RUSSIAN RAILWAYS REFORM AND THE PROBLEM OF NON-DISCRIMINATORY ACCESS TO INFRASTRUCTURE

by

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ABSTRACT**: Restructuring of the Russian railways system is well under way. Among the policies just now coming into practice are two that are standard in railways restructuring in other countries: the provision of access to the infrastructure by independent train operating companies, and assurances of non-discriminatory access terms for such companies. However, ‘discrimination’ – in the traditional economic sense – is a standard and often welfare-enhancing pricing strategy for the recovery of fixed costs in a sector, like railways, with declining average costs. If competition regulators are unable to distinguish between discrimination that harms competition and discrimination designed only to recover fixed costs, policy makers in Russia and elsewhere will face a choice between large government subsidies and large welfare losses. In these circumstances, other restructuring models should be considered

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**Résumé en fin d’article; Zusammenfassung am Ende des Artikels; resumen al fin del artículo.

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1 Vertical restructuring and non-discriminatory access

In the ongoing worldwide debate regarding railway sector restructuring, perhaps the only words that are used more frequently than ‘vertical restructuring’ are ‘non-discriminatory access’. The former words refer, of course, to the common proposal for some form of ‘unbundling’ of the ownership and operation of the railway infrastructure – track, roadbed, signaling, stations – from the ownership and operation of the trains running on that infrastructure. Whether such unbundling should be of an accounting nature only or should be the creation of wholly separate enterprises is a matter of lively debate. The direction of the debate would seem to be in the direction of complete vertical separation: for example, EU Competition Commissioner Monti has argued that ‘the only way I can see of removing those risks [of market foreclosure and abuse of dominance] entirely when it comes to the allocation of capacity is the complete and irreversible structural separation of infrastructure from operations’ (Monti 2002).

Whether or not there is complete separation, reformers everywhere are clear in their favour of the policy summarized by the second set of words, ‘non-discriminatory access’. That is, whether the enterprise owning and operating the infrastructure is permitted to own and operate trains or not, most reformers and most reform plans call for a restructured railway sector that allows all train operating companies access to the infrastructure on the same terms: there is to be no discrimination among different train operators. Again Commissioner Monti provides a forceful example:

For freight, the objective is to apply the rules to ensure that open access means precisely that. The application of competition rules in the rail transport sector as a whole is aimed at contributing to the effective opening of the markets by ensuring that rights conferred upon newcomers are actually exploited in a non-discriminatory way…. For the market to work properly, there must be supply side competition in the form of new entrants capable of mounting a realistic competitive threat; and conditions of access to networks that are transparent and non-discriminatory’ (Monti 2002).

Similarly, a World Bank rail specialist notes the importance of ‘pricing rail infrastructure capacity in a transparent, efficient, and nondiscriminatory way’ (Thompson 1997).

The Russian railways system is in the midst of a complete restructuring, and both of these principles are very much in evidence. As part of a ten-year, three-stage reform plan, the railway operating company,
RZhD, has only recently been completely separated from the Ministry of Railway Transport. A small number of new train operating companies has been granted access to the infrastructure, carrying only oil and oil products at this point but with the potential to carry other commodities as well. The stated long-term goal of the plan is for RZhD to control 50 per cent of the wagon fleet and to continue to run trains in competition with private train operating companies, which would be guaranteed non-discriminatory terms of access to the track and other infrastructure. Thus – although the exact nature of the post-reform industry structure remains not completely clear – the idea is evidently to allow access by non-integrated train operators but not to force complete vertical separation, and to enforce non-discriminatory terms of access in order to create and protect competition between integrated and non-integrated train operators.1

It is important to examine, however, exactly what is meant by the term ‘discrimination’ in the context of these discussions of ‘non-discriminatory access’ to the infrastructure.2 Economists have a well-accepted definition of price discrimination as, broadly, ‘the practice of selling the same product at two or more prices where the price differences do not reflect cost differences’ (Kaserman and Mayo 1995). Furthermore, following Pigou (1920), it is standard to distinguish among three levels or categories of price discrimination: (a) first degree, ‘perfect’ discrimination, where each customer is charged exactly his willingness to pay, (b) second degree discrimination, where customers are offered a choice of prices based on the quantities that they purchase, and (c) third degree discrimination, an ‘imperfect’ variant on first degree discrimination, where the seller attempts to segment groups of customers according to their elasticities of demand and to charge different prices to different customer groups based on these elasticities.

In general, the welfare consequences of price discrimination are ambiguous. Customers who pay a lower price than that which would prevail under uniform prices of course gain, and society gains accordingly, especially if some of these customers would not be served at all under uniform prices. On the other hand, customers who pay a higher price are losers, and social welfare decreases when they cut back their quantity demanded as a result.

