

Managing Private Participation in Transportation

TRANSPORTATION IS ESSENTIAL TO A MODERN economy and a smoothly functioning society. Enormous changes in the world economy—including the dramatic increase in international flows of goods and services (globalization)—demand efficient transportation services. Indeed, recent findings suggest that productivity increases in transportation are the most important determinant of structural changes in the world economy (ECMT 2003). The competition generated by globalization has increasingly led users to demand faster, more reliable, more flexible transportation services. Thus increased demand, structural economic change, and new industrial logistics have placed enormous pressure on transportation systems.

National growth and international competitiveness are partly determined by how domestic transportation systems respond to these challenges.¹ For example, in the 1970s and 1980s national inventories of raw materials for manufacturing were two to three times larger (relative to GDP) in developing and transition economies than in the United States—in large part because of weak transportation services. These large inventories undermined these countries' competitiveness (Guasch and Kogan 2003).

Around the world, transportation has been among the most extensively regulated sectors. Vertical relationships, financial structure and accounting methods, and entry, operating, pricing, and exit rules have all been subject to government control. But in recent years limits on competition and ownership in this sector have been considered inimical to consumer and industry interests. After airlines, trucking, and freight railroads were deregulated in the United States in the late 1970s

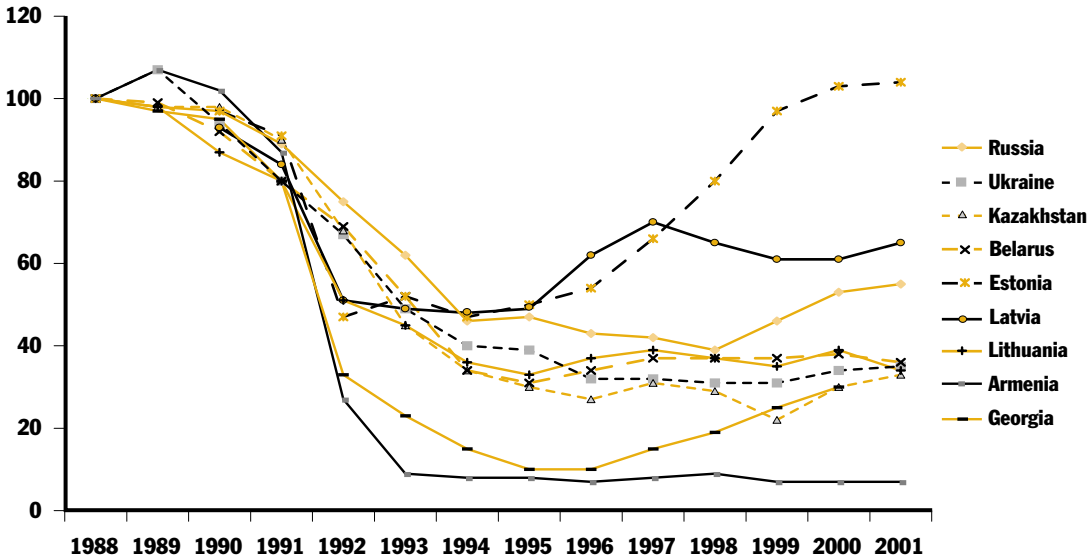
and early 1980s, many other industrial countries reviewed their transportation policies and liberalized their transportation systems (Gómez-Ibáñez and Meyer 1993; Oster and Strong 2000). Many developing and transition economies, facing huge fiscal pressures and poorly performing state enterprises, have also introduced wide-ranging policy reforms and realigned private and public roles in transportation (Estache and de Rus 2000; Estache 2001).

This chapter focuses on railroads and ports—two areas where the private sector has started to play a large role in many developing and transition economies. It identifies characteristics of these modes that have determined forms of private participation, and examines the implications that these characteristics and forms have for regulation.

Railroads: Restructuring Regulation for the Public Interest

SINCE THE EARLY 1950S THE RAILROAD INDUSTRY HAS EXPERIENCED plummeting performance—financially and operationally—in both industrial and developing countries. In today's transition economies this decline was delayed by an emphasis on heavy industry and by policies that gave railroads favored status. But once central planning was abandoned, railroads experienced an even sharper drop in performance in these economies (figure 4.1; Thompson 2003).

Several factors have contributed to this worsening performance: growing competition from more advanced transport modes, monolithic industry structures and rigid management structures unresponsive to customer needs and market opportunities, excessive political interference, overstaffing, outdated technology, and regulation poorly suited to promoting the public interest. Most countries' rail networks were determined by the technologies and the industry and consumer locations of the 19th century. When these changed, large parts of many rail networks became almost obsolete. In passenger markets, advances in airplanes and automobiles made railroads much less competitive. In freight, the dominance of railroads was undermined by a shift away from bulk commodities toward high-value products, increasing the importance of quality and timely delivery—not characteristics common to traditional rail services.

Figure 4.1 Railroad Freight in Transition Countries, 1988–2001

Source: von Hirschhausen and Meinhart (2001).

The railroad industry has had a hard time adjusting to these changes in its market environment. Misguided regulation has exacerbated the industry's problems, reducing its incentives and ability to respond to competition from other transport modes. For example, price restrictions and cross-subsidies from freight to passenger transport accelerated rail's loss of freight market share to trucking. In addition, the combination of public ownership and exclusive monopoly dulled incentives to control costs. Governments often imposed investment programs that did not reflect railroads' true priorities (World Bank 1994a), with more attention given to achieving physical targets than sound economic and financial planning.

In developing and transition economies most rail operations have also had extraordinarily high levels of excess employment. Labor costs have typically exceeded 50 percent of revenues, and have often been well above 100 percent. (China, at less than 20 percent, is a notable exception.) Chronic revenue shortfalls have impaired the industry's ability to maintain, replace, and modernize its equipment and operations. As a result railroad productivity has been extremely low relative to technological opportunities.

Thus government ownership and regulation have been largely responsible for the railroad industry's mediocre service, poor financial condition, deteriorating assets, and delays in introducing cost-saving innovations, as well as for misallocations of freight traffic between competing transport modes.

The industry's first signs of serious financial distress appeared in the United States, where tight regulation of the country's privately owned railroads largely ignored emerging competition between transport modes. In the early 1970s the bankruptcies of several major railroads threatened service in important parts of the country. These developments were followed by an enormous financial disaster in Japan. By the time the Japan National Railway was restructured and privatized in 1987, it had accumulated more than \$300 billion in debt. Between the late 1950s and early 1990s British Railways also experienced a series of crises that made it financially unstable. In addition, rail systems in continental Europe lost substantial market shares in freight and passenger traffic.² These systems also suffered serious financial damage due to high labor costs—ranging from 80 percent of revenue to more than 200 percent (Kopicki and Thompson 1995; CEC 1996; Thompson 2003).

By the early 1990s railways in Latin America, Sub-Saharan Africa, and other developing regions were undergoing similar financial collapse, compounded by physical shortcomings. In many developing and transition economies railway traffic has been limited by poorly maintained track and shortages of trains. For example, in the early 1990s more than 40 percent of Brazil's track was in bad condition, and 35 percent of trains were immobilized at any given time, typically awaiting parts or funds for repairs (World Bank 1994a).

Railroad subsidies and losses have exacerbated fiscal crises in many developing and transition economies. Reductions in passenger traffic caused Poland's railroad to lose \$300 million in 1998. Since 1999 the Bulgarian government's contribution to the rail system has hovered around 8 percent of GDP (World Bank 2001a). Uganda's Railways Corporation has consistently been among the three most heavily subsidized public enterprises (PPIAF 2001). And in the early 1990s Brazil's railroad received more than \$250 million a year in public support (Estache, Gonzalez, and Trujillo 2002).

These problems led a wide range of countries to reassess policies toward railroads. Though reforms vary, common elements include:

- Rebalancing the supply roles of the private and public sectors.

- Adjusting the industry's vertical and horizontal structures.
- Modifying railroad regulation and giving railroads more pricing and structural flexibility.
- Increasing transparency in the provision and use of public subsidies.

U.S. reforms sought to free the railroad industry from regulatory constraints that crippled its performance and to replace regulation with market forces. In 1980 the Staggers Act substantially deregulated the industry, giving railroads pricing flexibility and allowing them to abandon unproductive and redundant track and other facilities. A program to restructure Japanese National Railways was launched in 1986, creating nine new enterprises: six vertically integrated passenger railways, a freight operator, an infrastructure holding company for part of the track, and a settlement corporation. This privatization lasted through the late 1990s.

