



Unbundling, public infrastructure financing and access charge regulation in the German rail sector

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ABSTRACT

This paper provides an analysis of the outcomes of the German model with a focus on unbundling, public infrastructure financing and access charge regulation. It reviews recent regulatory initiatives in Germany such as the regulator's proposal to introduce a price-cap regulation and the draft of a new regulation law for the German rail sector. The analysis shows that the German Holding model appears to be successful in terms of transport performance and financial outcomes. However, it is characterised by regulatory deficits which have hampered a faster progress in introducing competition in the rail sector. The new regulation law contains a series of measures which will provide more transparency in access and access charges, strengthen the position of the regulator and move the current ex-post regulation towards an ex-ante regulation based on the efficient costs of service provision. However, exclusion of costs for replacements and new investments from access charge regulation leaves only the smaller part of costs for a consistent regulation and will weaken the impacts of regulation.

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1. Introduction

Looking back at almost two decades of rail restructuring, Germany belongs in Europe to the first movers in reforming its national railways. While strongly defending an organisational model of vertical integration between infrastructure and operation through the DB Holding on top of DB's transport and infrastructure companies, Germany has realised most comprehensive opening up of a rail networks in Europe. Since the beginning of the reform in 1994, the market share of non-DB companies has steadily increased. In 2011, about 20% of train-km on DB infrastructure was operated by non-DB companies (see [DB AG, 2011](#)). The liberalisation index elaborated by IBM and Humboldt University ranks Germany regarding market opening at the third place after Sweden and Great Britain (see [IBM et al., 2011](#)). The German reform model is commonly considered as successful regarding the increase of rail transport performance and regarding the financial outcomes. Government transfers have almost remained constant in real terms, in contrast to other countries such as the UK and Sweden (see [Nash et al., 2013](#)) indicating that the German approach has led to a relief of taxpayers' burden for railway financing. These positive results of rail policy in Germany have been used in the political discussion to argue against a full institutional separation between DB's infra-

structure and transport companies and against new regulatory initiatives (see for example [Miram et al., 2012](#)).

Various legal initiatives and procedures both at the national and at the European level appear to contradict the positive image of the German Holding model. On the national level, complaints of competing rail companies, court decisions as well as actions taken by the German rail regulator BNA¹ have revealed problems of the German Holding model. As a response to this, the government has provided a draft for a new regulation law which has been under discussion at the time of writing. At the European level, the European Commission has referred Germany (together with other 12 Member States) to the EU's Court of Justice for failing to correctly implement various parts of the basic EU legislation on opening the EU's rail market to competition.² The Recast of the first railway package ([CEC et al., 2010](#)) and the surrounding discussion at the European institutions have a similar focus. They aim at introducing rules for more transparency in the relationship between infrastructure providers and operating companies.

Against this background this paper analyses the current regulatory framework for the German rail market with a focus on unbundling, infrastructure financing and access charge regulation. It summarises the outcomes of the rail reform, identifies regulatory

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¹ To these actions belong the decision to abolish the regional surcharges raised for regional lines on top of the access charges, the prohibition of the performance regime and the decision that DB has to provide a new, more transparent scheme for station charges.

² This legislation consists mainly of the so-called "first railway package" (Directives 91/440/EEC, as amended, and 2001/14/EC).

deficits and analyses how the suggested new regulation law responds to these deficits. The remainder of this paper is organised as follows. Section 2 presents the theoretical background for access charge regulation. Section 3 introduces the regulatory framework for rail in Germany. It summarises the performance of the German rail sector since the reform and analyses the deficits in the regulatory framework. Section 4 discusses the new regulation law and its potential for improving competition at the rail market. Section 5 concludes.

2. Theoretical background for regulation

2.1. Rail infrastructure as non-contestable natural monopoly

Unregulated markets where a service or good is provided by a monopolistic supplier are characterised by welfare losses compared with competitive markets. Lacking pressure from competition hampers an efficient supply of the service and leads to excess prices set by the monopolistic supplier and eventually too low investment and low quality. The major theoretical foundations for regulation are laid down in Baumol et al.'s theory of contestable markets (Baumol et al., 1982). This theory defines sub-additive cost functions as a sufficient condition for the existence of a natural monopoly, e.g., a market situation where the cost of providing a service by one sole supplier is lower than the total cost of more than one supplier providing the same service. However, even in such a situation regulatory measures are only requested if the market is not contestable, e.g., if both entry and exit from the market are not possible due to irreversible investments and related high sunk costs. Furthermore, regulatory measures have only to be implemented if the expected improvement of market situation exceeds the regulation-related transaction costs.

