

Options for Restructuring the State-Owned Monopoly Railway

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Abstract

Vertical separation in the freight railways sector may sacrifice significant economies of integration. Economies of density suggest that corresponding benefits may be elusive. We examine competitive alternatives to vertical separation. One option is the creation of competition among restructured vertically integrated railways, an option generally limited to relatively large countries absent willingness to create multinational railway networks. A second is the opening of the infrastructure of the integrated railway to access by train operating companies. Rarely are the benefits of separation of train from track likely to be so great as to outweigh the losses from the vertical separation itself.

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1. Introduction

A broad consensus has emerged that the traditional arrangement of a state-owned monopoly railway is inefficient and unworkable and so should be replaced by an institutional arrangement that allows for the introduction of market forces.¹ State-run monopoly railways have been judged *inefficient* because of the poor incentive properties of state ownership and the soft budget constraint generally, and because state-owned railways have been unable to resist political demands for over-manning, above-market wages, and restrictive work rules. They have been judged unworkable because of the combination of the resulting high operating costs with the inability of state owners to resist the temptation to continually postpone expenditures on maintenance and new investment, eventually allowing even long-lived plant and equipment to deteriorate.

The introduction of private investment, control, and ownership into the system has been considered a part of the solution to these problems. However, while a private monopolist may have better incentives to operate efficiently than a public monopolist – in both the short and long run –, arguably any type of monopolist continues to enjoy the incentive to increase price and restrict output vis-à-vis the levels that a firm facing significant competition would choose. In this chapter we assume that private sector “participation” in the railway sector has been chosen as a policy decision – though we will address some details, in particular the question of control of the infrastructure itself – and focus on the question of how to restructure the system in such a way as to protect customers from the presence and exercise of monopoly power.

First we must separate freight rail service from passenger rail service for analysis. Most railway systems around the world offer both types of service, but the two service types are generally characterized by very different cost structures and competitive conditions, so that the preferred policy choices for a system that provides mostly freight service (for example, the US and Canada) may differ from that for a system that provides mostly passenger service (for example, most Western European countries).

In particular, it is very rare under current conditions in any country that the passenger service operations of a railway can pay even their direct costs, much less pay their fully allocated costs, and much less support competing service providers. The combination of widespread automobile ownership with quick and inexpensive air travel has taken a great deal of personal travel off the rails. Thus in almost every country – Japan is the principle exception – what passenger rail service remains, both commuter and long distance, is subsidized by governments, generally in an effort to reduce traffic

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¹ See, for example, Kopicki and Thompson (1995), ECMT (2004), and ECMT (2005).

congestion, fuel consumption, and air pollution and sometimes to keep transportation available to the poor as well. (When the latter concern is the principle rationale for subsidies, buses rather than passenger trains are often the more efficient and economical policy choice.)

This means that the question of how to restructure the state-owned monopoly *passenger* railway is generally the question of the most efficient way to provide subsidies, along with, sometimes, the most efficient way to administer and target universal service obligations. There is a widespread presumption among economists that the correct policy choice here is the creation of competition *for* the market through a franchise bidding scheme with a negative price (Chadwick 1859; Demsetz 1968), though Williamson (1976) has shown that in the presence of long-lived assets there may be problems in the rebidding process that make the process less competitive and/or less efficient than it might otherwise appear, and Affuso and Newbery (2002a and 2002b) confirm the importance of this issue in the context of British Rail privatization. Otherwise, however, passenger rail policy would seem to raise few competitive issues, and we focus mostly on questions involving freight rail policy in this chapter.

For freight services, the answer to the question of how businesses may be protected against abuses by a monopoly railway is for many classes of commodity shippers a straightforward one: make sure that shipment via other modes is an economic alternative. It is important to note, however, that the determination of whether particular classes of shippers have economic alternatives may require a complex and fact-specific investigation. In general, higher valued commodities such as manufactured goods are more likely to be shipped economically by motor carrier than lower valued commodities such as bulk minerals and construction materials, and, in both categories, motor carriers are generally able to compete better for shorter distance hauls than for longer distance (Pittman 1990, Kwoka and White 2004). Water transport, though generally slower than rail or motor, is often competitive for the long-distance transport of bulk commodities, but of course only under the right geographic circumstances and hydrologic conditions.