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1 See, for example, Ministry of Railway Transport of the Russian Federation (2002a, b) and Pittman (2003b).
2 The same issues are raised in discussions of vertical restructuring in other infrastructure sectors, such as electric power, gas, and telecommunications. See, e.g., Newbery (2000), von Hirschhausen (2002), and Pittman (2003a).
Those reformers arguing for ‘non-discriminatory access’ to infrastructure might argue that they have a more specialized and distinct concept of discrimination in mind: any favorable treatment, whether of access price or other access terms, which the incumbent train operator receives in comparison with that received by new entrant train operators. It is clear why this should be a matter of concern when the infrastructure operator and train operator remain under common ownership: under a variety of circumstances, the regulated infrastructure operator will have incentives to give favorable treatment to its affiliated train operating company, regardless of whether there is some kind of accounting or other structural separation. Favoritism is a lesser concern with complete vertical separation, but experience has shown that there may be a problem of former affiliates continuing to provide each other with preferential treatment. In either case, so long as the incumbent receives the same access terms as new entrants, these reformers would argue, other types of discrimination – such as charging higher access terms for trains carrying one commodity than those carrying another – may not lay any special burdens on new entrants, and therefore may not harm competition, and thus should not be of any special policy concern.

Unfortunately it is not at all clear that regulators either can or are willing to make the distinction between these two types of discrimination in practice. To cite an example to which we will return, the German competition authority, the Bundeskartellamt, recently forced the German railway, Deutsche Bahn, to abandon an access pricing plan ‘menu’ that would have allowed all freight train operating companies to choose between paying a two-part tariff – a fixed fee accompanied by a variable fee based upon usage – and a single, higher, variable tariff, on the grounds that such a plan discriminated against smaller scale users of the infrastructure (Haase 2001).

This issue may be a crucial one for rail sector reformers in Russia and other transition and developing countries. It is well accepted by economists that some form of price discrimination – in the first sense – may be a desirable and even necessary tool for recovering the costs of infrastructure in a sector like railways where a large portion of these costs are fixed and sunk. It has perhaps not been as widely understood or articulated that this principle holds regardless of whether the pricing takes place at the level of final customers or of intermediate customers –

3 See, e.g., Nash and Matthews (2002) and BTRE (2003) for valuable discussions.
4 Again, it may be important in the discussions regarding reforms in other infrastructure sectors as well, but, as I have argued elsewhere (Pittman 2003c), it may be most important in the railways sector. See also BTRE (2003).
that is, non-integrated users of the infrastructure grid. If restructured railway systems in Russia and other transition and developing countries are not permitted to utilize price discrimination in setting charges for access to the infrastructure, their task may be much more difficult than is generally understood.

In the following, we review the discussions regarding the regulation of end-user pricing and then examine what lessons may be available for the regulation of access pricing. The distinction between the two types of price discrimination turns out to be a critically important one, raising questions that appear to be not clearly present or understood in ongoing discussions of rail reform in these countries and that involve very large sums of money. The paper focuses on freight railways only. This is partly because for transition countries like Russia and many other Central and Eastern European countries, the freight share of the rail business is considerably higher than in countries like the UK and other EU countries, where so much of the literature on rail reform has focused, and partly because, unlike rail passenger transport, rail freight transport is generally expected to pay its own way, so that the question of access pricing is less easily obscured by the presence of government subsidies to operations.

2 End-user pricing

Consider a traditional, vertically integrated, natural monopoly enterprise – for example, a railway in a sparsely populated region – with marginal cost curve MC constant over the relevant range of demand and below the falling average cost curve AC. Setting price equal to marginal cost – what was in the past often called the ‘first best’ solution, because it eliminated final-product pricing distortions – results in an operating deficit (in Figure 1) of the rectangle AEBP1, so that government subsidies are required to pay the fixed portion of costs.5 As the reduction or

5 My colleagues Grigory Kosenok and Judith Shapiro suggest that the ‘first best’ label is also a nod to the ‘theory of the second best’ of Lipsey and Lancaster (1956). In the context of the current paper, ‘second best’ policy measures would likely only make the problems discussed more serious, since they would generally argue for pricing rail services and rail access at prices below measured marginal costs in response to the negative externalities imposed by motor transport. See, for example, Thomas (2002): ‘It has been suggested that, from an incentive viewpoint, differentiation of charges to reflect environmental externalities within the rail mode is desirable even in the absence of environmental charges faced by other modes.... However, if such differentiation of charges had the desirable behavioral effect, this would lead to the infrastructure manager under-recovering its costs’.

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elimination of government subsidies has been one rationale – and sometimes the primary rationale – for reform in the rail sectors of many countries, setting prices equal to marginal cost has not been considered a desirable solution in most cases.

Furthermore, the very label ‘first best’ is clearly a misnomer, or at least may be premature, so long as the corresponding government subsidies create their own social costs. The latter come in at least two forms: the well known incentives for inefficient operations caused by the presence of a soft budget constraint on the subsidized enterprise, and the distortions of taxation, that is, the shadow price on the government revenues $AEBP_1$. Estimates of this shadow price are typically in the range of 15–50 per cent in countries with well developed systems of public finance, and much higher – sometimes over 100 per cent – in countries, like Russia, lacking such systems.

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6 See, e.g., Estache et al. (2001).
7 See, e.g., Nash and Matthews (2002): ‘Concern regarding technical efficiency is a further reason why governments might be unwilling to use subsidy to cover financial deficits in the rail industry. That is, there is a fear that subsidies lead to technical inefficiency by relieving rail managers of hard budget constraints’.
8 See, e.g., Gagnepain and Ivaldi (2002) for the former and Jones et al. (1990) for the latter.
What are the alternatives? Note first that the solution against which regulation was created to guard was the unconstrained monopoly solution: quantity determined not by the intersection of the demand curve D with MC but by the intersection of the marginal revenue curve MR with MC (also Figure 1), price at the (high) level corresponding to that (low) quantity level on the demand curve, a deadweight welfare loss from pricing distortions of the triangle MBF.