In the rail sector it is commonly accepted that rail infrastructure (tracks and stations) form a non-contestable natural monopoly as defined above. Furthermore, rail infrastructure is an essential facility required by both the incumbent's (DB) TOCs and the competing TOCs to provide transport services. In this case, regulation follows two aims: (1) to avoid discriminatory behaviour of the incumbent which would prevent competitors from market entry, (2) to control access charges for efficiency and to provide efficiency incentives which cannot be generated by the market due to its monopolistic feature.

However, there are two characteristics of rail infrastructure which need to be considered in the design and implementation of regulation. First, due to high fixed costs for providing and maintaining infrastructure marginal costs are below average costs implying that first best pricing principles lead to a financial deficit of the track provider. Rail infrastructure provision is thus a loss-making business which has to be subsidised.³ Second, rail transport faces intermodal competition from road and air (see for example Friebel and Nifka, 2009; Ivaldi et al., 2005). This leads to the question whether this supersedes the regulation of access and access charges. (WIK Consult, 2006) argues that excessive access charges lead to price increases for transport services which would cause shifts of demand to the competing modes, and concludes that intermodal competition prevents the infrastructure providers from raising excessive charges (for a critical discussion of this argument see Eisenkopf et al., 2008; Commission on Monopolies, 2009). Irrespective of these arguments, it should be borne in mind that an unregulated monopolistic infrastructure provider within a vertically integrated rail company

has incentives to raise excessive charges for competing companies and to generate advantages for its own companies.

2.2. The unbundling problem

While economic theory provides strong arguments for regulating a monopolistic rail infrastructure provider, research is less clear regarding the unbundling issue. The major question is whether regulated access charges for infrastructure provided by a vertically separated company are welfare-superior over a situation where regulated access charges are raised by a vertically integrated infrastructure company, or vice versa. Econometric evidence on the cost effects of vertical separation between infrastructure and transport operation is ambiguous. Several studies such as Bitzan (2003), Ivaldi and McCullough (2001) and Jensen and Stelling (2007) conclude that vertical separation may raise costs. However, except for the latter study, they primarily analyse vertically integrated US freight railroads. (Friebel et al., 2010) show for a set of European railways that sequentially introduced deregulation measures had a positive impact on productivity while reforms introduced as a package did not improve efficiency. However, they did not explicitly consider vertical separation but rather third-party access and whether an independent regulator was established. (Growitsch and Wetzel, 2009) report significant diseconomies from the separation of infrastructure and operations in Europe, but their study is based on a static cross section comparison and does not allow for the impact of differences in geography or rail policy, and consequently in the volume and nature of the traffic on costs. In contrast to these studies, (Cantos et al., 2010) allows for differences in the nature of the traffic by introducing traffic density and mean train loads into a second-stage regression of efficiency scores. They find that productivity growth is faster when vertical separation is combined with increased competition in the freight market. (Mizutani and Uranishi, 2011) conclude that vertical separation leads to cost reductions in particular for railways with low train density, while railways with higher train density suffer from cost increases.⁴ Finally, it is often argued that higher transaction costs would be a major disadvantage from vertical separation. (Merkert et al., 2012) find that vertical separation increase costs, but the difference would only account for around 1% of rail system costs.

2.3. Price-cap regulation

Economic theory suggests a price-cap regulation as the most suitable form to regulate access charges for essential monopolistic infrastructures. This form of charge regulation defines ex-ante a price cap for a certain regulation period (often 5 years). The price-cap formula for a company with $i = 1, \dots, n$ products of quantity q and price p is.

$$\frac{\sum_{i=1}^n q_{it-1} p_{it}}{\sum_{i=1}^n q_{it-1} p_{it-1}} \leq I_t - X_t \quad (1)$$

where the left-hand side reflects the Laspeyres price index. Formula (1) restricts the increase of the regulated access charge to the increase of inflation for the inputs I_t minus the increase of productivity X_t . I and X have to be chosen by the regulator.⁵

⁴ It should be noted that within Europe, only Switzerland and the Netherlands have such a high train density.

⁵ There are various extensions and refinements of a price-cap regulation such as profit or earnings sharing schemes, sliding scales etc. which will not be discussed in this paper.

³ From this situation, several authors have concluded that regulatory measures are not necessary because the infrastructure provider suffers from insufficient cost recovery and is therefore not capable to generate any monopoly profits (see for example WIK Consult, 2006; Gersdorf et al., 2007; Miram et al., 2012).

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