for the allocation of track capacities as well as the principles of access tariffs. Negotiations concerning the level of infrastructure charges henceforth should only be permitted, if they are carried out under the supervision of a regulatory body. The member states were required to implement the directives of the first railway package by March 2003, aiming in particular to ensure the independence of the infrastructure manager from the provider of train services and the introduction of an independent regulator to focus on obstacles to competition on the markets for train services and the required non-

⁸ The railroad infrastructure package contains 3 Directives: Directive 2001/12/EC of the European Parliament and of the Council of 26 February 2001 amending Council Directive 91/440/EEC on the development of the Community's railways, OJ L75/1, 15. 3. 2001; Directive 2001/13/EC of the European Parliament and of the Council of 26 February 2001 amending Council Directive 95/18/EC on the licensing of railway undertakings, OJ L 75/26, 15. 3. 2001; Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification, OJ L 75/29, 15. 3. 2001.

discriminatory track access charges. Nevertheless the implementation of the first railroad package made only slow progress. European Parliament resolutions of July 2007 on the implementation of the first railway package emphasised the need for improving the competitiveness of the railroad sector.⁹ Due to these obstacles to market access and a lack of transparency of access conditions the Commission decided to refer to the EU Court of Justice in June 2010 complaining that a fully functioning single market for rail services in Europe was prevented by 13 Member States still not implementing EU rules properly.¹⁰

4.3. The danger of overregulation:

Recast of first railroad package 2010 – 2012

A further European Parliament resolution of June 2010¹¹ complaining again about the lack of independence of infrastructure managers, the lack of power of regulatory bodies and an inadequate infrastructure financing and charging framework urged the Commission to propose a revision of the first railway package by September 2010. In the same month the European Commission (2010b) provided a proposal for a Directive of the European Parliament and of the Council establishing a single European railway area (Recast) integrating the three directives of the first railroad package.¹² This proposal provided the basis for a compromise between the European Parliament and the European Council on 19 of June 2012 after which a final Draft Directive establishing a single European railway area was passed by the European Parliament on 3 July 2012.¹³

⁹ European Parliament resolution of 12 July 2007 on the implementation of the first railway package (2006/2213(NI)).

¹⁰ Europa - Press Releases - Rail services: Commission legal action against 13 Member States for failing to fully implement first railway package, IP/10/807, Brussels, 24. June 2010.

¹¹ European Parliament resolution of 17 June 2010 on the implementation of the first railway package Directives (2001/12/ECm 2001/13EC and 2001/14).

¹² Repealing Directive 91/440/EEC, Directive 95/18/EEC, Directive 2001/14/EC.

¹³ Draft Directive: European Parliament legislative resolution of 3 July 2012 on the Council position at first reading with a view to the adoption of a directive of the European Parliament and of the Council establishing a single European railway area

Regarding the market for infrastructure capacities, in particular track capacities, the ruling in Article 28 and Article 29(3) of the Draft Directive repeats the basic principles of the first railroad package that agreements between railway undertakings (train companies) and infrastructure managers shall be non-discriminatory and transparent, that the charging scheme in use should be based on the same principles over the whole network, resulting in equivalent and non-discriminatory charges for different train companies.

A major goal of the Draft Directive is to strengthen the implementation of market power regulation in order to guarantee the non-discriminatory and transparency requirements of access conditions as a precondition for competition on the tracks. However, the Draft Directive also contains additional rulings which may result in the danger of overregulation regarding the regulatory base as well as regarding the implementation of regulatory instruments.

In the Draft Directive the need for access regulation is laid down by an ad hoc specification of a list of access services to be supplied by the infrastructure provider to the train companies without network economic foundation.¹⁴ In Article 13 together with Annex II of the Draft Directive four classes of services to be supplied to railway undertakings are differentiated. Unfortunately, it remains open which of the listed access services are part of the monopolistic bottleneck facilities and which belong to the competitive markets for transportation services. Whereas tracks, passenger stations and freight terminals are monopolistic bottleneck facilities, there may be sufficient room for alternative providers of maintenance facilities and other service related markets. Although storage siding and train formation facilities are based on track facilities which are characterized as monopolistic bottlenecks, logistic activities of train formation, maintenance etc. belong to the competitive markets of railway traffic services. Competitive service facilities may therefore not only include ancillary services such as tech-

(recast) (18581/2/2011-C7-0268/2010-2010/0253(COD)) (Ordinary legislative procedure: second reading).

