

Transport Services: Reducing Barriers to Trade

High transport costs are a barrier to trade—

The costs of international transport services are a crucial determinant of a developing country's export competitiveness. Shipping costs often represent a more binding constraint to greater participation in international trade than tariffs and other trade barriers. Across economies, a doubling of shipping costs is associated with slower annual growth of more than one-half of a percentage point. Transport costs determine the potential access to foreign markets, which, in turn, explains up to 70 percent of variations in countries' gross domestic product (GDP) per capita.

—reflecting geography and income—

Transport costs depend on a mixture of geographic and economic circumstances. Adverse geographic locations and low-income levels—the latter being associated with poor infrastructure and low traffic volumes—pose an inherent challenge for many countries' trade and development prospects—at least in the short to medium term.

—but also competitive forces in service markets

Public trade barriers and private commercial practices hamper the provision of international maritime and air transport services. Policies toward maritime transport, such as cargo reservation and limitations on the provision of port services, often protect inefficient service providers and unduly restrain competition. At the

same time, competition restraining practices among shipping lines and port terminal operators around the world pose the risk that the benefits of government reforms will be captured by private firms. International air transport is one of the services sectors most protected from international competition. The current regime of bilateral air service agreements largely denies access to efficient outside carriers. International airline alliances, while enhancing network efficiency, can also be detrimental if they impede effective competition.

Policy reform can lower costs—

In most countries, policy can make better use of existing transport resources and significantly improve the efficiency of services. At the domestic level, targeted infrastructure investments, regional cooperation on transportation, and trade facilitation initiatives can play an important role in improving the transport competitiveness of exporters. As discussed in chapter 3, liberalizing services policy can produce substantial cost reductions and widen the availability and choice of services. The preponderance of anticompetitive practices by transport service providers also demands the development of efficiency-oriented competition policies.

—and multilateral policies can be supportive of domestic reforms

Multilateral negotiations on transport services under the General Agreement on Trade in Services (GATS) Agreement have, so far, not un-

leashed substantial liberalization, nor have countries bound existing policies to gain credibility in their domestic reforms. Indeed, the negotiations on maritime transport were the only post-Uruguay Round services negotiations that completely failed. International air transport services are largely outside the scope of the GATS. The new round of services negotiations offers the possibility of creating a rules-based services regime for maritime transport, as well as an opportunity to develop a framework under which a multilateral regime for air transport services could be phased in. Moreover, the multilateral trading system can play a useful role in developing procompetitive regulatory principles for the transport sector, and in fostering international cooperation on competition policy matters more generally.

High transport costs penalize exports

High transport costs push down profits and wages

The efficiency of transport services greatly determines the ability of firms to compete in foreign markets. For a small economy—for which world prices of traded goods are largely given—higher costs of transportation feed into import and export prices. To remain competitive, exporting firms that face higher shipping costs must pay lower wages to workers, accept lower returns on capital, or be more productive. The pressure on factor prices and productivity is even higher for industries with a high share of imported inputs. In these cases, small differences in transport costs can easily determine whether or not export ventures are at all profitable. In developing countries, for labor-intensive manufacturing industries such as textiles, high transport costs most likely translate into lower wages, directly affecting the standard of living of workers and their dependents.

The cost structures of firms are equally affected by the quality of transport services. If services are unreliable and infrequent, or if a country lacks third party logistics providers who

efficiently handle small shipments, firms are likely to maintain higher inventory holdings at every stage of the production chain. The costs of financing large inventories can be significant, especially in countries with high real interest rates. Gausch and Kogan (2001) find that inventory holdings in the manufacturing sector in developing countries are two to five times higher than in the United States, and estimate that cutting inventory levels in half could reduce unit costs of production by over 20 percent. At the wholesale and retail levels, firms depend greatly on high quality transport services in distributing products to geographically dispersed markets. For example, seamless transport services were critical to Kodak's decision to integrate once-separate national warehousing operations in the Mercosur countries into one trade bloc-wide operation located in Brazil, thus reaping economies of scale in distribution.¹

Long journeys have a similar effect. They delay payments if goods are exported on a cost, insurance, and freight (c.i.f.) basis or importers may demand a time discount if goods are delivered free on board (f.o.b.). If products are perishable (such as food) or subject to frequent changes in consumer preferences (such as high-fashion textiles), longer journeys lead to additional losses in terms of a product's shortened lifetime in the export market. Box 4.1 illustrates the complex logistical arrangements that ensure the timely delivery of Kenyan cut flowers to European consumers. One recent estimate, based on comparisons between air and ocean freight rates for U.S. imports, puts the per day cost for shipping delays at 0.8 percent of the value of trade for manufactured products. Only a small fraction of these costs can be attributed to the capital costs for the goods during the time they are on board the ship.² Delivery time is found to have a more pronounced effect for imports of intermediate products (Hummels 2000), suggesting that the fast delivery of goods is crucial for the maintenance of multinational vertical product chains. Quality aspects of transportation are thus likely to be an important factor in the location decisions of multinational companies.

Box 4.1 The Kenyan-European cut-flower supply chain

Kenyan exports of cut flowers to Europe have grown remarkably in recent years, increasing by 217 percent in value from 1992–98. The competitiveness of Kenyan cut flower exports stems from favorable climatic conditions, the use of modern farming technology and skilled manpower, and their counter-seasonality to the patterns of production in Western Europe. Although a wide range of flower varieties are cultivated in Kenya, the industry's growth in the 1990s was primarily due to expanded rose production—sparked by strong consumer demand and relatively high prices in Europe.

Cut flowers are highly perishable commodities, having a vase and marketable life ranging from a few days to not more than two weeks. International flower trade demands cold storage and transportation facilities, efficient inland and air-freight shipping arrangements, and mechanisms for rapid distribution in the export markets. Prior to packing, harvested flowers are placed in solutions to maintain post harvest quality, then graded, bunched and placed in cold storage. Refrigerated or insulated trucks carry the flowers to specialized freight handlers, which consolidate consignments from various growers, palletize them, record temperatures, and load them directly onto commercial or charter airlines. They also facilitate customs, inspections, and proper documentation, which serves as the basis for claims should flowers arrive in Europe at exceedingly higher temperatures.

Import functions at the European end (cutting, rehydrating, and repacking) are typically handled by independent agents, who also provide a wider array of services including consultancy and product and marketing information. Several large Kenyan producers have established forward linkages with freight

firms and clearance and import agents, in order to ensure supply continuity and gain greater control over production, distribution, and sales.

About 40 percent of Kenyan flowers enter European wholesale markets through one of the seven flower auctions in the Netherlands. Dutch auctions trade, on average, 15 million flowers and potted plants daily, with total sales amounting to \$1.9 billion in 1998. After the flowers are collected and checked for quality, ripeness, grading, and packing, selling takes place with the help of computerized “auction clocks,” which provide information on the grower, product, quality, unit of currency, and minimum purchase required. The financial transactions are settled immediately following the auction process, and flowers are then distributed to the buyers, who repackage and box the flowers for further air or land transport.

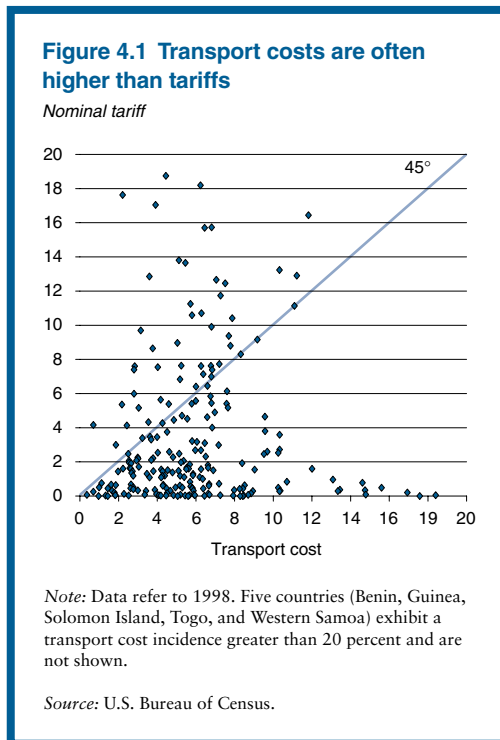
Aside from the Dutch auction system, importers are directly sourcing cut flowers from Kenyan growers for European supermarkets and traditional retailers. In the United Kingdom, for example, supermarkets have contractual arrangements with Kenyan exporters (via import agents) and send daily orders to growers, which form the basis for harvesting, processing and shipping schedules. Through fully integrated supply chains, products can be harvested and on U.K. supermarket shelves within 24 hours from harvest. The final retail price in the United Kingdom is more than four times the farm gate price in Kenya, with the difference between the two prices accounted for by freight charges, fees and commissions, retail margin, and value-added tax.

Source: Thoen and others 2000.

Shipping costs often represent a greater burden than tariffs—

Transport costs are important relative to other trade barriers. Figure 4.1 compares countries' transport cost incidence for exports to the United States (the share of international shipping costs in the value of trade) and their tariff incidence (the trade-weighted ad valorem duty actually paid). For 168 out of 216 U.S. trading partners, transport cost barriers outweigh tar-

iff barriers. Only a few developing countries—including, among others, Bangladesh, the Arab Republic of Egypt, Lesotho, Mauritius, Mongolia, Nepal, Pakistan, and Sri Lanka—are more constrained by trade taxes than by shipping costs. For the majority of Sub-Saharan African countries, the tariff incidence typically amounts to less than 2 percent, while the transport cost incidence often exceeds 10 percent. Most striking is the example of Benin, where



exports faced duties equivalent to 0.6 percent of total exports, but shipping costs represented 22.7 percent of trade. Amjadi and Yeats (1995) confirm that freight rates for African exports to the United States are considerably higher than on similar goods originating in other countries—contributing to the region’s lackluster trade performance over the last two or three decades.³

In interpreting the relative importance of transport costs and tariffs, several points should be kept in mind. First, the freight rate calculations, based on c.i.f./f.o.b. comparisons, *understates* the true door-to-door shipping cost, because only the international leg of the transport journey is considered. The importance of port and inland transportation costs vary substantially by country and exporter location, but can take up as much as two-thirds of the total door-to-door costs (see below). Second, the U.S. tariff schedule is lower compared to other countries, and exporters face other policy-induced barriers to trade besides tariffs.⁴

