

A Note on Non-Discriminatory Access to Railroad Infrastructure

By Russell Pittman *

Abstract

The setting of user prices for enterprises with large fixed costs and marginal costs below average costs – “natural monopolies” – raises important policy questions regarding both efficiency and equity. It has become well accepted among economists that, in a variety of settings, welfare may be improved if such prices are set using systems that are non-linear or discriminatory – for example, two-part tariffs and Ramsey pricing. If these pricing schemes are ruled out, the principal alternatives are large government subsidies and the inefficiencies of fully allocated cost pricing. Why should the setting of access prices be any different?

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“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)

1. Vertical Separation and Non-Discriminatory Access

In the ongoing worldwide debate regarding railway sector restructuring, perhaps the only words that are used more frequently than “vertical separation” 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, and whether, if wholly separate enterprises are created, the owner and operator of the infrastructure may own and operate trains as well, is a matter of lively debate. The direction of the debate would seem to be in the direction of complete separation without cross-ownership – in the same speech cited above, EU Competition Commissioner Monti argues 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” – but, as I have argued elsewhere (Pittman 2001a, 2001b), the

expectations that vertical separation in the rail sector will create significant competition and significantly increase economic welfare may be overly optimistic.

Whether or not there is complete separation, however, reformers everywhere are clear in their favor for 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, it is a matter of certainty for most reformers and reform plans that a restructured railway sector must, as one part of its restructuring, allow all train operating companies access to the infrastructure on the same terms: there is to be no discrimination, not only between a vertically integrated and a non-integrated train operator, but also among different non-integrated train operators.

As the forceful statement of Commissioner Monti makes clear, this is considered a matter of competition policy as well as regulatory policy – and the Commissioner promises vigorous enforcement action from the competition authorities to enforce this policy. 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 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). More generally, Directive 2001/14/EC imposes the following requirement:

“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)

Why there should be such a consensus on the desirability of non-discriminatory access to the rail infrastructure is not completely clear. As a matter of competition policy, rules against

discrimination among different buyers or sellers may have a sound pedigree, dating at least to the Robinson-Patman Act of 1936 (which amended the Clayton Act) in the United States and to both Articles 85 and 86 of the Treaty of Rome, the Articles which form the basic competition law of the European Union. However, decades of enforcement experience have made it clear that attempting to prevent discrimination may impose tremendous costs on economic efficiency and welfare, particularly as innovation and technological improvements may be discouraged and delayed.¹ As a result, these rules are widely criticized – one textbook describes the Robinson-Patman Act as “often considered antithetical to the fundamental purpose of antitrust” (Kaserman and Mayo [1995]) – and they are far from a central component of most antitrust enforcement regimes.

Similarly, there is a long history of complaints of discriminatory behavior as one source of pressure for the creation of regulatory agencies and one rationale for the shape taken by early regulations, but in recent decades there has been a growing appreciation of particular forms of discrimination, both second-degree and third-degree, as policy options that enable regulators to increase welfare as compared with some non-discriminatory alternatives. In particular, economists since at least Joan Robinson (1933) have understood that as a matter of price theory, the welfare implications of price discrimination are ambiguous.

Let us briefly review the discussions regarding the regulation of end-user pricing and then examine what lessons may be available for the regulation of access pricing. I will focus 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, 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.

¹ See, *e.g.*, Schwartz (1986).

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 $AEBP_1$, so that government subsidies are required to pay the fixed portion of costs.² As the reduction or elimination of government subsidies has been one rationale for reform in the rail sectors of many countries,³ setting prices equal to marginal cost has not been considered a desirable solution in most cases (though of course it was, broadly speaking, the solution adopted in many countries in the past). **(Figure 1 about here)**

Furthermore, the very label “first best” (besides defying grammar) is clearly a misnomer – or at least overly hasty – unless the subsidies are raised in a completely non-distortionary way. More generally, this solution prevents pricing distortions at the expense of the distortions of taxation: the shadow price on the government revenues $AEBP_1$. Estimates of this shadow price are typically in the range of 15 to 50 percent in countries with well developed systems of public finance, and much higher – sometimes over 100 percent – in countries, like Russia, lacking such systems.⁴

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

² 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, there is no need to consider “second best” policy measures, since the primary competitors to rail transport, long-distance, truckload-haul trucking and water transport, are both generally structured as competitive industries.

