Railroad Restructuring in Russia and Central and Eastern Europe: One Solution for All Problems?[*]

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1. Introduction

Governments in Russia and virtually all of the countries of Central and Eastern Europe (hereinafter CEE) have begun the process of restructuring their railway sectors. In this restructuring they join many of the countries of Western Europe. In all three cases, the broad idea is the same: the old state-owned monopoly railways are first to be transformed into joint stock companies or otherwise removed from the close embrace of their parent ministries, after which the infrastructure (the "track", as well as signaling and stations) is to be opened to entry by new operating enterprises carrying passengers and/or freight (the "trains"). In many cases the track is to be administered by an enterprise that is to remain under state control and which is to be separated from two additional enterprises that will be in charge of freight and passenger transport operations, either or both of which may be partially privatized.

The broad similarity of the restructuring strategies chosen in Western Europe, the CEE countries, and Russia is notable in view of the very different roles played by the railway sector in the different economies, the very different situations faced by the new railway enterprises, and – perhaps most of all – the very different problems sought to be addressed by restructuring in the three different locations. In Western Europe the railways carry mainly passengers, while in the CEE countries and especially Russia, freight haulage is much more important. In Western Europe, much of the freight haulage business is concerned with manufactured goods, so that rail freight carriers face intense competition from motor carriers, while in the CEE countries and Russia, the freight cargo mix is more heavily weighted towards bulk commodities that rarely travel by motor carrier under any circumstances. In addition, highway coverage and conditions in

Western Europe are superior to those in the CEE countries and far superior to those in Russia, particularly Russia east of the Urals Mountains. On the other hand, the Western and CEE railways tend to carry freight for much shorter distances than the Russian railway, a comparison that, *ceteris paribus*, favors motor carriers in the former. The rationale for reforms in Western Europe is principally to reduce air pollution and road congestion, to further the integration of the European Union, and to increase the efficiency of the industry in order to reduce the fiscal burden it imposes. These are important goals, to be sure, but perhaps not in the same league as the need for the CEE countries and Russia to prevent the collapse of the primary transporters of goods in their economies. Finally, the CEE countries and Russia are still seeking to establish the institutions of private property markets and the rule of law that are more or less taken for granted in Western Europe, and upon which complex reform strategies may depend.

Under this diverse set of circumstances, it does not seem obvious that a single overall reform strategy would be the optimal one for all the countries involved. This is especially the case since a very different reform strategy has been utilized in some other countries with some similarities to the CEE countries and Russia, and with modestly to highly successful results. In this paper we suggest how the lessons from the successful experience with an alternative reform model might be used to construct at least the outlines of a similar strategy for Russia and some of the CEE countries.

We begin the paper with a detailed discussion of the different circumstances facing railways reformers in the three broad settings of Western Europe, the CEE countries, and Russia. We then consider the two broad reform strategies that have been adopted by rail reformers around the world and the situations in which one strategy or the

other seems more likely to have been and to be successful. Next we report the results of two examinations of the results of rail reforms in Western Europe. We conclude with a discussion of the details of reforms pursued in several CEE countries and Russia and a consideration of how ongoing restructuring projects might be adapted in ways likely to improve the likelihood of success, focusing in particular on a strategic reform option that maintains vertical integration in the rail sector in order to minimize the reliance on the enforcement of complex long-term contracts.

2. The Settings

Railways reform in Western Europe has taken place in the context of a rapidly deteriorating competitive position for rail vis-à-vis motor carriers for both freight and passenger hauling: in the fifteen countries of the EU, rail currently carries only 13 percent of freight ton-km and less than 10 percent of passenger-km. Highways are new and cover the geography well, and motor haulage is a well developed and aggressive business. The high valued manufactured commodities produced by highly paid workers are more conducive to motor haulage than are the bulk commodities produced further east. Most countries are fairly small relative to the range of minimum efficient scale for railway enterprises found by econometricians (Preston 1996, Bitzan 1999).

As road congestion has become steadily worse, accompanied by increased petrol consumption and air pollution, environmentalists and shippers have joined rail industry representatives in seeking restructuring in order to make the rail sector more responsive to demand and better able to adapt to rapidly changing circumstances. These three problems – road congestion, dependence on imports of petrol, and air pollution – have been cited as a rationale for policies to improve the efficiency and competitiveness of the

rail sector in these countries, and in particular as classic unpriced externalities of road usage that justify Pigovian policy measures to preserve and increase rail's share, including both road use taxes and government subsidies to rail infrastructure and passenger operations.

A second rationale for rail sector restructuring in Western Europe has been a desire for transport policies that further the integration of the EU. Geographically fragmented, country-based, government-controlled railway enterprises have acted as a limiting factor on the free movement of goods and people that the "single market" of a true economic union demands (and that road transport has better succeeded in supplying).

These two have been the most important factors leading to the adoption first of EU Directive 91/440/EEC, which called for all member countries to separate the accounts of infrastructure operations from those of rail and freight train operations and to provide some limited access for third-party train operators to national rail infrastructures, and then of EU Directive 2001/14/EC, which calls for "open access" to national rail infrastructures for any qualified third-party train operators beginning in 2007 and for any qualified third-party passenger train operators beginning in 2010. Note that even this most recent Directive does not call for complete ownership separation between infrastructure and operations, though that is exactly what has been demanded by EU Competition Commissioner Mario Monti (Monti 2002; Pittman 2004a).

The situation in the CEE countries and Russia as reform and restructuring begin is very different. These economies are significantly poorer than those of Western Europe, and their business sectors are much more focused on lower value, bulk commodities that are traditionally largely dependent on rail (or, where feasible, water) for economical

shipping: coal, minerals, timber, construction materials, and oil. The road sectors are in much worse shape than the West, in poor repair and more reliant on two-lane roads – some still with the occasional horse-drawn cart – than on highways (Pittman 2001). In Russia, some bulk shippers in northern Siberia are not served by road at all. Thus the producing sectors of the economy rely heavily on rail transport to get their goods to customers.