In the early 1990s the United Kingdom restructured British Railways vertically and horizontally. The government subsequently privatized six freight businesses and all rail infrastructure and competitively awarded 25 franchises for passenger traffic. And during the 1990s most rail systems in Latin America and several in Africa moved from state ownership to private concessions (Thompson 2003).

Economic Characteristics of Railroads

The same economic characteristics that make the rail industry a natural target for government intervention also make it difficult to restructure and regulate in the public interest. Separating infrastructure ownership from train operations and marketing—a structural option that has attracted considerable attention in recent years—can generate significant benefits of competition. But it also makes it harder to coordinate essential services. Thus unbundling will likely be costly (Gómez-Ibáñez 1999). Moreover, old regulatory systems failed to solve the main regulatory problem facing railroads and some other network utilities (such as telecommunications and electricity): the mix of competition and monopoly in supply (Baumol and Willig 1987).

Structure of costs. The railroad industry's output is inherently multidimensional: at different times, different firms produce different

services of different quality for different users at different origins and destinations. Thus the mix of output and shipment characteristics significantly influences a firm's costs. For example, railroads specialized in transporting coal incur much different costs than railroads specialized in moving passengers or manufactured commodities.

Moreover, rail activities involve significant economies of scale, scope, and density (Braeutigam 1999). Fixed costs are large because of the infrastructure—track, stations, and the like—that must be in place for trains to run.³ Duplicating this infrastructure is inefficient, so the physical network has costs akin to a natural monopoly. And because rail infrastructure has little value for other purposes, its fixed costs are largely sunk—creating significant entry barriers.

The multiproduct nature of railroads implies that the same facilities, equipment, and labor are often used to produce different services. For example, passengers and freight are transported on the same track. In the movement of freight, low-value commodities and high-value manufactured goods often share the same services and facilities. These shared costs confer economies of scope on carriers offering a multiplicity of transportation services: a carrier that provides an array of services can do so at lower cost than a set of carriers producing each service separately. The multiproduct nature of railroads also implies that a large portion of rail costs cannot necessarily be attributed to a particular service at a particular point in time. Rather, a significant portion of costs are incurred on behalf of several activities and do not vary with the amount of the service provided.

The structure of railroad costs has significant implications for the competitive organization and behavior of rail markets. Indivisibilities in rail technology lead to increasing returns to scale and limit the number of competitors. As a result service prices are likely to exceed marginal costs. In addition, the multiproduct nature of rail operations makes it difficult to allocate costs and can complicate pricing policy and inhibit the achievement of financial viability.

When it comes to economies of scale in railroads, it is important to distinguish between economies of density (which result in less than proportionate increases in cost as more traffic is run over an existing set of track) and economies of system size (which result in less than proportionate increases in cost as more traffic is run over an enlarged track). Given the paucity of new track construction, economies of density are the more relevant measure (Pittman 2003).

Sources of competition. High sunk costs and pervasive economies of scale and scope may suggest that the railroad industry is not structurally competitive or contestable. But while scale economies go hand in hand with natural monopoly, a railroad may or may not have the price-setting discretion of a textbook monopolist—and rail services are far more contestable than these impediments to entry suggest.

Although the provision of a rail network has natural monopoly characteristics, the operation of services on that network may be more consistent with active and potential competition. Providing services requires trains, crews, support facilities, and rights of way. Although hiring crews and buying or leasing rolling stock involve some sunk costs, they are small relative to those of establishing network infrastructure. And most of the costs of trains can easily be recovered by rolling them to other markets (Kessides and Willig 1995).

Competition in railroads can come from a variety of sources and forms (Baumol and Willig 1987). Rival products and sources of supply—including trucks, barges, buses, airplanes, pipelines, and even alternative rail routes—will likely impose competitive restraints on many rail activities. In freight, for example, coal shipped by rail competes with oil and natural gas shipped by pipeline. Thus competition from petroleum products can limit the prices that railroads can charge for transporting coal.

The relative costs of truck and rail in a given market depend on the distance covered and the types of commodities shipped. Rail has a cost advantage in long-distance shipments of bulk commodities because transit times are less of a concern. Trucking has an advantage in small, short-distance, time-sensitive shipments. Because of its flexibility, trucking is ideally suited for just-in-time movement of high-value-added manufactured goods. Despite recent technological improvements that have enhanced productivity and service, railroads still have a hard time serving just-in-time—and especially exactly-on-time—shipment needs.

Where navigable waterways exist, rail faces fierce competition from barges in moving bulk commodities. In the United States, for example, shipping wheat from Blackfoot, Idaho, to Portland, Oregon, costs about \$0.73 a bushel (\$26.83 a metric ton) for loads of fewer than 20 rail cars. Using a barge to ship wheat from Lewiston, Idaho, to Portland costs about \$0.23 cents a bushel (\$8.45 a metric ton; Capital Press 2003).

When transporting petroleum products, rail faces strong competition from pipelines—considered the most energy-efficient, cost-

effective mode. Pipelines also minimize the environmental risks posed by the transportation of petroleum products: oil spills, gaseous emissions, and effluent leaks are negligible relative to other transport modes. In Brazil, for example, new pipelines have cut into railroad pricing power for petroleum transportation (Estache, Goldstein, and Pittman 2001).

Though it is generally not practical or economical to duplicate existing rail infrastructure, there are still opportunities for direct competition in rail, especially among large shippers. A large industrial plant can use:

- Direct services from two railroads with tracks that go directly into the industrial site.
- Competitive services from two railroads with a reciprocal switching agreement—that is, the railroads switch cars for each other at a given junction.
- Competitive services from two railroads through a terminal switching railroad that they own jointly and that switches cars for either in its junction.

These forms of intramodal competition are arguably the most intense. But there are also other, more subtle forms. A shipper directly served by just one rail carrier may benefit from the geographic proximity of a competing railroad: the shipper could ship its traffic to this other railroad by truck or by building a spur line. Similarly, a shipper with production facilities in different locations served by different railroads could generate competition between those carriers by adjusting production levels in its plants in response to the rail rates charged to each plant.

Moreover, a shipper deciding where to locate a plant could induce railroads to compete for its future business. Each railroad could offer favorable long-term contract rates to attract the shipper to locate on its own line. Finally, shippers could stimulate competition among rail carriers through product or geographic competition. An industrial plant (such as a power plant) captive to a railroad in a particular market (such as coal) may be able to obtain the same product, or use a substitute, shipped from a different location by a different carrier—at least up to a junction near the plant (Grimm and Winston 2000). But in reality, economic and other constraints often hold shippers captive to limited competition in the rail industry (box 4.1).

Box 4.1 Limited Rail Options Result in Captive Shippers

RESOURCE COMMODITIES—GRAINS AND OTHER agricultural products, minerals, fertilizers, coal, potash, sulfur, ores and concentrates, chemicals, forest products, petroleum products—are typically transported in large shipments over long distances, especially in large countries such as Brazil, China, India, Poland, and the Russian Federation, and in Africa. These commodities have low values relative to manufactured goods. The combination of large volumes, long distance, and low values often makes these commodities captive to the railroad industry, especially when roads are in bad shape.

About two-thirds of the traffic on Poland's state railway consists of hard coal, metals, ores, brown coal, and coke. Russia's railroads carry more than 90 percent of the country's shipments of coal, ore, ferrous metals, and cement, 80 percent of chemical and mineral fertilizers, and 70 percent of construction materials. Although competition from road transport

is growing for containers, perishables, and high-value goods, it is largely limited to the Far East and to areas west of the Urals, where highways are well developed. Thus most Russian industrial customers continue to depend on railways for shipping. The situation is similar for several Brazilian mining companies, which lack meaningful competitive alternatives.

Commodity shippers are often captive not just to rail but also to a single carrier. Many chemical plants, for example, rely on one railroad for freight transportation. Similarly, coal mines (especially in remote areas) have few choices. Electric utilities also tend to be served by a single rail carrier. Such captive shippers must accept the rates and service levels offered by dominant rail carriers—and various analyses indicate that captive shippers pay much higher freight rates than noncaptive ones (by some estimates, more than 20 percent higher in the United States).