³ See, e.g., Estache, Goldstein, and Pittman (2001).

⁴ See, e.g., Gagnepain and Ivaldi (2002) for the former and Jones, Tandon, and Vogelsang (1990) for the latter.

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 also 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. (As one of many simplifying assumptions so far, we do not consider the effect of government subsidies on enterprise incentives to operate efficiently, both technically and dynamically, *i.e.* to keep MC and AC low – an effect that empirical research suggests may be of considerable magnitude.) **(Figure 2 about here)**

Eventually 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 the “first best” solution, if the fixed tariff can be set in such a way that it is non-distortionary and still cover 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 solution 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 may be broadly termed “Ramsey pricing” (Laffont and Tirole 2000). The original insight came from Ramsey (1927) and was applied to the natural monopoly pricing situation first by Boiteux (1956) and then by Baumol and Bradford (1970). The idea here is that, just as an unconstrained monopolist may increase its profits by discriminating among customers with different elasticities of demand – a variation on the Lerner (1934) rule – so can consumer surplus be increased 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. This makes the emphasis on “non-discriminatory access” to the railway infrastructure all the more notable. 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, Sweden, and Germany, and planned for the near future in a growing number of other countries, including Russia. Even if, as many reformers argue, the downstream freight train operating sector can support competition,⁵ most would concede that under most 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 probably considerably higher than that in two other sectors often also discussed as candidates for vertical separation, electricity and telecommunications (compare Hylen [2000] with Newbery [2000]).

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

⁵ As I note in my two papers cited above (Pittman 2001a and 2001b), this point is not at all obvious. In fact, most measures of economies of density in the rail sector would support the opposite conclusion: that opening up the infrastructure to free entry by train operators would result in one dominant train operator, or at best a small-number oligopoly of train operators.

level upstream, 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 ninety percent: that is, train operators paying the full value of the variable costs imposed on the infrastructure from their operations will pay no more than ten percent of the total costs of the infrastructure (Hysten 1998, Ekstrom 2002). In a world of vertically separated rail infrastructure enterprises, from where or whom is the remaining ninety percent to come?

The basic economic analysis does not change in the move upstream, and neither does the set of available options.⁶ As in the previous discussion, we have four principal 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 Banverket 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 in tangible assets” of almost 3.9 million thousand SEK, *i.e.* over US\$350 million.⁷ Since Banverket was set up in 1988, its

⁶ 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.

⁷ 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

mandate has been to set trackage fees at the level of only marginal cost (Ekstrom 2002). 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 – we arrive at 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 ten percent 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, 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. 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, the demand for rail, and the derived demand for rail infrastructure, will be correspondingly less elastic.

Econometric estimates of the own price elasticity of demand for rail freight transport, usually derived from US or Canadian data, have varied a good deal, but have perhaps centered around a value of -1.0 .⁸ Some estimates have been as low as -0.5 , however, and this is probably a more persuasive working estimate for the situation in many 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

dreamt of before. It should be emphasized, however, that this investment has not been financed by the rail transport sector but by the taxpayer.”

⁸ See, for example, Friedlaender and Spady (1980, 1981); Oum (1989); Oum et al. (1990); and Hsing (1994). An extremely useful summary of this and related literature has been compiled as the “Elasticities Database” by the Australian Bureau of Transport Economics, and is available at <http://dynamic.dotrs.gov.au/bte/tedb/index.cfm>.

in total rail transport costs, which averages around 0.2; the product, a very rough estimate of the derived demand for rail infrastructure in Russia, is -0.1 .⁹

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 fifteen percent, from 14,400,000 thousand tkm in our hypothetical country to about 12,250,000 thousand tkm, while a nine-fold increase to the fully allocated cost of \$52 would cause tonnage to decline by over twenty percent, to about 11,400,000 thousand tkm. The implied welfare loss for our hypothetical country from the latter scenario is about $(.5)(\$46.8)(3,000,000) = \$70,200,000$ per year. Again, to obtain a very rough Russian result to compare with that of our hypothetical country, we multiply by eight, and obtain a welfare loss of about \$560 million per year to accompany the twenty-percent 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.)