Unfortunately, this heavy reliance on the rail sector has not translated into adequate funding for operations and, especially, investment. Throughout the CEE countries and Russia, the infrastructure, rolling stock, and locomotives used by the railways are heavily depreciated and in need of repair and replacement. Funds are lacking to maintain current levels of operation, much less to expand coverage, improve efficiency, or provide better service to customers seeking to compete in distant markets. Rail enterprises in these countries are mostly strongly unionized and heavily overstaffed. Governments lack resources to make the severance payments necessary to win union approval for reform and to maintain and improve the mobile and immobile capital stock.

All of this leads to a restructuring and reform rationale centered on the need for additional, reliable funding. It will be unfortunate if the deterioration of the railway sector results in freight traffic being lost to trucks when it could more efficiently moved by rail; it will be disastrous if trucks are not able to take over the long hauls of these bulk commodities and already troubled economies are further straitened by their deteriorating rail infrastructure. Given the fiscal difficulties of the governments of these countries, the need for reliable funding as a rationale for rail sector restructuring translates directly into a need for large-scale and long-lived foreign direct investment.

Other rationales, such as the desire for increased efficiency, are certainly important, especially as increased efficiency both improves macroeconomic health and frees available funds for investment. Increased competition is highly desirable where feasible, as it provides strong incentives for increased efficiency. And the Western European goals of reduced road congestion, reduced petrol consumption, reduced air pollution, and European economic integration are not to be denigrated. But as one moves east, the need for additional, reliable funding for the rail sector becomes paramount.

Finally, the central question of the reliance on the firm versus the reliance on vertical contracts for the organization of complex transactions takes microeconomic analysis back to the "first principles" of Coase (1937) and Williamson (1975). Railway operations entail a huge number of interactions based on very long-lived and mostly sunk investments. Though there remains some dispute about the reasons for the problems associated with complete vertical separation in countries like the UK, there is no dispute that vertical separation was an enormously complex and lawyer-intensive exercise that dramatically increased the reliance of the sector on the enforcement of arm's-length contracts as opposed to intrafirm relationships. There is similarly no dispute that the CEE countries and Russia present far less fertile ground for the cultivation of such complex reform strategies than that of Western Europe.

3. Choices Among Reform Strategies

Broadly speaking, policy makers around the world have chosen one of two overall reform strategies for the railways. These two reform strategies can roughly be associated with the Americas and the European Union. In Central and South America – and especially in the largest countries there, including Brazil, Mexico, and Argentina –

railway reform has left in place *vertically integrated* companies – typically private concessionaires – that control both infrastructure and operations and often have some degree of regional monopoly power. In maintaining vertically integrated companies, these countries have followed, again broadly speaking, the examples of the United States and Canada, both of which have systems of vertically integrated railway companies that compete with each other to carry cargoes, especially bulk cargoes like grain, coal, timber, and minerals, and especially over long distances, where motor carriers cannot operate as efficiently.

However, in practice there is an important distinction between what we may call the "Latin American" model of railways reform and that which we may call the "North American" model. In the U.S. and Canada, a large portion of the competition between private, vertically integrated railway companies has traditionally been of the so-called "parallel" sort: two independent, vertically integrated railway companies offer to carry grain products from, say, Chicago to New York over their own separate infrastructure systems. This is a reflection of the fact that, especially in the U.S. (as in the U.K.), the railways systems originated as small, private, vertically integrated companies in competition with each other (and often with canals). In Brazil, Mexico, and Argentina, the railway systems did not grow up in this way, and consequently when the decision was made to restructure the systems, there were not large sections of "parallel" track where competition among vertically integrated companies could be created.

Instead, reformers in these countries sought to create a second type of competition relied on by shippers in North America, that of "geographic" or "source" competition. Under a system of geographic competition, a shipper of grain from Chicago to New York

may have only one railway company that can offer precisely this service, but the shipper is served by other railway companies that are offering to carry the grain to different destinations. It is clear that geographic competition is in principle inferior to parallel competition as protection from the monopoly power of a railway line; if the shipper must get the product to New York, the other options are not relevant, and he faces a monopolist. However, in practice it has also become clear that so long as there are other railway companies competing to offer service to the shipper, even though they go to different destinations (or, correspondingly, arrive from different origins, or "sources", to a single destination), this competition is sufficient to force the railway companies to offer lower rates and better service to get the customer's business. Geographic competition has been shown by empirical research to be very often effective in protecting shippers from monopoly abuses (MacDonald 1987, 1989a, 1989b; Majure 1996).[1]

Where Latin American policy makers have been able to create competition among railways in the course of restructuring, it has often been of the geographic variety. In Argentina, the system was set up in such a way that all major ports were served by a least two vertically integrated railway companies, typically offering to carry the cargo in different directions from (or to) the port. Similarly, in Mexico, the system was largely divided among three vertically integrated companies that all have access to all shippers in Mexico City. Thus a shipper in Mexico City who really must get his cargo to El Paso has only one rail carrier offering service, but in general he may be protected from monopoly

[1] We may also consider re-labeling the "Latin American" model as the "Tsarist Russia" model. In the late 1800's, grain exporters from the Black Earth region of Russia enjoyed geographic competition from competing private, vertically integrated railway companies: some offered to carry their grain north to the Baltic Sea, while others offered to carry their grain south to the Black Sea (Meyer 1905). Similarly, at the time of the October Revolution, a number of privately owned railways served Moscow from different directions – though whether they competed with each other or operated as a cartel is not entirely clear (Zhuravlyov 1983). See also Westwood (1964).

abuses by the presence of other railway companies that can carry his product to Laredo or Veracruz. Since in many cases the final destination of the cargo will be New York or São Paulo or Lisbon anyway, this geographic competition may be quite effective. If it is far from "perfect competition", it is in many cases "workable competition".