Source: Ordovery and Pittman (1994); Campos (2002); Grimm and Winston (2000).

Regulatory Issues

The basic premises of railroad regulation, established many decades ago under entirely different market conditions, have become obsolete. This regulation was guided by the view that railroads held a monopoly (or near monopoly) on long-distance land transport—a condition that disappeared long ago, if it ever existed. Today competition for railroad traffic can be fierce. Where railroads do not dominate markets, they should be granted freedom in pricing. Where intramodal, intermodal, geographic, and product competition is weak or nonexistent, market forces may fail to prevent excessive prices. The resulting monopoly power is the basic justification for regulating rail rates and earnings and is the basic task for regulators.

Two main principles should guide regulatory reform in railroads (Baumol and Willig 1987). First, the competitive market should serve as the model for regulation. Market forces will contain prices for most rail services in most countries. Regulatory restraints should be imposed or maintained only if market forces are insufficient to enforce competitive behavior.

Second, regulatory impediments to adequate revenues should be eliminated. This should mean not a guarantee of profitability, but an opportunity to generate competitive earnings. Indeed, in a regime of deregulation without general subsidies, a key element in protecting the public interest is eliminating regulation that interferes with the rail networks financial viability. Thus regulatory reform should give railroads substantial flexibility in pricing and industry structure.

The regulatory issues identified below—cost allocation, demand-based differential pricing, regulatory protection for captive shippers, and access to rail infrastructure—cut across sectors, meaning they also arise in electricity, telecommunications, ports, and (to a lesser extent) water. Chapter 6 discusses these issues in more detail and suggests responses consistent with the features of developing and transition economies and their infrastructure sectors.

Cost allocation. The large fixed and common costs in the railroad industry create challenges for regulation. Perhaps the most troubling is that it is impossible to allocate these costs in a mechanical fashion based on economic logic (Baumol, Koehn, and Willig 1990). Historically, regulators have set rail tariffs using accounting cost allocation rules, the most common being the fully distributed cost methodology. Under this method regulators allocate a railroad's shared production costs to individual services in terms of some common basis of use, such as gross ton-kilometers (Braeutigam 1980).

Fully distributed cost pricing has several defects. The most serious one is that it does not necessarily measure marginal cost responsibility in a causal sense—taking into account how much costs would increase if more of a particular service were used (Kahn 1988). A further defect is this approach's neglect of demand data. Accounting and arbitrary cost allocation rules can undermine the efficient use of transport resources, cause misallocations of traffic among competing modes, and seriously damage the financial viability of railroads, as the U.S. experience indicates.

Demand-based differential pricing. Fully distributed cost pricing often overassigns or underassigns a rail carrier's unattributable fixed and common costs to certain services and almost invariably produces inconsistencies with patterns of shipper demands. If a carrier were forced to apply fully distributed cost pricing to all its traffic, some prices would be too high and the carrier would lose traffic to other modes (such as trucking) from which it is facing strong competition. The remaining captive shippers would then be saddled with a larger portion of the carrier's costs because they would no longer share those costs with the lost traffic. But other prices would be too low, leading the railroad to receive less than the optimal contribution from those services. Thus, in the multiproduct railroad industry, pricing individual services on the basis of accounting cost allocation rules that neglect demand characteristics is contrary to the interests of both carriers and shippers.

Demand-based differential (Ramsey) pricing overcomes this problem by apportioning all of a rail carrier's unattributable fixed and common costs among its services based on their demand characteristics. Each service is priced at a markup over marginal cost that is inversely related to the elasticity of demand for that service. Under Ramsey pricing it is the shortfall between total costs and the revenues that would accrue from pricing each service at its marginal cost that is apportioned on the basis of demand (Kessides and Willig 1995). Differential prices benefit all shippers, because lower prices for some shippers generate revenue that otherwise would have to be raised from those with the strongest demand for rail transportation.

Regulatory protection for captive shippers. Long-term contracts for rail service offer shippers protection from the exploitation of future captivity by a single railroad, particularly if such contracts can be negotiated when shippers are making their investment and location decisions. The costs of such decisions are often sunk, making it difficult for shippers to make competitive adjustments when facing higher rail rates. Thus regulations should focus on shippers caught in the transition to a privatized, less regulated rail system. This type of situation reveals the conflict between rate protection for shippers and rate flexibility for railroads, and highlights the need for regulatory intervention to strike the proper balance.

A critical issue for efficiency is the criterion used to set rate ceilings for captive shippers—that is, where the railroad has market domi-

Railroads would lose customers if they had to charge everyone the same markup over variable costs

To recover costs, railroads must price in line with the varying demands for rail service

nance. Although rate ceilings derived from fully distributed costs are inimical to the public interest, economically rational ceilings can be obtained from stand-alone costs. These are the costs of serving any captive shipper or group of shippers that benefit from sharing joint and common costs as if the shipper or group were isolated from the railroad's other customers (see endnote 4 of executive summary). The stand-alone cost method finds the theoretically maximum rate that a railroad could levy on shippers without losing its traffic to a hypothetical competing service offered by a hypothetical entrant facing no entry barriers or by a shipper providing the service itself.

The stand-alone cost test does not apply—and cannot be made to apply without disastrous consequences—if railroads are not allowed to abandon unremunerative facilities or services. If that freedom is denied, a railroad cannot earn adequate revenues from its potentially remunerative activities. For that reason it is unwise for public policy to limit the freedom of railroads to abandon uneconomic services unless public funds are provided to defray the costs of those services.

Access to rail infrastructure. Rail infrastructure remains a natural monopoly, regardless of the option adopted for the industry's structure. In most countries any operator seeking to run rail services between two points has the choice of only a single provider of infrastructure. Thus regulations are needed to govern the terms and conditions of access to bottleneck rail facilities (Nash and Toner 1998). The access problem is especially vexing if several railroad firms compete in the sale of final services and one is the monopoly owner of the track and other essential infrastructure facilities (competitive access option). In a variety of market settings the holder of bottleneck rail facilities has incentives to behave anticompetitively and create handicaps for its rivals.

Restructuring the Railroad Industry

For much of the 20th century most railroads in developing and transition economies were run by monolithic state-owned organization that controlled all facilities, operations, and administration and determined what services to provide to generally captive markets. But the conditions that generated this model no longer exist in most countries, forc-

ing governments to consider fundamental restructuring of the railroad industry and its relationship with the state. Such restructuring has sought to introduce more innovative and efficient management, reduce railway deficits and public subsidies, increase competition with other transport modes, and make railroads more responsive to the needs of emerging private enterprises (Thompson 2003).



Options for vertical restructuring. Three options are available for the vertical structuring of railways, addressing the relationships between a railway and other transportation entities (rail and other), markets served, and functions performed—including ownership, maintenance and improvement of fixed facilities, control of operations such as dispatching and freight classification, train movement, equipment provision and maintenance, marketing, and financial control and accountability. Determining which option is best is a complex policy decision.

The first option is often the status quo: a monolithic, integrated entity that owns and operates all railway facilities and vehicles. In theory this approach should maximize production efficiency by exploiting the economies of scale and scope of rail operations. But in practice the monolithic entity—lacking financial incentives and disaggregated information on profitability—is at best production oriented and unresponsive to demand, with a hierarchical (often bloated) organizational architecture.

Some Latin American and African countries are developing spatially separated but vertically integrated private railway companies (table 4.1). Competition comes primarily from road (or sometimes waterway) haulage. For example, most nonurban rail concessions in Latin America and Africa (including those in Cameroon, Côte d’Ivoire and Burkina Faso, and Gabon and the one being prepared in Senegal and Mali) are vertically integrated, predominantly freight carriers competing with deregulated road freight carriers.

Under the second option for vertical restructuring, competitive access, competing railway companies have exclusive control over some track and exchange access rights with other companies. Forms of competitive access include conferrals of track rights and joint terminal agreements, where a railway obtains the right to use the tracks or freight handling facilities of another railway at a particular location or along a particular route.