¹⁴ In contrast to European telecommunications regulation, where the so-called three criteria test has been developed to substantiate the requirements for regulatory intervention (Knieps, Zenhäusern, 2010, p. 997).

nical inspection of rolling stock or ticketing services in passenger stations which do not fall under service obligation (Art. 13, (8)), but may also include logistic activities of train formation and maintenance. In article 13(3) of the Draft Directive the criterion of a dominant position in national railway transport services markets for which an access service is provided is taken into account although the network-specific market power problem is on the (vertical) access problem to railway infrastructure. Since network-specific market power does not originate on the markets for network services, regulation should be limited to the market power at its roots. Thus, instead of regulating the components of competitive network services, future regulation should be limited to the monopolistic bottleneck components of the railroad infrastructure.

The principles of charging (Articles, 31-37, Annex VI of the Draft Directive) are based on cost-based regulation well-known from traditional regulation in the telecommunications and electricity sectors. It is required that charges for the minimum access package (focusing in particular on track capacity and train control) and for access to infrastructure connecting service facilities should be based on the costs directly caused by infrastructure usage resulting from operating the train. Furthermore, scarcity of capacity usage due to congestion may also be taken into account. Mark-ups on the basis of demand elasticities for infrastructure access are allowed in order to obtain full recovery of the infrastructure costs (Articles 31, 32 of the Draft Directive). In addition, if an infrastructure has been declared to be congested, the infrastructure manager may employ priority criteria to allocate infrastructure capacity. In particular, international freight services shall be given adequate consideration in determining priority criteria (Article 47/5 of the Draft Directive). The question arises whether a consistent application of congestion pricing would not be superior for solving the scarceness of capacity problem, at the same time being non-discriminatory and thereby avoiding regulatory prescribed ad hoc allocation criteria. The transition from cost-based regulation to principles of incentive regulation would allow the infrastructure companies the entrepreneurial flexibility to develop access charging systems reflecting the relevant opportunity costs of infrastructure capacities usage and simultaneously creating the proper investment incentives for capacity extensions.

According to Article 3(2) of the Draft Directive infrastructure managers are responsible for establishing, managing and maintaining railway infrastructure including traffic management, whereas these functions may be executed by different actors. The entrepreneurial flexibility to allocate infrastructure capacities is also important from the trans-border perspective of international rail freight traffic. The construction of international train paths and a related demand for a one-stop-shop for freight corridors requires cooperation between the infrastructure managers with the competency of capacity allocation in the individual networks. The conclusions of the Draft Directive can be supported, that this goal may result in the establishment of a joint body by the infrastructure managers dealing with the construction of international train paths (Article 43/2; 44/4 of the Draft Directive). Since the track capacities should remain under the entrepreneurial competency of the railroad infrastructure providers the construction and implementation of international train paths should not become a regulatory task.¹⁵ Nevertheless developments of regulatory overkill in the process of developing international freight corridors cannot be excluded.

5. Competition on the markets for rail services and interoperability requirements

Before the process of liberalization started, technical standards of the railroads in Europe were strongly oriented on the national borderlines. The process of standard setting was carried out within national railroad administrations. Railroad engineers developed train systems mainly within the national boundaries. Examples are the first generation of the TGV trains in France and the ICE trains in Germany, developed independently and not compatible with the tracks of the respective other network. Moreover, the development of standards for traffic

¹⁵ In September 2010 the Proposal on the Recast (European Commission 2010b) was initiated, and in addition a Regulation (EU) No. 913/2010 of the European Parliament and of the Council of 22 September 2010 concerning a European rail network for competitive freight was adopted (OJ L 276/22, 20.10.2010). Although it constitutes directly applicable law, this regulation remains rather vague about the future role of regulatory agencies regarding the implementation of freight rail corridors in Europe (Otte, 2011, p. 2).

control of high speed trains was optimized for the national train markets. The paradigm change towards trans-European railroad networks created the necessity to support the interoperability of the railroad systems of the different European countries.¹⁶

Whereas interoperability issues were first considered in the context of the trans-European high-speed rail system (Directive 96/48/EC), interoperability of the trans-European conventional rail system (Directive 2001/16 EC) became also a relevant part of the first railroad package. Directive 2004/50 EC integrated both Directives.¹⁷ The goal of Directive 2008/57/EC was to specify further requirements regarding the interoperability of the European rail system (recitals 12, Article 2 (g)).¹⁸ Essential requirements are listed in Annex III focusing on safety, reliability and availability, health, environmental protection and technical compatibility. ‘Harmonized’ standards are focusing on the development of new technical specifications for interoperability (TSIs) and the required backward compatibility with the already existing rail system to promote the competitiveness of rail transport and prevent unnecessary cost of harmonization (recital 16).