Unlike their North American counterparts, the vertically integrated railway companies in Argentina, Brazil, and Mexico do not actually own their track or the land on which their track rests; rather, as noted above, they have long-term concessions – thirty or fifty years in different countries. In practice, this length of time has proven sufficient for the concession operators to achieve one of the prime goals of railways restructuring: they have invested hundreds of millions of dollars in their track, signaling, and rolling stock. And freight shippers – though still asking for more reform and more competition – are generally pleased with the great progress already made, in terms of competition, service quality, and improved infrastructure.

The European Union, most of its member countries, and a significant portion of the rest of the world have chosen a different railways reform model. Following the lead of reformers of the gas, electricity, and telecommunications sectors in many countries, they have sought to attract private investment and create competition by privatizing and/or allowing private entry into one part of the sector – in the case of railways, train operation – while maintaining the infrastructure "grid" as a monopoly, owned and operated by the state or a state-owned company (Newbery 1999, Pittman 2003).

Here again there have been two principal variations: the first EU plan, adopted in 1991, called for some degree of "open access" to the infrastructure in each country by railways operators from other countries, but did not as a rule seek separation of

ownership or operation between the train operator and infrastructure operator functions within a single country's railway system. The second, and current, EU plan, following the lead of rail reformers in Sweden and the UK, calls generally for *complete vertical separation* between the "competitive" sector and the "monopoly" sector: independent train companies operate over a monopoly infrastructure, and the infrastructure operator is not permitted to operate its own trains. The object of the vertical separation model, of course, is to ensure non-preferential and non-discriminatory treatment of different train operating companies by the infrastructure company.

It is important to note that the degree to which the EU reforms have actually been implemented differs a good deal across countries. In the UK and Sweden, separation has been fully implemented, while other countries have taken only the first steps towards disentangling the accounts of infrastructure and operations. To a similar extent, free access to tracks is ensured in the law books, but the ease with which a train operator can receive access to tracks in practice differs a good deal, as a recent survey shows (IBM Consulting 2004).

Both what we may call the "vertical access" model and the "vertical separation" model are designed to substitute competition among different train companies for rate regulation by the government: if a timber company in Ostersund is not satisfied with the price or quality of its existing rail service to Stockholm, it may solicit bids from other companies to carry the timber on the same track in competition with its existing train company, or it may begin running its own trains on the same track. Swedish furniture giant IKEA tried this strategy for a while, and a German chemicals company continues to do so with its Rail4Chem subsidiary. In practice, unfortunately, most countries that have

opened their rail infrastructure to entry by independent train operators have found that not much competition has been created, at least not yet. (Part of the problem has been with the refusal of infrastructure operators to grant licenses to companies seeking to serve as independent train operators.) Freight railway charges in many of these countries are constrained by competition from motor carriers, but not so much by competition from other rail carriers.

One obvious concern regarding the complete vertical separation option is that any economies of scope between train operation and track operation would be sacrificed. A recent paper by Ivaldi and McCullough (2004) tests for subadditivity in the railway sector and concludes that "there would be a 20-40 percent loss of technical efficiency if railroad freight operations were separated from infrastructure." A concern regarding both the vertical separation and the vertical access model is the consistency of findings that there are economies of density in train operations, so that an incumbent with a large or monopolistic market share enjoys significantly lower costs than potential entrants (Ivaldi and McCullough 2001).

The more serious problem with the "vertical access" and "vertical separation" models thus far, however, has been in the area of attracting private investment. It is true that *governments*, such as Sweden's, have been more willing to invest in the rail infrastructure now that they can be assured that their investments will not be diverted into subsidies or inefficiencies in train operation. However, reformers have not yet succeeded in creating a restructured railway system with "vertical access" or "vertical separation" that provides good incentives for a *private* or budget-constrained infrastructure operator to make large investments in maintenance and improvements.

In part this lack of private investment is because regulators and competition authorities have insisted that the access fees paid by independent train operators be "non-discriminatory"; economists and railway operators can both affirm that it may be very difficult to pay for the high fixed costs of a sector like railways if discriminatory charges are forbidden.[2] In part this is because in many countries, for reasons of short-run economic efficiency, infrastructure access fees are designed by law or regulation to reflect "marginal" rather than "average" or "fully allocated" costs, and "marginal" costs do not, by definition, cover fixed costs, and particularly so in a sector like railways. And, in part, this is because some countries have – again for reasons of short-run economic efficiency – added some form of "congestion charges" to basic infrastructure access fees, and relied in part upon these congestion charges as a source of fixed cost coverage. Of course, infrastructure operators whose main source of investment funding is congestion charges do not have very good incentives to invest in such a way that the congestion is eliminated (Australian Bureau of Transport and Regional Economics, 2003).

4. The Results of Reforms in Western Europe

The EU reform strategy builds on three pillars: a) unbundling infrastructure from operations, b) creating independent regulatory institutions for railways, and c) opening access to national railway markets for competitors ("third party access"). There is a firm belief among many policy-makers, on both EU and national levels, that these reforms *ought to* increase efficiency, but little broad research up to now as to the actual experience.

[2] The share of fixed costs in total costs in the railways sector is relatively high even by the standards of other infrastructure sectors. Thompson (2003) estimates this share at around 25 percent – with a good deal of international variation – versus the "relatively small fraction" – around 10 percent – estimated by Newbery (1999) for the electricity sector.

