

**ECONOMIC ANALYSIS GROUP
DISCUSSION PAPER**

**Competition Issues in Restructuring Ports
and Railways, Including Brief
Consideration of these Sectors in India**

by

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EAG 09-6 November 2009

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Abstract

One important issue facing reformers considering the restructuring of the seaports and freight railways sectors of a developing country is the creation of competition – or, alternatively, avoiding the creation or preservation of monopoly power. In seaports a crucial distinction is often that between intraport and interport competition; in freight railways, between competition among train operating companies over a monopoly track and competition among vertically integrated railways. In both cases it is useful to frame the issue as one of competition at the component level within an open system versus competition between closed systems. In both cases as well, the market definition paradigm suggested by the *Horizontal Merger Guidelines* of the U.S. competition agencies provides a useful framework for analysis.

Keywords: competition, ports, railways, market definition, India

JEL codes: L14, L23, L33, L91, L92, O14, O22, R48

1. Introduction

As globalization deepens, and the transport and communications sectors continue the remarkable increases in productivity that have shrunk time and space in the economic world, governments are discovering that they can no longer afford the luxury of allowing inefficient, state-owned infrastructure providers to serve more as employers of last resort than as facilitators of international competitiveness.

One frequently chosen strategy for improvement has been the introduction of private sector participation in the formerly state-only infrastructure sectors. This strategy has involved not only outright privatization of existing state-owned enterprises – whether through sale or long-term franchise – but also public-private partnerships for enterprise operation and improvement, and the tendering to private companies of the right to build new facilities that may or may not transfer later to state ownership – *i.e.*, build-own-operate, build-operate-transfer, and variations thereto.

A second strategy, complementary to the introduction of private sector participation and arguably even more important, has been the creation of competition in order to improve the incentives for the efficient operation of the infrastructure enterprise regardless of its ownership.

But how is competition to be created in the infrastructure sectors of the economy? Often these sectors are characterized by capital stocks of sufficiently high fixed and sunk costs that their economies of scale are not exhausted at existing and forecast levels of demand, rendering complete duplication potentially costly and inefficient. The traditional responses of either government ownership or close government regulation may be responsible for the inefficiency that new policies seek to address.

Economists and policymakers have responded to this conundrum with three broad categories of solutions:

1. Separate the “natural monopoly” portions of a sector from those activities that may be efficiently opened up to competition. Continue some sort of regulation of the natural monopoly portions – for example, the price of access – while allowing competition to replace regulation for the remaining activities. The paradigmatic example of this strategy is the breakup of AT&T as the result of an antitrust suit brought by the U.S. Department of Justice (Brennan, 1987), but there are multiple

- other examples worldwide in multiple other sectors, including railways, electricity, and natural gas (Newbery, 1999). An important detail is whether the “separation” is to be complete or only to require increased transparency of operations within an enterprise that remains vertically integrated (Pittman, 2003).
2. Where the economies of scale in the capital stock either have been reduced by technical change (telecoms) or persist with some aspects of scale but not others (railways), seek innovative ways to create competition among vertically integrated providers. In telecoms, to the degree that an increasing number of customers are content to rely on mobile rather than fixed wire service, there may be little need to worry about access conditions to the “natural monopoly” fixed wire grid in the future (Laffont and Tirole, 2000; Sung and Lee, 2002). In railways, where economies of system size are typically exhausted before economies of density (Savignat and Nash, 1999), most of the countries in the Americas have chosen to rely upon competition among integrated providers competing at common points rather than seeking vertical restructuring and access by competing train operating companies to a common track (Pittman, 2007a).
 3. Finally, some have urged renewed and more strenuous attempts to achieve efficient operations within the traditional context of government ownership or government regulation. The huge literature on “incentive regulation” has constituted a spirited attempt to correct some of the well documented flaws of older systems of regulation without jettisoning regulation altogether (Laffont and Tirole, 2000). Closer to home, the Indian Railways achieved remarkable improvements in efficiency in the 2004-2007 period without relying on either competition or privatization (Kumar and Mehrotra, 2009; Thompson, 2009).

Increasingly, as well, economists and policymakers have recognized that competition may take unexpected forms and appear in unexpected places, such that the competitive restructuring of a particular natural monopoly sector may not be required for customers to be protected from monopoly. (Another way of saying this is that sometimes a “natural monopoly” has no monopoly power.) Railways face competition from motor or water carriers for many commodities. Cable television providers are increasingly offering telecommunications services, as are internet service providers; correspondingly,

telecommunications services providers have begun offering cable television services. As we will discuss below, it may be inefficient and unnecessary to create competition among terminals within a single port if there is competition between ports.