The scope of interoperability includes the whole railroad system, including rolling stock, as well as the guarantee of a harmonious operation of the trans-European rail system and efficient traffic management (Annex I). Of particular importance for competition on the track is the harmonization of traffic control systems. The provision of train services requires simultaneous access to rail infrastructure and traffic control system, regardless of whether these functions are provided by a vertically integrated enterprise or by different undertakings. A precondition for competition on the markets for train services is that train com-

¹⁶ See Treaty of Amsterdam, Title XV, Transeuropean Networks, Art. 154(2).

¹⁷ Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system, OJ L 164, 30.4.2004, p.114, corrected by OJ L, 220, 21.6.2004, p. 40.

¹⁸ See Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast), OJ L191/1, 18.7.2008.

panies have non-discriminatory access not only to railway infrastructure but also to the different train control systems. Train control systems are the decisive link between railway infrastructure capacities and train operations. The throughput of train traffic as well as repairs of infrastructure components (tracks etc.) must be coordinated by train control systems. The cost of such coordination depends on the number of trains and their operating speeds rather than the number of train companies active on the network. The geographical borderlines of train control systems have to be clearly defined and enforced by technical regulation. However, this does not imply that train control systems have the characteristics of a monopolistic bottleneck. The computer software and know-how needed to set-up a train control system are not bound to a specific geographical location and therefore do not constitute irreversible costs. Thus, competitive bidding procedures via auctioning of a predefined geographical train traffic control area for a well-defined period of time can work. The result is awarding the contract to the bidder who is able to offer the train control service at the lowest prices while at the same time covering the required costs. From the perspective of a European market for train services intense coordination and harmonization of train control systems is required allowing systematic internalization of cross-border restrictions either by integrated technical solutions or adequate compatibility standards (Knieps 2006 b, p. 7 f.).

According to the European Commission (2010a, p. 8) lack of interoperability creates significant barriers to entry in the EU market for train services. Whereas technical specifications for interoperability (TSI) have only been applicable to the trans-European network, the intention is that the whole railway system in Europe should have harmonized specifications by 2013.

In particular the phasing-out of old nationally oriented systems and their replacement by the European Rail Traffic Management System/ERMTS is required. This new technology is intended to provide a trans-European uniform train traffic control system (European Train Control System/ECTS) as well as the international wireless communications standard for railway communication and applications (Global System for Mobile Communications-Railway/GSM-R). Although some progress with interoperability specifications for high-speed and

conventional rail has been achieved, further harmonization of technical specifications for interoperability (TSI) remains necessary. Since 1995 the development of ERTMS standardization efforts has been financially supported by the EU. Moreover, the European Rail Agency (ERA) was founded with the task to support the interoperability efforts of the European railroads and in particular the development of ERTMS.¹⁹ Although the Draft Directive is not focussed on the European harmonization process of train traffic control systems in particular, it grants a temporary reduction of the infrastructure charge for trains equipped with the European Train Control System (ETCS) running on lines equipped with national command control and signalling systems (Article 32 (4) of the Draft Directive).

6. Competition on the markets for rail services and public subsidies

6.1 Subsidies of rail infrastructures

The Draft Directive (Article 6) reaffirms the necessity of accounting separation between the railway infrastructure (the track and related equipment) and the operation of rail services requiring different accounts for passenger transport services under public service obligations and profitable freight transport services in order to avoid cross subsidies and discriminatory practices. Public funds for rail infrastructure are not to be used to finance passenger transport services and vice versa. Subsidisation of non-profitable railway infrastructures is to be distinguished from ordering loss-making train services.