The general policy lessons from the consideration of “intermodal competition” – note that economists use this term in a different sense than do railroaders – is twofold. First, tax and infrastructure policies that improve the ability of motor carriers and water carriers to compete for the custom of freight shippers may directly reduce the level of market power held by rail freight carriers and so be directly welfare-enhancing in that respect. Second – as generally accepted in rail merger analysis in the US and Canada – individual shippers and categories of shippers who can economically substitute among different transport modes for shipping their goods are not at risk of exploitation by a rail “monopolist”: this is a “monopolist” without market power.

The interesting and difficult questions appear when there are significant magnitudes of commodities to ship that are rail-captive – that have no economic shipping alternatives other than rail. In countries such as the US and the UK with a history privately constructed, vertically integrated railroads competing against each other for freight traffic, shippers have relied upon two different forms of intramodal (i.e. railway

vs. railway) competition, generally labeled “parallel” (or sometimes “end-to-end”) competition and “source” competition. Countries lacking such a history have been more likely to attempt to create rail competition by introducing new train operating companies on the same track infrastructure used by the incumbent train operating company. Let us consider these differing options in more detail.

2. Options for Creating Rail vs. Rail Competition

The most obvious and direct form of intramodal rail competition occurs when two independent vertically integrated railways provide service between the same city-pairs.² So, for example, companies seeking to ship freight between Chicago and Los Angeles can choose between the Union Pacific/Southern Pacific Railway and the Burlington Northern/Santa Fe Railway, while those seeking to ship freight between Toronto and Vancouver can choose between the Canadian National Railway and the Canadian Pacific Railway. This *parallel competition* is typically abetted by institutions like reciprocal trackage rights and terminal railroads that allow any railway company that reaches a particular city to have access to most shippers in that city.

A second form of intramodal rail competition occurs when a shipper can send its product to an alternative destination using a different railroad, or a customer can receive a product from an alternative source using a different railroad. This *source competition* – sometimes called “geographic” competition – is not so “obvious and direct” as parallel competition, but it has been shown to provide important constraints on the behavior of rail companies that would otherwise enjoy market power.³ A company seeking to ship commodity X – and in particular *bulk* commodity X – from origin O to destination D may appear to face a rail monopolist if only one railway connects these two points. However, if the shipper has access to other railways at point O – even if they do not reach D, perhaps going in completely different directions –, and if there are potential customers for its commodity located on these other railways, then these options may in many circumstances provide sufficient competition to the O-D “monopolist” that its market power is significantly constrained. Similarly, for the customer at D seeking to receive goods to have protection from this O-D “monopolist”, the customer must have access to other railways serving D from different origins – with, of course, corresponding access to substitute products to those available from O.

Source competition is clearly an imperfect substitute for parallel competition, and a close, fact-specific investigation is required to determine whether in particular circumstances the apparent market power of an O-D rail monopolist is in fact tempered

² I have elsewhere (Pittman, 1990) quoted Alfred Marshall (1920, V, XIV, 5) on this form of competition: “One of the most interesting and difficult applications of the theory of monopolies is to the question whether the public interest is best served by the allotment of a distinct basin to each great railway, and excluding competition there. . . . It must be admitted that, other things being equal, the ‘monopoly revenue price’ fixed by a railway will be lowered by every increase in the demand for its services. . . . But, human nature being what it is, experience has shown that the breaking of a monopoly by the opening out of a competing line accelerates, rather than retards the discovery by the older line that it can afford to carry traffic at lower rates.”

³ See, e.g., STB (1998).

significantly by the presence of other railways at both origin and destination. If a producer at point O absolutely requires that its output reach a customer at point D, the fact that another railway serving O could take the output to point E may not be relevant, and similarly for a customer at point D who absolutely requires a particular product available only from point O. Nevertheless many shippers confirm that if they have a second railway soliciting their business – even if the origin or destination would be a different one from that offered by the first railway – the very presence of the second railway provides them alternatives and hence protection from the ability of the first to charge high tariffs. Furthermore, there is strong econometric evidence confirming the ability of source competition to affect O-D rates; examples include MacDonald (1987, 1989a, 1989b) for grain rates and Winston, *et al.* (2004) for coal rates.⁴ Source competition has become a more widespread limitation on rail rates as globalization has increased the size of geographic markets, for example forcing US railroads to set rates for grain haulage constrained by the ability of the ultimate international customers to receive grain from other countries.