What is required for an informed discussion of restructuring options for these historically monopolistic sectors is a close analysis of the structure of particular markets, using the same tools as those used by competition law enforcers: a careful evaluation of the existing competitive situation and the likely competitive implications of contemplated future arrangements. In the case of ports and railways, as with other infrastructure sectors considered for restructuring, this analysis must in addition acknowledge the “systems” nature of the services provided and hence of the choices available to purchasers.

In particular, when a customer uses a “system” made up of complementary components to perform a certain function – a laptop computer or a video game, but also a national or international freight transportation chain – it is not always clear whether competition is most efficiently and effectively provided by competition among producers of individual components of the chain – the computer itself, particular peripheral components, particular types of software – or among vertically integrated suppliers of the entire chain. This is the IBM vs. Apple model of the provision of personal computer services, but it is also the American vs. European model of the provision of freight railway services, as we will discuss below. Which model is most effective at protecting customers from monopoly abuses is likely to depend on the facts of the particular sector and situation.

2. Competition in a Systems Context: Seaports

Seaports are one component of a vertical chain that carries a product from producer to customer. This chain may include inland transport from producer to port, the multiple port services themselves, water transport, port services at the destination port, and inland transport to the final customer – as well as intermediate terminals at various stages for freight consolidation plus agents offering to arrange particular steps, such as freight forwarders and third party logistics providers.¹

¹ See, e.g., the Bonacich and Wilson (2008), Notteboom (2008), OECD (2009), and Talley (2009).

From the standpoint of competition analysis, we begin by defining markets, and we do this by analyzing the choices faced by both the producer of the product and the customer of the product. Begin with the producer. In defining the relevant market for a particular port, we first ask whether that port has market power vis-à-vis that producer: is the producer forced to pay whatever the port charges if the producer is to sell its product, or does the producer enjoy other, economic alternatives? Note that such alternatives might be other ports, but they might also be other types of customers.

Consider even more specifically the producer of a product important to India: iron ore. A miner and processor of iron ore who wishes to export his product may be economically “captive” to one port, or may have several other ports among which to choose, depending upon his location, upon the internal transport options potentially serving alternative ports, upon the terminal facilities available at these alternative ports (including whether he owns one such terminal himself), and upon the ability of alternative ports to serve as intermediaries to his ultimate customers – for example, the steel producers of a foreign country. But those may not be all of his economic options. There may be steel producers within his country or within a neighboring country that is economically reached by land transport who would pay a price for iron ore comparable to the (net) price received from those at the end of the sea voyage. There may even be a steel mill next door to the iron ore processing plant, perhaps commonly owned or connected via long term contract.

All of these possibilities must be examined for all important producers in the hinterland of the port if one is to define the market, and thus determine whether the particular port constitutes a market from the standpoint of those important customers, and thus determine whether reformers and restructurers should be concerned about the possibility of a terminal owner exercising market power within the port. Market power can be exercised only in a market, and if a particular port is not a market from a competition standpoint, one need not worry that a large share of traffic passes through a single terminal or port. Returning to the systems context, if the iron ore producer can substitute economically between one vertical transport chain (system) that uses terminals in port X and another than uses terminals in port Y, then the question of competition at

the level of individual terminals within a single port (at the components level) loses much of its importance and interest.

As in any sector (Coate and Fischer, 2008), one useful source of information for market definition may be “natural experiments”. For example, Talley (2009) reports that

In the summer of 1997, the Union Pacific (UP) railroad ... experienced a severe shortage of intermodal rail cars and locomotives in the [Southern California] region. This equipment shortage and the resulting backlog of containers for departure from the Ports of Los Angeles and Long Beach reached such a critical level that UP took the unprecedented step of chartering an APL ship – to transport containers from these ports, through the Panama Canal, destined for the Port of Savannah.

Similarly, Banacich and Wilson (2008) note that when congestion in the ports of Los Angeles and Long Beach threatened to delay the delivery of imports to large US retailers as the Christmas season of 2004 approached, “some diverted their cargo to other West Coast ports or to all-water routes [*i.e.*, through the Panama Canal]. From July through mid-November 2004, over a hundred ships were diverted to Oakland, Manzanillo, and other ports....” This at least suggests the existence of interport competition for container shipments among those ports.