A recent study (Friebel et al. 2004) investigates systematically to what extent vertical separation, independent regulation, and third-party access have affected the efficiency of railway performance in Europe. As different countries have implemented the reforms to different degrees and at different times, one can identify the impact of regulatory regimes on railway performance by using the production frontier approach pioneered by Farrell (1957). Friebel and colleagues match World Bank data on rail inputs and outputs for 11 European countries over the period 1980-2000 with information about regulatory reforms in these countries and look at the impact of reforms on the efficiency in passenger traffic. Table 1 presents these deregulation data.[3]

Table 1: Deregulation events

	separation infra-structure, operations	***third party access***	***independent regulatory entity***
Austria	1997	1995	
Belgium	1998		
Denmark	1997	1999	
Finland	1995	1999	
France	1997	1997	
Germany	1994	1994	
Italy	1998	1999	
The Netherlands	1995	1995	
Portugal	1997		1997
Spain	1996	1995	
Sweden	1988	1989	
United Kingdom	1993	1993	1993

The study suggests that reforms increase efficiency, that is, that railroad productivity would have, *ceteris paribus*, been lower in the absence of reforms. In

[3] The data have the advantage that they capture the effects of regulatory changes both over time and across countries. They have the disadvantage that they report the state of national laws, and not the implementation of these laws. Moreover, there are many reform specificities across countries. Finally, as noted, the data are for passenger train operations, whereas our discussion in this paper focuses on Russian and CEE *freight* train operations.

particular, it is always efficiency enhancing to implement one of these reforms. This corresponds to an additional output of on average 0.4 percent per year after a country has introduced a reform. Table 2 summarizes the results.[4]

Table 2: OLS regression estimates: dummy *Deregulation Productivity* indicates if any of the above reforms have occurred

	Without United Kingdom		***With United Kingdom***	
Variables	***Parameter estimate***	***t-value***	***Parameter estimate***	***t-value***
Intercept	-1.327***	-4.92	-1.271***	-4.92
Logarithm (Capital)	0.526***	9.77	0.520***	9.89
Logarithm (Labor)	0.737***	15.53	0.728***	15.91
Deregulation Productivity trend	0.004*	1.76	0.003	1.52
Productivity trend Austria	0.009**	2.03	0.010**	2.16
Productivity trend Belgium	0.020***	4.40	0.020***	4.55
Productivity trend Denmark	0.038***	7.75	0.038***	7.98
Productivity trend Finland	-0.002	-0.39	-0.002	-0.43
Productivity trend France	0.049***	9.62	0.050***	10.09
Productivity trend Germany	0.024***	4.42	0.025***	4.79
Productivity trend Italy	0.050***	11.57	0.051***	12.23
Productivity trend The Netherlands	0.081***	16.47	0.082***	16.99
Productivity trend Portugal	0.032***	6.28	0.032***	6.52
Productivity trend Spain	0.039***	7.15	0.040***	7.43
Productivity trend Sweden	0.026***	3.85	0.026***	3.92
Productivity trend United Kingdom	-	-	0.031***	4.98

R^2 = 0.9798
Number of observations: 231.
: significant at a 10% level, **: significant at a 5% level, *: significant at a 1% level.*

However, one important qualification is in order: in this study, the precise effect of reforms depends largely on "sequencing: the introduction of multiple reforms in a single package has at best neutral effects, but sequential reforms improve efficiency. Table 3 shows this result.

[4] The empirical effects are less significant when one includes the United Kingdom. This may point to a problem with UK data: with the beginning of reforms, data quality for UK has declined, and data for staff since 1995 are missing. It may also reflect the different rail reform experience of the UK as compared with the rest of Western Europe.

Table 3: OLS regression estimates, sequencing of reforms matters, packages of reform have no positive effect, compared to no reforms

Variables	*Parameter estimate*	*t-value*
Intercept	-1.133***	-4.23
Logarithm (Capital)	0.518***	9.53
Logarithm (Labor)	0.711***	14.93
DeregulationPartial Productivity trend	0.008*	1.59
DeregulationSequential Productivity trend	0.011**	3.05
DeregulationPackage Productivity trend	-0.005	-1.28
Productivity trend Austria	0.004	0.89
Productivity trend Belgium	0.018***	3.63
Productivity trend Denmark	0.035***	6.98
Productivity trend Finland	-0.009	-1.48
Productivity trend France	0.054***	10.15
Productivity trend Germany	0.031***	5.31
Productivity trend Italy	0.049***	11.04
Productivity trend The Netherlands	0.085***	16.98
Productivity trend Portugal	0.034***	6.87
Productivity trend Spain	0.034***	5.80
Productivity trend Sweden	0.017**	2.25

R^2 = 0.9801
Number of observations: 231.
: significant at a 10% level, **: significant at a 5% level, *: significant at a 1% level.*

This finding is consistent with the view of some other studies concerning gradual vs. shock reforms (for instance, Dewatripont and Roland, 1995), based on the notion that gradual reforms allow a government to learn about the desirability of further reforms in intermediate stages. It is particularly interesting that these results do not provide any support for the position that full separation of infrastructure from operations is a *conditio sine qua non* for railroad efficiency.

In a separate, theoretical, study, Friebel and Gonzales (2004) examine precisely this issue. They focus on the fact that railroads are a business with very high fixed costs that need to be covered either by transfers from the government or by access charges (as

emphasized in Pittman [2004a]). The model stresses an important element, mentioned above, that has been absent from the discussion: the cost of the public funds that may be required for making up the fixed costs of the railway system. The main finding of this study is that vertical separation is welfare enhancing if fixed costs can be financed by costless fiscal transfers, but that this is no longer the case if transfers are socially very expensive. Put differently, the benefits of separation in terms of more competition may conflict with another goal of transition reforms, namely, the stabilization of government budgets.

International estimates of the costs of raising one Euro of public funds are around 30 cents for developed and more than 90 cents for less developed countries. The higher the costs of public funds, the more fixed costs must be covered through access charges for welfare maximization, and the less likely it is that there will be welfare gains when separation takes place. In the Russian context, an inefficient public finance system suggests a high shadow price on government funds in the long run, though in the short term situation of budget surpluses from oil revenues the price must be lower.

The potential consequence of vertical separation in a context of a high cost of government funds is what has happened in many industries in transition economies: double marginalization and output fall.