Parallel competition and source competition are the foundations upon which freight railway deregulation has been constructed in the US and Canada, though Canada especially has relied to some degree upon third party access as well. (We do not consider here a further source of competition that may be effective on occasion: *product competition*, the ability of a customer to use a substitute product delivered by another railroad.) Source competition in particular was relied upon in the restructuring of the railways of Argentina and Mexico (and to a lesser degree Brazil) into vertically integrated railways competing with each other for freight customers at common points.⁵

In contrast to the situation in the Americas, in Europe policymakers have generally chosen a different strategy for the creation of intramodal rail competition: they have sought to create competition “above the rail” between different train companies operating over a common track infrastructure – and so leaving the infrastructure monopoly intact. As with the American model, this strategy comes in two variants, typically labeled “third party access” and “vertical separation”. The parallel to widely used reform strategies in other infrastructure sectors such as electricity, natural gas, and telecommunications should be clear (Newbery 1999; von Hirschhausen 2002; Pittman 2003).

Third party access (TPA) imposes upon an integrated railway the obligation to provide access to its track infrastructure to independent, non-integrated train operating companies (TOCs). Under the railway directives of the European Union, for example, vertically integrated railways are required not only to allow such TOC access but also to create sufficient internal organizational separation to allow regulators to verify that the independent TOCs have access to the infrastructure on the same terms as those available to the affiliated trains of the integrated company. Of course, as with any access mandated

⁴ Clark (1910) was one of the first to emphasize the importance of this factor, which he terms “competition of markets”, in constraining tariffs charged by railways over particular O-D paths. Clark (1908) described how this factor operated in Southeastern Australia.

⁵ See, *e.g.*, Kohon (1995) for Argentina, Pittman (2004a) for Mexico, and Estache, *et al.* (2001) for Brazil.

by regulators, the integrated company is likely to have the incentive to discriminate in subtle ways, and in practice this has been a serious challenge for regulatory and competition authorities.⁶

A second problem with the TPA model – “problem” from the standpoint of reformers, “advantage” from the standpoint of both integrated railways and those worried about the downside risks of reform – is that it can be imposed and implemented very, very gradually – so gradually, in some cases, as to make it almost imperceptible. The experience with TPA in freight railways in Europe and Russia to this point – though it does vary by country – is that not much competition has been created, at least not very quickly. Russia’s railways restructuring plan is in its second phase – a phase in which competition is to be introduced – but so far the principal events in this regard have been the continued delays in getting parliament to enact the law formally creating a regime for granting access permits to third party TOCs, and widespread complaints that the integrated railway discriminates even against shippers who seek to use their own rolling stock on RZhD trains.⁷

The solution often proposed to the problems of TPA is complete *vertical separation*: the splitting of the vertically integrated railway into two independent enterprises, one controlling the infrastructure and the other operating trains, with the assumption that the incentive for discrimination by the infrastructure operator is thereby removed and that new TOCs will now enter. Indeed in the railway sector as in other infrastructure sectors this vertical separation model has come to be considered a sort of “default option” for public utilities restructuring. For example, Laffont (2004) states that

The general trend is to separate the monopolistic segment from the competitive ones. In other words, vertical separation is taken to be the mainstream restructuring form of industrial structure.

Newbery (2005) agrees:

The new conventional wisdom is that network utilities should be unbundled, with the potentially competitive network services under separate ownership from the natural monopoly network, so that the network owner has no incentive to favour its own service provider.

⁶ I discuss a case involving the Bundeskartellamt in Pittman (2004b). Bayliss (2001) is eloquent regarding the same issue in the electricity sector: “Even now – ten years since privatization – Ofgem, the UK regulator – is struggling to prevent market abuses by private firms. This is in a wealthy country where the regulator has substantial resources. How much more difficult then is the job of the regulator in developing countries where organizations are staffed by poorly paid public sector workers with little exposure to international corporate activities and where the ‘opposition’ consists of highly paid internationally trained corporate executives. What is more, the regulator has little at hand in the way of sanctions, should the firm refuse to adhere to the rules of the regulator.”