Using the basic framework introduced in the *Horizontal Merger Guidelines* of the U.S. Department of Justice and the Federal Trade Commission, we begin with the smallest possible market of potential interest and expand as appropriate. From the perspective of our iron ore producer, begin with the nearest port. If that port charged monopoly prices, would the iron ore producer have to pay them in order to sell his product at the highest possible profit? If so, that port constitutes a market from the perspective of that customer. If not, we ask what is the closest substitute from his perspective – what is the alternative that constitutes the most binding constraint on the ability of that single port to charge monopoly prices – and add that alternative to our candidate market.

Perhaps this closest substitute is a second port, reachable by a slightly more expensive but still economical rail haul from the iron ore processing plant. If so, we consider the two ports as a candidate market, and ask whether, if the two ports were together to charge monopoly prices for their services, the iron ore producer would have to

pay them in order to sell his product. If so, the two ports together constitute a market from the standpoint of the iron ore producer. If not, we seek out the next closest substitute. And so on.

As this description should make clear, if we perform the market definition exercise for different producers of the same commodity seeking to ship from a particular port, or for producers of different commodities seeking to ship from the port, we may reach different answers regarding the scope of the relevant market. For example, containers may travel to the port as easily by motor carrier as by rail carrier, so in a region better served by roads than by rail, a producer using containers may enjoy more economic options – a broader relevant market – than a producer of a bulk good like iron ore that typically travels by rail. Port terminal services are not easily arbitrated, especially across commodities, so a terminal owner will likely be able to price discriminate across different producers, exercising market power to “captive” shippers and offering competitive prices to those with more options. Thus the presence of users of a particular port with multiple port options will likely offer little or no protection from monopoly abuses to producers who lack such options (ABA, forthcoming).

This market definition exercise for a port is then repeated from the standpoint of the buyer/receiver of goods, with the same corresponding questions and issues raised. A steel mill receiving iron ore shipped via bulk freighter, a grain processor receiving wheat carried by bulk container, a large retailer receiving consumer goods carried by container – each of these may have very different sets of economic alternatives to a particular port, but in each case the same group of questions is asked: If the port charges monopoly prices, can the sender reach the receiver economically via another port? If a single port or a group of ports charges monopoly prices, can the receiver obtain the same goods via land transport, from domestic or other international producers? And again arbitrage is unlikely, so market power and potential abuse by a port or group of ports vis-à-vis a single important receiver will not likely be tempered by the presence of other receivers who have more options (i.e., whose relevant supply markets are broader).

Consider, then, the question of how best to restructure Port X. We will have investigated the economic options of the important senders and receivers of both bulk and containerized commodities through port X and defined markets accordingly. In

particular, we want to determine whether it is important that the restructuring process create intraport competition – competition among different terminal owners within Port X – or whether interport competition is sufficient to protect customers from monopoly abuses (Notteboom, 2002; De Langen and Pallis, 2006; Phang, 2009; Talley, 2009; ABA, forthcoming).

If all significant customers enjoy economic alternatives for their outputs, whether other ports or other kinds of options – which is another way of saying, if Port X is not an economic market from the standpoint of any significant customer – then no single terminal owner may have market power in the port – since the port is not a market in which to have market power – and the terminals of the port may be placed under the control of a single private owner with no worry about monopoly abuses to follow. However, if this is not the case – if for certain exporters or importers of iron ore or petroleum or grain or manufactured goods carried in containers, Port X is the only economic alternative – then the port constitutes an economic market, and restructurers may want to seek to create intraport competition: different terminals within Port X offering the same services competing for the business of importers and exporters.

Similarly, if, rather than a single port, it is a group of ports that constitutes an economic market from the standpoint of significant customers, then restructurers must concern themselves with the structure of *that* market: whether one firm may end up controlling sufficient terminal capacity for particular commodities in that group of ports – for example, in one broad area of one coast of a particular country – that it holds a position of market power over senders and receivers of those commodities.