The traditional regulatory outcome prevents monopoly profits by setting price at average cost, or more specifically by setting price at marginal cost plus a mark-up sufficient to cover fixed costs, a combination that is sometimes termed ‘fully allocated cost’: price is determined by where the demand curve crosses AC, with output set correspondingly (Figure 2). The smaller deadweight loss triangle GBH that results from non-marginal-cost pricing is superior to the monopoly deadweight loss MBF and is the price to be paid for avoiding the difficulties and distortions of government subsidies.

After much debate, economists came to understand that some of these distortions and deadweight losses could be reduced, though not necessarily eliminated, if some form of non-linear and/or non-uniform pricing were allowed. One solution not so different from the ‘first best’ in concept is the ‘two-part tariff’: customers are charged one fixed tariff for access to the market and a second, variable tariff per unit of output, a form of second-degree price discrimination. As with

![Diagram of 'Fully allocated cost' pricing](https://example.com/diagram.png)

Figure 2 – ‘Fully allocated cost’ pricing

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the ‘first best’ solution, if the fixed tariff can be set in such a way that it is non-distortionary and still covers the fixed costs of the monopoly enterprise, the variable tariff can be set at marginal cost in order to remove the pricing distortion. Also as with the ‘first best’ solution, however, avoiding distortions is easier said than done; if the fixed tariff causes some potential customers not to participate in the market at all, even though their marginal valuation of a unit of output exceeds the marginal cost of production, then the pricing distortion is re-introduced in a different form. One alternative is to offer a ‘menu’ of different two-part tariff packages, with those users who are not discouraged by a high fixed tariff paying that in order to enjoy a lower variable tariff.

A second solution is often broadly termed ‘Ramsey pricing’ (Laffont and Tirole 2000). The idea here is that, just as any firm may increase its profits if it can discriminate among customers with different elasticities of demand, so can consumer surplus be increased in a regulated industry with a third-degree price discrimination scheme as compared with uniform pricing. Ramsey prices are defined as those that maximize surplus subject to the break-even constraint for the monopoly enterprise, so they are by definition not welfare inferior, and potentially welfare superior, to the traditional regulatory, average-cost-pricing solution.

3 Access pricing

Two-part tariffs and Ramsey pricing are by now a widely accepted and important part of the regulator’s toolbox regarding setting prices for customers of final output in infrastructure industries. This makes the emphasis on ‘non-discriminatory access’ to the railway infrastructure all the more notable, and the careful distinction between the two classes of discrimination suggested earlier all the more important. Consider the case of a vertically separated railway infrastructure enterprise – a hypothetical construct until just a few years ago, but now observable in the UK and Sweden, and planned for the near future in a growing number of other countries, including (perhaps) Russia. Even if, as many reformers argue, the freight train operating sector can support competition, under many circumstances the infrastructure sector itself cannot: its proportion of fixed costs to total costs is high enough that there are economies of scale over the relevant range of demand in most situations. The share of fixed costs in total costs in the rail sector is generally considerably higher than
that in two other sectors often also discussed as candidates for vertical separation, electricity and telecommunications (Hylen 2001, Newbery 2000, BTRE 2003, Thompson 2003).

This places the vertically separated railway infrastructure enterprise squarely in the situation of the natural monopoly discussed earlier, with the pricing issue simply pushed one step backwards, from user prices (for the outputs of the integrated rail enterprise) to access prices (for the outputs of the infrastructure enterprise). A broadly accepted estimate for the proportion of fixed (i.e. non-traffic sensitive) to total infrastructure costs in the rail sector might be as high as 80–90 per cent: that is, train operators paying the full value of the variable costs imposed on the infrastructure from their operations will pay no more than 10–20 per cent of the total costs of the infrastructure (Hylen 1998, Adler et al. 2002, Nash and Matthews 2002, BTRE 2003). In a world of vertically separated rail infrastructure enterprises, from where or whom is the remaining 80–90 per cent to come?

The economic analysis does not change in the move from user pricing to infrastructure pricing, and neither does the set of available options. As in the previous discussion, there are four alternatives to unconstrained monopoly pricing: fully allocated (average) cost pricing, two-part tariffs, Ramsey pricing, and the ‘first best’ solution, marginal cost pricing with government subsidies. Let us consider each one in detail. We will use data for Sweden’s vertically separated infrastructure operator, Banverket, to give us rough indicators of the resource magnitudes involved in these alternatives; the total route kilometres of Bankverket are, for example, just a bit below those of the Romanian railway system (9,978 vs. 11,364 in 1998), as are the volumes of freight carried, measured in ton-kilometres (14,400 million vs. 15,927 million in 1998). For Russia, multiply the size of the rail system by eight (86,000 km) and the volume of ton-kilometres carried by eighty (1,204,547 million) (Thompson 2001).