Table 4.1 Market Structure and Ownership Options in Railroads, Various Countries, 2001

		Private involvement 		
		Public ownership	Partnerships: concessions or franchises awarded	Private ownership
Structural change 	Monolithic	China, Russia, and India (ministries), MAV, SRT, MZ, others (SOEs)	Argentina (13), Brazil (9), Mexico (5), Peru (3), Guatemala, Bolivia (2), Panama, Côte d'Ivoire/Burkina Faso, Cameroon, Congo (Brazzaville), Malawi, Madagascar, Jordan	New Zealand, Ferronor (Chile), CVRD (Brazil), A&B (Chile)
	Competitive access	Amtrak, VI, Japan Freight, CN	Mexico City suburban, CONCOR (India)	U.S. Class I, CN, and CP East-West-Central, Japan Railways
	Vertical separation	E.U. and Chile Passenger, Banverket	Swedish suburban, FEPASA (Chile), LHS line (Poland)	U.K. franchises and EWS, Polish and Romanian freight

Note: MAV (Hungarian State Railways), SRT (State Railways of Thailand), MZ (Macedonian Railways), CN (Canadian National), E.U. (European Union), CP (Canadian Pacific), East-West-Central Japan Railways (East Japan Railways, West Japan Railways, and Central Japan Railways), EWS (England Wales and Scotland).

Source: Thompson (2001a).

Another arrangement may involve handing off traffic between railroad entities (interlining). U.S. railroads do a great deal of largely unregulated interlining, engage in regulated reciprocal switching, and exercise track rights as a result of both free negotiations and regulatory mandates (mostly achieved in settlements of disputes over rail mergers).

With the third option, vertical separation, the ownership of track and other fixed facilities is separated from other rail functions, with the track held by government, a consortium of operators, or a regulated private entity. A recent example is a joint terminal company in Mexico created to give the three main freight concessionaires nondiscriminatory access to Mexico City and ensure access to the track by future operators carrying suburban passengers (Campos and Jimenez 2003).

Vertical separation or competitive access? Vertically separating the ownership of track and trains may permit active or potential competi-

tion among rail operators (Thompson 1997). Under this option operators need not be subject to detailed regulatory scrutiny, as competition creates strong incentives to be efficient and responsive to the needs of shippers and a growing entrepreneurial economy. But separation can create coordination problems, undermine economies of scope, and impose other unnecessary transaction costs.

A rail operator cannot offer reliable high-speed passenger service, for example, unless track is well maintained and made available by the infrastructure monopolist. In a vertically integrated railroad, track and rail operations are typically overseen by different departments. But because these departments are parts of the same corporate entity, they coordinate their actions to ensure consistency with corporate strategies and goals. Although their interests might not be perfectly harmonized, they are free of narrowly opportunistic behavior.

In a vertically unbundled system, on the other hand, coordination must be achieved through contracts between separate firms (Gómez-Ibáñez 1999). Though such firms might have a shared interest in the success of passenger or other services, they will likely have conflicting views on how to split the underlying investment costs and risks. Serious contractual and investment coordination issues arose, for example, in Britain's vertically unbundled rail system. The track owner (Rail-track) and operating companies often did not agree on the timing of needed track repairs. Coordination failures significantly increased broken rails, with obvious safety consequences (Yvrande 2000; Martin 2002). Such problems could be quite serious in many developing and transition economies, where significant new investments are required to rehabilitate track and other fixed rail facilities.

Powerful competition requires that entering operators believe they can avoid heavy sunk investments in rolling stock and specialized facilities. Trains may be an example of capital on wheels—as long as they can be transported to different points for productive use at reasonable costs. While this is feasible for services provided in the middle of a landmass with an extensive rail network, it may not be for specialized cars or an isolated market. In addition, the entering operator may not have yard, loading, maintenance, and other facilities. For these to be equally available to the entering and the incumbent operators, the infrastructure entity will have to have made the needed investments. But the more the infrastructure entity has to supply entrepreneurship and risk-taking investment, the less is gained from the separation.

Moreover, there is evidence that rail operations are characterized by significant economies of density (Ivaldi and McCullough 2001). This implies that firms offering rail services are likely to enjoy large market shares on specific routes. In that case vertical separation will generate limited competition.

The main alternative to vertical separation, competitive access, differs most clearly in allowing integrated operations by the rail entity. Competitive access may require that the integrated carrier make its facilities available to other entities on a fair and equal basis. But if the integrated carrier has strong incentives to keep out other entities, it is unclear how effective such equal access mandates will be (see chapter 1).

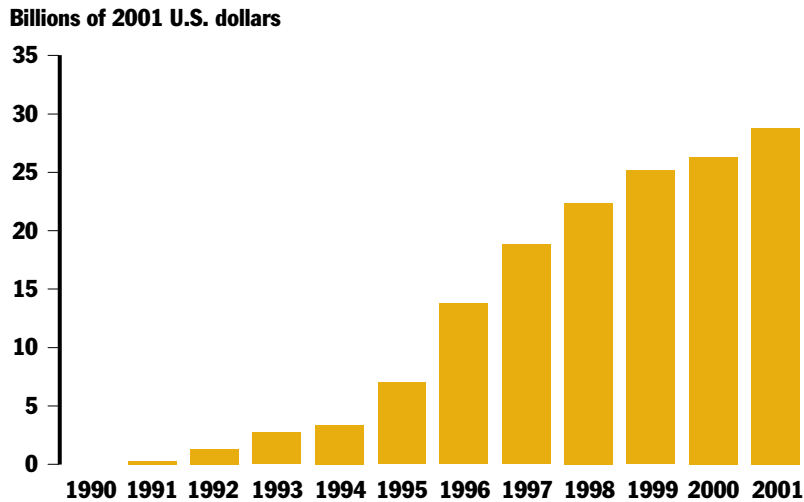
If regulation permits an integrated carrier to charge higher prices to captive shippers when it does more business, it would have incentives to exclude other participants. (This effect arises under rate of return regulation.) Similarly, if regulation limits the amount an integrated carrier can earn from the access it provides to another entity, it has incentives to undermine such cooperation (Ordober, Sykes, and Willig 1985). A carrier might also be motivated to exclude an efficient participant to weaken that participant's competitive impact in another market. Thus these approaches to rail regulation should be avoided in developing and transition economies.

Reform Experiences and Lessons

Railroad reforms are still at an early stage in most developing and transition economies. Still, emerging evidence seems to confirm what theory predicts: decentralized, market-oriented decisionmaking freed from excessive regulation and energized by market incentives is the surest way to develop efficient, innovative solutions to transportation challenges.

Progress on private participation. In response to the declining financial and physical condition of railways over the past decade, many fiscally constrained developing and transition economies sought to restructure rail systems and increase private participation in their operations. Thus the 1990s marked the reemergence of private railways in some of these countries, after more than half a century of public ownership and management. More than 40 railways in 16 countries were concessioned or privatized in the 1990s. Another 7 railways in 7 coun-

Figure 4.2 Cumulative Investment in Rail Projects with Private Participation in Developing and Transition Countries, 1990–2001



Source: World Bank, Private Participation in Infrastructure Project database.

tries are now being concessioned (Thompson 2003). During 1990–2001 more than 76 rail projects with private participation reached closure, with cumulative investment of \$28.8 billion (figure 4.2; Harris and others 2003).

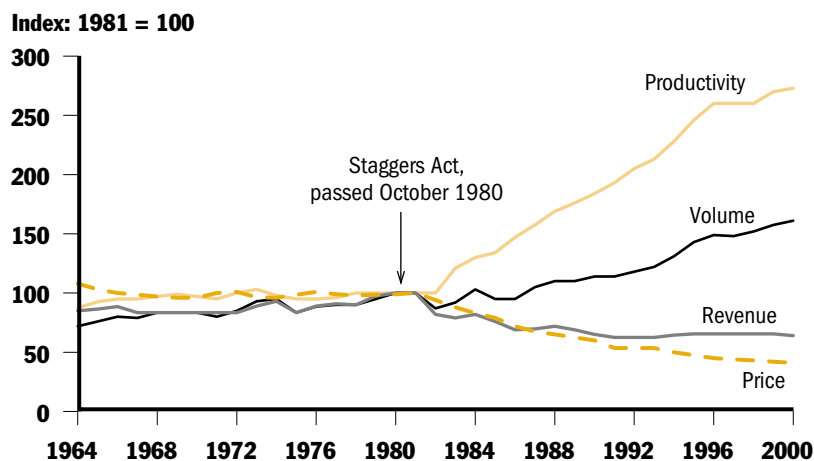
Only a few countries have fully privatized their railways. Several approaches to private participation have been used, combining varying degrees of private-public ownership and competitive restructuring (see table 4.1). These changes make clear that the monolithic, vertically integrated, state-owned railway is becoming obsolete and is no longer the preferred option. The dominant form of private participation in developing and transition economies is the concession (franchise) to operate and manage existing railways, with obligations for major capital spending to refurbish assets.