Whether the focus of restructuring is intraport or interport competition, three ongoing international trends create interesting complications. The first is the ongoing worldwide improvement in inland freight transport, tending to gradually increase the ability of users to substitute among ports economically and thus to reduce the focus on intraport as compared with interport competition (McCalla, et al., 2004; Notteboom, 2008; Cwinyai, 2009).² The second is the growth – both internal and through merger – of large multinational terminal operating firms (Talley, 2009), reducing the number of

² On the other hand, a recent econometric examination suggests that even for containers, the elasticities of substitution for shippers among the Australian ports of Melbourne, Sydney, and Brisbane are relatively low (Menezes, *et al.*, 2007).

potential bidders for particular concessions or privatizations and increasing the likelihood of competitive problems whether a single port or multiple ports in a region constitute a relevant market.³ This is notably a trend regarding container terminals, the fastest growing area of port operations; Notteboom (2008) notes that “four worldwide operating companies (PSA, HPH, DP World and APM Terminals) represent ... some 42% of total worldwide container handling.”⁴ One stated rationale for this consolidation trend has been to counteract the similar ongoing consolidation of ocean shipping lines (Cwinyai, 2009; Frémont, 2009; Van de Voorde and Vanelslander, 2009).

The third trend is vertical rather than horizontal and thus raises somewhat less straightforward issues. Increasingly over the past few years, ocean shipping lines have been – in addition to horizontally integrating – vertically integrating into the ownership and operation of container terminals, while bulk producers of iron ore, coal, and petroleum have been vertically integrated into the ownership and operation of the specialized bulk terminals used for their products.⁵ The apparent primary rationale for ocean shipping line integration into container terminal operations has been to better coordinate the related operations and thus offer seamless, more efficient service to shippers – again, an efficient *system* (Frémont, 2009; Van de Voorde and Vanelslander, 2009). The apparent primary rationale for producers of bulk goods to integrate into terminal operation has been to remove the danger of exploitation by independent terminal operators who hold them captive, given the less mobile nature of bulk goods as compared with containerized goods (De Langen and Pallis, 2006, 2007).

Nevertheless vertical acquisitions – like vertical alliances and vertical agreements – in concentrated markets have the potential to raise horizontal competitive issues. In a market with a small number of competitors – frequently the case now regarding not only container terminals and bulk goods terminals but also ocean shipping lines – the ownership or control by one competitor of an important facility such as a port terminal

³ This is not a problem only for seaport terminals. Benitez and Estache (2005) note increasing global concentration for concession bidding and operation in a variety of infrastructure sectors. Similarly, as the European railways sector has been liberalized, observers have expressed concerns about the number of tenders won by the German railway giant DB Schenker (Pittman, 2009).

⁴ See also World Bank (2000), Notteboom (2004), Slack and Frémont (2005), Frémont (2009), and Van de Voorde and Vanelslander (2009).

⁵ For vertical integration by ocean shipping companies, see Haralambides, et al. (2002), Slack and Frémont (2005), and Cariou (2008). For vertical integration by bulk shippers, see De Langen and Pallis (2007).

may be used anticompetitively, by either denying access to the facility to competitors or allowing access under unfavorable terms.

All of this is not to suggest that competition issues are the only relevant considerations in the reform and restructuring of seaports and their terminals. Certainly efficiency considerations are crucial as well; for example, as in any capital-intensive industry, if demand is insufficient to support multiple providers at efficient scale, there may be a tradeoff between allocative efficiency through competition and productive efficiency through large facility or enterprise size. Similarly, the transactions cost advantages of close vertical relations – particularly in a dynamic sector like container shipping – must be weighed against concerns about discriminatory access conditions if one producer owns or has a close relationship with a specialized terminal and its competitors do not.

A few examples from recent world experience illustrate these principles in practice.

- The Argentine government, seeking to create intraport competition in the port of Buenos Aires, its largest and busiest port, created a six-terminal authority within the port called Puerto Nuevo and limited awards to only one terminal per company (Estache and Carbajo, 1996).
- A few years later, the Argentine Comisión Nacional de Defensa de la Competencia investigated but decided not to challenge the acquisition of one of the terminals in Puerto Nuevo by Maersk Sea Land, one of the world's largest ocean shipping companies. Its concern was possible vertical foreclosure: the ability post-acquisition of Maersk Sea Land to disadvantage its ocean shipping competitors by denying them access to its own terminals, or providing access under inferior terms (TERI, 2008).
- In Indonesia the Komisi Pengawas Persaingan Usaha (Commission for the Supervision of Business Competition) found PT. Pelabuhan Indonesia I, the public company controlling the ports of the provinces of Aceh, North Sumatra, and Riau, to be in violation of the competition law for having a) monopolized the market for palm kernel and copra export from the major North Sumatran port of Belawan and b) sought to impose exclusive dealing

requirements on seven major customers (Decision, Case No. 01/KPPU-L/2004). The Commission’s decision does not explicitly address the question of alternative ports as part of the market definition exercise, but in fact Belawan is by far the largest port on the island of Sumatra, and it would not be at all surprising if the two principal additional ports on the island – Palembang in South Sumatra and Panjang in West Sumatra – lacked the dry bulk terminal capacity or the inland transport connections that would be required for them to be economic alternatives for palm kernel and copra exporters at Belawan (Ray, 2008).