According to its most recent annual report, the total costs of Banverket in 2001 were almost 8 million thousand SEK – almost US$750 million at the exchange rate at the end of 2001. This figure includes ‘depreciation and write-downs’ on the existing capital stock of about 2.5 million thousand SEK, but does not include ‘investments

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9 Note, however, that the welfare implications of discriminatory pricing of an intermediate good are not as well understood as for final goods. I am indebted to Tim Brennan and Marius Schwartz for helpful discussions on this point.
in tangible assets’ of almost 3.9 million thousand SEK, *i.e.* over US$350 million.\textsuperscript{10} Since Banverket was set up in 1988, its mandate has been to set trackage fees at the level of only marginal cost (BTRE 2003, Peter 2003). In 2001 it received in track charges just under 456 million SEK, or just over $43 million. Using financial figures for 2001 and volume figures for 1998 – we are after only orders of magnitude here – yields an average infrastructure cost per thousand ton-km of about $52, and, assuming constant marginal costs, a marginal infrastructure cost per thousand ton-km of about $3. But let us be conservative and move the marginal cost estimate up to 10 per cent of average cost, or $5.20.

In order to examine the possible welfare losses from fully allocated cost pricing, we must use an estimate for the elasticity of demand for access to the rail infrastructure. This demand, as derived from the demand for rail freight transport, seems likely to have at least a bit of elasticity in most situations, in Russia and elsewhere, especially as many goods that travel by rail are competing with substitute goods shipped from other locations, so that price increases may result in lost markets for the goods. This is especially likely to be the case for export goods. Two statements from a recent report on Russia from the International Energy Agency (2002) implicitly describe non-zero derived demand elasticities with regard to coal transport:

> Although the electricity sector is the main domestic market [for coal], its demand for steam coal barely increased, despite increases in electricity supply of 2\% in 1999 and 4\% in 2000. Coal prices rose sharply in 2000 due to higher transportation charges as the rail carrier took advantage of strong market conditions to pass on costs (pp. 152–3).

Russia faces a disadvantage in increasing its share of the highly competitive international coal market. Competitors generally exploit high-quality coal deposits relatively close to ports, allowing easy access to international markets. This is not possible in Russia, given the remote locations of most of its coal deposits and the huge transport distances and costs involved (p. 169).

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\textsuperscript{10} Indeed, Jansson (1998) remarks approvingly that ‘Before the separation of SJ [the train operator] and Banverket, rail track investment had been lagging behind for decades because of SJ’s chronic financial problems. The most important effect by far of the separation in 1988 has been a surge in rail track investment that no one could have dreamt of before. It should be emphasized, however, that this investment has not been financed by the rail transport sector but by the taxpayer’.
On the other hand, in a country like Russia where rail freight transport tends to face little competition from motor transport over the inadequate highway system – especially east of the Ural Mountains – the demand for rail, and the derived demand for rail infrastructure, will be correspondingly less elastic, *ceteris paribus*.

Econometric estimates of the own price elasticity of demand for rail freight transport, usually derived from US or Canadian data, vary a good deal, but perhaps center around a value of $-1.0$.\textsuperscript{11} Some estimates have been as low as $-0.5$, however, and this is probably a more persuasive working estimate for the situation in Russia and many other transition economies. Assuming that the elasticity of substitution between rail infrastructure and other inputs into rail transportation is low, a conservative estimate for the derived demand for rail infrastructure would then be this transportation demand elasticity of $-0.5$ times the share of rail infrastructure in total rail transport costs, for which a conservative estimate would be at least $0.2$ (Thompson 2003); the product, a very rough estimate of the derived demand for rail infrastructure in Russia, is $-0.1$.\textsuperscript{12}

Using this estimate and a simple constant-elasticity demand function, a fivefold increase in the access price from $5.20$ to $26$ would cause rail freight haulage to decline by about $15$ per cent, from $14,400,000$ thousand ton-km to about $12,250,000$ thousand ton-km, while a nine-fold increase to the fully allocated cost of $52$ would cause tonnage to decline by over $20$ per cent, to about $11,400,000$ thousand ton-km.\textsuperscript{13} The implied welfare loss from the latter scenario is about $(0.5)(46.8)(3,000,000) = 70,200,000$ per year. Again, to obtain a very rough result for Russia, we multiply by eight, and obtain a welfare loss of about $560$ million per year to accompany the $20$-per cent fall in rail tonnage. This estimate is sensitive to the elasticity of derived demand assumed: if we use $-0.2$ instead of $-0.1$, the welfare loss is almost $1$ billion per year, and the fall in rail tonnage over one-third.

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\textsuperscript{12} The formula for the elasticity of derived demand is shown by Kennan (1998), explicating the discussion in Hicks (1935).

\textsuperscript{13} Again, $14,400,000$ million is the level of ton-km for Sweden in 1998.
4 Discrimination, access prices and the competition authority

Potential losses of traffic and welfare of these magnitudes certainly focus the mind on finding alternative solutions for financing the rail infrastructure. As with the more general discussion above, two obvious candidates are two-part tariffs and Ramsey pricing. Indeed both of these pricing regimes are used in the USA and Canada. First, in these countries an integrated rail enterprise that reaches a voluntary agreement to use the track of another integrated rail enterprise will often pay a two-part tariff: an annual fee to contribute to non-traffic-sensitive capital costs and a variable fee to compensate for traffic-sensitive costs. The same is sometimes true concerning payments that are part of involuntary trackage-rights agreements imposed by regulators. Second, the majority of rail freight moving in Canada and the USA (since the Staggers Rail Act of 1980 substantially deregulated US rail freight haulage) travels under contracts whose terms are both unregulated and secret; it is certain that under such circumstances, price discrimination takes place.\(^{14}\)

Unfortunately, either of these strategies for recovering the capital costs of the rail infrastructure would seem to run square up against the strictures of the competition authorities (and, more generally, reformers and regulators) against discriminatory terms of access to the infrastructure grid. The example that suggests that price discrimination of the traditional second degree sort – and perhaps of the third degree sort as well – may be challenged by competition and regulatory authorities is the recent conflict between the German railway infrastructure operator, Deutsche Bahn AG, and the German Cartel Office, the Bundeskartellamt.