⁷ See “RZhD side-track” (*Vedomosti*, February 27, 2006); Ekaterina Glazunova and Svetlana Khabirova, “Telegrams that Shocked Railway Network” (*RZhD-Partner*, March 1, 2006); and Anastasiya Lebedev, “RZD Criticized for Halting Foreign-Owned Freight Cars” (*Moscow Times*, March 3, 2006).

In the European railway system, former EU competition director Mario Monti made clear his opinion that while TPA was all very well, effective competition among independent TOCs would take place only once there was complete vertical separation (Monti 2002).⁸

3. Choosing Among the Alternatives

How might a policy maker or analyst choose among these reform options for creating competition for freight shippers on the state-owned monopoly railway in their country?

Let us begin the discussion with a brief return to passenger-related issues. If the country's railway is mainly a passenger railway, parallel competition is unlikely to be economically viable, and source competition is unlikely to provide much protection to customers. (For a very large proportion of the travelers leaving origin O, most destinations E are not close substitutes for destination D.) Furthermore, as noted earlier, the world experience seems to confirm that it is an exceedingly rare event for a passenger train operation to cover its direct expenses even as a "monopoly", much less for demand to be sufficient to support competing train operators. In the UK, initial plans to create competing passenger train operating companies for the same locations were significantly scaled back.⁹

For a railway that is mostly or solely a passenger operation, then, the choice for creating competition in restructuring would seem to be between auctioning a concession for the integrated railway – that is, for infrastructure and train operations performed by the same franchisee – and auctioning a concession for train operations while making other arrangements (continued state ownership? a separate auction?) for the infrastructure.

From purely a competition standpoint, there would seem to be no advantage to forcing vertical separation in this case beyond possibly expanding the list of potential franchisees if the integrated package would be so large as to exclude some potential bidders from the process. However, some countries have chosen for other reasons not to relinquish government control of infrastructure, even in the form of a long-term franchise, in which case auctioning off the passenger train operation becomes an attractive outcome. Whether the integrated railway operation or only the train operation is auctioned off, the length of the franchise period is a difficult and important issue, introducing a tradeoff between the ability and incentive to invest in capital equipment and the force of potential and then actual competition for the franchise as a disciplining device (Welsby and Nichols, 1999; Affuso and Newbery, 2002a and 2002b).

In contrast to passenger rail operations, freight rail operations are generally expected to be self-supporting; thus the need for subsidies does not complicate the discussion of options for creating competition. Perhaps the most important issue distinguishing the American-style restructuring models discussed above versus the European-style models is that of vertical integration between the infrastructure operations and the train

⁸ See also Stehmann and Zellhofer (2004).

⁹ See, for example, Welsby and Nichols (1999), Nash (2001), and Preston (2001).

operations. As I have argued elsewhere (Pittman, 2005a), there are strong *a priori* reasons to believe that economies of vertical integration are significant in the railways sector; the very locus of vertical separation, between the wagon wheel and the track, is a point where investments, maintenance, and other actions on one side may have a significant impact on costs on the other. The econometric estimates of Ivaldi and McCullough (2004) suggest a cost advantage of 20-40 percent for an integrated railway versus separate infrastructure operators and diversified train operators based on US data, and Wetzel and Growitsch (2006) derive similar results using European data.¹⁰

In addition to these static results, the experience with vertical separation in rail and other sectors has begun to suggest that it is difficult to create appropriate incentives for investment – in both maintenance and new capacity – for a vertically separated, regulated infrastructure company. Several observers argue that incentive problems for maintenance and improvement of the track infrastructure were the single most important reason for the failure of the UK experiment with vertical separation of the railway.¹¹

All this would seem to suggest that some burden of proof be placed on those who argue for vertical separation as a policy for creating competition. How would they go about trying to meet this burden?

The first response is that it may be difficult to create intramodal rail competition while maintaining vertical integration. If that is the case, then there may be an explicit tradeoff to consider between the gains from competition and the losses from vertical separation.