- In Mexico the Comisión Federal de Competencia, concerned more about interport competition, initially refused to allow any single firm to win more than one port concession on either coast – though it later revised this restriction to incorporate a straightforward prohibition on gaining a dominant position in a relevant market (Estache, et al., 2001b; De Leon, 2009).⁶
- In recent years the Romanian Competition Council has considered the competitive implications of various ownership arrangements of the cement terminals in Constanța by the three large cement producers in Romania.⁷
- When grain processing giants Cargill and Continental Grain sought to merge in 1999, the Antitrust Division of the U.S. Department of Justice insisted on divestitures of a number of port terminals (“elevators”) in order to protect farmers from monopsonistic abuses:
 - “The Pacific Northwest. Cargill’s port elevator in Seattle competes with Continental’s port elevator in Tacoma for the purchase of corn and soybeans. The overlapping draw area for these facilities includes

⁶ The Argentine and Mexican experiences are also discussed by Llanto, *et al.* (2005), which focuses on the reform and restructuring debate in the Philippines.

⁷ See, *e.g.*, Foreign Investors Council (Bucharest), “Competition Council investigates possible economic concentration,” Daily Newsletter Archive, Legislative News, September 5, 2003; Romanian Competition Council, DECISION NO 94/26.05.2005 relating to the sanctioning of LAFARGE ROMCIM S.A., HOLCIM (Romania) S.A. and CARPATCEMENT HOLDING S.A. for the infringement of Article 5(1)(a) of the Competition Law no 21/1996, at ¶118; and EU Twinning Project RO 02/IB/FI/02 and Romanian Competition Council, *The List of Sectors Essential for the Romanian Economy from the Competition Point of View*, Bucharest, 2005, at ¶80.

portions of North Dakota, South Dakota, Minnesota, Nebraska, and Iowa....

- “Central California. Cargill’s port elevator in Sacramento competes with Continental’s port elevator in Stockton for the purchase of wheat and corn. The overlapping draw area for these facilities is located in the Sacramento/Stockton area, where all suppliers are captive.
- “Texas Gulf. Cargill’s port elevator in Houston competes with Continental’s port elevator in Beaumont for the purchase of soybeans and wheat. The overlapping draw area for these facilities includes portions of Texas, Louisiana, Oklahoma, Kansas, New Mexico, Colorado, Nebraska, Missouri, Iowa, and Illinois.”⁸

3. *A Few Words on Indian Ports*

India has twelve “major” ports, six on the west coast and six on the east. The two ports handling the largest tonnage in 2007 were Vishakhapatnam and Chennai, both on the east coast, but if one combines the tonnages for the Mumbai and Jawaharlal Nehru (JNPT) ports, adjacent to each other on the west coast, that combined port becomes by far the dominant port by tonnage handled (Chudasama, 2009).

The most important commodities handled by Indian ports are petroleum oil and lubricants (“POL”, 32 percent of major port tonnage), iron ore (19 percent), containers (15 percent), and coal (14 percent) (TERI, 2008). Of all commodities handled, containers have been by far the fastest growing, and are forecast to remain so, perhaps moving into second place by tonnage within the next five years (Committee of Secretaries, 2006). At this point only JNPT seems to handle significant quantities of containers, though smaller quantities are handled by Kandla, Chennai, and Kolkata (*Ibid.*). TERI (2008) suggests that the dominance of JNPT in container handling is “largely a result of poor hinterland connectivity at other ports.”

The dominance of JNPT in container handling probably explains the government’s concern for creating intraport competition there; in 2002 it prohibited the

⁸ Competitive Impact Statement, U.S. v. Cargill and Continental Grain, July 23, 1999, <http://www.usdoj.gov/atr/cases/f2500/2584.htm>. See also Hayenga and Wisner (2000).

Australian giant P&O Ports, already handling containers at its own NSICT terminal in JNPT, from bidding on a second JNPT container terminal. Ironically, the disqualification of P&O from that bidding raised new concerns about vertical foreclosure, since all but one of the remaining bidders were shipping lines (Ray, 2004).