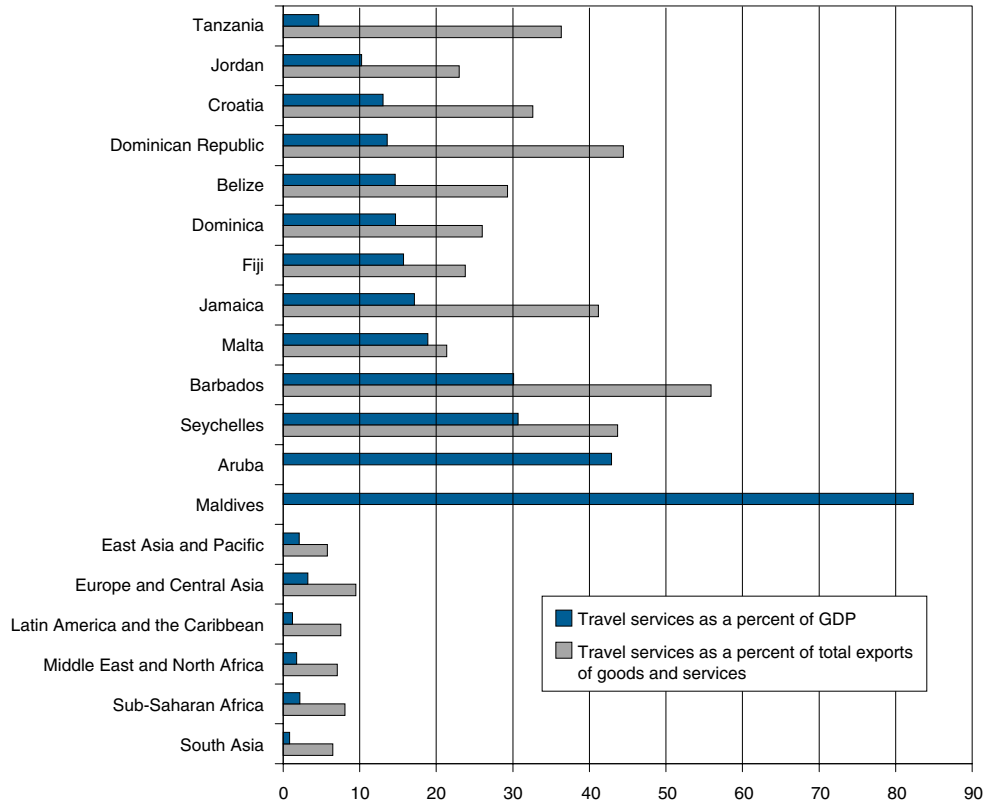
Indeed, for some product groups, restrictions implied by standards or domestic regulations represent a bigger obstacle to trade than import taxes. Third, it is somewhat arbitrary to look only at transport services and ignore the costs of other producer services critical to the supply of foreign markets. High costs of communications, legal assistance, or export finance, for example, represent other sources of inefficiencies that may erode exporters’ competitiveness.⁵ Finally, transport costs—as distinct from tariffs—cannot be brought down to zero.

One recent estimate finds that a doubling of the ad valorem freight rate leads, on average, to a fall in aggregate import values between five- and six-fold.⁶ These are rough calculations, however, and the effect is likely to vary substantially across countries and industries. Much depends on the degree to which higher shipping costs are directly passed on to consumer prices. Another factor is the price sensitivity of final demand and the degree to which imports from one location can be substituted with imports from another location, or from domestic sources. If final demand is highly price sensitive, and goods from different locations are good substitutes, small changes in shipping costs can have a substantial effect on bilateral imports.⁷

—and restrain trade in services—

Transport costs also represent a barrier to trade in services. Though difficult to quantify, this is important for developing countries that rely heavily on tourism services as a source of foreign exchange (figure 4.2). Tourists are sensitive to travel costs, especially where close substitute destinations exist. Estimates vary substantially across locations, but a doubling in travel costs may reduce tourism demand as much as eight-fold.⁸ More than 90 percent of tourists arrive in developing countries by air, underscoring the importance of efficient air transport services for this export industry. For example, air transport costs in East and Southern Africa are reported to be up to ten times higher than for Florida, in the United States, limiting the pool of lower- and middle-

Figure 4.2 Tourism earnings in developing countries, 1998



Source: World Bank Development Indicators.

income tourists able to afford a holiday in these regions.⁹ The price of international passenger transport also dictates the extent to which firms can afford business trips necessary to maintain ties with foreign companies and to gather information about market demand in other countries. In addition, the mobility of businesspeople is key to the formation of multinational production networks, which have emerged as a dynamic driver of world trade over the past decades.

Transport costs affect growth rates—

Shipping costs can affect economic growth in several ways. First, higher transport costs re-

duce rents earned from the exports of primary products, lowering an economy’s savings available for investments. They push up import prices of capital goods, directly reducing real investments. Second, all things being equal, countries with higher transport costs are likely to devote a smaller share of their output to trade. Those countries are also less likely to attract export-oriented foreign direct investment (FDI). Since trade and FDI are key channels of international knowledge diffusion, higher transport costs may lead an economy to be farther removed from the world technology frontier and slow its rate of productivity growth.¹⁰ Third, transport costs determine a country’s selection

of trading partners. If export markets largely consist of poor, slow-growing markets and there are significant costs (including transportation) of switching to new, richer, and faster-growing markets, countries may be constrained in their growth potential. This dilemma may be especially severe for small landlocked countries far away from major economic centers.¹¹

Controlling for a large number of socioeconomic, geographic, and institutional factors, Radelet and Sachs (1998) find that developing countries with lower shipping costs experienced more rapid growth of manufacturing exports relative to GDP in the period from 1965 to 1990. In addition, when exploring the relationship between shipping costs and overall economic growth across economies, the study concludes that a doubling of the cost of transportation is associated with slower annual growth of slightly more than one-half of a percentage point.

—and help to explain regional variations in income

Transport costs—as opposed to tariffs faced by exporters—vary widely across trading nations. The availability, price, and quality of transportation services therefore have strong implications for what countries produce and with whom they trade.

In a theoretical analysis, Venables and Limão (1999) find that transport costs may cause the world to be divided into “zones of specialization.” The more transport-intensive a good is, the more likely it is that it is exported by countries that exhibit lower shipping costs to the economic center. By contrast, exceedingly high shipping costs to a major economic center can lead a country to be self-sufficient in a particular good—despite the fact that it may not hold a comparative advantage in its production solely based on its factor endowments. Countries with higher transport costs but identical factor endowments also exhibit lower real incomes, as more resources are devoted to transportation and the gains from trade are smaller.

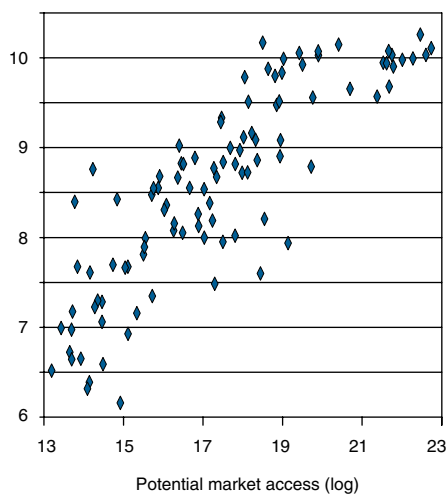
Redding and Venables (2001) estimate the potential access of a country’s manufacturing

goods to the domestic and foreign markets, as determined by shipping costs.¹² This measure of market access explains up to 70 percent of variations in countries’ GDP per capita in 1996 (figure 4.3). Admittedly, the study lends strong causative weight to transport costs, as other factors explaining income variation—notably capital accumulation—are taken, themselves, to be determined by market access. At the same time, the inclusion of characteristics of physical geography and social, political, and institutional variables does not fundamentally alter the study’s result. While more research is necessary to verify and refine these findings, they support the view that a country’s development prospects are greatly affected by their economic geography, of which shipping costs are an important determinant.

As much as transport costs explain the location of production across countries, they are

Figure 4.3 Potential market access explains variations in income

Income per capita (log)



Note: Countries’ potential access to the domestic and foreign markets are estimated by a gravity equation, whereby bilateral trade flows are explained by characteristics of the importing and exporting countries, as well as bilateral transport costs.

Source: Redding and Venables 2001.

equally important in affecting the location of exporting firms within countries. As foreign trade barriers are removed, firms have an incentive to move to regions with good access to foreign markets, such as border areas or port cities—especially if exports account for a large fraction of total sales. For example, closer ties between the United States and Mexico caused a rapid expansion of manufacturing employment in northern Mexico at the expense of the Mexico City manufacturing belt.¹³ Agglomeration forces may create a self-reinforcing process, whereby entire industries move toward exporting centers, causing sharp regional inequalities in production and income. The severity of this process depends on the efficiency of internal transport systems—as illustrated in box 4.2 on China.¹⁴

Transport services thus matter for trade competitiveness. Even if tariff and nontariff barriers to trade were removed, cross-country evidence suggests that the penalty of high shipping costs will continue to hold down growth rates and income of countries with poor international transport links. Furthermore, inefficient internal transport systems can sharpen economic inequalities within countries, with hinterland regions being disconnected from international commerce. Two questions that immediately arise in this context are why some countries pay more for transport services than others, and what governments can do to improve the transport competitiveness of trading firms.

Why some countries pay more for transport services: geography and income

International transport costs vary dramatically

Transport costs vary widely across countries. According to the price quotes of one U.S. freight forwarder, it costs \$1,000 to ship a 40-foot container from Baltimore to Dar es Salaam, the largest port city in Tanzania (figure 4.4). Yet the price of shipping the same container to Durban

(South Africa) is \$2,500 and goes up to \$4,000 for Vienna (Austria), \$6,500 for Asunción (Paraguay), \$7,800 for Yerevan (Armenia), \$10,000 for Bujumbura (Burundi), and \$13,000 for Kathmandu (Nepal). The geographic distance from Baltimore alone cannot explain these dramatic price differences. Transport costs are determined by factors that can be changed in the short run by policy, and those that cannot. This section concentrates on the second set of determinants. Despite advances in transport *technology*, a large number of developing countries continue to be challenged by *geography* in terms of being landlocked or far away from the world's economic centers. In addition, poor physical *infrastructure* and thin *traffic densities*, typically associated with low-income economies, represent additional impediments to transport competitiveness (although policy can alter these constraints in the longer term). Thus, high shipping costs undeniably represent a constraining factor in the trade and development prospects of many developing countries.

Advances in transport technology—

Innovations in transportation have been an important factor in the globalization of goods markets observed in the late twentieth century. An examination of ad valorem freight rates for U.S. imports, for which detailed data are available, suggests that the share of shipping costs in the value of trade in 1998 was smaller for all major commodity groups compared to 1938, and for all but two goods classes compared to 1974 (see table 4.1).¹⁵ However, declining ad valorem freight rates may also be due to changes in the composition of trade or in unit values of traded commodities, due, for example, to improvements in the quality of goods.

Ocean, air, road, and railway shipping have each seen a different mix of technological and institutional innovations, with profound implications on how traded goods are shipped from one location to another.¹⁶ *Ocean shipping* is a relatively mature industry, yet there have been important advances in maritime transport technology over the past decades. Specialized ships have emerged for dry bulk commodities, oil,

Box 4.2 Inefficient internal transport systems contribute to the concentration of China's export industries in coastal regions

A remarkable feature of China's dramatic expansion in international trade over the past two decades has been the concentration of export-oriented industries in coastal regions. The four main coastal provinces (Guangdong, Jiangsu, Fujian, and Shanghai) have been the main recipients of outward-oriented foreign investment, with the remaining portion going to either other coastal provinces or regions adjoining coastal areas. The provinces in the central core—usually referred to as lagging provinces—barely benefited from the incoming investment. While dispersion of export-oriented units have narrowed coastal income disparities—with the south coast regions catching up with the hitherto affluent east coast—the export boom has exacerbated the coastal-inland gap. Thus, while China's economic reforms have been successful in raising living standards for a considerable share of the population, a large number of Chinese people in inland provinces still live below the poverty line.