Consider the two forms of intramodal competition among integrated railways discussed above. There is little dispute that parallel competition works well to protect shippers from rail market power in those locations where it exists today – principally the US and Canada. (There are strong arguments that it worked even better in the US before the most recent round of large rail mergers; see, e.g., Chapin and Schmidt [1999] and Kwoka and White [2004].) And there seems no reason to doubt that it would be at least theoretically possible to restructure some existing monopoly railways in such a way as to create vertically integrated railways that could compete in parallel fashion – across national borders in the EU, for example, or in Russia (Friebel, *et al.*, 2006) or China (Pittman, 2004a).

The principal argument for caution in the creation of parallel competition among vertically integrated freight railways is the fear that these competing lines would operate with insufficient business to achieve the available economics of density in rail freight hauling. Econometric studies have generally found that existing freight railways are

¹⁰ Bitzan (2003) similarly finds cost savings from joint production of infrastructure and freight services (*i.e.* vertical integration) in the US; however, the earlier results of Ivaldi and McCullough (2001) are more ambiguous.

¹¹ BTRE (2003); Gomez-Ibanez (2003); Mercer Management Consulting (2003). See also Vickerman (2004); Buehler, *et al.* (2004) for a theoretical discussion; and Newbery (1999) for network investment issues in the restructured electricity sector.

operating at levels where economies of density are not yet exhausted; this is the conclusion of a review of the literature by Savignat and Nash (1999) and of more recent studies of US class I railways by Wilson (1997), Ivaldi and McCullough (2001), and Bitzan (2003). The estimates of the magnitude of unexhausted economies of density of course vary across studies, but it is interesting to note that Wilson's estimate of 31 percent at the mean of his sample is squarely in the middle of the range of economies of vertical integration estimated by Ivaldi and McCullough (2001), cited above. Of course, unexhausted economies of density would seem to argue against competing train operating companies on the same track as well as against competing parallel integrated railway companies.

It is interesting to note, however, that estimates of unexhausted economies of density do *not* appear to be accompanied by suggestions of unexhausted economies of system size – i.e., track mileage. Though “railwaymen” would certainly point to such factors as longer average lengths of haul, fewer interchanges, more alternatives for direct routing, and better utilization of equipment as economies available with increased system size, econometric estimates suggest that these decreasing costs flatten out at fairly moderate scales of operation. Savignat and Nash (1999) report a consensus in the literature that only relatively small railways operate at a level of unexhausted economies of system size, and Wilson (1997) finds that at the mean of his sample, US class I railways are operating with slight diseconomies of system size. The results of Bitzan (1999) suggest a flattening of the cost curve for system size at around 5000 miles, while Chapin and Schmidt (1999) also find a flattening of the cost curve, but at about twice that mileage level.¹²

This finding leads directly to the consideration of the second form of intramodal competition among vertically integrated railways: source competition. Savignat and Nash (1999) conclude from their literature review that

The general finding of economies of density might suggest that a single operator on each route is best, whilst the lack of economies of scale [i.e., system size] beyond a certain point would suggest that ... several integrated railways per country would be possible, at least in the larger countries.

They go on to suggest that such a system “might at least provide some possibilities of yardstick competition between regional operators”, but the more important point for our purposes is that such a system might also provide some possibilities for direct competition for the business of shippers and customers located at points served by two or more such vertically integrated railways.

Indeed the experience with competition among vertically integrated “regional” railways in the US, Canada, and Mexico suggests that other competitive forces may be set in motion by this form of restructuring as well. First, it is quite common in these countries now for railway companies to compete with each other to provide incentives for firms to build new plants located on their lines rather than those of a rival. Second, as I

¹² I am grateful to John Bitzan and Stephen Schmidt for confirming my interpretations of their published results in personal communications.

noted in Pittman (1990), many rail freight shippers – including but not limited to those using containers – are not located directly on a railroad line, but rely on motor carriers to haul their products to a rail line for shipment. (When not related to containers, this practice is called transshipment.) Once the product has been loaded onto a motor carrier, it may be economical to have it hauled to a more distant rail line if that railway is offering better terms, and this then becomes a second way for these “regional” railways to compete with each other. Finally, at locations where two such railways are not far from each other, it is not unusual for a large shipper to threaten to build – or actually to build – a spur line connecting with an alternative railway, when dissatisfied with the terms offered by the incumbent. Even a threat to build may evoke more attractive terms from the existing railway.