In some cases this is a complex arrangement. For example, in the Sitarail concession in Côte d’Ivoire and Burkina Faso, formal ownership of the infrastructure and operating assets remains with two national patrimony companies. The concessionaire must make payments into their investment and renewal funds and must service the debt on any investment they make on behalf of the concession.

Latin America has led the way in railway privatization. During 1990–97 seven countries in the region awarded private entities 26 rail contracts worth nearly \$6.5 billion. The region’s dominance in private railway projects can be attributed to its generally positive experience with private participation in other infrastructure sectors. Although countries in East Asia and the Pacific awarded fewer privatization contracts, their total investment—nearly \$8.0 billion—exceeded that in Latin America due to the different nature of these projects (greenfield projects involving metropolitan rail systems and build-operate-transfer contracts). During this period only a few rail privatization projects reached financial closure in Sub-Saharan Africa and Europe and Central Asia, while Middle Eastern and North African countries have yet to transfer any railway operations to the private sector.

Effects of restructuring, deregulation, and privatization. Since the Staggers Act went into effect in 1980, productivity gains in rail have exceeded those in nearly every other U.S. industry (Braeutigam 1993; Wilson 1997). Between 1981 and 2000 labor productivity increased 317 percent and locomotive productivity 121 percent. Lower rail rates—down 59 percent in real terms between 1981 and 2000 (figure 4.3)—and increased reliability have saved shippers and their customers

Figure 4.3 Performance of Class I U.S. Railroads, 1964–2000



Source: AAR (2003).

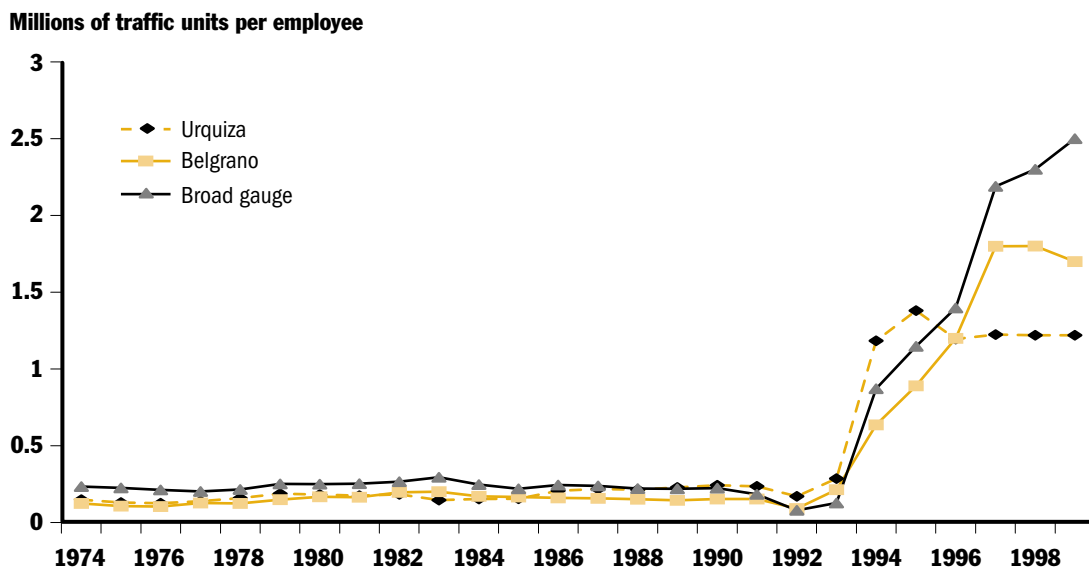
more than \$10 billion a year (1999 dollars; Grimm and Winston 2000). After decades of decline, rail's market share (measured in ton-miles) increased from 35 percent in 1978 to more than 40 percent today. These outcomes were achieved without vertical separation but with a great deal of consolidation: the number of class I railroads has fallen from more than 40 in 1980 to just 7 today, 2 of which are Canadian-based.

Restructuring, deregulation, and private participation have also generated significant benefits in developing and transition economies. Several policy options previously closed to state enterprises contributed to these gains. First, as part of their privatization agreements, new operators could cut excess employment—among the most vexing problems for state-owned railroads. Second, the freedom to change price structures (up to specified maximum rates) allowed concessionaires to attract traffic for which they had a comparative advantage. Third, in some cases freedom to withdraw from unremunerative activities (including passenger services) enabled concessionaires to focus on more profitable ones. Fourth, low spending on equipment and maintenance had hurt performance, so the physical refurbishment that preceded some concessions helped restore railways' ability to provide services.

Privatization significantly shrank labor forces in almost every case, ranging from an 8 percent reduction in Côte d'Ivoire and Burkina Faso to 44 percent in Estonia, 66 percent in Mexico, and 92 percent in Argentina. These reductions have usually not been due to service cuts but were achieved primarily through programs dealing with labor redundancy (Thompson, Budin, and Estache 2001; Thompson 2003).

Rationalization of the labor force, especially when combined with traffic growth, has dramatically increased labor productivity. In all but one case (Côte d'Ivoire and Burkina Faso) railway output per employee (measured as the sum of ton-kilometers and passenger-kilometers) has at least doubled—and has usually tripled or even quadrupled (figure 4.4; Thompson and Budin 2001).

Before concessioning, railroads experienced declines in traffic largely because of poor service, insufficient technological progress, and ineffective management. For example, in Argentina between 1965 and 1990 the railroad's share of freight traffic fell 50 percent. But concessions reversed this trend. In most concessions better service, combined with more flexible pricing and lower freight rates, has significantly increased the volume of freight carried.

Figure 4.4 Rail Labor Productivity in Argentina, 1974–2000

Source: Thompson (2001b).

Post-reform pricing in several developing and transition economies has provided considerable benefits to rail users. Among 16 privatized railroads (mostly in Latin America), 14 had lower freight tariffs in 1999 than when the concessions started (mostly in the mid-1990s; table 4.2). In Latin America rates dropped 8–54 percent, while in Côte d'Ivoire they fell 14 percent. These tariff reductions saved about \$1 billion a year in transport costs for the six countries involved. Moreover, these estimates understate the total savings because they do not reflect the competitive pressures that lower rail tariffs exerted on trucking and other competing transport modes.

For most of its history Brazil's railroad system generated negative returns on its operations. In the early 1990s the country's freight railroads obtained higher unit revenues than most of those elsewhere on the continent. Still, the railroads were experiencing substantial losses. In 1995 Rede Ferroviaria Federal (RFFSA) lost \$308 million and its debt reached \$4 billion (Estache, Goldstein, and Pittman 2001).⁴ Persistent losses reflected low productivity, pervasive organizational inefficiencies, government obligations that weakened railroads in the face of growing

Table 4.2 Rail Freight Tariffs in the Initial Years of Concessions and in 1999, Various Countries

Country, railway	Initial year	Tariff in initial year (PPP\$ per ton-kilometer)	Tariff in 1999 (PPP\$ per ton-kilometer)	Change in tariff (percent)	Savings (millions of U.S dollars)
Côte d' Ivoire	1995	0.123	0.106	-13.8	8.9
Argentina, broad gauge	1993	0.039	0.036	-7.7	20.7
Argentina, standard gauge	1994	0.032	0.043	34.4	-5.4
Bolivia, FCO	1996	0.147	0.123	-16.3	15.0
Bolivia, FCA	1996	0.061	0.098	60.7	-20.6
Brazil, FCA	1996	0.051	0.032	-37.3	138.1
Brazil, Novoeste	1996	0.043	0.027	-37.2	25.4
Brazil, Nordeste	1996	0.056	0.026	-53.6	21.3
Brazil, MRS	1996	0.027	0.022	-18.5	134.2
Brazil, ALL	1996	0.044	0.033	-25.0	113.1
Brazil, Tereza Cristina	1996	0.120	0.101	-15.8	4.9
Brazil, Bandeirantes	1998	0.038	0.023	-39.5	89.8
Chile, Fepasa	1994	0.089	0.053	-40.4	42.8
Chile, Ferronor	1996	0.072	0.046	-36.1	19.3
México, TFM	1997	0.054	0.043	-20.4	189.8
México, Ferromex	1997	0.041	0.036	-12.2	103.2
New Zealand	1992	0.104	0.081	-22.1	93.8
Total					994.2

Note: Tariffs and savings calculated using 1999 purchasing power parity (PPP) dollars.