Another contributing factor to coastal agglomeration has been various inefficiencies in China's internal transport systems. Transport infrastructure disparities between the coastal and inland provinces narrowed considerably following policies aimed at promoting more regionally balanced economic development since 1990. However, indications of increasing inter-provincial trade between inland regions, and between inland and coastal regions, suggests that it is not the availability of transport infrastructure per se that have precluded inland provinces from actively participating in foreign trade. Rather the inadequacies associated with transport services are the more binding constraint to better integrating China's hinterland economy.

The compositional shift of exports from low-value raw materials to high-value manufactured goods has made transport increasingly suitable for containerization. Though there has been significant increase in the volume of container traffic in China since 1990, the increase is largely confined to coastal regions, and associated with the oceangoing leg of travel. Container traffic in inland areas is much less, with no significant change in the percentage of sea-borne containers traveling beyond port cities and coastal provinces. Truck rates for moving a container 500 kilometers inland are estimated to be about three times more, and the trip

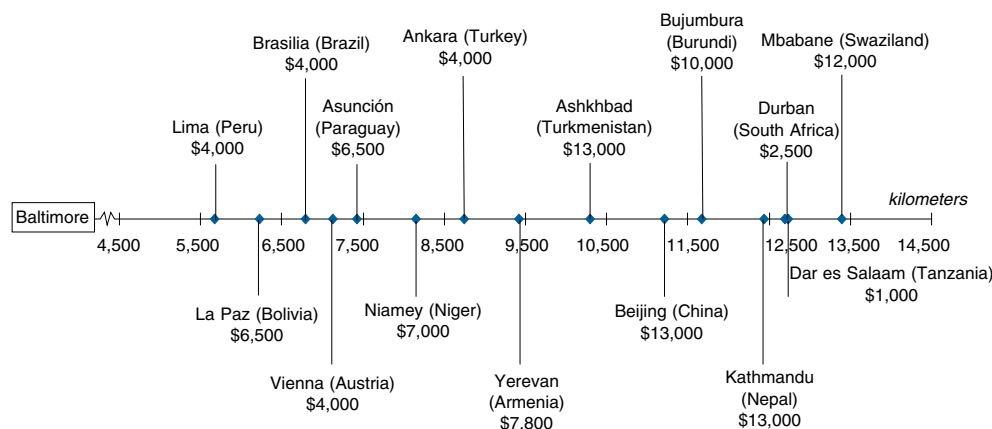
time five times longer, than they would be in Europe or the United States. China's railways still charge what is, in effect, a penalty rate for moving containers. Priority on the congested rail network is still given to low-value bulk freight (mostly coal), rather than to high-value freight, such as containers.

Surveys based on major foreign shippers, shipping lines, and freight forwarders based in the United States, Japan, and Hong Kong (China) indicate that China's transport systems, particularly inland transport, are well below international standards. First, respondents pointed to the lack of container freight stations, yards, and trucks in inland regions. Second, border procedures were perceived to be cumbersome and time-consuming, due to the many certification requirements and duplication of documents—in part, a consequence of the lack of coordination between the different government agencies involved in the various modes of transport. Third, container-tracking capability was particularly poor, with shippers often unaware of their containers' whereabouts. Shippers attributed this to poorly trained staff, the lack of a reliable recovery system, and the poor accountability system in government agencies. Fourth, the intermodal transport system was found to be poorly integrated, with no streamlined procedures to support the continuous movement of containers between the coast and inland.

Another source of inefficiencies is the dominance of state-owned enterprises and the lack of competition in transport service markets. Since pricing in many of the intermediate transport service activities is controlled, the companies have little incentive for aggressively pursuing cost-cutting methods. Due to a lack of competition, intermediate service providers represent the interests of transport operators. Hence value-added service and reliability, hallmarks of winning business confidence in a modern economy, are not practiced by most participants. Investment by foreign enterprises or joint ventures between foreign and domestic enterprises in intermediate transport services is limited in inland regions. Though foreign investment is not prohibited, there are restrictions on investors' activities.

Source: Atinc 1997; Graham and Wada 2001; Naughton 2001; and World Bank 1996.

Figure 4.4 Shipping a container from Baltimore, Maryland, around the world: Distance is only half the costs story



Note: Shipments refer to loosely packed freight and do not include insurance costs.

Source: Limão and Venables 1999.

chemicals, automobiles, forest products, and other goods. Probably the most far-reaching development in maritime transport has been the growth of containerized cargo shipping, which has allowed investments in larger and faster ships. Today, more than 60 percent of global general cargo trade moved by sea is carried in containers. On trades between industrialized countries the percentage is just over 80 per-

cent.¹⁷ However, evidence from major developed-country shipping routes suggests that the real price of ocean liner shipping has not declined over the past decades, while tanker and tramp shipping has arguably become cheaper (Figure 4.5). Unfortunately, no information is available to assess the development of real ocean freight rates for developing country routes in past decades.

Table 4.1 Ad valorem freight rates for U.S. imports: 1938, 1974, and 1998

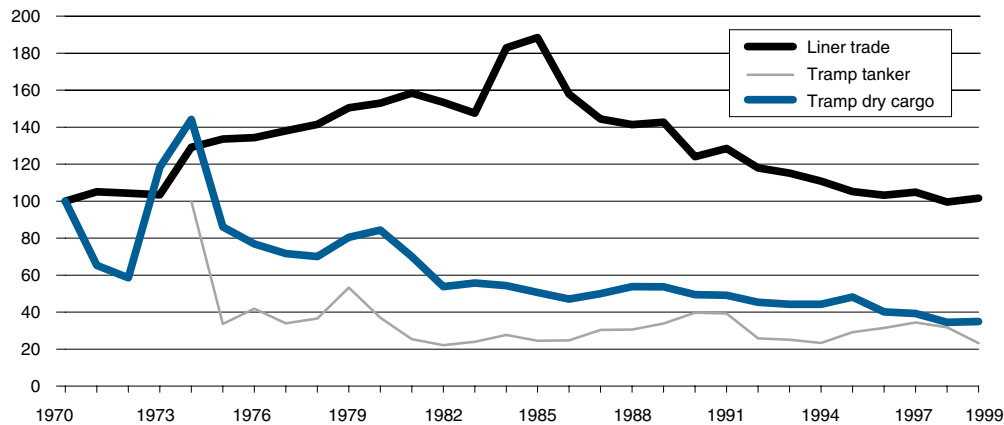
(As percent of total import values)

	All countries			Developing countries		
	1938	1974	1998	1938	1974	1998
Foods	9.3	9.4	7.0	12.5	8.3	8.4
Agricultural raw material	7.5	11.4	6.5	10.3	14.3	10.2
Crude materials and ores	65.2	44.5	12.0	57.3	30.4	13.9
Fuels	14.3	7.7	7.8	21.5	13.0	9.3
Chemicals	10.4	14.3	3.3	6.7	16.0	6.4
Metals	10.0	7.7	5.2	10.2	6.8	5.5
Other manufactures	10.1	10.6	4.6	5.2	7.5	4.5

Note: Ad valorem freight rates are based on comparisons between f.o.b. export and c.i.f. import values, as reported by U.S. customs. They therefore do not include inland transportation costs and charges incurred at the port of exportation.

Source: Yeats 1981 for 1938 and 1974; and U.S. Bureau of Census for 1998.

Figure 4.5 Ocean freight rates, 1970–99



Note: The liner trade series is based on freight rates observed in Germany seaborne trade and deflated by the German consumer price index (CPI). Freight rates are typically quoted in U.S. dollars, but shippers often apply currency adjustments to compensate for fluctuating exchange rates. Using the U.S. CPI, the overall trend in prices is very similar, although freight rates would decrease over the 1970–99 period due to higher U.S. inflation. The tramp tanker and tramp dry cargo (trip charter) series are deflated by the U.S. CPI, since charter prices are typically quoted in U.S. dollars and set in highly competitive markets.

Source: UNCTAD Review of Maritime Transport (various issues), based on data from the German Federal Statistical Office (for liner trade) and Lloyd's ship manager (for tanker and dry cargo).

—have boosted air transport—

Air transport is still a relatively young industry that has gained in significance only after the emergence of long-distance jet airliners in the late 1950s and the introduction of the wide-body jet in 1967. The liberalization of air transport services, starting domestically with the United States in 1978, provided an additional impetus to the industry's growth, as airlines were granted greater freedom in determining their routes and schedules, and service competition intensified. Since 1980 airlines' freight operating revenues per ton-kilometer have fallen by 55 percent in real terms. As air shipping prices have fallen relative to prices for ocean transport, the share of world trade shipped by air has continuously grown over the past decades—from 7 percent in 1965 to 30 percent in 1998 in terms of value for U.S. imports.¹⁸ In terms of ton-miles shipped worldwide, air cargo shipping has grown by almost 10 percent annually from 1970–96, compared to only 2.6 percent growth for ocean shipping.¹⁹

Air passenger transport has also experienced a dramatic real price decline, which has led to a sharp increase in international air travel, growing at an average annual rate of 5.8 percent in terms of passenger-kilometers since 1980.

—and have improved the quality of services

Due to the introduction of faster ships and the growth of air transport services, the average time of cargo delivery has fallen sharply in the past decades—from an estimated 40 days in 1950 to 14.3 days in 1998 in the case of U.S. imports.²⁰

Managerial innovations and closer integration of transport services into production, inventory, and distribution systems have been additional drivers of change in the international transport industry. Just-in-time delivery of intermediate inputs, for example, has allowed firms to outsource certain stages of production, cut inventories, and geographically disperse production. Better management of the

supply chain has enabled producers of perishable commodities to compete in distant consumer markets. These managerial changes have, in turn, led many transport operators to become multidimensional providers of logistics services—including packing and labeling, freight forwarding, insurance and banking, the processing of border formalities, tracking of shipments, and other services. The growth of these services has, in part, been propelled by the falling cost and increasing power of communications and computing, as logistics primarily involves the processing of information.

Geography continues to exert its own tyranny—

Despite technological advances, however, geography continues to be an important determinant of international variations in transport costs. The distance between the origin and destination points of a transport journey directly affects the variable cost of shipping in the form of fuel, wear and tear of vehicles, and the amount of time that goods are traveling.

Due to the existence of fixed costs of transportation, however, the effect of distance on transport costs is less than proportionate, suggesting that distance matters more where the costs of packaging, documentation, port services, and other distant-invariant activities are small.²¹ Typically, a 1 percent increase in distance causes trade volumes to fall by slightly more than 1 percent—although this large effect is also due to factors other than transport costs.²² Countries that share a common border are found, on average, to trade significantly more than countries without a common border, which can in many instances be attributed to more integrated transport networks and the existence of bilateral customs agreements that reduce transit times.

—especially for landlocked countries

The effect of distance depends greatly, however, on the mode of transport. By one estimate, an additional kilometer of overland transport adds seven times more to transport costs than an additional kilometer by sea.²³ It

is thus not surprising that landlocked countries pay, on average, more for shipping exports and imports than coastal economies. Multiple studies have documented the “penalty” of being landlocked, and estimates usually put the additional cost of transportation at more than 50 percent of that paid by countries with maritime ports.²⁴ For many shipments to landlocked countries this “penalty” is likely to be higher. For example, the price quotes for container shipments from Baltimore reveal that the cost of shipment to Durban (South Africa) is \$2,500, whereas the cost to Mbabane (Swaziland) via Durban comes to \$12,000—a landlocked “penalty” of 380 percent (figure 4.4). Aside from longer overland distances, traffic to and from landlocked economies often suffers from higher transaction costs due to the complexities of coordinating multimodal transport journeys and the crossing of multiple borders.