The other major ports are mostly devoted to bulk goods, both wet and dry. So, for example, Visakhapatnam handles mainly POL and iron ore; Mumbai by itself handles mostly POL; Paradip handles iron ore, coal, and fertilizers; Mormugao handles mainly iron ore; and New Mangalore handles mainly POL and iron ore (Committee of Secretaries, 2006). It appears that a combination of proximity to bulk shippers and poor interior connectivity may cause many of the major ports to constitute economic markets vis-à-vis many of their bulk shippers, thus rendering intraport competition a concern for reformers, but obviously a close analysis would be required in each case. On the other hand, some of the ports seem close enough to each other – especially if the freight rail network is improved – to suggest at least the potential for interport competition. For example, might iron ore exporters be able to substitute between terminals at Mormugao and New Mangalore, or between terminals at Paradip and Vishakhapatnam?

4. Competition in a Systems Context: Freight Railways

Railways may be considered as part of a worldwide system of freight transport that includes ports as important potential bottlenecks, as we have just discussed; furthermore, the coverage and efficiency of a domestic railway system in a country as large as India may be an important factor in the market definition exercise for seaports and hence for the relative importance that reformers and restructurers should attach to the creation and preservation of intraport vis-à-vis interport competition. At the same time, we may consider freight railways as important and interesting systems in themselves, with the corresponding standard policy issue of whether customers are best protected from monopoly abuses by competition among vertically integrated, “closed” systems – that is, enterprises that own or control both the track and signaling infrastructure and the trains operating on the infrastructure – or by competition among independent train operating companies using a monopoly track and signaling infrastructure – “component”

competition. As we shall see, different countries have in recent years chosen different paths in this regard.

The historical record is fairly straightforward. The world's pioneering railway countries, England and the United States, used private capital to build privately owned, vertically integrated railway companies that competed with each other on parallel routes and in serving common points (Stover, 1961; Kostal, 1994). Australia, Canada, and Russia in time adopted similar policies (Clark, 1908; Cruikshank, 1991; Kopicki and Thompson, 1995; Haywood, 1998; Pittman, 2007b). Some of the countries of Western Europe followed the same path of emphasizing private sector financing and operation (Italy, Spain, Prussia), though other countries even early on followed very much a state-directed policy (France, Belgium) (O'Brien, 1983; Dunlavy, 1994; Schram, 1997).

Sooner or later, however, most of these and other countries – omitting only the United States and Canada – ended up nationalizing their railways, running them as government monopolies for a number of years, and then – typically within the last decade or two – considering how to induce private sector participation and create competition in order to revive moribund, overmanned state-owned enterprises (Kopicki and Thompson, 1995; Friebel, *et al.*, 2007; Pittman, 2007a).

As with the seaports sector, our reformers and restructurers should begin their analysis of particular freight railway locations with a market definition exercise. Begin once again with a miner and processor of iron ore, and assume this time that he wishes to send his iron ore by rail to a steel mill located hundreds of kilometers away. Does a vertically integrated railway that offers to carry the iron ore from origin O to destination D have the power to impose a monopoly price on the iron ore producer, so that that railway constitutes the relevant market? What alternatives might the iron ore producer enjoy that would protect him from a monopoly railway and hence cause us to define the economic market more broadly than that single O-D railway?

This time our useful concepts are labeled “intramodal” competition and “intermodal” competition – that is, respectively, competition from other railway companies and competition from carriers using other modes (Pittman, 1990; Kwoka and White, 2004). Before railways restructuring, there is no intramodal competition by definition. However, many goods producers are protected from monopoly abuses from

railways by the presence or potential of intermodal competition. The other modes involved are typically water, pipeline, or road, and each has certain built-in limitations as a competitor to rail:

- Water carriage is limited in its potential by geography; only if the O and D are connected by water can this mode substitute for rail. In addition, water carriage tends to be slower than rail and other modes, and in some countries the rivers and/or ports are frozen for part of the year.
- Pipelines compete with rail for only a small number of goods, usually in the POL category, occasionally (through slurry pipelines) for coal. Typically pipelines are not close, marginal substitutes for rail: if pipeline capacity is available for POL-type products, it is typically cheaper, faster, and more direct than rail, and so is used until capacity is exhausted.
- Motor carriers have over the years taken a good deal of tonnage from the railways; their speed and easy door-to-door service may give them many inherent advantages. In recent years, some of this traffic has been won back to the rails via trailer-on-flat-car or container-on-flat-car hauls, so that truck/rail/truck container movements have become substitutes for truck movements. In general, railways have a significant cost and convenience advantage, and motor carriers cannot compete, for the haulage of bulk commodities over long distances (Pittman, 1990; Kwoka and White, 2004).