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 heavily used in the United States and Canada:

- An integrated rail enterprise that reaches a voluntary agreement to use the track of another integrated rail enterprise will generally 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 generally true concerning payments that are part of involuntary trackage-rights agreements imposed by regulators.
- The majority of rail freight moving in Canada and the United States (since the deregulation set in motion by the Staggers Act) travels under contracts whose

⁹ The formula for the elasticity of derived demand is shown by Kennan (1998), explicating the discussion in Hicks (1935).

terms are both unregulated and secret; it is certain that under such circumstances, price discrimination takes place.

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 must have sent chills down the spines of rail infrastructure operators everywhere 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.*). But Deutsche 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 Bundeskartellamt 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 *ex post* depending on their usage levels – a textbook example of second-degree price discrimination. The Bundeskartellamt apparently agreed, and brought pressure to bear on Deutsche Bahn to institute non-discriminatory access rates. Following “exhaustive talks and consultations” (*Ibid.*), Deutsche Bahn agreed to replace TPS 98 with a single option: a single-level tariff based entirely on usage rates.

It is important to be very careful about terms here. In the context of competition law enforcement 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. This latter aspect of discrimination is certainly as important in the rail sector as in others; infrastructure access prices and other terms that favor the national rail carrier against those from other countries are both easy to imagine and likely to be especially harmful to integration, because of their potentially broad impact on trans-border movements of goods. 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 pay the fixed costs of the infrastructure provider. However, I believe that the words of Commissioner Monti quoted above, the actions of the Bundeskartellamt, and the language of Directive 2001/14/EC all suggest strongly that other forms of discrimination are likely to come under attack from competition authorities as well.

Similarly, it is easy to 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. This would constitute geographic discrimination, but as it would not discriminate among different train enterprises operating in the same area it seems at least possible that it could pass the muster of the competition authorities. In the experience to date, however, no infrastructure operator has been given anything approaching this level of discretion in setting access prices. 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.

If, then, this action by the Bundeskartellamt is consistent with the opinions and analyses of other competition authorities around the world – and the near-unanimous 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. If a two-part tariff – second-degree price discrimination – is so discriminatory among different users as to be unacceptable from a competition law or competition policy standpoint, then certainly Ramsey pricing – third-degree price discrimination – is as well. But that removes from the list of policy options for paying for the railroad infrastructure the two regulatory tools that are by general consensus the most effective at minimizing welfare losses from price distortions. We have just seen that the welfare cost of fully allocated cost pricing is high, reflecting in part the likely reductions in rail freight traffic from access price increases of such magnitude. Indeed, one of the international criticisms leveled at rail reform in the UK has been that the requirement for the infrastructure enterprise, Railtrack, to cover its costs from access fees has resulted in the setting of those fees at undesirably high levels. (Hyllen 2001)

We are apparently left with only a single alternative to fully allocated cost pricing, and that is the original “first best” solution, marginal cost pricing with the government paying most of the infrastructure expenses: *i.e.* that ninety percent of infrastructure expense that is not traffic-sensitive in the short and medium term. 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.” (Hysten 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)

In fact, 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. Both France and Germany have set their access charges according to marginal cost formulas. (Hysten 2001)

Where this outcome is or may be surprising, I believe, is in the transition and developing countries that have received the advice from Brussels and elsewhere to separate their railroad systems vertically AND to set non-discriminatory access charges to the infrastructure. As I have argued here, 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, near-100 percent government subsidies for infrastructure. How large would the subsidies be? In Sweden, where (as in 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 tend to want to terminate, not to perpetuate.