It is thus not surprising to find that landlocked countries have only 30 percent of the trade volume of average coastal economies; that none of the 15 developing countries with the fastest export growth is landlocked; and that all 15 of those economies are located either directly on major shipping routes or close to a major developed-country market.²⁵ The study by Redding and Venables (2001) provides additional proof of the burden of geography: access to the coast raises per capita income by 64 percent, while halving the distance to all trading partners increases per capita income by 74 percent. While these figures provide a pessimistic view on the trade and development prospects of geographically disadvantaged countries, in the long run new economic centers emerge. High-income landlocked economies such as Switzerland, or the state of Colorado in the United States demonstrate that such disadvantages need not be permanent.

Infrastructure links the hinterland to the world—

Transport infrastructure, encompassing road, railway, and internal waterway networks, seaports and airports, warehousing facilities, and supporting communications systems, is a key

prerequisite to efficient transport services. When goods originate or terminate in remote regions, inland shipping accounts for a substantial share of the total door-to-door transport charge (figure 4.6). If internal transportation networks are dense, remote regions are in a better position to supply foreign markets. In countries with well-developed infrastructures, exporters can typically choose among alternative modes of transport (truck, railroad, or internal waterway) and alternative seaports and airports to ship their goods abroad. Aside from greater flexibility, increased modal and port choice directly promotes competition and limits the potential abuse of market power by transport operators serving chokepoints. Based on an index that captures the densities of countries' road, railway, and telecommunications networks, Limão and Venables (1999) confirm that better infrastructure translates into significantly lower transport costs.²⁶ Moreover, a higher infrastructure density in transit countries reduces transport costs to landlocked economies. Both own and transit country infra-

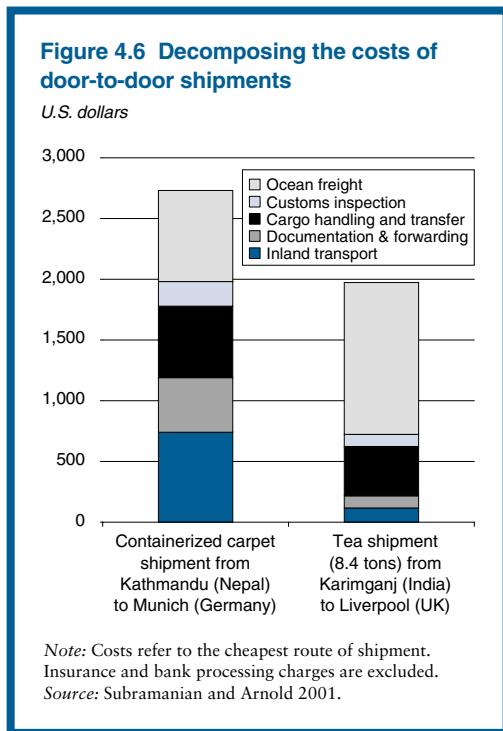
structures are found to be important determinants of bilateral trade flows.²⁷

—and poor countries are at a disadvantage

Poor infrastructure conditions are often the direct result of low income levels, as the resources available for infrastructure investments are limited. Nonetheless, governments play an important role in expanding the reach and improving the quality of existing infrastructure. Investments in transport infrastructure often take a significant share of developing countries' GDP.²⁸ Governments in many countries—in part driven by the need to cut public expenditures—have increasingly turned to the private sector for financing such large investments. Successful involvement of private investors necessitates an attractive investment climate, transparent and carefully designed concession contracts, and a credible overall policy regime.²⁹ Yet where commercial risks are too high, public sector investments are still required—especially in the poorest countries that are typically not able to attract private investment. Governments also play a crucial role in infrastructure planning. Road, railway, and port capacities need to accommodate projected growth in trade. The design and construction of transport networks need to be coordinated with neighboring countries, which is especially important for small and landlocked economies.

Economies of scale and scope

There are large economies of scale in the provision of shipping services. Greater transportation flows allow service providers to operate larger vehicles and to spread fixed route costs over a larger number of shipments. The capacity of containerships operating on the major East-West trading routes is several times that of those operating on North-South routes, where traffic density is substantially smaller. Controlling for other determinants of liner freight prices, shipments from the port of Lagos, Nigeria, to southern California would be 24 percent cheaper, if traffic on this route would be the same as from the port of Hong Kong (China)



to the same region.³⁰ Furthermore, due to relatively low trading volumes, developing countries often face longer travel times and less frequent services, as ocean carriers require a larger number of stops to fill vessels.³¹

At sufficiently large traffic volumes, transport operators can reap economies of scope by offering services on connected routes. Through hub-and-spokes systems, maritime and ocean transport operators have been able to cut costs, while at the same time offering transport links between a larger number of locations at higher frequencies. The overwhelming share of intercontinental ocean trade is today delivered by hub-and-spoke systems, through major ports such as Hong Kong (China), Los Angeles, Rotterdam, or Singapore. By contrast, most ocean carriers serving the routes to and from West Africa still operate under so-called multiple ports of call systems. However, given current traffic levels, commodity mix, port infrastructures, and inland transportation systems, Pálsón (1997) finds that the adoption of a hub-and-spoke system would not systematically yield substantial cost savings. Future growth in trade as well as infrastructure improvements may change this calculus. Yet the implementation of a hub-and-spoke system would still require the willingness of the spoke countries to accept lower traffic volumes to the benefit of the hub port.

Why some countries pay more: policy-driven factors

Government policy can inadvertently inflate transport costs. Most developing countries enact rules that detract from using existing transport resources efficiently. These rules drive up transport-related transaction costs and often preserve monopolies in service markets.

Reducing high transaction costs in-country—

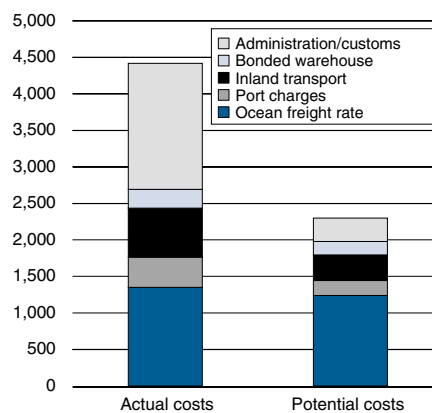
High costs of transport-related transactions—such as frequent reloading of goods, customs clearance, fulfillment of documentation require-

ments, and others—add to the overall logistical costs of international shipments. Uncertainty about the enforceability of legal documents (such as bills of lading or letters of credit) increases the risks faced by importers and exporters as well as transport operators. One study on Brazilian ports reports the average costs per container related to administration and customs clearance at \$1,727, which could be reduced to \$320 according to international best-practice estimates (figure 4.7).³² In many cases, transport-related transaction costs do not even show up in the final freight bill, but take up a firm’s resources that could be used more productively.

Multiple changes of transport modes during the transport journey create costs in the form of frequent reloading of goods, coordination problems that result in shipment delays, and the need to contract several transport operators instead of a single door-to-door service provider—often exacerbated by legal provisions preventing foreign multimodal oper-

Figure 4.7 Potential door-to-door cost savings on containerized imports in Brazil

U.S. dollars



Note: Figures are based on the port of Santos. Insurance charges are excluded. Potential costs are estimated based on international best practice.

Source: World Bank 1997.

ators from undertaking door-to-door contracts. Containerization has substantially reduced the reloading costs of multimodal journeys, as goods are packed once at the factory's door and unpacked at the importer's site. Indeed, containerization has fostered the integration of transport service providers toward multimodal operations, which internalizes transaction costs resulting from modal switches. Even though containerization of general cargo has taken hold in many developing country-ports, containers are less frequently used for inland transport (especially in Africa)—obviating one of the main cost-saving characteristics of container shipping.³³ The main reasons for this are long inland turnaround times for containers, risks of loss or damage to containers, and inadequate road infrastructure unsuited to container loads. Limitations on the cross-border provision of trucking services create bottlenecks at the border, because goods have to be reloaded onto different carriers. Different national standards regarding safety requirements, vehicle sizes, railway gauges, or coupling and braking systems similarly constrain the smooth cross-border movements of goods.

Although official customs fees are typically only a small portion of overall transportation costs, inefficiency in customs procedures can result in congestion and long queues at the border. For example, at the key border crossing-point between India and Bangladesh as many as 1,500 trucks queue up on both sides of the border, and waiting times vary between one and five days.³⁴ Inefficiencies often are the result of understaffing, burdensome documentation requirements, poorly defined procedures, and the need to obtain approval from many officials. High trade protection typically results in more complex customs requirements—for example, through the need to obtain import licenses before goods are shipped. Corruption is endemic in many developing country ports and is more widespread the more opaque are the customs procedures, and the greater the discretion of customs officials.

Advances in information technologies have created a large scope for reducing transport-

related transaction costs. The development of the electronic data interchange (EDI) system, for example, has substituted the traditional paper documentation routines for customs clearance. Through the global positioning system, firms can monitor the location of vehicles and better time loading and reloading. The Internet has opened new ways of organizing transport movements, creating more flexible and efficient transport markets with reduced uncertainty regarding the quality of shipments. Yet use of these technologies is still primarily confined to developed countries and large ports. Lack of communications infrastructure and the necessary skills, as well as an inadequate legal framework for electronic signatures, often present obstacles to the dissemination of transport-related information technology in the developing world.

—requires coordinated government action

There is much that governments can do to reduce transport-related transaction costs, usually under the umbrella of so-called trade facilitation initiatives. Such programs can result in significant reductions in direct and indirect shipping costs in relatively short time periods. They are most effective if implemented in partnership with the private sector (box 4.3). Another role for governments is to create an appropriate legal and regulatory framework for multimodal transport, which often represents one of the most pressing constraints to the provision of efficient door-to-door services. Cooperation on standard-setting and the conclusion of mutual-recognition agreements with neighboring countries can facilitate the cross-border movement of goods by trucks. While countries should remain free to adopt their preferred regulatory standards, it is important to ensure that such standards do not unnecessarily discriminate against foreign-service providers (see chapter 3).

From public monopoly to private competition

For a long time the provision of many transport services was the domain of public monop-

Box 4.3 Lessons from customs reforms in Mexico

Just years before joining the North American Free Trade Agreement, Mexico introduced a series of customs reforms as part of its ongoing trade reform in 1989. An important part of the modernization initiative was reducing customs clearance time, through risk management and selective testing of cargo, in line with similar initiatives in North America and Australia.

Prior to 1989, customs procedures were highly centralized, a reflection of the then inward-oriented bias of the economy. The directorate general of customs (DGC)—part of the ministry of finance—had unlimited authority over customs, with little accountability enforced on customs officials. The import-export guidelines were either not published ahead of time, or subject to frequent and arbitrary revisions. Adjudications of customs-related disputes were time-consuming. The approval of customs brokers' licenses was strictly regulated, thereby providing incentives for collusion between customs officials and customs brokers.