Some, including this author, would argue that the preceding factors should render the creation of vertically integrated railways competing for traffic at common points a more attractive default option for railways restructuring than vertical separation. However, it must be admitted that this model has its own weaknesses as a restructuring option. First, until the world becomes more ready for multinational integrated railway companies, this is mostly a large and medium-sized country option: the results of Bitzan (1999) and Chapin and Schmidt (1999) cited above suggest that creating multiple, competing vertically integrated railways smaller in size than 5000-10,000 mile track networks would sacrifice economies of system size. (For reference, the size of the French railway network is about 20,000 miles; the Czech, about 6000.)

Second, it is clear that source competition offers more effective protection against a railway holding a monopoly over service on a particular origin-destination corridor in some circumstances than in others. As usual with the evaluation of competition in railways, the devil is in the details. Levin (1984) argues that source competition

tends to be effective when sources of supply are numerous, when cost conditions of alternative sources of supply are homogeneous, when transport costs from alternative sources are similar, when the delivered products are close substitutes, and when the share of transport costs in the delivered price of the product is high.

(He is focusing on competition from alternative origins to a single destination; corresponding arguments would apply to competition for traffic from a single origin to alternative destinations.) Further and more specifically, my own interviews with shippers have suggested that

Source competition tends not to be effective in constraining market power for the carriage of commodities that are strongly differentiated by brand name, because maintenance of the goodwill stock of the brand name may require service to particular locations. (Pittman, 1990)

On grounds of network size alone, then, and assuming a requirement that restructured railways remain within the borders of a single country, probably only three countries in the world remain obvious candidates for a restructuring plan that would

create multiple vertically integrated railways competing among themselves in parallel fashion and at common points: Russia, China, and India. On the other hand, if we note that Mexico's experience with this restructuring plan is generally evaluated as quite successful, that Mexico's network is of only moderately large size (12,000 miles), and that many railway freight operations in transition economies operate with relatively dense traffic loads, another group of candidates suggests itself, including perhaps Poland, Ukraine, Kazakhstan, and Romania.¹³

Finally, given the high and growing importance of international freight railway haulage – on which more below – it seems worth emphasizing at least the possibility of the adoption of railways restructuring plans that would create vertically integrated railways whose networks cross national borders. This would of course render this restructuring option feasible in several regions where at least some within-country integrated railways would be too small to be viable, and of course would face no direct rail competition, except at international borders. The most obvious examples would seem to be Central Europe, Southeastern Europe, Central Asia, and Central and Southern Africa.

However, if national railways are in fact to be restructured and reorganized on a national basis, at least in the foreseeable future, it is clear that some are too small for the creation of what is called in the telecommunications world “facilities-based competition” – i.e., competition among multiple firms that each have their own infrastructure. In that case the only possibility for creating intramodal rail freight competition is by granting infrastructure access to competing operators of trains. This option is all the more relevant for those countries that are in a position to serve as transit countries for long-distance freight rail haulage – most conspicuously, countries through which one of the competing routes for hauling freight from Asia to Europe may pass.

For these small and medium-sized countries, deciding between the TPA model and the vertical separation model would seem to create a set of stark trade-offs involving at least four factors: economies of vertical integration, economies of density, regulatory capacity, and the relative importance of domestic vs. transit traffic.¹⁴ In particular:

1. As argued above, the importance and apparently significant magnitude of *economies of vertical integration* in the rail sector argue against vertical separation. It is true that these economies are something of a weakness for the TPA model as well, since the creation of competition under that model requires the TOCs that have no vertical economies to exploit to compete with the vertically integrated incumbent. Still, the likelihood that vertical separation

¹³ I propose one such system for Romania in Pittman (2002) and another for China in Pittman (2004b). Five of these seven countries – all except China and India – have taken at least some steps to restructure their railways, and so far all are following some form of either the TPA or vertical separation models. Russia's three-part long-term restructuring plan calls for future consideration of the creation of competing vertically integrated companies in the European portion of the country, but there is no indication that this option is being seriously considered at this point. See, e.g., ECMT (2004) and Pittman (2004b and 2005b).