If goods producers can economically substitute carriers using water or pipelines or roads for rail, then the product market for the O-D rail haul includes carriers using those other modes, and reformers (and competition authorities) generally need not worry about the creation of intramodal competition to protect those goods producers. However, if other modes are not competitive, then the railway constitutes an economic market, and reform strategies must consider ways to create competition.

Broadly speaking, railways reformers and restructurers have chosen between two models of railways reorganization: horizontal restructuring (systems competition) and vertical restructuring (components competition). The larger countries in the Americas that have restructured their freight railways have followed the United States and Canada in favoring competition among “closed” systems. Argentina, Brazil, and Mexico have all

divided their formerly monopolistic railway systems horizontally, into separate vertically integrated railway enterprises, controlled by private companies under long-term franchise agreements, and competing with each other mostly at common points but occasionally over parallel routes as well (Kopicki and Thompson, 1995; Estache, *et al.*, 2001a; Kogan, 2006). On the other hand, beginning with Sweden and the UK, the countries of Europe have followed a path of partial or complete vertical separation, seeking to create competition among multiple train operating companies over monopoly infrastructure – “components” competition (Molnar, 2006; Nash, 2006; Glaister, 2006; Wolff, 2006; Pittman, *et al.*, 2007).

The two reorganization models have inherent advantages and disadvantages. Horizontal separation maintains economies of scope between train and track operation (Pittman, 2005; Growitsch and Wetzel, 2006; Wills-Johnson, 2007; Ivaldi and McCullough, 2008; Merkert, 2009; Sánchez, *et al.*, 2008) but always leaves some rail customers with no competition and may risk economies of system size (Bitzan, 1999; Chapin and Schmidt, 1999; Savignat and Nash, 1999). Allowing access to the track by independent train operating companies while allowing the track operator to run its own trains preserves economies of scope but may create incentives for discrimination (OECD, 2006; Drew, 2009; Vogt and Slack, 2009), while complete vertical separation removes the incentives for discrimination but at the cost of the economies of scope and perhaps investment incentives as well (BTRE, 2003; ECMT, 2004; Pittman, 2007b). Furthermore, the presence of economies of scale in above-the-rail operations means that even if train entry is invited it may not take place: the incumbent may have such low costs that potential entrants are discouraged (Ivaldi and McCullough, 2001 and 2008; Wills-Johnson, 2006 and 2007).

One of the overall surprises of the railways reform experience to date is the success of horizontal separation even when it is impractical to create directly parallel competition (*i.e.*, more than one vertically integrated railway serving the same O-D pair). TERI (2008) argues that in this situation “the scope for competition is limited.... Competition is enhanced in only those cities that are located on the border” of the two railways – but in practice it has been possible to set up those borders in such a way as to maximize the number of customers provided with rail transport choices. It turns out that

our iron ore producer may be protected from abuse by a monopoly O-D rail enterprise by the presence of a second vertically integrated railway serving him at O, even when that railway serves different destinations – and similarly for our steel producer, with the presence of a second vertically integrated railway protecting him at D, even when that railway delivers from different origins (Pittman, 2007a). This principle was the basis, for example, for the relatively successful Mexican railways restructuring project (Campos, 2002; Kogan, 2006; OECD, 2006).

Correspondingly, the European experience with complete vertical separation began with some conspicuous problems in the UK (Glaister, 2006), but many consider this model as well to be showing signs of success more recently (Friebel, *et al.*, 2007; Drew, 2009; Thompson, 2009). Part of the problem of comparison is that the environments are so different, and in very relevant ways: railways in the Americas tend to be freight dominated and to be characterized by relatively long freight hauls, while railways in Western Europe tend to be passenger dominated and to be characterized by shorter freight hauls – though Eastern Europe tends more toward the American characteristics (Pittman, *et al.*, 2007).

5. *A Few Words on Indian Railways*

The Indian Railways are truly the economic backbone of the country. With a network of over 63,000 km, they are the fifth largest rail network in the world – after those of the United States, Russia, China, and Canada – and they are uniquely balanced among the largest railways in their almost equal division between passenger and freight transport: the top four are much more freight-dominated.

After decades of severe financial losses and poor economic performance, the Indian Railways enjoyed something of a renaissance in the 2004-2007 period, with dramatically increasing freight revenues – the result partly of the introduction of Ramsey pricing and partly of targeted investments and operational improvements – yielding a positive annual cash flow and alleviating what was universally considered to be a short term financial emergency (Kumar and Mehrotra, 2009; Thompson, 2009).