In May 1998, Deutsche Bahn introduced ‘TPS 98’, a set of two payment options for train operators desiring to use the track infrastructure. The first option was a two-part tariff: ‘a flat-rate charge regardless of the extent of the line capacity used . . . plus a variable train path price based on actual usage of the infrastructure’ (Haase 2001). The idea, of course, was to charge a fixed tariff that would contribute to fixed expenses, while keeping the variable part of the tariff as low as possible as ‘a powerful incentive to increase rail traffic’ (ibid.). In fact Deutsche

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\(^{14}\) Secret price-cutting is of course a double-edged sword: it is generally considered highly desirable from a competition standpoint but undesirable from a regulatory transparency standpoint. As it is easier to engage in price discrimination if prices are secret, how one evaluates the welfare consequences of secret prices may vary directly with how one evaluates the welfare consequences of price discrimination.
Bahn wanted to go further and insure that the fixed portion of the tariff did not exclude smaller carriers from using the track. Therefore it also instituted the second option, a purely traffic-sensitive tariff, with this tariff higher than the variable portion of the two-part tariff of option one (otherwise, of course, no one would choose the first option).

Some train operating companies complained to the Bundeskartellampt that TPS 98 was a discriminatory system, both because small carriers would pay a higher variable charge than larger carriers, and because, even under the first option alone, the average price paid by different train operators would differ \textit{ex post} depending on their usage levels – a textbook example of second-degree price discrimination. The Bundeskartellampt agreed, and brought pressure to bear on Deutsche Bahn to institute non-discriminatory access rates. Following ‘exhaustive talks and consultations’ (\textit{ibid.}), Deutsche Bahn agreed to replace TPS 98 with a single option: a unitary tariff based entirely on usage rates.

Note the importance here of defining ‘discrimination’. Under the proposed pricing structure, train-operating companies that were affiliated with the infrastructure operator, such as DB Cargo AG, would have paid lower access charges on a per-unit basis than unaffiliated train operating companies, so long as the former carried more traffic than the latter. The integrated company argued that the charging system was not discriminatory because other train operating companies could achieve the same access pricing levels as the affiliated operators if and when they achieved the same volume levels – that, in other words, the standard sort of second degree price discrimination discussed above should be permitted. However, the Bundeskartellampt insisted that the observed differences in actual prices paid by integrated and non-integrated train operating companies constituted illegal discrimination – that, in other words, the large volume of traffic carried by the incumbent, integrated train companies meant that a two-part tariff structure was \textit{in fact} discriminatory against entrants.\footnote{Note also a third possible meaning of ‘discrimination’ in this context. In the enforcement of competition law in the European Union, concern about discrimination has always been partly about abuse of a dominant supply position in general and partly about actions which may harm the integration of the Union – for example, prices that discriminate in favor of national customers and against customers elsewhere in the Union. To the degree that it is this ‘national’ discrimination that is the focus of policies against discriminatory access to rail infrastructure, and other forms of discrimination that are solely elasticity related are permitted, then a two-part tariff or Ramsey type of policy for access pricing may be permitted that will contribute to the fixed costs of the infrastructure provider – but, most likely, only if such policies do not result in national discrimination.}
The words of Commissioner Monti quoted above and the language of Directive 2001/14/EC both suggest that European competition authorities may be unlikely to distinguish among different types of access price discrimination by vertically integrated rail infrastructure operators. The Bundeskartellamt is equally explicit and direct. The initial press release describing the tentative agreement notes that ‘according to the Bundeskartellamt’s initial evaluation of the situation, the introduction as announced by DB AG of a single-component pricing system charging all competitors uniform prices per kilometer of route is in principle a suitable way of stopping the unfair hindrance of competitors’ (Bundeskartellamt press release, September 8, 2000). The press release announcing the final settlement notes approvingly that by eliminating the two-part tariff, ‘Deutsche Bahn is abiding by its commitment to reform the current system, TPS 98, which is to be seen critically from the point of view of competition law, to bring it in line with competition law. Through the introduction of a new route price structure, a major obstacle to effective competition in the rail sector is being removed’ (Bundeskartellamt press release, March 20, 2001). Adler et al. (2002), Nash and Matthews (2002), BTRE (2003), and Peter (2003) all express similar concerns that this decision signals that second degree price discrimination in access charging, and perhaps third degree discrimination as well, will not be permitted by European competition authorities.

Is it possible, though, that Ramsey pricing, i.e., third degree price discrimination, could escape regulatory attacks of this kind? One can imagine an infrastructure enterprise provided with sufficient pricing discretion to charge different access fees in different geographic areas of the infrastructure, and to set these fees using knowledge of the elasticity of demand for rail haulage for the commodities produced in those different areas. Of course, a profit-maximizing integrated infrastructure enterprise would typically have incentives to set commodity-specific access fees so that the commodities that its own trains carried paid lower fees than commodities carried by its non-integrated competitors – or such a pattern of commodity-related differentials could result by accident. It seems quite likely that, as in the case of second degree discrimination, a competition authority or

16 ‘The charging and capacity allocation schemes should permit equal and non-discriminatory access for all undertakings…. Infrastructure managers shall ensure that the application of the charging scheme results in equivalent and non-discriminatory charges for different railway undertakings that perform services of equivalent nature in a similar part of the market….’ (Preamble point 11, Article 4.5).