Concerning railway infrastructure, the implementation of horizontal accounting separation is of particular importance (Weiß, 2011). The first step should be to differentiate between profitable core networks and non-profitable peripheral networks. Since revenues are increased under application of optional non-linear pricing as compared to linear pricing, the entrepreneurial flexibility to apply

¹⁹ Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast), OJ L191/1, 18.7.2008.

price differentiation also reduces the need for public subsidies (Pittman, 2004). Profitable networks should be subject to price-cap regulation. Non-profitable parts should be subject to politically desired subsidies to the extent that track access charges do not cover the decision-relevant total costs. The decision how to finance the deficit is not in the competence of the sector-specific regulator. The question of a subsidy from tax revenues is up for democratic debate. Government subsidies are to be legitimized politically and fixed accordingly. Such a clear-cut separation of competences between regulation and policy then allows both efficient access charges and the efficient subsidization of railway infrastructure deficits.

Incentive compatible access regulation and efficient subsidies are a precondition that competition in the markets for rail traffic can be fully exploited. In particular, subsidies for public infrastructure should not be used to cross-subsidize markets for rail services. Therefore a clear-cut localization of and separate accounting for monopolistic bottleneck areas in combination with adequate regulation of track access conditions is required.

6.2 Subsidies for train services

Subsidies for train services are strongly focussed on local and regional public passenger transport, although other inland passenger transport services may also be involved. From the perspective of competition on the track the way public service contracts are to be awarded is of particular importance. The implementation of competitive tendering was left open until Regulation EC No. 1370/2007²⁰ prescribing that in the future competitive tendering has to be applied in order to allow non-discriminatory and transparent allocation of subsidies for train services. Competitive tendering is an efficient method, because railway transport services – as opposed to the provision of railway track infrastructure – are not associated with irreversible costs. Thus the most efficient and cost-

²⁰ Regulation (EC) No 1370/2007 of the European Parliament and of the Council of 23 October 2007 on public passenger transport services by rail and by road and repealing Council Regulations (EEC) Nos 1191/69 and 1107/70.

effective service provider can be determined by competitive tendering – it is the provider that requires the lowest subsidy. A public service contract may guarantee exclusive rights for a maximum period of 15 years to allow a combination of profitable and non-profitable service areas. Therefore a conflict may arise between exclusive rights and allowing international passenger service providers to apply strategies of inland transportation (cabotage).²¹ Unfortunately this conflict was not solved by Directive 2007/58 EC, although a possible solution is indicated in that the holder of the exclusive rights could be compensated by a levy on passenger services to contribute to the costs of public service obligations.²² This economically superior solution has not been enforced until now, leaving room for railroad companies in member states to strategically forbid competition by cabotage activities under the pretext that otherwise public service contracts would be destroyed. In order to strengthen competition on the international and national long distance markets for train services it is necessary to allow all forms of competition on the track and simultaneously raise an entry tax in order to compensate the holder of the exclusive right for providing subsidized train services. Subsequently the stated conflict between international competition on the track and competitive tendering with exclusive rights to provide subsidized train services would disappear.

²¹ See also Directive 2007/58/EC amending Council Directive 91/440/EEC on the development of the Community's railways and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure, OJ L 315/44 of 3.12.2007 focusing on the opening of the market for international rail passenger services within the Community.

²² The Draft Directive only repeats this conflict, Recitals 19-21.

References

- Baumol, W.J., Sidak, J.G. (1994), *Toward Competition in Local Telephony*, Cambridge, MA, MIT Press.
- European Commission (2010a), *Communication from the Commission concerning the development of a Single European Railway Area*, COM(2010) 474 final, 17.09.2011, Brussels.
- European Commission (2010b), *Proposal for a Directive of the European Parliament and of the Council establishing a single European railway area ('Recast')*, COM(2010) 475 final, 2010/0253 (COD), 17.09.2011, Brussels.
- Fremdling, Rainer, Knieps, Günter (1993), *Competition, Regulation and Nationalization: The Prussian Railway System in the Nineteenth Century*, *The Scandinavian Economic History Review*, XLI/2, 129-154.
- Knieps, G. (2006a), *The different role of mandatory access in German regulation of railroads and telecommunications*, *Journal of Competition Law & Economics*, 2/1, 149-158.
- Knieps, G. (2006 b), *Delimiting Regulatory Needs in OECD/ECMT Round Table 129, Transport Services: The Limits of (De)regulation*, Paris: 7-31.
- Knieps, G. (2011), *The Three Criteria Test, the Essential Facilities Doctrine and the Theory of Monopolistic Bottlenecks*, *Intereconomics*, 46/1, 17-21.
- Knieps, G., Zenhäusern, P. (2010), *Phasing out sector-specific regulation in European telecommunications*, *Journal of Competition Law & Economics*, 6/4, 995-1006.
- Otte, K. (2011), *Considerations for regulating the allocation of train paths on EU freight corridors*, Paper presented at the fourth Annual Conference on Competition and Regulation in Network Industries, Brussels, 25 November 2011.
- Pittman, R. (2003), *A Note on Non-Discriminatory Access to Railroad Infrastructure*, US Department of Justice Antitrust Division Economic Analysis Group Working Paper No. EAG03-5.