The model has an additional result that is interesting for our purposes. If a regulator can use two-part access charges, market structure does not matter any more, and in the absence of information asymmetries, the first best can be implemented through any market structure. Compared to the case of linear access prices, the access charge and therefore downstream prices are lower. Hence, if a regulator can use two-part tariffs,

distortions in the downstream market can be mitigated. Pittman (2004a) has argued in this context that it may be unwise to forbid price discrimination as this makes more difficult to cover fixed costs. In the model of Friebel and Gonzales, not allowing for such tariffs would indeed require increased subsidies or tend to create the very downstream distortions that regulators try to avoid by assuring discrimination-free entry.

These two studies support the suggestion that there is not a "one-size-fits-all solution" to the problem of the restructuring of network industries in general and the rail sector in particular: the desirability of the separation of infrastructure from downstream operations is determined by other factors in addition to concerns for downstream competition (Newbery 1999; Pittman 2003a). Otherwise, we should indeed see one dominating reform model.

5. Reform in the CEE Countries and Russia

In their eagerness to join the European Union – later if not sooner – the CEE countries have for the most part enacted laws that would codify the requirements of the principal EC rail directives. Table 4 shows the state of restructuring in the four Visegrád countries plus Bulgaria and Romania. As noted above, the formal implementation of a particular policy or statute is not always representative of the reality on the ground; in addition, it is not always straightforward to choose the exact point that events such as these may be said to have taken place. Nevertheless the Table demonstrates the uniformity with which the overall European model of railways reform is in the process of being implemented in the CEE countries.

Note, for example, that all six of these countries have implemented the separation of business accounts between their rail infrastructure, rail freight, and rail passenger

operations. This is a step that generally has no place in the Latin American and North American reform models, unless there is the (unusual) requirement by a regulator that one integrated railway enterprise allow access to shippers located on its line to another integrated railway enterprise. Note that all six countries either have formally opened their rail infrastructure to access by any approved third party train operator, or have been given special permission by the EC to delay doing so until later in the decade. This is another step that generally has no place in the Latin American and North American reform models. In fact in four of these countries there are third party train operators already, usually large shippers carrying their own cargoes and representing a very small share of total rail freight.[5] As noted above, the policy mandate for complete vertical separation seems the rail restructuring options least strongly urged by EU policy makers, and this also is reflected in the only tentative adoption of this policy in CEE.

Even the degree of adoption suggested by the Table may be optimistic, as there is widespread skepticism concerning the degree to which the railwaymen of these countries really treat each other in the arm's-length, impartial manner implied by the *de jure* vertical separation. The clearest example of this problem is the Czech Republic, where the *de jure* separation that took place in 2003 created a new enterprise, Správa železniční dopravní cesty (SŽDC), that owns the infrastructure, but the old vertically integrated monopolist, České Dráhy (Czech Railways, ČD) operates the infrastructure, receiving a fee for this service from SŽDC. In other words, ČD continues both to operate trains and

[5] In Hungary there is reciprocal access between the dominant carrier MÁV and the localized, mostly international railway Györ-Sopron-Ebenfurti Vasút Railway Company; both remain vertically integrated.

to control the infrastructure, and the access charges that it pays to SŽDC are repaid directly to it as a management fee.[6]

	Separation of railroad from Ministry	Accounting Separation	Access for 3rd party domestic train operators?	Access for international train operators	Vertical Separation
Bulgaria	2002	2002	No	2002 (no requests yet)	2002
Czech Republic	1994	1994	Yes	Delay to 2006	2003
Hungary	1993	2003	No	Delay to 2006	2004
Poland	2001	2002	Yes	Delay to 2007	Unclear
Romania	1998	1998	Yes	1998 (no requests yet)	1998
Slovakia	1994	1994	Yes	2003	2002

Table 4. Vertical restructuring of railways in 6 CEE countries.

The broad acceptance and adoption of the European style, vertical-restructuring based model for railways reform in the CEE countries is hardly surprising, in light of the uniform and long-standing desire of these countries to become EU member countries. (Of course, four of the six are already members now.) Nevertheless it is not clear that this model is the most appropriate one. As noted above, the ability to attract private investment has thus far been a conspicuous weakness of the European model. In contrast, both Brazil and Mexico have adopted a restructuring model based on competition among vertically integrated railway companies, and both have shown remarkable success in transforming their formerly subsidy-addicted and ramshackle national railways into

[6] Former Czech Deputy Transport Minister Michal Tosovsky summarizes the situation well: "You see this split between the tracks and the rest of Czech Railways makes sense when you implement some competition and this is not the case because the new Czech Railways company will also control the tracks. The tracks will be in state ownership but effective control will be held by Czech Railways in the future as well. That means that they will decide who will compete with them so it's not competition at all." Dita Asiedu, "Parliament approves transformation of Czech Railways", Czech Radio 7, Radio Prague, June 2, 2002 (www.radio.cz/en/article/25457).

modern enterprises enjoying hundreds of millions of dollars of private investment (Estache, Goldstein, and Pittman 2001).

Thus it seems quite possible that some CEE countries – in particular the larger ones like Poland and Romania – might have had or might have more success with a reform model that maintains vertical integration by the incumbent dominant rail enterprise but seeks to create competition through some type of horizontal separation – that is, the creation of regional railways competing among themselves for both parallel traffic and traffic originating at or terminating at common points. As suggested by Pittman (2002, 2003b), Romania has a sufficiently extensive track structure and likely sufficient traffic to support several – probably three – independent, competing, vertically integrated railway enterprises should that reform strategy ever be chosen.

The same holds *a fortiori* for Russia. As with the CEE countries, the long-term railways restructuring outcome in the Russian Federation has not been completely decided upon. Nevertheless Russia has an unusually well planned and carefully laid out overall restructuring strategy, and, though it has its own unique aspects, it is much more closely based on the European than on the Latin American model.