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regulator who found that access charges differentiated by commodity resulted in higher charges in fact to entrants than to the incumbent would challenge such a scheme as well. In theory, however, it seems possible that the integrated infrastructure enterprise engaging in Ramsey access charging could take care that the average access charges paid by new train operators were no greater than those paid by its affiliated train enterprise – continually making adjustments to keep these charge levels equivalent – and so not be attacked for anti-competitive discrimination. In other words, this operator would be walking the fine line of using traditional, Pigouvian price discrimination (of the third degree) without at the same time discriminating in the anti-competitive sense.

In the experience to date, however, there is almost no infrastructure operator that has been given anything approaching this level of discretion in setting access prices. This may be partly because of the information requirements that such a strategy would impose, arguably burdensome on the infrastructure operator and especially on the regulator. Who is going to tell Moscow what is carried in each of those freight cars? This would seem to call for a vastly more sophisticated regulatory body than is likely to be present any time soon in Russia or most other transition and developing economies (World Bank 2002). Also, even this type of discrimination would be difficult to impose in more densely populated regions (such as European Russia) with multiple classes of shippers. All in all, it seems a clever but likely unworkable solution to the dilemma.

If, then, this action by the Bundeskartellampt foretells a hostility to all forms of price discrimination by enterprises controlling rail infrastructure – and the near-unanimity of the calls for ‘non-discriminatory access’ to the rail infrastructure suggest that it probably does – then rail reformers are placing their infrastructure enterprises in a difficult position. A two-part tariff – second-degree price discrimination – is apparently so discriminatory among different users as to be unacceptable from a competition law or competition policy standpoint. A Ramsey tariff – third degree price discrimination – would apparently impose information requirements on regulators that would make it impossible in practice to distinguish innocent from

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17 According to Drew (2003), the exception is Network Rail, the successor enterprise to the UK’s Railtrack, which in its most recent regulatory review in October 2001 was given permission to charge trains carrying coal and iron ore higher access charges than other trains, ‘because road competition for these commodities is weaker’. 
anti-competitive discrimination. Thus the two regulatory tools that are by general consensus the most effective at minimizing welfare losses from price distortions have been removed from the list of policy options for paying for the railroad infrastructure (Adler et al. 2002, Nash and Matthews 2002, BTRE 2003).

We are apparently left with only a single alternative to fully allocated cost pricing, with its likely high welfare costs and significant reductions in rail traffic, and that is the original ‘first best’ solution, marginal cost pricing with the government paying most of the infrastructure expenses. In a sense this is not a surprising outcome; many Western European analysts have made quite clear their recommendation for a policy of vertical separation of the rail system combined with government support for the infrastructure. For example:

- ‘If infrastructure charges are set above SRMC because of the need to meet a cost recovery target, the costs to society of the trains which are priced off the network may be larger than the costs of raising an equivalent amount of revenue through general taxation. Economic theory alone cannot identify the efficient level of cost recovery…, but it strongly suggests that it is likely to be low, and probably not very far above that which results from SRMC pricing’ (Hylen 1998).

- ‘Optimal rail user charges would, in most places, make a very insufficient contribution to rail track capital, maintenance and repair costs’ (Jansson 1998).

- ‘Infrastructure charging should not be a means to achieve infrastructure cost coverage’ (Ekstrom 2002).

- ‘In practice, the freight business cannot sustain paying for infrastructure….The long term risks of providing infrastructure HAVE to be borne by someone else, usually government (as they do for highways) – however access charges are formulated’ (UK rail commentator, confidential communication with the author, January 2003).

- ‘It is accepted by both the EU and the UK Rail Regulator that charges should be non-discriminatory and based on short run margin cost…. This approach may not, however, allow the network operator to fund development of the network…’ (Drew 2003).

- ‘An economically efficient infrastructure charging rule is to adopt social marginal cost pricing….The objective is to ensure socially optimal use of the infrastructure. The provisions on charging in Directive 2001/14 reflect these recommendations of economic theory’ (Scherp 2002).
Directive 2001/14/EC calls for access prices to be set at the level of ‘the cost that is directly incurred as a result of operating the train service’ (Preamble point 38), though it concedes that they may under some circumstances need to be set at a higher level to reduce the required level of government support. Denmark, Finland, the Netherlands, and Norway have, like Sweden, set their access charges according to marginal cost formulae.\(^{18}\)

Where this outcome may be more surprising is in Russia and the other transition and developing countries that have received advice from Brussels, London, and Washington to separate their railroad systems vertically AND to set non-discriminatory access charges to the infrastructure. As we have argued here, if the term ‘non-discriminatory’ is interpreted as broadly as appears likely, there are only two choices for the third horse of this troika: either fully allocated cost pricing, with the associated high access charges, losses in rail traffic, and welfare losses, or large, over-75 per cent government subsidies for infrastructure. How large would the subsidies be? In Sweden, where (as in many other countries, and especially developing countries) policy makers are trying to make up for years of neglect of the rail infrastructure, in 2001 government appropriations to cover the operating costs of the infrastructure enterprise were about $370 million, while government loans and grants ‘for financing of investment operations’ were about $320 million. In 2002 the Russian government budgeted $3.7 billion for railway sector investments (though these included rolling stock as well as infrastructure). Government subsidies of these magnitudes are what railroad sector reforms are generally intended to terminate, not to perpetuate.\(^{19}\)

There are some factors that may mitigate this problem in particular situations.