Source: Thompson, Budin, and Estache (2001).

intermodal competition, and a failure to rationalize operations by shedding low-density lines, excess capacity, and redundant labor.

As part of restructuring, which started in 1995, Brazil split RFFSA into six freight concessions, cut its workforce from 110,000 in 1975 to 42,000 in 1995 (significantly increasing labor productivity),⁵ eliminated subsidies for public service obligations, and gave the new operators considerable pricing flexibility. Operators were permitted to engage in demand-differentiated pricing and negotiate shipper contracts with confidential terms and conditions, and all operators significantly improved their performance. Losses fell quickly, with net operating profits turning positive in 1996 (Estache, Goldstein, and Pittman 2001). In addition, rail's declining share of freight traffic was stemmed: in 2000 Brazilian railroads carried 24 percent of the nation's freight traffic, up from 21 percent in 1996 (*International Railway Journal* 2000). One

area where the expected benefits of privatization have not been fully realized, and could become a problem, is private investment. Most operators have not achieved the goals described in their investment plans (Campos and Jimenez 2003).

Concessions have also led to increased use of suburban passenger rail. After Buenos Aires, Argentina, unbundled its metropolitan rail services into seven concessions in the mid-1990s, suburban rail traffic more than doubled in just a few years—suggesting significant benefits for consumers (Thompson 2001b). The main reasons for the jump appear to have been more reliable services and increased passenger safety, though more attention to collecting fares may have overstated the increase in passengers. Still, lower fares were not among the initial reasons for increased use.

Lessons. Over the past decade the railroad industry has undergone some of the most sweeping structural changes ever observed in the transport sector. But in most developing and transition economies railroad restructuring and privatization is at too early a stage to permit a clear assessment of long-term impacts. Still, the experience to date offers general insights into the reform process:

- Restructuring raises several difficult policy questions with no clear-cut or universal answers: Is the organizational separation of track ownership and train operations conducive to economic efficiency? How much pricing freedom should an infrastructure entity have to recover its replacement costs? What regulatory restrictions should be imposed on pricing by a dominant service provider facing weak intramodal and intermodal competition?
- Injecting competition into the railroad industry is not easy. It requires introducing new and complex regulations. Although many developing and transition economies might lack the expertise to implement such schemes, maintaining the status quo—a monolithic, state-owned railroad—is likely the most costly option.
- A variety of approaches can be used to increase competition in the railroad industry and its vertical relationships. But few reforms have significantly enhanced intramodal competition. Most of the benefits of structural reorganization seem to come from unsettling embedded business cultures and providing managers with

the flexibility, independence, and incentives needed to become efficient and fiscally responsible and to respond to growing intermodal competition. Thus it may be appropriate for public policy in developing and transition economies to focus on freeing rail entities from unnecessary regulatory restraints and creating a level playing field between rail and other transport modes, rather than trying to create rail competition through aggressive structural remedies. This is especially important in Central and Eastern Europe and the Commonwealth of Independent States, where rail still accounts for a large share of freight traffic. Although this situation is partly explained by physical impediments—such as underdeveloped and poorly maintained highways—to the use of alternative transport modes and a continued emphasis on extractive and heavy industries, policies favoring the rail industry have also played a major role.

- Ownership and market structure options form a continuum in the rail industry. Choosing one of these options is a complex policy decision: many country- and industry-specific characteristics must be considered. Countries differ significantly in size, level of development, institutional capacity, density of the rail network, condition of fixed rail facilities, strength of intermodal competition, and efficacy of public finances. Thus an uncritical choice among extreme options (entirely private or public, complete vertical integration or separation) could reflect ideology rather than carefully designed policy for the public interest.

Ports: Alternatives for Organizing a Multiproduct Activity

IN MOST COUNTRIES PORTS HAVE PLAYED A VITAL ROLE AS GATEWAYS for trade and commerce.⁶ Shipping remains by far the main mode for international transport of goods, and more than 80 percent of trade involving developing countries is waterborne (measured in tons; al Khouri 1999). As an important determinant of maritime transport costs, port efficiency is critical to the success of any strategy to integrate a country with the global trade system (Clark, Dollar, and Micco 2002). Excessive port costs make a nation's products less competitive in world markets and can impede economic development.

Recent technological innovations and changes in the content of trade have led to far more integrated operations in international transport. Ports have become nodes in a seamless global logistics supply chain. Globalization of economic activity and strong competition in the shipping industry have increased the demand for optimal capacity use and effective delivery of integrated logistics services. Moreover, port container throughput is expected to reach 270 million TEUs (20-foot equivalent units) by 2005—55 percent higher than in 1998 (al Khouri 1999).

Even with increased productivity, considerable investment is needed in new port facilities: 200–300 additional full-fledged container terminals. Thus port operators and authorities are under enormous pressure to adapt their roles and functions and, in particular, increase their efficiency and labor productivity (Juhel 1998). Doing so will require a fundamental reorganization of ports, a rebalancing of the roles of the private and public sectors, and regulatory reform aimed at eliminating administrative constraints that stifle port productivity and investment.

Many countries have taken steps to reorganize port operations and management (Haarmeyer and Yorke 1993; World Bank 2001d). These reforms have dramatically increased private activity in ports—especially in developing countries where the public sector could no longer finance investments in modernization and expansion. There is evidence of increasing competition between ports, and there are pressures to increase it within ports (van der Veer 2001). There is also a widespread belief that private management improves port strategies and operations, reduces excessive government control, and deals more effectively with restrictive labor practices. The efficiency gains from increased private activity largely depend on the efficacy of port regulation. Inadequate economic regulation could result in inefficient, costly port services.

Economic Characteristics of Ports

From a technical perspective, ports have a large, indivisible initial capacity requirement that is immobile (sunk) and long-lasting. From an economic perspective, port operations involve large fixed costs (especially for container terminals, where up to 80 percent of costs are fixed), strong economies of density (unit costs fall as more ships and cargo are handled through existing port facilities; Walters 1979), and increasing

returns to scale (costs per unit of traffic handled decline as a port expands; Button 1993). Thus ports have traditionally been viewed as exhibiting natural monopoly characteristics, justifying direct public involvement in provision (to ensure sufficient investment) and operations (to limit monopoly power).

Multiproduct character. This simple characterization breaks down on elaboration, however, because ports are multiproduct entities, encompassing diverse activities with entirely different economic characteristics. These activities involve both infrastructure and services, and the range of both creates scope for unbundling and competition (Trujillo and Nombela 2000b).

In terms of infrastructure, a port typically requires several types of capital assets. It needs infrastructure for maritime access (channels, protective works, sea locks, lights, buoys) and land access (roads, railways, inland navigation channels). In addition, port activities require basic infrastructure (berths, docks, storage areas, internal links) and so-called superstructure (terminals, sheds, office buildings, fuel tanks, cranes, pipes).

Maritime and land access infrastructure entail long-lived, largely sunk assets with costs that cannot be easily assigned to specific users. Thus these assets are not an attractive proposition for private investors and are typically owned by governments. They could also be held by a consortium of port operators. Although a lot of basic port infrastructure and superstructure are also long-lived assets, their costs can be assigned to users without much difficulty. Accordingly, there is much greater scope for private participation and investment in such infrastructure.

Ports use this infrastructure to provide a range of services (box 4.2). For example, movement of freight traffic through a port generally involves the following distinct activities. On arrival, a vessel is allocated a berth and typically requires piloting and towing to navigate through the appropriate channels into and within the port. On berthing, the vessel requires cargo handling, both onboard (stevedoring) and on land. Cargo usually also requires stacking or storing (not least for customs purposes) before being released for land transport out of the port area. Other value-adding activities often also occur in ports. Vessels require a range of services while in ports, including bunkering, tank cleaning, and repairs and maintenance. The appropriate form of private participation, and hence regulation, may differ by function.