- Pittman, R. (2004), Russian railways reform and the problem of non-discriminatory access to infrastructures, *Annals of Public and Cooperative Economics*, 75/2, 167-192.
- Sax, Emil (1879), *Die Eisenbahnen*, Alfred Hölder, K.K. und Universitäts-Buchhändler, Wien 1879.
- Walras, Léon (1875/1980), L'État et les Chemins de Fer, in: *le Nouvelliste Vaudois*, Oktober 1875, revidierte Fassung in: *Revue du Droit public et de la Science politique*, mai-juin et juillet-août 1897; übersetzt von P. Holmes, *The State and the Railways*, *Journal of Public Economics*, 13, 1980, 81-100.
- Weiß, H. (2011), *Unbundling of Non-Profitable Rail Infrastructures, Competition and Regulation in Network Industries*, 12/4, 357-370.

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94. **G. Knieps:** Entgeltregulierung aus der Perspektive des disaggregierten Regulierungsansatzes, erschienen in: Netzwirtschaften&Recht (N&R), 1.Jg., Nr.1, 2004, S. 7-12
95. **G. Knieps:** Neuere Entwicklungen in der Verkehrsökonomie: Der disaggregierte Ansatz, erschienen in: Nordrhein-Westfälische Akademie der Wissenschaften (Hrsg.), Symposium „Transportsysteme und Verkehrspolitik“, Vorträge 17, Schöningh-Verlag, Paderborn, 2004, S. 13-25
96. **G. Knieps:** Telekommunikationsmärkte zwischen Regulierung und Wettbewerb, erschienen in: Nutzfinger, H.G. (Hrsg.), Regulierung, Wettbewerb und Marktwirtschaft, Festschrift für Carl Christian von Weizsäcker, Verlag Vandenhoeck & Ruprecht, 2003, S. 203-220
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98. **G. Knieps:** Verkehrsinfrastruktur, erschienen in: Akademie für Raumforschung und Landesplanung (Hrsg.), Handwörterbuch der Raumordnung, Hannover 2005, S. 1213-1219
99. **G. Knieps:** Limits to the (De-)Regulation of Transport Services, erschienen als: “Delimiting Regulatory Needs” in: OECD/EMCT Round Table 129, Transport Services: The Limits of (De)regulation, OECD Publishing, Paris, 2006, S.7-31
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- 103. G. Knieps:** Von der Theorie angreifbarer Märkte zur Theorie monopolistischer Bottlenecks, in: Daumann, F., Okruch, S., Mantzavinos, C. (Hrsg.), Wettbewerb und Gesundheitswesen: Konzeptionen und Felder ordnungsökonomischen Wirkens, Festschrift für Peter Oberender, Andrassy Schriftenreihe, Bd. 4, Budapest 2006, S. 141-159
- 104. G. Knieps:** The Different Role of Mandatory Access in German Regulation of Railroads and Telecommunications, erschienen in: Journal of Competition Law and Economics, Vol. 2/1, 2006, S. 149-158
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- 108. H.-J. Weiß:** Die Potenziale des Deprival Value-Konzepts zur entscheidungsorientierten Bewertung von Kapital in liberalisierten Netzindustrien, Juni 2005
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- 110. H.-J. Weiß:** Die Probleme des ÖPNV aus netzökonomischer Sicht, erschienen in: Lasch, Rainer/Lemke, Arne (Hrsg.), Wege zu einem zukunftsträchtigen ÖPNV: Rahmenbedingungen und Strategien im Spannungsfeld von Markt und Politik, Erich Schmidt Verlag, Berlin, 2006, S. 119-147
- 111. G. Knieps:** Die LKW-Maut und die drei Grundprobleme der Verkehrsinfrastrukturpolitik, erschienen in: Schriftenreihe der Deutschen Verkehrswissenschaftlichen Gesellschaft: Die LKW-Maut als erster Schritt in eine neue Verkehrsinfrastrukturpolitik, Reihe B, B 292, 2006, S. 56-72
- 112. C.B. Blankart, G. Knieps, P. Zenhäusern:** Regulation of New Markets in Telecommunications? Market dynamics and shrinking monopolistic bottlenecks, erschienen in: European Business Organization Law Review (EBOR), Vol. 8, 2007, S. 413-428
- 113. G. Knieps:** Wettbewerbspotenziale im Nahverkehr: Perspektiven und institutionelle Barrieren, erschienen in: Schriftenreihe der Deutschen Verkehrswissenschaftlichen Gesellschaft: Warten auf Wettbewerb: ÖPNV in Deutschland, Reihe B, 2007, S. 11-23
- 114. F. Birke:** Universaldienstregulierung in der Telekommunikation heute: Herausforderungen, Chancen und Risiken – Ein historischer Ansatz, Mai 2007