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

- 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. However, most freight traffic is not so time-sensitive that it must pay peak-load prices where and when they are charged.¹⁰
- 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

¹⁰ 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.”

the pockets of regional and local governments – can hardly alleviate the more general problem.

I have been unable to find any discussion of this issue in official documents or press reports concerning railway restructuring in developing and transition economies. The Russian government has adopted a ten-year railways reform plan that calls for vertical separation of the railway sector, “guaranteed nondiscriminatory 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.”¹¹ 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.¹²

but 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 separation and the policy of non-discrimination are clear.

These are vast sums of money that are apparently being glossed over in the debates over railway restructuring in transition and developing economies. As I have noted elsewhere (Pittman 2001a, 2001b), there are serious reasons to doubt whether vertical separation is the best strategy in many countries, Russia included; I believe that both “source competition” and “parallel competition” among vertically integrated rail companies may be a more promising solution, at least in European Russia. But this problem will suffice for starters. Countries that

¹¹ Ministry of Railway Transport of the Russian Federation, “The Railway Transport Reform for Industry, Country and People,” Analytic Material 27 June 2002, www.eng.mps.ru/agency/showarticle.html?article_id=37&he_id=71.

¹² *Ibid.* See also Ministry of Railway Transport of the Russian Federation, “Goals and Stages of the Structural Reform in the Russian Rail Transport in 2000-2010,” Analytic Material 17 February 2002, www.eng.mps.ru/agency/showarticle.html?article_id=10&he_id=71.

have reformed their railways in such a way as to maintain vertical integration have, in so doing, implicitly created the possibility for internal discriminatory pricing of access to infrastructure. If those reformers and advisors recommending vertical separation are also insisting upon non-discrimination, they need to say where the money for the infrastructure is coming from. And if it is coming from the state, policy makers who are considering reforms need to be aware of that.

References

- Baumol, William, and David Bradford, "Optimal Departures from Marginal Cost Pricing," *American Economic Review* 60 (1970), 265-283.
- Boiteux, Marcel, "Sur la Gestion des Monopoles Publics Astreints a l'Equilibre Budgetaire," *Econometrica* 24 (1956), 22-40. Published in English as "On the Management of Public Monopolies Subject to Budgetary Constraints," *Journal of Economic Theory* 3 (1971), 219-240.
- Ekstrom, Alf, "Can the Rail Sector Be Treated Like Roads?," remarks presented to the Seminar on Railway Reform, Restructuring and Competition, Organization for Economic Cooperation and Development and Development Research Center of the State Council of the People's Republic of China, Beijing, January 2002.
- Estache, Antonio, Andrea Goldstein, and Russell Pittman, "Privatization and Regulatory Reform in Brazil: The Case of Freight Railways," *Journal of Industry, Competition and Trade* 1 (2001), 203-235.
- Friedlaender, A.F., and R.H. Spady, "A Derived Demand Function for Freight Transportation," *Review of Economics and Statistics* 62 (1980), 432-441.
- Friedlaender, A.F., and R.H. Spady, *Freight Transport Regulation: Equity, Efficiency, and Competition in the Rail and Trucking Industries*, Cambridge, Mass.: MIT Press, 1981.
- Gagnepain, Philippe, and Marc Ivaldi, "Incentive Regulatory Policies: the Case of Public Transit systems in France," *RAND Journal of Economics* 33 (2002), 605-629.
- Haase, Dagmar, "New Train Path Pricing System at Deutsche Bahn, *DB Netz*, 2001.
- Hicks, J.R., *The Theory of Wages*, London: MacMillan, 1935.
- Hsing, Y., "Estimating the Impact of Deregulation on the Elasticity of the Demand for Railroad Services," *International Journal of Transport Economics* 21 (1994), 301-312.
- Hylen, Bertil, "An Examination of Rail Infrastructure Charges," unpublished paper, Statens vag-och transportforskningsinstitut, 1998.
- Hylen, Bertil, *Access to the Rail Network in Some European Countries*, VTI notat 47A-2001, Swedish National Road and Transport Research Institute, 2001.
- Jansson, Jan Owen, "An Analysis of the Rail Transport System," (1998) in Chris Nash, *et al.*, *Railways*, Northampton, Mass.: Elgar (Classics in Transport Analysis), 2002.
- Jones, Leroy, Pankaj Tandon, and Ingo Vogelsang, *Selling Public Enterprises: A Cost-Benefit Methodology*, Cambridge, MA: MIT Press, 1990.
- Kaserman, David, and John Mayo, *Government and Business: The Economics of Antitrust and Regulation*, New York: Dryden Press, 1995.
- Kennan, John, "The Hicks-Marshall Rules of Derived Demand: An Expository Note," unpublished manuscript, University of Wisconsin-Madison, October 1998.
- Laffont, Jean-Jacques, and Jean Tirole, *Competition in Telecommunications*, Cambridge, Mass.: MIT Press, 2000.