As part of the reform program, DGC was divested of all ancillary functions and the customs administration was decentralized. To ensure transparency, the rights and obligations of the traders were widely published. Traders under the new guide-

lines were required to pay tariffs through commercial banks that opened branches in customs facilities. An important component of the modernization program was targeting enforcement efforts on mainly “high risk” consignments, while allowing the cargo of usually compliant importers with minimum or no inspection. Customs uses a random system that determines whether or not goods will be inspected. This system relies on data—including the country of origin, importer or exporter, type of merchandise, tariff item number, and other variables—to determine whether a particular passenger or consignment is to be inspected. The system is not entirely random, because it uses information in its database to determine the level of risk. Upon completion of customs formalities in respect of a passenger or a consignment, the system is interrogated by pressing the appropriate button. In 90 percent of the cases the green light flashes indicating that no further formalities are required.

The benefits of the reforms, reduction in customs transit time and attendant reductions in the costs of interest, storage, and transport, as well as lower broker fees, were estimated to be about 5 percent of the total value of the merchandise.

Source: World Bank 1997.

olies, and indeed state-owned enterprises continue to be a dominant force in many countries' transport sectors. Public monopolies were often justified by natural monopoly arguments, such as in the case of port operations, which require large infrastructure investments. Prestige arguments (for example, the desire to operate a national flag airline) and security concerns (self-sufficiency in times of war) afforded a justification for limiting the participation of foreign service providers in domestic transport operations. Such arguments are becoming increasingly harder to defend. Private entry and competitive market structures have proved to be feasible for virtually all transport services and, to a large extent, have led to efficiency gains and lower prices for consumers. Moreover, the principle of comparative advan-

tage fully applies to the provision of transport services, as it does to other traded commodities. By opening up domestic markets to foreign competition, shippers can choose among a broader spectrum of services and opt for service operators with superior technologies or lower operating costs.

Maritime transport—

Due to differences in commodity type as well as to technological improvements in the shipping industry—most importantly, containerization—international maritime freight transport has developed specialized branches. *Liner shipping*, meaning maritime transport of commodities by regular lines, which publish in advance their calls in different harbors, is distinct from *tramp shipping*, which refers to

transport performed irregularly, depending on momentary demand. Typically, liner carriers transport commodities with a higher degree of industrial processing using containers, while noncontainerized raw materials (such as crude and refined oil, iron ore, grain, coal, or bauxite) tend to be carried in tramp carriers.

—is affected by government policies—

Tramp shipping is generally believed to be a highly competitive market that is, as a rule, free from restrictions.³⁵ Prices are set in spot markets based on either time charter or voyage charter contracts. In contrast, liner shipping has traditionally been subject both to trade restrictions and private cooperation. The most important policy-imposed barriers applied to international maritime transport have been various cargo reservation schemes. These require that part of the cargo carried in trade with other states must be transported only by flagships (ships carrying a national flag) or ships interpreted as national by other criteria.

Cargo reservation takes various forms. It can be imposed unilaterally if ships flying national flags are given the exclusive right to transport a specified share of the cargo passing through the country's ports. An alternative form involves cargo sharing with trading partners on the basis of bilateral or international agreements. A specific form of multilateral cargo reservation scheme is the United Nations Conference on Trade and Development (UNCTAD) Liner Code of Conduct, which was conceived to encourage the development of the shipping industry of developing countries by guaranteeing domestic lines a minimum (40 percent) share of traffic, and ensuring their participation in international liner conferences.³⁶

Cargo reservation schemes have probably declined in significance, as more and more countries have phased them out. In addition, the increased transfer of ships to open registries to enable the ship owners to benefit from more efficient cost conditions has further diluted the importance of cargo sharing. The UNCTAD Liner Code, which was never applied on a large scale, is even less visible today,

being applied mostly to routes between West Africa and Europe (box 4.4). Nevertheless, countries ranging from Benin to India still have in place reservation policies that at least nominally restrict the scope for trade.

—and the practices of ocean carriers

Competition-restraining practices in liner transport take the form of cooperative agreements among maritime carriers on technical or commercial matters. Carriers' cooperative habits are deeply rooted in the history of maritime transportation. The first shipping cartels, covering the routes between the United Kingdom and Calcutta, India, date back to 1875. By joining carrier agreements, shipping companies retain their juridical independence, but consent to common practices with the other members regarding pricing, traffic distribution, or vessel capacity utilization. One of the most common types of agreement are *liner conference agreements*, which typically provide for the fixing of and adherence to uniform freight tariff rates and conditions of service. Liner conferences also employ exclusive contracts and other loyalty-inducing instruments to deter entry of outside shipping lines.³⁷ Another type of carrier agreement includes *cooperative working and discussion agreements*, which establish exclusive or preferential working relationships between shipping lines, and provide a forum for information sharing but do not necessarily engage in unique price setting. A more recent form of private cooperation is *strategic alliances*, which aim at closely integrating vessel operation activities and service networks.

It has been frequently pointed out that in recent years the power of liner conferences and other cooperative arrangements has been eroded. In the 1990s efficient outside shipping lines were able to gain a significant share of the market on many routes. Moreover, more liberal regulations affecting international shipping have weakened the command of rate-fixing agreements. For example, the Ocean Shipping Reform Act of 1998 in the United States introduced the confidentiality of key service contract terms, allowing greater scope for price com-

Box 4.4 Maritime shipping in West Africa

West Africa has lagged behind the rest of Africa and the world in terms of growth of sea-borne trade over the last two decades. Sea-borne transport increased by an average annual growth rate of 1.2 percent since 1990. This compares to 1.6 percent for all developing countries in Africa and just over 3 percent for total world sea-borne trade. Between 1980 and 2000, West Africa averaged about 4 percent of total goods loaded in the world's seaports. For goods unloaded, the region averaged about 2 percent of world sea-borne trade.

West African nations adopted the UNCTAD Liner Code in the 1980s and rapidly expanded their fleets, hoping to be in a position to take full advantage of the code's cargo sharing formula. However, most of the shipping lines based in West Africa either collapsed or went bankrupt. Today the market share of West African lines is very slim in the containerized trade to and from Europe, with five national lines mustering up about 6–7 percent of total capacity offered. They run a fleet of small and generally old vessels and offer exclusive service between their home countries and Europe, consequently limiting themselves to a small cargo base. Low traffic levels in West Africa restrict the number of regional carriers that can be sustained and limit market entry by commercially oriented carriers.

Due to low volumes, there is also concern about abusive practices by private operators. Interesting evidence on such practices was revealed in the Associated Central West Africa Lines (CEWAL) liner conference court case, which was initiated by the European Commission (EC) against three liner shipping conferences operating on routes between continental North Seaports and West Africa. Although European Union (EU) regulations provide for a block exemption for liner conferences, the abuse of a conference's dominant position still falls under the realm of the competition rules provided in the EC's treaty of Rome.

The members of the CEWAL conference were found to have abused their collective dominant position in several ways. First, the conference established a system of loyalty agreements, whereby loyal shippers received rebates on routes between Northern Europe and Zaire, while disloyal shippers were "blacklisted" and could no longer count on "nor-

mal" services from CEWAL members. Second, a special agreement with the Zairian Maritime Freight Administration granted the conference the power to prevent any intrusion of competition on its market and allowed it to monitor sea-borne trade. Third, the conference employed "fighting ships" to eliminate competition from its most direct competitor and potential market entrants. "Fighting ships" were identified as those vessels that sailed at dates close to the sailings of its principal competitor. Special freight tariffs—identical or less than those offered by the competing line—were established for those ships.

These agreements and practices enabled the conference to maintain a high market share, which contrasts with other Euro-African trades for which the market share of the conferences is sometimes less than 60 percent. After the court hearing, members of the CEWAL conference had to amend the terms of their loyalty contracts to prevent infringement of EC competition rules. Moreover fines were imposed on several members of the conference. The CEWAL case demonstrates the positive spillover of competition law enforcement by a large trading bloc, such as the EU. Since the final decision by the European Court of Justice in March 2000, liner transport prices on routes between northern Europe and West Africa have reportedly fallen.

Notwithstanding the dominance of certain liner conferences, there is growing competition from independent service providers in specific port to port markets, including niche operators (operating in special, well defined market segments, sometimes with special equipment) and operators without vessels who rely on chartering space from liner companies—so-called non-vessel-owning common carriers. These corporations frequently keep at arm's length from the large operators and can be quite successful within their particular markets. In view of West Africa's stagnant trade volumes, however, there is continued need to closely monitor competitive conditions in this critical trade-supporting industry.

Sources: Audige 1995; European Union 1999 and 2000; Pålsson 1997; and WTO 2000.

petition. It is also important to recognize that private cooperation can bring benefits to consumers of shipping services—notably due to improved network coordination, which can generate economies of scope and a wider choice of services available to shippers.

Yet one recent study, which examines the impact of price-fixing and cooperative working agreements on liner freight rates for U.S. imports, concludes that private practices continue to exercise a significant influence on liner freight rates, and that the hypothetical breakup of carrier agreements could lead to cost savings of as much as 20 percent (see box 4.5). In practice, the extent to which liner freight rates are pushed up by private anti-competitive practices is likely to differ across routes. Developing country routes are arguably more prone to such practices, since low overall traffic volumes limit the number of competitors that can be commercially sustained (see box 4.4).

Seaport services are increasingly driven by private capital and competition—

In performing their function as the interface between various modes of transport, seaports provide multiple services. The management of ships in ports requires a mixture of services related to berthing, including pilotage, towing, and tug assistance. Cargo handling is the most important service in moving goods through seaports, accounting for 70 to 90 percent of total port charges. Other services related to cargo manipulation include customs clearance, storage, and warehousing. Specialized agents or consignees take on the paperwork and all matters related to the use of port facilities by a ship. Finally, there is a series of ancillary services to crew members and ships, including provisioning, fueling and watering, garbage collecting, and repair facilities.³⁸

The last decades have seen profound changes in the organization of seaports—the general trend being toward increased private sector participation and greater competition within and between ports. A variety of ownership and operational structures have emerged

with regard to port management and coordination, the provision of infrastructure, and the supply of services. For example, under the Landlord Port concept—which is becoming widespread worldwide—the public Port Authority owns the basic infrastructure—land, access, and protection assets—and leases it out to private operators on a long-term concession basis. Under the Tool Port concept the Port Authority owns the infrastructure, the superstructure, and heavy equipment, and rents it to private operators, which carry out commercial operations under licenses. The Port Authority usually retains all regulatory functions in the case of landlord and tool ports. In only a few ports in the world has port land been sold to private operators, and all public management and regulatory functions been transferred to the private sector.³⁹

—but smaller ports are at a disadvantage—

The feasibility of competitive provision of port services, especially cargo handling, depends on several factors. The availability of port space poses a constraint to the number and the degree of specialization of port terminals. Second, traffic levels have to be sufficiently large, such that it is feasible to operate several terminals at full capacity. Experience has shown that the operation of more than one container terminal only becomes viable if port traffic exceeds 150,000 twenty-foot equivalent units (TEUs) per year. Third, competition between ports depends on geographic factors, the density and quality of inland transport networks, and overall traffic volumes in the greater port region. In practice, competitive forces are likely to lead to a cost-efficient provision of services only in large seaports and regional hubs. For smaller ports, ex ante competition, in the form of auctions where private firms bid for the right to operate a terminal, can extract potential monopoly or oligopoly rents that service providers expect to generate. Furthermore, it is necessary to accompany private port participation with appropriate regulation over tariffs charged by service providers. Indeed, the

Box 4.5 How important are public and private barriers to trade in maritime services?