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118. **G. Knieps, H.-J. Weiß:** Regulatory Agencies and Regulatory Risk, Revised Version: January 2008
119. **G. Knieps:** Regulatorische Entbündelung in Netzindustrien, erschienen in: *Tagungsbände der Gesellschaft für Verkehrswissenschaft und Regionalpolitik an der Universität Freiburg e.V.*, 40. Freiburger Verkehrsseminar 2007, *Entbündelung in Netzindustrien: Chancen und Risiken*, Freiburg, S. 11-25
120. **G. Knieps:** The Net Neutrality Debate and the German Communications and Competition Law, erschienen in: *Journal of Law & Economic Regulation*, Vol. 3/1, 2010, S.118-126
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123. **G. Knieps, P. Zenhäusern:** ‘Stepping stones’ and ‘access holidays’: The fallacies of regulatory micro-management, erschienen in: P. Baake, R. Borck (eds.), *Public Economics and Public Choice: Contributions in Honour of Charles B. Blankart*, Springer Verlag, Berlin u.a., 2007, S. 257-277
124. **G. Knieps:** Qualitäts- und Preisdifferenzierung im Internet, erschienen in: Jörn Kruse, Ralf Dewenter, Hrsg., *Wettbewerbsprobleme im Internet*, Nomos Verlag, Baden-Baden, 2009, S. 103-113
125. **G. Knieps:** Wettbewerb im transeuropäischen Eisenbahnverkehr, erschienen in: *Zeitschrift für Verkehrswissenschaft*, 81. Jg., Heft 1, 2010, S. 1-12
126. **G. Knieps:** Sektorsymmetrische Regulierung in Netzsektoren: Ein Vergleich zwischen Gas und Elektrizität, erschienen in: *Netzwirtschaften & Recht (N&R)*, 6. Jg., Nr. 3, 2009, S. 138-143
127. **G. Knieps:** Theorie und Praxis der Price-Cap-Regulierung, in: *Netzwirtschaften & Recht (N&R)*, 7. Jg., Nr. 2, 2010, S. 66-71
128. **G. Knieps, P. Zenhäusern:** The reform of the European regulatory framework for electronic communications: The unexploited phasing-out potentials, erschienen als: *Phasing out sector-specific regulation in European telecommunications*, erschienen in: *Journal of Competition Law & Economics*, Vol. 6/4, 2010, S. 995-1006

- 129. G. Knieps:** Regulatory Reforms of European Network Industries and the Courts, February 2010 – Revised Version: May 2010
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- 139. G. Knieps:** Warum und wozu Regulierung im europäischen Mehr-Ebenen-System? – Gründe für bzw. Ziele von Regulierung, erschienen in: C. Manger Nestler, L. Gramlich (Hrsg.), Europäisierte Regulierungsstrukturen und -netzwerke: Basis einer künftigen Infrastrukturvorsorge, Nomos Verlag, 2011, S. 25-35
- 140. G. Knieps:** Wettbewerb und Pfadabhängigkeit in Netzen, erschienen in: H. Enke und A. Wagner (Hrsg.), Zur Zukunft des Wettbewerbs. In memoriam Karl Brandt (1923-2010) und Alfred E. Ott (1929-1994), Metropolis-Verlag, Marburg, 2012, S.171-178
- 141. G. Knieps, P. Zenhäusern:** The reform process of the railway sector in Europe: A disaggregated regulatory approach, December 2011
- 142. G. Knieps:** Competition and the railroads: A European perspective, revised version of a paper presented at the GRIP-SPEA conference held at the German Research Institute for Public Administration Speyer, July 19-20, 2012