- Lerner, Abba, "The Concept of Monopoly and the Measurement of Monopoly Power," *Review of Economic Studies* 1 (1934), 157-175.
- Lipsey, R.G., and R.K. Lancaster, "The General Theory of the Second Best," *Review of Economic Studies* 11 (1956).
- Monti, Mario, "Effective Competition in the Railway Sector: A Big Challenge," speech given at the UNIFE Annual Reception, Brussels, May 21, 2002.
- Newbery, David, "Lessons from Other Utilities," in UK Office of the Rail Regulator, *The Structure of Rail Track Access Charges*, April 1998.
- Newbery, David, *Privatization, Restructuring, and Regulation of Network Utilities*, Cambridge, Mass.: MIT Press, 2000.
- Oum, T.H., "Alternative Demand Models and their Elasticity Estimates," *Journal of Transport Economics and Policy* 23 (1989), 163-187.
- Pittman, Russell, "Vertical Restructuring of the Infrastructure Sectors of Transition Economies," background paper, *World Development Report 2002: Institutions for Development*, Washington: The World Bank, 2001a; U.S. Department of Justice, Antitrust Division, Economic Analysis Group Discussion Paper 01-7, September 2001; available at <http://papers.ssrn.com/abstract=286290>.
- Pittman, Russell, "Options for Creating Competition in the Rail Sector" (in Russian), *ECO* (Journal of the Institute of Economics and the Organization of Industrial Production, Russian Academy of Sciences, Siberian Branch), August 2001b, and *Competition and Markets* (St. Petersburg), fall 2001; available in English at http://papers.ssrn.com/paper.taf?abstract_id=291067.
- Ramsey, Frank, "A Contribution to the Theory of Taxation," *Economic Journal* 37 (1927), 47-61.
- Robinson, Joan, *The Economics of Imperfect Competition*, London: 1933.
- Schwartz, Marius, "The Perverse Effects of the Robinson-Patman Act," *Antitrust Bulletin* 31 (1986), 733-757.
- Thompson, Louis S., "Railways in Eastern Europe," in European Conference of Ministers of Transport, *What Role for the Railways in Eastern Europe?*, Round Table 120, Paris: 2001.
- World Bank, *World Development Report 2002: Building Institutions for Markets*, Washington: 2001.