A recent study by Fink and others (2001) has attempted to quantify the absolute and relative importance of public and private barriers to trade in maritime services. Using data on liner transport charges for U.S. imports, broken down to the six-digit Harmonized System commodity level, the study estimates a model that explains port-to-port liner prices with their standard determinants, ranging from distance to containerization, as well as various proxies for public and private restrictions that exist across countries and on different routes. Public policy restrictions include cargo reservation and the extent to which certain port services, such as pilotage and towing, are mandatory for incoming ships. Private restrictions considered are price-fixing and cooperative working agreements on routes between U.S. trading partners and selected U.S. coastal districts.

The econometric results show that both public policy and private practices exercise a significant influence on liner transport prices. Of public restrictions, the cargo reservation policies that proliferated in the 1970s and 1980s seem to be largely ineffectual, but restrictiveness in the form of mandatory port services significantly raises prices. Most striking is the even more powerful effect that private carrier agreements have in keeping prices high. The table below presents the estimated reductions in transport prices due to policy liberalization and the hypothetical breakup of private carrier agreements. While port liberalization would lead to an average reduction in transport prices by 8 percent and cost savings of up to \$850 million, the breakup of private carrier agreements would cause prices to decline further by 20 percent and there would be additional cost savings of up to \$2 billion on U.S. routes.

Estimated reductions in liner transport prices

	Liberalization of port services	Breakup of cooperative working agreements	Breakup of price-fixing agreements	Cumulative effect of the breakup of private carrier agreements	Cumulative total effect
1. Average percentage price reduction	8.27	5.29	15.73	20.05	26.37
2. Projected total savings for all U.S. imports (in millions of dollars)	850.4	544.1	1618.4	2063.0	2712.5

Note: The average percentage price reductions are computed from the sample of 59 countries included in the study, while the projected total savings apply to all U.S. trading partners. Given the functional form of the underlying regression equation, the individual effects do not sum to the cumulative effects. See Fink and others 2001 for additional explanatory notes.

While the study provides important evidence on the forces constraining competition in maritime transport, several important questions fall outside the scope of the empirical analysis. First, the overall restrictiveness of the port services regime is only imperfectly captured by the extent to which certain port services are mandatory for incoming ships. The efficiency of cargo handling—the most important service in bringing moving goods through ports—is not considered in the analysis. Moreover, the data employed only capture inefficiencies in the provision of port services to the extent that they push up liner freight rates. More research is needed to evaluate

how public and private restrictions directly affect charges for port and auxiliary services. Second, due to data availability, the study only considers liner traffic to the United States, where recent reforms have increased the scope for price competition, potentially reducing the role of private carrier agreements. Evidence for other routes involving developing countries is needed to evaluate how public and private barriers to competition affect maritime shipping.

Source: Fink and others 2001.

creation of regulatory capacity is an important element in every port reform package—not only to monitor and set tariffs, but also to ensure the safety and quality of services supplied.

With few exceptions, such as Singapore, public port monopolies are typically associated with inefficient and expensive services; experience has shown that liberalization programs can, in principle, greatly improve performance (see box 4.6). Yet achieving successful liberalization is a complex task—even in developed countries. To attract long-term private investors, the overall policy regime has to be credible and consistent over time. At the same time, governments need to ensure that efficiency gains are passed on to port users, which requires carefully designed concession contracts *ex ante* and appropriate regulatory mechanisms *ex post*. Thus a country with weak institutions, high overall economic uncertainty, a reputation for policy reversal, and limited regulatory capacity arguably faces a significantly more difficult task in managing the liberalization process. Another frequently encountered obstacle in reforms is the adjustment to the labor force in port. Due to technological progress, port operations have, over the past decades, become more capital-intensive, such that modernization typically requires the reduction of excess labor. Forming consensus with workers on the design of reforms, retraining programs, and measures to soften the social impact of labor reductions can overcome some of the resistance of often-powerful port unions.⁴⁰

—and powerful operators are emerging at the global level

Opening port services to the participation of foreign operators can bring special benefits, as multinational companies often bring technology, experience, and managerial know-how. Large global port operators can also offer a loyal customer base, networking possibilities, and access to finance. Yet a number of observers have voiced concerns about the rising global concentration of the industry. A relatively small group of port operators has established a regional or worldwide presence; by one

estimate this small group now accounts for about 40 percent of the world's annual container liftings.⁴¹ While consolidation may bring benefits to port users, there is the danger that dominant operators may abuse their market power—for example, by offering exclusive contracts to shipping lines if they use their worldwide facilities. Such practices may pose the risk that the benefits from port liberalization are to some extent captured by foreign firms.

International air transport services are heavily restricted—

International air transport is divided into scheduled passenger, freight, and mail services, and chartered services that depend on momentary demand. In 1998, scheduled services represented 87 percent of revenues, of which the overwhelming share (88 percent) came from the movement of passengers.⁴² International airfreight transport can be further divided into passenger belly-hold freight and dedicated freight services. Passenger belly-hold freight is typically cheaper, because freight rates are set at marginal cost, whereas dedicated freight services need to recover the full costs of operating the aircraft.

Trade in international air transport services is heavily restricted by governments around the world—more so than international maritime transport. Market access of foreign passenger and cargo carriers is largely determined through a complex system of bilateral air service agreement (ASAs), which typically designate the airlines allowed to operate on bilateral routes, the number and frequency of flights they operate, what types of aircraft they use, and how much they charge.⁴³ ASAs also determine the traffic rights of airlines operating on bilateral routes, which are defined by so-called freedoms of the air. Under third and fourth freedom rights, airlines are allowed to carry traffic between their home countries and foreign countries. Fifth freedom rights permit an airline of one country to carry traffic between two other countries, provided the flight originates or terminates in its own country. The most liberal—yet rarely granted—traffic rights

Box 4.6 Lessons from reforming Argentina's ports

As part of its overall program of macroeconomic stabilization, liberalization, and public sector reform, in the 1990s the government of Argentina initiated a comprehensive reform of the port sector. The reform was a major success, in that it greatly improved the performance of Argentina's largest sea-ports, sustaining a rapid expansion in the volume of sea-borne trade, growing more than four times from 249,000 in 1990 to 1,070 million twenty-foot equivalent units (TEUs) in 2000.

Before 1990, Argentinean ports were characterized by institutional inadequacies, including a major corruption problem, inefficient cross-subsidization, and insufficient investment in the modernization of the sector. Tariffs charged by the publicly operated ports were reportedly among the highest in the world. Total cargo moved in the ports fell by 10 percent between 1970 and 1989, with the port of Buenos Aires alone experiencing a 52 percent reduction in traffic.

The overall reform program consisted of a combination of devolution of most port responsibilities to the provinces, private sector participation, and promotion of service competition. Provinces were given the freedom to operate, concession, or close ports, with the exception of large ports, for which the creation of independent autonomous companies was foreseen. In the case of the port of Puerto Nuevo (Buenos Aires), six terminals were competitively concessioned to the private sector, with a payment of a leasing fee to the government for use of infrastructure assets—following the landlord port model. To improve the contestability of port operations, the government also established free entry into the sector by allowing any operator to build, manage, and operate a port for public or private use. A new regulatory agency (*Autoridad Portuaria Nacional*) was created under the ministry of the economy. Finally, the restructuring process included a major labor reform that eliminated restrictive work regulations and softened the social impact of labor reductions.

The main economic effect of the overall reforms was to transform Argentinean ports from the most expensive ones in Latin America into the cheapest ones—as illustrated in the table below for the port of

Buenos Aires. Private investment picked up significantly in the second half of the 1990s, leading to a substantial expansion in capacity. Productivity has picked up sharply, significantly reducing operational costs and duration of stay in ports. Combined with more intense competition between port service providers, this has resulted in a reduction in overall container terminal handling prices.

Improved performance in the port of Buenos Aires

Indicator	1991	1997
Cargo (thousand tons)	4,000	8,500
Containers (thousand TEUs)	300	1,023
Capacity (thousand TEUs)	400	1,300
Cranes	3	13
Productivity (tons per employee)	800	3,100
Average container time at port (days)	2.5	1.3
Charges per container (\$/TEU)	450	120

Despite these impressive achievements, unresolved issues from the first wave of port reforms as well as changes in the competitive environment in the sector, although not pressing, demand solutions in the long run. While intraport competition is working effectively, the likelihood of future mergers between terminal operators at the port of Buenos Aires raises the risk of collusion. Improved monitoring and benchmarking mechanisms, as well as the fine-tuning of price regulations, may be necessary to ensure that services continue to be provided on a cost-efficient basis. Inefficient customs operations pose a key constraint toward further productivity gains in the sector and represent a priority for future reform. Finally, some aspects of Argentina's port policy, such as restrictions on the circulation of containers, are reported to restrain intermodal integration. Addressing this issue in the context of the wider policy framework on multimodal transport would contribute to a better performance of the transport system nationwide.

Source: Trujillo and Nombela 1999; and Trujillo and Estache 2001.

are seventh freedom rights, which allow an airline of one country to operate flights between two other countries without the flight originating or terminating in its own country.⁴⁴

—but bilateral arrangements are becoming more liberal—

Over time, ASAs have become increasingly more liberal. For example, so-called Bermuda-type agreements do not regulate capacity on each route, but leave it to the designated airlines to negotiate the number and frequency of flights. “Open skies” agreements are an even less restrictive type of ASA, which originally emerged on selected routes to and from the United States. Under a multiple open skies agreement, airlines can typically fly on all routes between two countries without any ex ante controls on capacity or fares, and are granted unrestricted fifth freedom rights. Domestic reforms, especially the entry of second and third carriers to compete with the former national flag carriers have also led to more intense competition on a considerable number of international routes. In addition, unilateral and bilateral policies toward air cargo services are, in most countries, more liberal than passenger services. Governments have often been willing to authorize dedicated freight services when demand for services exceed what national flag carriers could provide.⁴⁵

Another noteworthy development is the conclusion of liberal regional air service agreements that, at least partially, attempt to overcome the distortions introduced by bilateral preferences. These are often linked to regional trade agreements, such as in the case of the common aviation market in the EU or the Andean Pact open skies agreement. The “Yamoussoukro Declaration” adopted by African countries provides for liberalization of air transport on the continent by 2002. The foreseen regime would replace bilateral air services arrangements and eliminate all restrictions in traffic rights up to the fifth freedom.

Privatization of state-owned airlines has also progressed in the 1990s. More than 70 percent of airline companies now have a ma-

jority of private capital. In addition, governments have become less willing to come to the rescue of distressed national flag carriers. Indeed, selected countries—notably in the developing world—have allowed the bankruptcy and closure of national carriers. While privatization is frequently driven by short-term fiscal needs, there is growing recognition that direct or indirect subsidies to national flag carriers distort the allocation of resources. The tightening of competition policies in relation to state aids has also contributed to a more commercially oriented climate in which airlines operate today.