\(^{18}\) Hylen (2001); BTRE (2003); Drew (2003). It is not always easy to classify a particular pricing system; thus the Hylen paper describes France as utilizing marginal cost pricing, and a paper from the Italian Rail Network (Marzioli 2003) describes an explicit marginal cost pricing methodology for the Italian infrastructure, while the BTRE classifies pricing in both France and Italy as ‘above marginal cost’ and the Drew paper describes both systems as an ‘adjusted average cost approach’. Part of the problem, as noted by Scherp (2003), is that estimates of marginal cost vary wildly in different countries. See Adler et al. (2002) and Nash and Matthews (2002) on marginal cost measurement issues.

\(^{19}\) See, for example, Adler et al. (2002): ‘There has been much interest at the EU level in reforming the railway industry, stemming from a strong desire to limit subsidies to the industry and enhance its market share’. ©CIRIEC 2004
First, peak-load pricing of infrastructure access is not discriminatory in the economic sense of this term; if peak-load pricing is allowed – based on time-of-day or day-of-the-week usage, for example – this will contribute some infrastructure funding beyond that measured by variable usage wear-and-tear (Nash and Matthews 2002, BTRE 2003). However, most freight traffic is not so time-sensitive that it must pay peak-load prices where and when they are charged. Furthermore, there is no particular connection between the amounts of revenue that would be collected from peak-load pricing and the amounts required for infrastructure investment. And using peak-load prices as a source of non-variable cost recovery gives the infrastructure operator poor incentives to eliminate bottlenecks.

Second, Russia’s intensity of usage of its rail system is among the highest in the world. If average cost curves indeed slope downward, the gap between average cost and marginal cost for rail infrastructure in Russia may be, ceteris paribus, smaller than in other countries. On the other hand, Russia’s railway infrastructure traverses some of the most difficult terrain and climate conditions of all the world’s railroads, and this likely raises fixed infrastructure costs more than variable infrastructure costs.

Third, it is generally conceded that passenger traffic on the railroads will require government subsidies in most situations; this may be an alternative source of funding for fixed infrastructure costs. However, Russia is one of the countries where passenger transport is the least intense user of the rail infrastructure relative to freight, and in any case moving the required subsidies from one government pocket to another – or from the pocket of the national government to the pockets of regional and local governments – can hardly alleviate the more general problem.

20 See Newbery (1998): ‘A distinction can be made between systems where there is a very inelastic demand in the short run, where you have to either meet that demand or the system collapses, and systems like the Internet where there can be long delays in the supply of information and where the demand is elastic. Railways are rather like the latter. Where there are systems that are intolerant of the absence of capacity then the obvious solution is to load all of the charges onto the provision of capacity….This is seen in abundance in the [UK] electricity industry with a very peaky pricing system’.

21 See, e.g., Martellaro (1992): ‘Not only in the construction phase but also during the operational phase has climate been a factor. Bitter, long winters take their heavy toll in maintenance; bridge instability, metal fatigue of moving stock, lubrication inefficiencies, thermal loss, and the realignment and replacement of track are common’.

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It is difficult to find any discussion at all of this issue in official documents or press reports concerning railway restructuring in developing and transition economies. As noted earlier, the Russian government has adopted a ten-year railways reform plan that calls for some form of vertical restructuring of the railway sector, ‘guaranteed non-discriminatory access to the federal rail transport’s infrastructure for independent cargo and passenger operators, and rolling-stock owners,’ and, by the end of the ten-year reform program, ‘competition in the freight traffic sphere’.

There is an explicit discussion on the Railway Ministry web site concerning the treatment by the reform plan of the current cross-subsidization of passenger traffic by freight:

The tariff policy in the sphere of passenger traffic will be carried on, taking into consideration people’s effective demand, with gradual reduction of passenger traffic cross subsidies at the expense of freight traffic. The necessary loss cover subsidies should be provided in federal and local budgets to grant directly to transporters or preferential passengers as a kind of individual support.

However, there is no statement as to whether the separate infrastructure enterprise is to be financed by user fees, government subsidies, or some combination thereof. Again, only the vertical restructuring and the policy of non-discrimination are clear. Perhaps the strongest clue is shown in a multi-color diagram distributed by the Ministry of Railways to describe the ten-year reform plan: in both the second (2003–2005) and third (2006–2010) phases of the plan, arrows show ‘financial flows’ from the ‘state budget’ to a ‘passenger operations support mechanism’, but no such arrows to ‘infrastructure services’ or to the Russian Railways Company (which is to maintain control over infrastructure services).