Box 4.2 Examples of Port Services

Services to vessels

- Piloting
- Towing
- Mooring
- Dredging
- Utilities
- Ship repair
- Environmental services

Services to cargo

- Stevedoring
- Wharf handling
- Transfers to land transport
- Storage
- Processing (consolidation, bagging, mixing)
- Cargo tracking
- Security
- Rental of specialized equipment

Source: Trujillo and Nombela (2000a).

As with other network utilities, most port infrastructure is likely to have natural monopoly characteristics. But unlike other utilities, ports provide a wide variety of services rather than a few specific products. Most of these services may be conducive to competition. Although provision of these services involves economies of scale and some sunk costs, they are smaller than those associated with port infrastructure. For example, most of the capital costs for towing and related services involve the purchase of tugs. There is an active international market for tugs, including second-hand ones. The costs of acquiring tugs are not a material barrier to entry, because only a small portion of such costs is sunk. Thus towing is a contestable activity.

Unbundling—that is, separating activities that are naturally competitive or entail no structural impediments to contestability (arguably most of the services and parts of port superstructure) from those with extensive scale economies or heavy sunk costs (such as access and basic infrastructure)—offers considerable opportunities to introduce competition and reduce the need for regulatory oversight in ports. In naturally competitive segments, interference with market mechanisms and truncation of property rights should be minimized, and scope for introducing competition should be fully exploited. By contrast, the public sector should regulate or even run segments with an unavoidable natural monopoly or substantial sunk capital.

Ports have also gotten more involved in providing, within their surrounding premises, logistical services (such as storing, packing, and distributing) that add value to a product. The private sector would likely be able to profitably develop such activities.

Models of port organization. Numerous activities occur simultaneously in a port because ships are constantly entering, unloading and loading, getting serviced, and exiting. Thus all ports need a coordinating agent to ensure the proper use of common facilities, ensure safety, and perform systemwide planning. These functions are usually performed by a public institution called the port authority.

The four main port models (in order of decreasing public involvement) are public service ports, tool ports, landlord ports, and private service ports (box 4.3). The services they provide depend on the role of the port authority and the degree of private participation. More than 90 of the world's 100 largest container ports are landlord ports (Cass 1996). The trend in developing and transition economies has been to move from the public service and tool models to the landlord model. For example, many Latin American countries have been adopting the landlord model (Hoffmann 2001; Micco and Perez 2001). However, some major ports—such as those in India and Sri Lanka—remain the public service type.

Box 4.3 Organizational Structures of Ports

There are four main port models:

- *Public service ports*—public sector owns land, infrastructure, and equipment and provides services.
- *Tool ports*—public sector owns land, infrastructure, and equipment but leases equipment and space to private providers on a short-term basis.
- *Landlord ports*—public sector owns land and infrastructure; private sector provides services on a long-term basis through concessions or build-operate-transfer (BOT) contracts.
- *Private service ports*—private sector owns all land, infrastructure, and equipment and provides services.

Source: van der Veer (2001).

Introducing competition in ports. Most of the benefits of private participation in port activities result from competition. Competition also reduces the scope of needed regulatory oversight. Thus the critical question is, how can governments foster competition in line with port characteristics and market opportunities for innovation? Several types of competition are possible:

- *Interport competition* can be fierce, as between the major container ports of East Asia. Major shipping enterprises are extremely demanding and expert at playing one port against another. A port's success in these contests may depend on its ability to process traffic quickly and reliably and integrate its activities with inland or feeder networks. Such external competition may be the most important determinant of the internal regulation a port requires.
- *Intraport competition between terminals* allows technically efficient integration of port functions without sacrificing competitive pressure within the port. Terminal operators have complete jurisdiction over their terminal areas, from berth to gate. This approach was adopted to great effect in the liberalization of the port of Buenos Aires.
- *Intraterminal competition between service suppliers* is encouraged by many ports. Competition in stevedoring, warehousing, forwarding, and other services is highly desirable whenever it can be physically accommodated. From a port authority's viewpoint, such competition may be influenced by licensing requirements, which limit the number of competitors but make the concessions attractive for competitive tendering.
- *Competition for the exclusive right to provide services* is an extension of the competitive tendering of licenses and may be the only way to attract private investment in small ports. When local monopoly rights are granted, the question usually arises: to prevent monopoly exploitation, should contracts be used or a regulatory authority established?

Governments and port authorities can take a number of steps to enhance competition, including introducing new berths and terminals, dividing ports into competing terminals (terminalization), dividing port operations within terminals, and introducing short-term operating leases or management contracts. The form of competition and regulatory requirements are closely related and largely depend on the size of

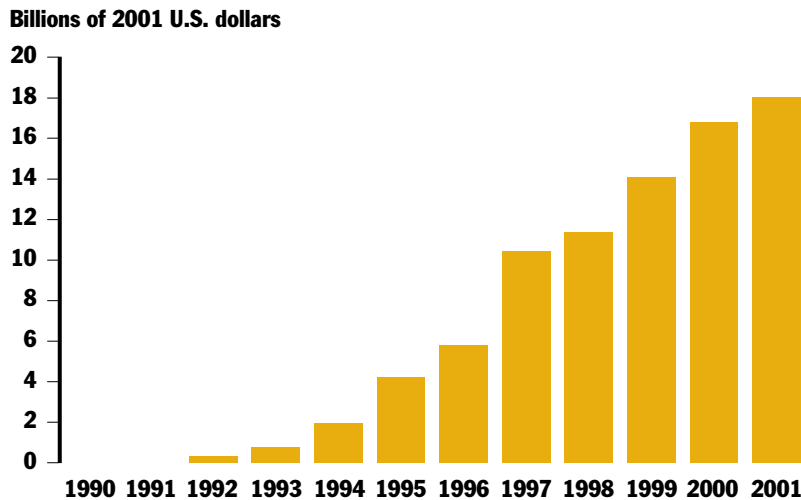
the port, the extent of external competition, and the degree of captive traffic that needs protection.

Effects of Restructuring, Deregulation, and Privatization

Private participation in ports has had impressive results. In developing and transition economies more than \$18 billion was invested in 177 port projects during 1990–2001 (figure 4.5; Harris and others 2003). Latin America and East Asia led such activities, with five countries accounting for two-thirds of the investment. Ports have recently been privatized in Brazil, China, Colombia, Estonia, Latvia, Lithuania, Malaysia, Mexico, Mozambique, Panama, Poland, the Russian Federation, and Tanzania.

One of the key arguments for privatization is that, relative to private owners and operators, public owners and operators are less able (and have fewer incentives) to control costs, are slower to adopt new technologies and management practices, and are less responsive to the needs of users. An early test of this claim came with the 1986 divestiture of the container operations of the Kelang Port Authority. (Port Kelang is

Figure 4.5 Cumulative Investment in Port Projects with Private Participation in Developing and Transition Countries, 1990–2001



Source: World Bank, Private Participation in Infrastructure Project database.

Table 4.3 Operating Performance of Ports in Colombia before and after Reforms, 1993 and 1996

Indicator	Before 1993	1996
Average vessel waiting time (days)	10	No wait or hours, depending on the port
Working days per year	280	365
Working hours per day	16	24
Tones per vessel per day		
Bulk cargo	500	2,500 minimum
General cargo	750	1,700
Containers per vessel per hour (gross)	16	25

Source: Gaviria (1998).

Malaysia's largest port.) Privatization generated significant efficiency gains (Peters 1995). Crane handling improved from 19.4 containers an hour in 1985 to 27.3 in 1987, bringing Kelang's performance very close to Singapore's (Tull and Reveley 2001). The return on fixed assets grew at an average annual compound rate of just 1.9 percent in 1981–86, but jumped to 11.6 percent in 1986–90. The higher return was due to improvements in productivity and throughput, not higher prices. Workers also benefited from the gains in productivity: by 1990 they were paid 60 percent more an hour in real terms, put in 6 percent more hours, and produced 76 percent more than before privatization (Galal and others 1994).

Privatization and deregulation have produced similar improvements in port performance in other countries. In 1993 Colombia conceded its four main ports to separate regional port authorities. These authorities do not provide services directly but contract with operators that use the facilities. In addition, new laws allow stevedoring services to compete freely at each port. Although the initial concessions involved little investment, the main reason for their success seems to have been the development of effective competition—not only within but also between ports. These reforms have significantly improved port performance (table 4.3).