¹⁴ See Pittman (2003) for a discussion of factors such as these in the context of the rail, electricity, and telecommunications sectors.

- imposes a discrete 20-40 percent negative shock on efficiency constitutes a serious reason for hesitating to adopt this option – and, one might argue, particularly in developing countries with mining, manufacturing, and agricultural sectors already struggling to compete on world markets.
2. The generally accepted result that most railways are operating in a region of continued *economies of density* suggests that neither TPA nor vertical separation is likely to lead to a vibrantly competitive train operating sector in any but the most densely operated rail systems: more often one can expect that the first mover – that is, the incumbent – will enjoy lower operating costs than smaller entrants and thus maintain a dominant position vis-à-vis rail-captive shippers. This factor also would seem to argue against vertical separation, since it suggests that the gains from competition to counterbalance the losses from vertical separation are likely to be small.
 3. On the other hand, one relative attraction of the vertical separation model is that imposes fewer demands on a country's *regulatory capacity*, since detecting and preventing discrimination by a vertically integrated firm against its non-integrated access customers is likely to be a difficult, complex, and never-ending task, in rail as in, say, electricity and telecommunications.
 4. Finally, the greater the percentage of non-integrated TOCs that are international freight operators using the infrastructure for transit as opposed to domestic freight operators serving domestic shippers, the more attractive seems the TPA model, since the vertically integrated incumbent will have generally less reason to discriminate against international transit operators than against domestic competitors.

4. Access Pricing

In those cases where non-integrated TOCs are given access to the infrastructure – whether in competition only among themselves or in competition with the vertically integrated incumbent – a policy question that sometimes receives less attention than it merits is how to set the access charges. It is a truth universally acknowledged – especially among competition enforcers – that any access pricing regime for a monopoly infrastructure like the railway track system must be transparent and non-discriminatory. It is also generally assumed – especially in the developing world – that one reason for restructuring the state-owned monopoly railway is to end government subsidization of the system. What is not always recognized is the set of trade-offs implied by these two goals.

The problem is a straightforward one.¹⁵ Economically efficient pricing requires that prices – in this case, access prices – be set at the level of marginal costs. However, sectors with high levels of fixed costs exhibit large ranges of output where marginal costs are below average cost, meaning that marginal-cost pricing does not cover fixed costs. One solution is for the government to pay the fixed costs, and indeed in many countries, especially in Western Europe, marginal-cost access pricing accompanied by government subsidies to infrastructure maintenance and investment is the planned long term

¹⁵ See Pittman (2004b) for a more detailed discussion, with a focus on restructuring options in Russia.

arrangement.¹⁶ However, government subsidies may create undesirable incentive problems for the operation of the railway – as noted at the opening of this chapter – and one must in addition account for the shadow price on government funds, generally accepted as quite high (sometimes over 100%) in developing countries.¹⁷

A second solution is average-cost pricing, which is essentially some form of the old fully-allocated-cost pricing common in rate-of-return regulation schemes.¹⁸ This solution avoids the problems created by subsidization but unavoidably causes welfare losses by denying access to the infrastructure to potential users who would be willing to pay their marginal cost of usage but not their fully allocated cost. I estimate in Pittman (2004b) that the welfare cost from this inefficiency in Russia could be on the order of 1% of GDP.

The standard, widely accepted solution that avoids either of these two problems is some sort of discriminatory pricing regime – generally, using Pigou’s categories, either second degree (two-part tariffs) or third degree (Ramsey pricing) price discrimination. Either of these options is specifically designed to cover fixed costs while minimizing the inefficiencies imposed by the resulting departures from pure marginal-cost pricing. Unfortunately, either is – by definition – discriminatory, and the former in particular, while generally easier to implement and manage, ends up charging more intensive users a lower price than less intensive users (if not, no one would move off of the low fixed cost/high variable cost option). Since the most intensive user is usually the incumbent, non-integrated TOCs can be expected to complain of favoritism.¹⁹