5 Discussion

It is important to keep the broad picture in view here. Those arguing for restructuring and reform of the rail sector, particularly in

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22 Ministry of Railway Transport of the Russian Federation (2002b). See also ‘Putin has been working on the railroads: the President looks to the private sector to help rebuild Russia’s rails’, Business Week, April 28, 2003.
23 Ibid. See also Ministry of Railway Transport of the Russian Federation (2002a).
transition and developing economies, have tended to focus on three (interrelated) goals: reducing the demands of the railway sector for government funding, increasing the efficiency of operation of the railway sector, and creating competitive options for shippers. The first goal is not consistent with the policy option of marginal cost access pricing and government funding to make up the fixed costs. The second goal is not consistent either with this option, for reasons of incentives for operational efficiency, nor with the option of fully allocated cost access pricing, for reasons of pricing efficiency. Both seem consistent with access pricing schemes utilizing second or third degree price discrimination, but these in turn seem as a practical matter to run counter to the goal of creating competition conditions in transport markets.

As I have argued elsewhere (Pittman 2003a, c), the way out of this dilemma may in many cases lie in abandoning the premise that railways restructuring should be based on the concepts of vertical access and vertical separation.

Many freight shippers can take advantage of intermodal competition, using the options of road and/or water haulage to keep a ceiling on rail rates, and this will be increasingly the case for manufactured goods in Russia, especially European Russia. Unfortunately intermodal competition is typically not an option for shippers of the bulk commodities – oil, coal, minerals, chemicals, timber – that make up the largest share of Russian rail haulage.

However, many Latin American countries have reformed their railways without relying on vertical access or vertical separation to create competition. In Argentina, Brazil, Chile, and Mexico, the restructured railways systems are made up of multiple vertically integrated railway companies that compete with each other primarily at common points. Shippers to or from Mexico City, for example, can choose among three independent, vertically integrated railroad companies to carry their commodities, and this ‘geographic’ or ‘source’ competition, in addition to US-style ‘parallel’ competition in limited areas, has proved surprisingly successful in limiting the market power of individual railroad companies.

Based on the experience in Latin America and North America, the creation of vertically integrated, competing railway companies in Russia, as suggested in Pittman (2001) and Guriev, et al. (2003), would seem likely to have two additional outcomes that are especially


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attractive in light of the thesis of this paper. First, and perhaps contrary to expectations, it seems to be easier for the price discrimination that may be necessary to pay for the fixed infrastructure in the railroad sector to be done implicitly by vertically integrated companies, in the form of differentiated charges to shippers, rather than explicitly by infrastructure companies, in the form of differentiated access charges. In addition to problems with competition authorities, as discussed above, the experience in both the UK and Australia with small numbers negotiations in setting differentiated access charges suggests that the transactions costs of such an approach may be very high (BTRE 2003).

Second, one of the advantages of the Canadian and US systems of competition among vertically integrated railroad companies has been the ability of these companies to cover their fixed costs and make new investments. The same has already been observed in some of the reforming Latin American countries, where, for example, in both Brazil and Mexico the railway systems have moved in a few short years from draining the government treasuries to attracting hundreds of millions of dollars of private investment funds and paying taxes.

If the thesis of this paper is correct, it may be very difficult for railways in Russia and other transition and developing countries to achieve simultaneously the goals of reformers under models of vertical access and separation. This is in part a problem of regulatory capabilities and in part a problem of the huge amounts of investment required by a modern railway system. For this and other reasons, alternative models of restructuring that maintain vertical integration in the rail sector are worth serious consideration.

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Réforme des chemins de fer en Russie et problème d’accès sans discrimination aux infrastructures

La restructuration du secteur des chemins de fer en Russie est en cours. Deux des politiques mises en œuvre sont des politiques classiques de restructuration des chemins de fer utilisées dans d’autres pays: la fourniture d’accès à l’infrastructure pour les opérateurs de transport indépendants et l’assurance d’un accès non discriminatoire pour ces compagnies. Cependant, la ‘discrimination’ – au sens économique traditionnel – est une stratégie de prix classique augmentant souvent le bien-être qui permet de couvrir les coûts fixes dans un secteur, comme les chemins de fer, grâce à une baisse des coûts moyens. Si les régulateurs de la concurrence sont incapables de faire la distinction entre discrimination nuisant à la concurrence et discrimination visant seulement à couvrir les coûts fixes, les décideurs politiques en Russie et ailleurs seront confrontés à un choix entre une subvention large de l’Etat ou une diminution importante de bien-être. Dans ces cas, d’autres modèles de restructuration devraient être envisagés.
Umständen sollten andere Restrukturierungsmodelle in Betracht gezogen werden.

La reforma de los ferrocarriles en Rusia y el problema del acceso sin discriminación a las infraestructuras

La reestructuración del sector del ferrocarril en Rusia está ya en curso de ejecución. Dos de las políticas puestas en práctica son las clásicas ya utilizadas en otros países: facilitar el acceso a las infraestructuras a los operadores de transporte independientes y la garantía de un acceso no discriminatorio para estas compañías. Sin embargo, la ‘discriminación’ -en el sentido económico tradicional- es una estrategia de precios clásica, que permite cubrir los costes fijos en un sector, como el ferrocarril, gracias a una reducción de los costes medios. Si los reguladores de la competencia son incapaces de distinguir entre la discriminación perjudicial para la competencia y aquella que trata solamente de cubrir los costes fijos, los políticos en Rusia y en otras partes se verán abocados a elegir entre una subsidiación amplia del Estado o una disminución importante del bienestar. En estos casos se deberían considerar otros modelos de reestructuración.