In particular, the Russian railways reform plan, like those of the CEE countries just described, calls for separation of railway operations from direct government control, and this change was effected in 2003 with the creation of the Russian Railroad Company, RZhD, a commercial company though owned by the government. RZhD is vertically integrated and will remain so at least through the first decade or so of restructuring, but access to the infrastructure by independent, non-integrated train operators is mandated by

the reform legislation, and indeed as of this writing there are three such operators hauling oil for export.[7]

The current reform plan calls for increasing levels of private investment, especially but not exclusively in rolling stock, and increasing numbers of independent operators competing with the vertically integrated RZhD in train operations. RZhD freight tariffs to shippers are to remain closely and tightly regulated – with particular tariffs dependent on commodity, origin, and destination – while the tariffs charged by independent train operators are unregulated. Eventually RZhD is to directly own only fifty percent, or even less, of the rolling stock and locomotives operating in Russia. The RZhD track infrastructure is to remain under government ownership, though shippers may continue to build and operate spur lines that feed into the RZhD infrastructure. In the long term – in the "third stage" of the reforms – the plan cites the possibility of setting up competing vertically integrated train companies, along the lines of the Latin American model, but there have been no steps in that direction up to this point.

The Russian reform model is consistent with the broad outlines of the European model, and thus is broadly similar to the reforms being implemented by the CEE countries. (It is more than broadly similar to the extent that the vertical separation taking place in the latter countries is more of form than of substance.) Given the broad differences between the railway sectors in Russia and, say, Slovakia – not to mention the UK – what accounts for the similarity of the rail reform models chosen? After all, even if

[7] The proud statements of RZhD insiders that there are now more than eighty "operating companies" or "carriers" that account for over twenty percent of all freight traffic – see, for example, Fadeev (2004), Knutton (2004), and Shemanayev and Lukov (2004) – are literally accurate but may be misleading: the companies referred to may own rolling stock and act as freight forwarders or train assemblers, but they rely on RZhD for locomotives and train operation. There are only three "operators" that use their own locomotives to operate their own trains (European Council of Ministers of Transport 2004).

some Russian economic reformers have expressed a hope for EU membership, such an eventuality must be considered both a long shot and on the far horizon, not likely to have the strong influence on policy that the same consideration had and has in the CEE countries.

We suggest that there may be two reasons for the similarity. The first is the broad appeal among economists and economic reformers of the vertical separation and vertical access models for the restructuring of the old natural monopoly sectors of the economy. Both of these versions of the overall model seem to promise the separation of competition for regulation for a large and important portion of these sectors – train operation, electricity generation, natural gas production, "value added services" in telecommunications, and so on. The vertical access model in particular seeks in a sense to offer the best of both worlds, promising both competition in these "upstream" sectors with the continued enjoyment of economies of scope on the part of the integrated infrastructure operator – though of course at the cost of worries about discriminatory terms of access to the infrastructure for the non-integrated service providers. Some economists have treated one or both of these versions of the model as a sort of default option for natural monopolies restructuring, a seemingly obvious policy choice for pro-market reformers.[8]

The second reason for the appeal of these models in economies where a touch of dirigisme remains is – as suggested by our hints that even vertical separation may be a less radical policy than it appears – that it may be easier using a European rather than a

[8] This group of economists includes Russian Minister of Economic Development and Trade German Gref, who recently told a conference at the Higher School of Economics, "I think it important to accelerate the restructuring of natural monopolies. The current policy of separating competitive operations from monopolies and establishing tight control over these monopolies is absolutely correct and has no alternative" (Johnson's Russia List, April 9, 2004, citing Federal News Service, April 6, 2004).

Latin American railways reform model to maintain overall central control of the system for a much longer period of time – even indefinitely. Those countries using the Latin American reform model – in particular Mexico, Brazil, and Argentina – have seen their former unitary railway systems restructured into competing regional systems controlled by different private entities (though ultimately still owned by the state). In contrast, in the CEE countries and Russia, the very tradition-bound railway enterprises continue post-reform to enjoy the comfort of controlling both the entire infrastructure grid and a very large share of train operations as well – perhaps *de facto* rather than *de jure* in the CEE countries, but openly and by design in Russia. Complete and utter vertical separation may be characterized as the most radical of railway reforms, especially to railwaymen (and women), but either half-hearted vertical separation or continued vertical integration under the vertical access model maintains a great deal of the *status quo*.

Where the CEE countries and Russia seem to be parting ways – though only in the incipient stages so far – is in the policies and rationales behind the setting of access prices when the rail infrastructure is opened up to third party train operators. The debate on the setting of rail access prices has ranged far and wide in EU countries, but less so in the CEE countries and Russia. The overall problem, as suggested in the previous section of the paper, is that access prices that are efficient in the short run – that is, that permit infrastructure use by any carrier whose marginal revenue from use is at least as great as marginal cost – do not cover long-run costs nor, by the evidence accumulated thus far, provide good investment signals. As Nash and Matthews (2002) and others have noted, there is simply no way for a single tool such as the access price to achieve all the goals that have been set for it. Setting discriminatory access prices – using, for example,

Ramsey pricing or two-part tariffs – is one obvious way of addressing at least some aspects of this dilemma, but discriminatory access prices have been generally shunned on competition grounds (Pittman 2004).