Nevertheless serious problems persist. The system remains dependent on government subsidies for capital expenditures. The low hanging reform fruits have been

plucked. Freight operations heavily subsidize passenger operations – the ratio of the average freight tariff to the average passenger tariff is by far the highest in the world (Thompson, 2009) – and the result has been freight rates perhaps 40 percent higher than otherwise and a gradual loss of freight tonnage, even bulk freight tonnage, to motor carriers and coastal water carriers (Mattoo, 2000; Raghuram and Gangwar, 2007).⁹ The introduction of private sector participation in railway operations has been minimal, limited mostly to some private competitors to CONCOR in container handling (TERI, 2008).

The current period may present a unique opportunity for dramatic improvements. The government has announced plans to construct new dedicated rail freight corridors on the Mumbai-Delhi and Howrah-Delhi routes. A task force has recommended the setting up of a “Special Purpose Vehicle” to plan, finance, and construct the corridors, to be jointly owned by Indian Railways and many bulk customers; the Indian Railways and independent train companies would run freight trains on the track (TERI, 2008).¹⁰

As noted above, based on the international experience, the role of Indian Railways as both part owner of the infrastructure and operator of trains may lead to problems for independent train operating companies seeking non-discriminatory access to the infrastructure. Why not consider a Mexican-style system of horizontal separation instead? India has plenty of experience by now with the granting of long-term concessions in seaports; why not create a privately concessioned, vertically integrated freight railroad company running between Mumbai and Delhi to compete for traffic with a privately concessioned, vertically integrated company company running between Howrah and Delhi, and of course with both companies competing with motor and coastal water carriers?

In fact there is Indian historical precedent for such a system.¹¹ In 1876, the Rajputana-Malwa Railway opened, connecting Delhi to Ahmedabad and thus to Bombay; at about the same time, a rail link was also completed between the Punjab and Karachi. The result was intense competition among the ports of Karachi, Bombay, and Calcutta for

⁹ See also “Special Report – Indian Railways – There’s no such thing as free ride,” *The Economist*, December 6, 2003.

¹⁰ See also A.V. Poulouse, “Putting railway reform on the fast track,” *The Financial Express*, February 24, 2009.

¹¹ The following episode is described in Bell (1894) and Hurd (1983).

export traffic; for example, the Chamber of Commerce of Calcutta complained to the government that the shorter rail distances and hence lower rail tariffs from Delhi to the other two ports were diverting from Calcutta its fair and traditional share of exports. Export traffic to these three ports was such an important component of Indian freight railway traffic at the end of the 19th century that this vigorous competition led to a 50 percent decline in average rail freight tariffs between 1881 and 1916.

Unfortunately the story does not end there. The government, fearing for the financial health of the competing railways, in the 1885-1900 period set minimum tariffs for many routes, sought to establish a central clearing house to encourage cooperation among railroad companies, and began encouraging mergers among the major lines.¹² By 1915, competition had been checked; the main Indian lines each had their own geographic sphere of influence; and rates were increasing.

6. *Conclusion*

Creating competition in a systems world is not a straightforward exercise. In particular, whether efficiency and customers are best served by competition among vertically integrated, closed systems or by competition among suppliers of individual components all compatible with a single open system may depend upon many factors, including but decidedly not limited to economies of scope among vertical stages of production and economies of scale at the level of each component.

In this paper I have tried to outline a framework for some of the questions one should ask when examining the possibilities for creating competition when reforming and restructuring the seaport and freight railway sectors of an economy – two sectors that are in fact in a state of a good deal of flux worldwide just now. Creating competition is not always cheap, and more competition is not always better, particularly in a setting of significant economies of scale. Thus the questions of whether reformers and restructurers should focus on creating intraport or interport competition, and whether a monopoly railway system might be most effectively restructured horizontally or vertically, are challenging ones, and may have different answers under different circumstances.

¹² The parallel with the actions of the U.S. government at this time in setting up the Interstate Commerce Commission, discouraging rate wars, and eventually encouraging mergers among competing railroads is notable (Grodinsky, 1930; Stover, 1961; Kahn, 1970).

How these decisions are to be made in India in the first two decades of the 21st century may be one important determinant of the ability of the country to continue its remarkable progress both in achieving economic growth and in sharing that growth with its poorest citizens.

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