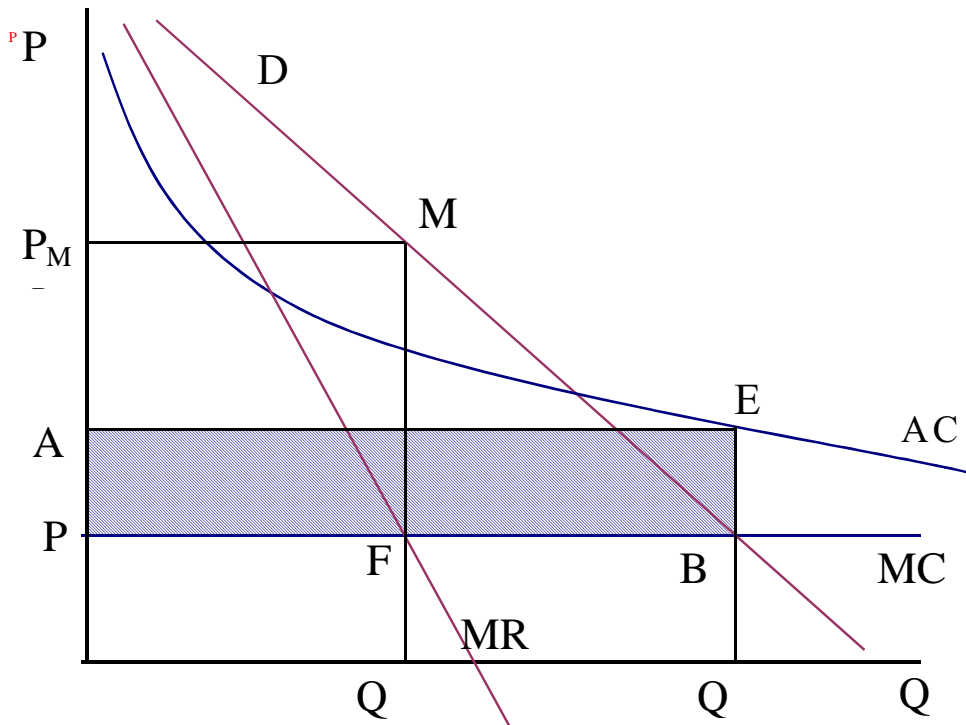


Figure 1.

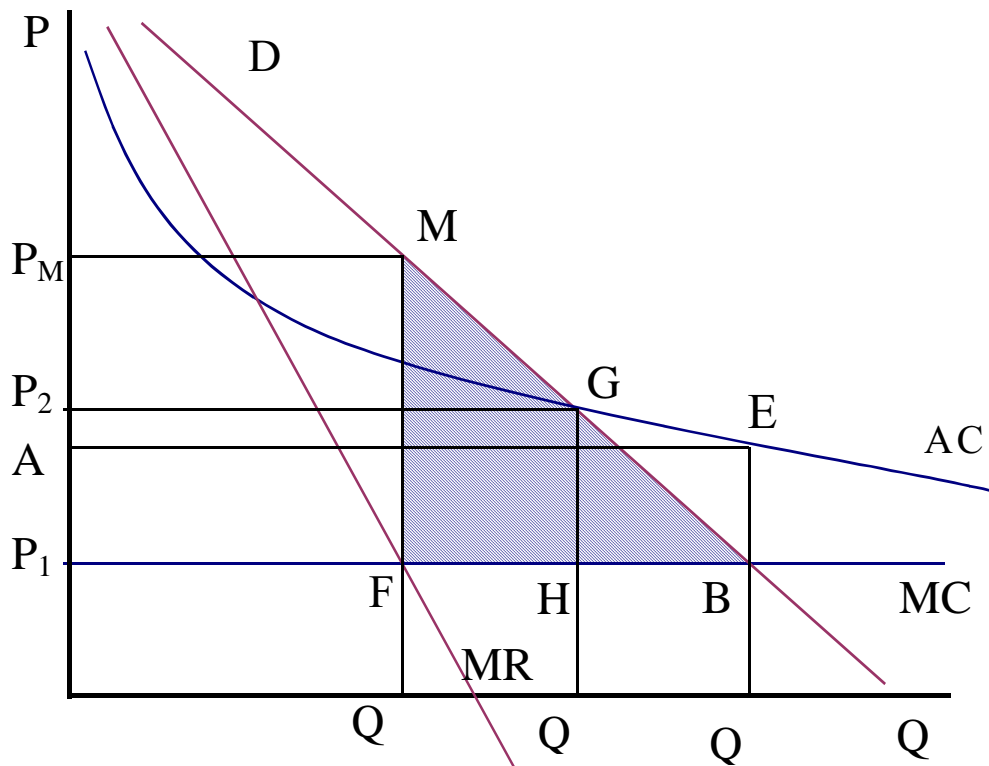


Figure 2.