Port reforms in Argentina also show the powerful effects of deregulation and interport and intraport competition. Before reforms, port operations were costly and inefficient because of restrictive labor practices, overregulation by multiple agencies with poorly defined respon-

sibilities, and weak organization. As a result Argentine ports were losing market share to roads and to more efficient Chilean ports (Estache and Carbajo 1996).

In the early 1990s the Argentine government deregulated and decentralized port operations and increased private participation and competition. It deregulated piloting and towing services, eliminated controls on contracts with stevedoring companies, permitted Argentine ship owners to temporarily register their ships under foreign flags, allowed foreign ships to practice cabotage (pick up and deliver freight within Argentina), and allowed operators to set tariffs. One of the most important reforms was authorizing private entities to build and operate ports for public use—undermining the market power of existing ports. The government also reorganized the largest port, in Buenos Aires, into three areas with separate functions and administrations. One of these was further split into six terminals that were concessioned to compete with each other (Estache, Carbajo, and de Rus 1999).

Deregulation and privatization had dramatic effects on port investment and performance. In the port of Buenos Aires between 1991 and 1997, annual container traffic jumped from 300,000 TEUs to more than 1 million, the number of cranes increased from 3 to 13, labor productivity almost quadrupled, and the average stay for full containers dropped from 2.5 to 1.3 days. As a result the port of Buenos Aires was able to successfully compete with Santos, Brazil—South America's largest port. In fact, from 1997 onward the port of Buenos Aires surpassed that of Santos in terms of cargo handling (Hoffman 1999).

Some port services in Argentina were supplied by the private sector before reforms were initiated in 1990. For example, the private sector managed stevedoring at the Buenos Aires port. But because of excessive regulation, inadequate competition, strong labor unions, and low investment by the port authority, no significant improvements in performance were achieved in the early years of private participation (Micco and Perez 2001). This points to the importance of substituting competition for regulation whenever feasible. Yet in many developing and transition economies competition within and between ports has not been an important part of reforms (Estache, Gonzalez, and Trujillo 2001).

Port reforms can also provide significant fiscal benefits. In the mid-1990s Mexico introduced an aggressive decentralization program that led to the concessioning of the country's major ports to private operators. In addition to resulting in much lower tariffs and vast improve-

ments in efficiency and productivity, privatization has enabled the port system to cover its costs. Indeed, the system now generates substantial tax revenue for the government, whereas before it depended on public support. This improvement in the system's financial condition has allowed the port authorities and concessionaires to undertake substantial investment in system expansion and modernization.

The Need for Post-privatization Regulation

The primary objective of port policy is to support national development. Although some emphasis has recently been placed on port services that add value to products, the development objective is usually best served by securing cheap and fast movement of traffic through ports. To that end, the landlord port model introduces competition either in the market for the provision of port services (between or within terminals) or for the exclusive right to provide services where the market is too small to support multiple providers. This approach may require structural controls to secure or maintain an appropriately competitive framework or, where structural measures are insufficient, controls to prevent monopolistic exploitation or distortion.

Structural approaches. The most complete form of privatization involves transferring ownership of entire ports or terminals to a single private operator. When there are many competing ports, complete privatization may generate the most intense competition. But where external competition is absent—as is often the case in developing countries—severe problems arise. In such circumstances the private owner's ability to exploit its monopoly position may provide a compelling reason to stop short of complete privatization. It is likely to be easier to regulate a port concession, albeit for a monopoly location, than to protect assets critical for national development once a country has transferred their ownership.

In recent years global carriers have sought to entrench their competitive position through long-term contracts for dedicated terminals in strategically located ports. Such vertical integration of terminal operations with shipping activities can ensure competition in large ports. But in smaller ports this approach can damage competition by enabling the

integrated company, as the terminal operator, to use its monopoly power to favor its associated shipping activities—as with American President Lines’ operation at the Karachi International Container Terminal in Pakistan. To avoid that outcome, a recent round of concessions in Chile stipulated that no more than 40 percent of a concessionaire could be owned by any shipping company, exporter, or importer operating more than 25 percent of the transfers at the concessioned terminal or more than 15 percent of the transfers in ports in the region in the previous year (Foxley and Mardones 2000).

Horizontal integration can be equally threatening. A limited number of global stevedoring companies emerged in the 1990s, including Hutchison Port Holdings (Hong Kong, China), International Container Services (Philippines), and PSA Corporation (Singapore). The threat here is that a company controlling a large portion of the terminals in a region could manipulate port use to its advantage, against national interests. For example, P&O Ports (Australia) has concessions for two of the five main container ports in India and may obtain two more. If successful, the company would control three-quarters of India’s container terminal capacity. In 1999 the European Commission refused to allow Hutchison International to buy a controlling interest in Europe Combined Terminals, Rotterdam because it already owned Felixstowe, Thamesport, and Harwich, and the additional expansion would have given Hutchison a dominant market position in northwestern Europe.

Regulation of behavior. Ports require many technical, environmental, social, and safety regulations. For example, technical oversight is needed to ensure safe movement, avoid environmental pollution, and so on, and social oversight is needed to ensure fair treatment of workers and healthy working conditions. In most countries these functions are regulated by sector agencies or specialized agencies that are usually attached to or part of line ministries. Agencies independent of port management should oversee technical regulation, whatever the degree of private participation.

Tariff regulation is required only when there is insufficient competition, internally or externally. Competition has increased substantially not just between ports, but also between companies that may or may not be located in the same port (Meersman, Van de Voorde, and Vanelslander 2002). Hence overall tariff regulation should be very light handed.

But ports encompass multiple activities with significantly different economic characteristics, and so require different regulatory treatment. Moreover, ports differ substantially in terms of size and hence opportunities for introducing intraport competition and degrees of desirable regulation. Thus there is no single solution to the problem of port pricing (Pettersen-Strandenes and Marlow 2000).

As a rule of thumb, ports handling less than 30,000 TEUs a year are too small to have several terminals and operators. The best approach in those ports is to have a single operator and regulate its charges. Ports handling more than 30,000 TEUs can facilitate intraterminal competition, and those with over 100,000 TEUs can support interterminal competition. Finally, regions where container traffic exceeds 300,000 TEUs a year can have several ports competing with each other. The need to exercise regulatory control over private operators' prices is clearly lessened as one moves from single operator ports to interport competition (Trujillo and Nombela 2000a).

Countries have adopted different institutional approaches toward port competition and regulation. In Mexico the Ports Law states that the Federal Competition Commission shall determine when to establish tariff regulation. If the commission deems competition inadequate, it may stipulate rate of return regulation or price controls to prevent monopolistic exploitation. In such cases rates may be set based on benchmarks from comparable ports in more competitive situations or a synthesis of rates from cost data. Both methods are difficult, and the problem is that the regulated bodies are almost inevitably better informed than regulators. One way to do so, adopted in port regulations for Sri Lanka, is to involve the regulator only in cases of disputed rates. Adjudicating disputes between port operators or between port users and operators may be the most important function of a regulator in a liberalized port sector.

Notes

1. For example, the international competitiveness of agriculture is highly sensitive to changes in transportation services and costs. Consider soybean production, which is rapidly increasing in Bolivia, Brazil, and Paraguay—where production costs are lower than in Iowa, the most important soybean-producing U.S. state. As transportation systems improve in Latin America, the

region's soybeans and other agricultural products will become more competitive worldwide (Bertels 1998).

2. Between 1970 and 1994 rail passenger traffic grew 25 percent—while overall passenger traffic doubled. During the same period rail freight traffic fell from 283 to 220 billion ton-kilometers, while overall freight traffic grew nearly 70 percent—meaning that rail lost half its market share in freight traffic (CEC 1996).

3. As much as 30 percent of the long-term costs of providing rail services are fixed and largely sunk (Pittman 2001).

4. In 1957 several railroads that the government had to bail out in previous decades were consolidated into RFFSA, a holding company controlled by the Ministry of Transport.

5. Before privatization the government implemented a staff reduction program that included early retirement and voluntary separation incentives, training assistance for outplacement, and severance packages for dismissed workers (Estache, de Azevedo and Sydenstricker 2000).

6. The discussion on ports draws heavily on Gwilliam (2001).