The most recent EU rail directives call for access prices to railway infrastructure to be set as closely as possible to marginal cost, while acknowledging that marginal cost is very difficult to measure. The directive recognizes that marginal-cost access pricing does not cover fixed infrastructure costs, however, and so allows for a sort of second best solution of access charges that are "marked up" above marginal costs in a transparent and nondiscriminatory way. As with much of the state of play in EU railways reform, this issue is far from settled, but in general some countries have sought to set access prices right at marginal cost (most notably Sweden, but also including Denmark, Finland, the Netherlands, Norway, and, originally, the UK) while others have set prices above marginal cost, though not usually at a level that would cover total cost (most notably Germany, but also including Austria, France, and Italy).[9]

The situation with access pricing in the CEE countries is even less settled than in the EU. Most countries seem to be adopting something like the German system, with access prices to be set at marginal cost plus a small mark-up, but in general with state funding expected to pay the cost of any infrastructure investments beyond routine maintenance and replacement. Precise methodologies remain far from development, but – again, in general – this characterization seems to apply to the Czech Republic, Hungary, Poland, Romania, and Slovakia. (There does not appear to be information available on access charges in Bulgaria, a fact that may speak to the degree to which true

[9] The information provided in Australian Bureau of Transport and Regional Economics (2003), especially Tables 9 and 11 and the surrounding discussion, is invaluable. Another excellent resource is Adler, *et al.* (2002).

vertical separation has taken place.) Hungary is the only one in the group that appears to be contemplating instituting the kind of two-part tariff that was struck down in Germany by the Bundeskartellamt (Tánczos and Farkas, 2003). However, one authority describes the Czech access charge as a "maximum" charge, which suggests that discounts may be available for either large users (as with a two-part tariff) or the incumbent rail operator (as with anticompetitive discrimination) (Steer Davies Gleave 2003a), and Fularz (2004) complains that the Polish rail enterprise PKP openly charges its affiliated train operators lower access prices than it charges to independent operators. (See also Steer Davies Gleave 2003b.)

Russia has broken ranks with the EU and CEE countries on access pricing, in a unique way that, fortunately or unfortunately, seems to address the issue of long-term financing at the cost of short-term inefficiency. As noted above, the Russian government continues to regulate the shipping rates charged by integrated train operator RZhD in a very detailed way according to commodity, origin, and destination. Apparently alone in the world, Russia has chosen to base infrastructure access prices on these detailed tariffs for final shipments. Thus, if the regulated tariff for shipping coal from the Kuzbass to Moscow is X rubles, the access charge for an independent train operator to ship coal from the Kuzbass to Moscow is the same X times a constant fraction (or, if the customer can supply the loaded hopper cars but needs RZhD to provide locomotives, X times a higher fraction).

Analyzed from one perspective, the Russian rail access pricing constitutes an ingenious solution to the dilemma of short-run versus long-run efficiency cited above: in

principal it approaches first degree price discrimination, which may achieve complete cost recovery with no loss of efficiency.

This is, however, the view from only one perspective, and there are others. The first possible problem to note is that this pricing regime constitutes something like first degree price discrimination only to the degree that the regulated tariffs are set according to the demand elasticities of shippers, and correspondingly to the degree that the elasticity of derived demand for access by train operators is closely related to the elasticity of demand on the part of shippers. The latter condition is most likely met, given the likely low elasticity of substitution between infrastructure and other inputs on the part of train operators.[10] The former condition is much less likely. To our knowledge, there has been no systematic examination of the extraordinarily complex set of tariffs for shipments on RZhD – at least not one released outside the organization – but it appears that politics and considerations of encouraging regional development play at least as important a role as any demand considerations in setting the tariffs.[11]

The second problem – no less important than the first – has to do with the calculations that are the background to the choice of the fraction to be applied to the commodity tariff to yield the access price. As a measure of the ratio of infrastructure costs to total service costs, the calculations are almost surely biased upwards, since they are based on a computation of total, fully allocated rail transport costs minus only estimates of the full cost of locomotive use and rolling stock use. This "top down"

[10] Kennan (1998) supplies a nice derivation and discussion in the context of the Hicks-Marshall model of derived demand.
[11] In fact there is some doubt that the tariffs for the longest distance shipments even cover marginal costs (European Council of Ministers of Transport, 2004).

calculation yields an average infrastructure charge of 55 percent of total rail transport cost – an extraordinarily high access charge by world standards.[12]

Access charges set at such a high percentage of total service costs may help to insure that any train operating company pays a significant share of the long-term costs of infrastructure provision, and the discrimination of these charges by commodity and distance may, in principle at least, help to prevent potential customers with the most elastic demands from being priced out of the market. Still, access charges based on an upwardly biased measure of cost and related at best imperfectly to demand elasticities will inevitably deny access to some, and likely a large number of, potential users who could cover their short-term costs of use, and who thus will use less efficient transport alternatives than short-run efficiency would dictate. It is impossible to say how much commodity-by-commodity access charges counterbalance the upward bias from the top-down calculation of average cost, including the loss of efficiency from the discouraging of intramodal competition by the unusually high access charges. However, Pittman (2004) has estimated that the use of uniform average cost rather than marginal cost by RZhD could yield a deadweight loss of 1-2 percent of Russian GDP annually.

Finally, it is important to appreciate how much the restructured railway system would continue to rely on close, day-to-day government regulation under the current reform plan.[13] RZhD would continue to have its tariffs completely regulated, and the

[12] Thompson (2003) provides rough estimates of rail infrastructure cost shares in some other countries as follows: the U.S., 17-27 percent; the U.K., 25 percent; France, 20.5 percent; Sweden, 30.9 percent; and India, 10 percent. The rail infrastructure access charges set in a number of countries are reported in Australian Bureau of Transport and Regional Economics (2003).