As BTRE (2003), Pittman (2004b), and others emphasize, the significant level of fixed costs in the rail sector makes it impossible to avoid this dilemma – and this is true whether one is setting shipper tariffs for an integrated railway or access charges for TOCs. What BTRE (2003) suggest, however, is the rather surprising idea that the very necessity of discriminatory pricing in order to cover fixed costs may weigh in as an additional argument against the TPA and vertical separation models. Experience has shown, they argue, that while shippers of a particular commodity will complain if they have to bear a greater share of the fixed costs of the rail sector than shippers of other commodities, so long as their competitors are in a similar situation they will not complain much, because they are not harmed competitively. Thus a vertically integrated freight railway setting tariffs for hundreds or thousands of shippers may use some form of Ramsey pricing, charging a higher mark-up over marginal costs to shippers with inelastic demands (bulk commodities over long distances) than to shippers with elastic demands (non-bulk commodities over shorter distances), and do so in a fairly direct,

¹⁶ See, e.g., BTRE (2003); Peter (2003); ECMT (2005).

¹⁷ See, e.g., Beato and Laffont (2002) and Jamasb (2006).

¹⁸ See, e.g., Kahn (1970).

¹⁹ In addition, in rail as in other sectors, any discriminatory set of access charges may be time-inconsistent. If we assume that users paying access charges below or equal to the average will be satisfied with that arrangement, while users paying above the average will seek relief from the regulator, access charges above the average may turn out to be nonsustainable – in which case charges below the average are nonsustainable as well.

straightforward manner. This is what has occurred in the US since the Staggers Act created the possibility for flexible tariff setting.

On the other hand, argues BTRE (2003), when an infrastructure operator seeks to set access charges that are in some way discriminatory to a much smaller number of TOCs – even if there is no integrated incumbent being favored – experience suggests that the result may be an endless round of negotiations, complaints to regulators, and jockeying over rents.

The argument, in summary, is that if one seeks to avoid either the inefficiencies and deadweight losses imposed by government financing of infrastructure, or the inefficiencies and deadweight losses imposed by average cost rather than marginal cost pricing, discriminatory shipper tariffs set by a vertically integrated rail freight enterprise may result in lower transactions costs, and may be more politically acceptable, than discriminatory access charges set by an infrastructure operator.

Otherwise one must face the marginal cost vs. average cost access pricing dilemma directly. Since there seems no *a priori* reason to believe that the inefficiencies from average cost access pricing would differ systematically between developed and developing countries, the much higher shadow price on government resources in developing countries would seem to argue for average cost pricing there, *ceteris paribus* (Beato and Laffont, 2002).²⁰

5. Conclusion

Common sense and econometric analysis both suggest that the application of the reformers' "default option" of vertical separation in the freight railways sector may impose high costs on the system in their destruction of economies of vertical integration; thus arguments for the adoption of this option would seem to require the demonstration of high levels of corresponding benefits. Unfortunately, certain other aspects of the railways sector, especially the apparently widespread persistence of economies of density, suggest that such high levels of benefits may be difficult to achieve.

In this chapter we focus on methods of protecting shippers from monopoly abuses by a restructured railway that do not require vertical separation. The first and most straightforward policy option is the encouragement of intermodal competition wherever economically feasible. The second is the creation of parallel and/or source competition among restructured vertically integrated railways, an option generally limited to medium sized and large countries unless and until countries are willing to create truly multinational railway networks. The third is the opening up of the infrastructure of the vertically integrated railway to access by non-integrated train operating companies

²⁰ We do not consider here three additional and quite relevant issues: 1) the desirability of setting access charges according to social rather than private marginal costs (Bickel, et al., 2006); 2) the difficulties of measuring marginal costs – private and social – with any accuracy (Nash and Matthews, 2002; Thomas, 2002); and 3) problems of the "second best" arising from possible divergences of access prices from social marginal costs in competing transport modes (Nilsson, 1992).

(TOCs), accepting the likelihood that these TOCs will be disadvantaged in competing with the incumbent but counting on their competition to provide at least some relief to shippers.

Only in very rare circumstances, we argue, are the benefits of complete vertical separation of train operations from the infrastructure operator likely to be so great as to outweigh the losses from the process of vertical separation itself.

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