Besides restrictive bilateral agreements, market access of foreign airlines is sometimes limited due to regulatory standards and requirements. While it is legitimate for more developed countries to seek higher safety and environmental standards, they can potentially have adverse effects on air services with developing countries, which should be taken into account when adopting new standards (box 4.7). International cooperation on technical standards, for example under the umbrella of the International Civil Aviation Organization (ICAO), can play a useful role in forming consensus about what are legitimate safety or environmental concerns and what can be considered unnecessarily discriminatory.

—fostering consolidation—

A large number of studies have documented the benefits of liberal international air service markets in developed economies. In principle, competition between airlines has been shown to result in overall lower prices, and an increased range and quality of services.⁴⁶ Little formal research has been conducted to evaluate the effects of air service liberalization in developing countries, but anecdotal evidence points to significant inefficiencies as a result of restrictive air service policies. At the same time, the experience of developed countries has shown that liberalization may foster consolidation in the industry, as airlines seek to expand the reach of their networks to generate hub-and-spoke economies.

Box 4.7 EU noise regulations and their potential effect on air service to Central Asian countries

The EU has been continuously framing regulations to curb noise pollution within the Community caused by older types of civil jet aircrafts. A trade dispute between the United States and the EU has thus been brewing over the issue of hushkits—retro-fitted noise muffling systems used extensively in U.S. carriers to bring older aircraft in conformity with ICAO standards. The hushkits law, effective from April 2002, would ban all non-EU aircraft with built-in hushkits that are not already flying in the EU.

The IL76, an aircraft with high cross-country carrying capacity will be prevented from operating as a result of these regulations. According to one air transport operator, almost 90 percent of all humanitarian and disaster relief operations around the world are performed by the IL76. Such aircrafts play a role in the advancement of emerging industries by carrying maintenance equipment and spare parts worldwide. They have also been used widely in servicing regions such as Kazakhstan, which lack sufficient infrastructure to support Western aircrafts.

The noise level near airports is determined not only by the fleet mix serving the airport, but also by the quantity of aircraft movements. A regulation that bans such aircrafts in populated areas but not in areas with low population density is an alternative that can be applied for a limited period until the aircrafts are re-engineered in accordance with the environmental standards. That could also imply channeling some of the air cargo through specialized remote cargo airports.

The negative implications for developing nations are evident. Delays in urgent relief could have catastrophic results. Cargo traffic between developing countries and the EU would also be adversely affected, as the costs of maintaining a fleet that is in line with stricter noise regulations would increase. Taking into account the implications for developing countries when setting environmental laws and regulations would make better development policy.

Source: Council of the European Union 1999; and www.coyneair.com.

A regional market with limited traffic may only sustain a number of airlines that is smaller than the number of states in the region. Some observers have, for example, pointed out that consolidation would be a likely consequence if air services were further liberalized in Africa. Consolidation may be in the consumer's best interest, if economies of scale and scope result in lower airfares and freight rates, yet it also raises the danger that "spoke" routes with thin traffic densities will become monopolized and airfares increase once price and capacity controls are removed.⁴⁷ Achieving successful liberalization may require the regulation of prices and the imposition of service requirements on thin routes—at least temporarily until competition has sufficiently intensified.

—and increasing the relevance of private practices.

A related concern stems from the emergence of a large number of airline alliances and code-sharing agreements between airlines of different countries. One of the main rationales of these arrangements has been to expand the reach of existing networks in an environment where cross-border trade and direct investments are restricted by bilateral ASAs.⁴⁸ In addition, regulation and market structure in industries upstream or downstream from air services can strongly affect competitive conditions for both passenger- and cargo-transport. Chiefly, the allocation of landing and takeoff slots at airports can be used to favor domestic incumbents and lead to a high concentration

of services in city-specific markets. Similarly, passenger carriers need access to computer reservation systems, which are provided globally by only a small number of operators.

Unleashing competition in international transport: policy implications

Domestic policy action is needed—

Government policies can play an important role in improving the efficiency of international transport services. Creating a favorable climate for private investments, targeted public infrastructure investments, and regional cooperation on transport matters can serve to lessen constraints imposed by adverse geographic or economic circumstances. As pointed out in chapter 3, the liberalization of service markets should focus on the removal of entry barriers in the form of public monopolies or specifically government policies that directly limit competition. Such policy-imposed restrictions are present in a large number of countries and can apply to virtually all transport services, ranging from public shipping lines, port monopolies, and national flag air carriers, to controlled freight forwarding, and agency and third party logistics markets.⁴⁹

Cargo reservation in maritime transport, while still applied in a number of developing countries, has arguably become less relevant. Liberalization of port services is a much newer phenomenon, but has proved to be a successful strategy in improving the performance of port operations in both developed and developing economies.

Notwithstanding the recent progress toward more commercially oriented and liberal air service markets, the current system governing international air transport remains one that essentially grants preferential access to airlines that reside at one end of an international route. Even the most liberal bilateral open skies agreements and regional accords do not grant seventh freedom rights. Preferential

liberalization entails costs, in that market access may be denied to the world's most efficient airlines, unless those airlines fall under the ambit of a bilateral agreement. Despite the spread of airline alliances, which has led to improved international network coordination, limitations on foreign ownership of airlines similarly prevent foreign airlines from fully integrating service networks and achieving economies of scale and scope. In the long term, the goal should be to move toward a nondiscriminatory trade and investment regime in air transport. Further liberalization at the domestic level would contribute to an environment in which such a regime would become feasible in the future.

—as well as a strong regulatory and competition policy framework

Liberalization needs to be accompanied by the development of appropriate regulatory mechanisms. Regulatory intervention is necessary to remedy market failures, to protect consumer interest and the environment, and to ensure the safety of services supplied. Good regulation is often the key to successful liberalization. Although there is no unique model of a good regulator, experience has shown that clearly defined responsibilities, institutional and some degree of financial independence, well-trained staff, and credibility in the market are important ingredients to the regulator's effectiveness. Assistance from bilateral or multilateral donors can be supportive, especially for newly created agencies with limited resources.

An adequate competition policy framework is needed to address potentially anticompetitive business practices by operators, and to ensure that the gains from policy liberalization are passed on to consumers of services. In principle, greater scrutiny of private carrier agreements by competition policy would not automatically imply the breakup of all forms of private cooperation, but would require a static and dynamic efficiency test as to whether carrier agreements, alliances, and other private practices—whether in maritime or air trans-

port—seek to lower operational costs or work to the detriment of consumers.

Yet effective application of competition policy may be difficult—

Many developing countries lack an adequate national competition policy framework to deal with private practices by transport operators. Although a large number of countries have recently adopted antitrust laws, examination and enforcement capabilities often remain weak and take time to develop. There are also significant extraterritoriality problems related to the application of national laws to transport services that are inherently international. Large states can probably tackle such practices unilaterally, but small states with limited enforcement capacity are at a disadvantage. Cooperation on antitrust matters (such as the collection of evidence) can help in pursuing multijurisdictional practices, but, again, such cooperation currently is most pronounced only among developed countries.

—in part due to developed country antitrust exemptions

Undoubtedly antitrust scrutiny of international transport operators in big trading nations, such as the United States and the EU, is likely to generate positive spillovers for developing countries; yet such positive spillovers are likely to be limited, for several reasons. First, the United States, the EU, and other countries have historically exempted—at least partially—shipping conferences from the realm of antitrust law, on the grounds that they provide price stability and limit uncertainty regarding available tonnage.⁵⁰ In some countries, governments even facilitate price-fixing by requiring ocean carriers to officially file their rate and schedule information. Similarly, the United States has exempted selected airline alliances from the realm of its antitrust law—justified by airlines' need to share scheduling and pricing information, which could be challenged under existing competition regulations. Second, developed country competition laws typically do not take into

account the interests of foreigner consumers, and foreign persons usually do not have standing in developed country courts.

A case can therefore be made to review competition regulations—including sectoral exemptions—in the major industrial countries in terms of their potential development implications. This would not only make for better overall development implications, but in many cases it could lead to better outcomes in developed countries.

Multilateral negotiations can be supportive of domestic reforms—

Reform programs aimed at improving the performance of transport services are primarily a challenge for domestic policy. Nonetheless, multilateral agreements can help in several ways to achieve good policy—as chapter 3 has discussed in greater detail. Transport services fall under the scope of the General Agreement on Trade in Services (GATS), which was one of the outcomes of the Uruguay Round of trade negotiations. Measures listed in member countries' specific commitments include, for example, quotas such as cargo reservation policies, foreign ownership limitations of service providers, requirements regarding the legal form of commercial presence, discriminatory taxes and subsidies, restrictions on the hiring of foreign crew members, and the terms of access to port services and other essential facilities such as computer reservation systems.

—but little has been achieved so far—

Notwithstanding the broad coverage of the GATS, relatively little has been achieved to date on disciplining transport services by multilateral trade rules. Take the case of maritime transport services, where negotiations stretched over a period of nearly ten years.⁵¹ Liberalization was a central concern in the Uruguay Round, but at the end of the process only 39 WTO–Member countries were willing to offer commitments, most with significant limitations. As in other sectors, such as telecommunications and financial services, it was decided to extend

negotiations in this sector until the end of June 1996. However, no agreement could be reached and negotiations were suspended. Thus even though the maritime transport sector is an integral part of the GATS, it is not subject to the most favored nation (MFN) rule, and existing commitments are limited to those that certain Members have been willing to make unilaterally. The suspension of the MFN obligation was prompted by the difficulty in eliminating MFN-inconsistent measures in the maritime sector. Examples of such measures are the bilateral cargo-sharing arrangements under the UNCTAD Liner Code of Conduct, and certain unilateral retaliatory actions—such as those maintained by the United States—against trading partners who are perceived to resort to restrictive foreign trade practices.

Liberalization of air transport services under the GATS has also been very limited. Current commitments only apply to three ancillary services—aircraft repair and maintenance services, selling and marketing services, and computer reservation services. The GATS expressly excludes the core issue of air traffic rights. Because the bilateral structure of the international air service regime is fundamentally at odds with the MFN principle of the World Trade Organization (WTO), exclusion was preferred to the possibility of scheduling a large number of MFN exemptions. Several developed countries—in part supported by their airlines—also preferred to pursue the liberalization of air services in a bilateral context. The fact that these countries can obtain a rapid and timely resolution of disputes under the existing bilateral system contributed to the lack of enthusiasm for a strong GATS framework.

—leaving the door open for mutually beneficial negotiations in the new round

In 2000, new negotiations on services were initiated, as called for in the GATS. If a broader new round were to be launched at the Ministerial Meeting in Doha, Qatar, in November 2001, the scope for intersectoral bargaining would substantially widen and encourage a

broader and deeper exchange of commitments by Members. Although specific negotiating interests on transport services are likely to vary from country to country, there are general guiding principles that would arguably contribute to beneficial outcomes. First, developing countries are likely to gain credibility in their domestic reforms by binding existing transport policies in a multilateral commitment. Holding on to commitments that are “below” actual policy—for example, motivated by the desire to preserve future negotiating leverage—entails significant costs, in that investors may be deterred by the risk of policy reversal. In maritime transport, the prospects for locking in existing policies have arguably improved since the last round of negotiations, as unilateral liberalization in this sector has gathered steam, and a larger number of countries appreciate that restrictions on maritime trade impose a significant cost on the whole economy.⁵²

Second, developing countries should use the negotiating process to advance liberalization of transport services—especially in sectors where there are powerful interest groups, such as in port services, which resist reforms. At the same time, market access demands by trading partners need to be reconciled with domestic reform priorities and overall development objectives. This “balancing act” requires careful analysis prior to negotiations, which should be supported by bilateral and multilateral development agencies.