[13] As with our earlier discussion of competition among vertically integrated railway companies in 19th century Russia, there is a parallel here to tsarist economic policy more broadly. Owen (1991) argues that a primary problem with Russian economic progress in the 19th century was that the desire of the tsars and their governments to emulate the dynamic capitalism of western Europe was balanced by a strong reluctance to allow the market rather than the government to dictate economic events.

regulator would be required to obtain reliable information as to the cargoes of each train and their origins and destinations to do the job properly. Nonintegrated train operating companies could set their tariffs freely, but their access charges would be set – and regulated – according to the same detailed criteria for which the corresponding RZhD tariffs would be set. If competition is to be even a loose constraint on the behavior of the incumbent RZhD, a regulator or the antimonopoly authority must be able to enforce the requirement of nondiscriminatory access prices and other terms of service over the vast expanse of Russia's geography. Given the absence of a tradition of either regulatory control of infrastructure enterprises or effective antimonopoly enforcement – or, for that matter, anticorruption measures or the rule of law in general – a cynic would have no trouble explaining why RZhD would favor a reform plan with these attributes.[14]

What accounts for this significant difference between the EU and CEE countries on the one hand and Russia on the other regarding the setting of rail access prices? Certainly the possibility of EU accession and the explicit EU directives must be the primary factor here; Russia, with no fear of criticism from Brussels or realistic hope for an invitation to membership in the foreseeable future, simply chose its own path. A second factor may be Russia's status as a low-cost exporter of important bulk commodities such as coal, minerals, and timber products; if there are large rents to be earned here, a transport infrastructure monopolist may be in a good position to appropriate them with high enough access charges. Related to this may be the factor just described, the strength of RZhD and the weakness of reform forces in general and the old

[14] For the same reasons, some shippers and potential competitors are pessimistic regarding the outcome of the reform plan. The director of Russian Aluminum, Oleg Deripaska, forecasts that "instead of one monopoly, another one will appear. Private carriers will have to compete with a colossus." Sergei Chereshnev and Marina Kochetova, "Rail Transport 1991-2000," *Kommersant*, March 12, 2004.

Antimonopoly Ministry (now the Federal Antimonopoly Service) in particular in Russian politics and policy making: although the competition agencies of the CEE countries are generally not strong players within the government, the Russian agency may have been the weakest (Pittman 2003c).

6. An Alternative Restructuring Model

What might an alternative model for restructuring the Russian railways look like? As noted above, several fairly large countries in Latin America, including Argentina, Brazil, and Mexico, have adopted a railways reform model that maintains vertical integration in the sector and seeks to largely replace regulation with competition among these integrated railways. There are vast areas of Russia where competition between integrated railway companies may not be possible – particularly the entire land mass east of the Urals Mountains, though there is some disagreement as to whether the Baikul-Amur Railway (the BAM) could be upgraded sufficiently to serve as a genuinely competitive route to the Trans-Siberian Railway.

However, "European Russia" – the portion of the country west of the Urals – has a population density and a railways density not so very different from the CEE countries and the Latin American countries just named, and it is not at all clear that a Latin America styled model of railways reform, with two or more vertically integrated railway companies competing among each other both along parallel track segments and in serving common origin and destination points, would not work as well as the more European style model put in place up to now. Recall in particular that in both Brazil and Mexico, the private consortia that have taken long-term concessions on the infrastructure in particular regions and that compete among each other mostly on a geographic rather than

a parallel basis have quickly moved from receivers of government subsidies to payers of taxes, and have put hundreds of millions of dollars of private investment into their systems. Especially given the serious needs of RZhD for investment funds, a model that has had this result elsewhere seems worth examination.

In a separate paper, three of us have taken first steps to suggest just what such a restructured railway might look like in Russia (Guriev, *et al*., 2003). Although we lacked the data necessary for an extensive analysis of commodity flows over the Russian railways system, we were able to outline one plan for splitting the system of European Russia into two competing vertically integrated railway enterprises that appeared likely to maintain economies of density over the two systems while creating parallel competition between a number of important points – Omsk and Moscow, St. Petersburg and the Black Sea – and competing service to a number of important common points – Moscow, St. Petersburg, Kursk, Saratov, Samara.

Map 1 shows this plan. It seems quite possible that with more detailed data we could outline a three-line plan, as in Mexico, that would potentially create even more competition. In either case, the reorganization would seek to rely on competition among the two or three vertically integrated rail enterprises both for parallel moves between the same origin-destination pairs and for moves into particular destinations or out from particular origins. As in Mexico and as in much of the United States, cities or other shipping areas served in common by two or more railroads would have their local rail infrastructures reorganized as either independent enterprises or joint ventures among the serving railroads, so that any railroad servicing the area could carry freight for any shipper and deliver to any customer. In addition – also as in Mexico and the US – with

competing lines fairly close to each other geographically, shippers could use their ability to send their freight by truck to a competing rail line (or to build a rail spur to that line) to seek to extract lower rates from their current service providers. Assuming that a rail regulator and the Federal Antimonopoly Service could prevent collusion among the competing railroads, most commodity tariffs in European Russia could then be deregulated – again, as in Mexico and the US.

Some of the CEE countries may be large enough and have large enough demands on their freight railways that a similar restructuring system would be a realistic possibility there – for example, Poland and Romania (Pittman 2002 and 2003b). Others, such as the Slovak and Czech Republics, may be too small to support more than one vertically integrated railway company within their borders. On the other hand, there seems to be no obvious economic – as opposed to political – reason why in either the EU or among CEE countries there could not be created international, privately controlled, vertically integrated railway enterprises, competing with each other to carry freight from, for example, Berlin to Moscow – a northern route through Warsaw and Minsk, a southern route through Krakow, Lviv, and Kiev. Recent acquisitions by the German rail enterprise DB of railfreight operations in neighboring countries suggest the beginnings of such a trend, at least for above-the-rail operations.[15] That larger scenario is beyond the scope of this paper, but it does provide another lens through which to view the question of the application of different railway reform scenarios under different circumstances.

7. Conclusion

Latin America and North America, on the one hand, and Western Europe, on the other, have largely chosen very different strategies for restructuring their formerly

[15] See, *e.g.*, "Battle for Europe Rages", *International Railway Journal*, July 2004.

monopolistic freight rail sectors. The CEE countries, strongly influenced by their desire for EU membership, have followed the Western European model in form, though the degree to which actually meaningful restructuring has taken or will take place is not always clear. Russia has chosen its own unique path, closer to the Western European than to the American models. It is too early for comprehensive empirical examinations, but it appears that both Russia and some of the CEE countries could benefit from a serious consideration of alternative reform strategies.

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