Third, and specifically regarding the coverage of air transport services under the GATS, a stronger multilateral framework for aviation would, in principle, be desirable and could contribute to a more level playing field for smaller countries. Realistically, application of the MFN principle to air transport—for example, by substituting bilateral quotas with non-discriminatory taxes—would require major changes in the way the industry is currently governed, which seems unlikely in the short to medium term. One way forward would be to negotiate the inclusion of air cargo and so-

called express integrated cargo services, which are already relatively more liberal than air passenger services. In the long term, multilateral rules for these subsectors can create the momentum for a more comprehensive treatment of air transport under the GATS.

Finally, it may be beneficial to create multilateral disciplines on transport regulation and measures that address anticompetitive business practices. Such disciplines could unleash a deeper exchange of liberalization commitments, as countries would be more confident that market access concessions are not reversed by regulatory barriers and that the gains from more liberal policies are not captured by private parties. The Reference Paper on Regulatory Principles, which is part of the 1997 GATS Agreement on Basic Telecommunications, has demonstrated that multilateral disciplines can play a positive role in this regard, without aiming at harmonizing regulatory standards or practices. The experience with these behind-the-border issues in the WTO is still young; further work is necessary to evaluate possible options in the transport sector. For example, extending nondiscrimination principles under the GATS to essential facilities in transportation, such as seaports and airports, or computer reservation systems, could make a positive contribution toward a secure trading regime for transport services. Competition disciplines could call for an end to exemptions of particular sectors—such as air and maritime transport—from domestic antitrust law. Another useful role the WTO might play in this regard is to uncover anticompetitive practices, for example in the context of the already existing trade policy reviews mechanism, or in the form of dedicated competition assessments. Developing countries that have limited resources available for this kind of analysis would likely be the main beneficiaries.

Notes

1. See Lakshmanan 2001.

2. If one assumed a 6.26 interest rate (the average U.S. Treasury Bill rate in the year of estimation), the

daily capital would be 0.017 percentage ad valorem, roughly 47 times smaller than the measured cost.

3. Amjadi and Yeats (1995) also show that African countries use a larger share of their foreign exchange earnings on net payments for transport services compared to other developing country regions.

4. Hummels (1999a) makes similar comparisons between freight rates and import tariffs for several Latin American countries and, in many cases, finds that tariffs do exceed transport costs, especially among manufactured goods.

5. Note that insurance services are included in the definition of freight rates shown in figure 4.3.

6. See Limão and Venables 1999. Geraci and Prewo (1977) estimate a similar elasticity of trade with respect to shipping costs.

7. Hummels (1999a) directly estimates the degree of goods' substitutabilities, controlling for the transport and tariff incidence on import prices. The study suggests an even larger trade-inhibiting effect of transport costs for individual product categories than the aggregate estimate by Limão and Venables 1999.

8. For an overview of travel cost elasticity estimates of tourism demand, see Witt and Witt 1995.

9. See Christie and Crompton 2001.

10. A recent study on productivity spillovers in Organisation for Economic Co-operation and Development countries finds that foreign research and development (R&D) stocks in distant economies have a much weaker effect on domestic total factor productivity than do R&D stocks in closer economies (Keller 2001).

11. Indirect evidence for the role of export market choice on growth is provided by Vamvakidis 1998. This study finds that the size of open neighbors' market and their level of economic development has a positive effect on home country economic growth, although a faster growth rate of the neighboring economy was found to not provide any positive spillovers.

12. Since direct data on transport costs are unavailable, Redding and Venables (2001) use geographic distance and the existence of a common border to approximate the effect of shipping costs. Estimations are performed for a group of 101 developed and developing economies, using 1994 bilateral trade data.

13. See Hanson 1998.

14. Interesting new work even suggests that transport costs—as an element of trade costs—help explain a variety of puzzles in the field of international macroeconomics. Their role in explaining countries' home bias in consumption may be the most straightforward, but Obstfeld and Rogoff (2000) also demonstrate that trade costs can be an explanatory factor of why savings in most countries are typically invested domestically, or even why exchange rates are excessively volatile.

15. It should be pointed out that 1974 is an unfortunate year for comparisons, however, because freight rates were pushed up by the oil price shock in the preceding years. Based on similar data from New Zealand, Hummels (1999b) finds that freight costs increased by at least 30 percent between 1973 and 1974, such that the decline in ad valorem freight rates between 1974–98 would be nearly eliminated.

16. Most of the discussion on ocean and air transport is based on Hummels 1999b. This study provides an excellent treatment of available evidence on the evolution of international shipping costs.

17. See World Bank 2000.

18. See Hummels 2000.

19. These estimated growth rates are based on Hummels 1999b.

20. See Hummels 2000. Based on an estimated daily ad valorem cost of 0.8 percent of the import value, this study concludes that, “. . . the advent of relatively fast shipping is equivalent to reducing tariffs from 32 to 11.4 percent.”

21. In the case of maritime transport, Fink and others (2001) estimate that a 1 percent increase in distance pushes up liner transport prices by 0.2 to 0.3 percent. Besides fixed transport costs, it is also possible that differences in the variable costs of shipping across ships and routes cause freight rates to increase less than proportionately with distance.

22. See, for example, Rose 2000 or Limão and Venables 1999.

23. See Limão and Venables 1999.

24. See, for example, Radelet and Sachs 1998, and Limão and Venables 1999.

25. See Radelet and Sachs 1998, and Limão and Venables 1999.

26. Improving the infrastructure density index in the export destination country by one standard deviation reduces transport costs by the equivalent of 6,500 kilometers by sea or 1,000 kilometers by land.

27. Raising infrastructure density of the median landlocked economy to the 25th percentile reduces the disadvantage of being landlocked by 12 percentage points; improving the infrastructure of the transit economy reduces the disadvantage by a further 7 percentage points.

28. For example, one study for Latin America estimates investment needs of \$18 billion annually in Latin America for 2000 to 2005, in order to bring road infrastructure to the upper-middle-income country average of 2.32 kilometers per capita. See Fay 2000.

29. For a more detailed discussion of the role of the private sector in transport infrastructure investments, see Estache 1999.

30. This estimate is based on the empirical model of ocean liner shipping by Fink and others 2001.

31. See Hummels 2000.

32. Admittedly, such best-practice estimates are often crude and sometimes do not fully take into account that practices or technologies employed abroad may not be applicable at home. Moreover, the study is based on the performance of Brazilian ports in 1997. Since then, port charges have been significantly reduced through the concessioning of private container terminals to private operators.

33. See Pálsson 1997.

34. See Subramanian 2001.

35. See World Trade Organization 1998a.

36. The UNCTAD Liner Code was adopted in 1974 and entered into force in 1983 through its ratification by more than 70 countries. Signatories are required to divide the cargo transported according to the following rule: 40 percent for ships belonging to the exporting country, 40 percent for ships belonging to the importing country, and 20 percent for ships belonging to other countries.

37. Marín and Sicotte (2001) provide historical evidence of how the stock returns of ocean lines respond to anticipated changes in the legal treatment of exclusive contracts.

38. See Trujillo and Nombela 1999.

39. For a more detailed description of port ownership and management structures, see World Bank 2001a.

40. See World Bank 2001b.

41. See World Bank 2000.

42. These shares were computed from operating revenue data published in the *Statistical Yearbook of the International Civil Aviation Organization*. They refer to the revenue of scheduled airlines, which in 1996 accounted for more than 97 percent of all carrier revenue.

43. With some exceptions, chartered air services remain outside the scope of the bilateral ASAs. Their authorization remains largely at the discretion of individual countries; airlines must satisfy the charter requirements of both the origin and destination countries before commencing services.

44. First and second air freedoms grant the right to fly over another country's territory or to land in another country for nontraffic purposes such as refueling or maintenance. Sixth freedom rights are a combination of two sets of third and fourth freedom rights—they allow an airline of one country to carry traffic between two other countries via its own country.

45. See WTO 1998b.

46. See, for example, Dresner and Trethewey 1992, Gillen and others 1999, Gonenc and Nicoletti 2000, and Productivity Commission 1998.

47. For example, Brueckner and Spiller (1994) simulate the effect of industry consolidation based on structural estimates of cost and demand parameters in

the U.S. domestic market. They find that a merger of two carriers who share the same hub results in a fare increase for passengers traveling on routes where previously only the merging carriers operated. Fares on routes that remain competitive after the merger, however, fall, indicating that density gains compensate for the loss of competition. Because the merger leads to a substantial increase in total airline profit, its net welfare effect is positive.

48. A recent study on global airline alliances concludes that, while the existing alliances are not stable enough to threaten competition of global airline markets, individual alliances may be able to dominate certain hubs or even city pairs (Laaser and others 2000).

49. For example, one study on container transport in China identified ineffective competition for freight forwarding services—with 80 percent of the market being controlled by two state-owned enterprises—as a reason for limited inland container use (World Bank 1996). Similarly, entry restrictions in the provision of third party logistics providers in Brazil are found to adversely affect Brazil's distribution economy (World Bank 1997).

50. The exemptions from competition law in the United States and the European Union are arguably accompanied by a strong regulatory framework and mechanisms that monitor competitive conditions in the affected transport markets. At the same time, the interests of foreign consumers are either not or only marginally taken into account by authorities in these countries.

51. See Mattoo 2001.

52. See WTO 1998b.

References

- Amjadi, Azita, and A. J. Yeats. 1995. "Have Transport Costs Contributed to the Relative Decline of Sub-Saharan Exports?" Policy Research Working Paper No. 1559. World Bank, Washington, D.C.
- Atinc, Tamar Manuelyan. 1997. *Sharing Rising Incomes: Disparities in China*. Washington, D.C.: World Bank.
- Audige, Michel. 1995. "Maritime Transport Serving West and Central African Countries: Trends and Issues." Sub-Saharan Africa Transport Policy Program (SSATP), Working Paper No. 16. World Bank, and Economic Commission for Africa, Washington, D.C.
- Brueckner, Jan K., and P. T. Spiller. 1994. "Economies of Traffic Density in the Deregulated Airline Industry." *The Journal of Law and Economics* 37 (2): 379–415.
- Christie, Iain T., and D. E. Crompton. 2001. "Tourism in Africa." Africa Region Working Paper Series No. 12. World Bank. [available at <http://www.worldbank.org/afr/wps/wp12.htm>]
- Council of the European Union. 1999. *Official Journal* L 115, 04/05/1999: 1–4.
- Dresner, Martin E., and M. W. Tretheway. 1992. "Modelling and Testing the Effect of Market Structure on Price: The Case of International Air Transport." *Journal of Transport Economics and Policy* 26 (2): 171–84.
- European Union. 1999. "Community Legislation in Force." Document No. 393D0082. [available at http://europa.eu.int/eur-lex/en/lif/dat/1993/en_393D0082.html]
- . 2000. "Proceedings of the Court of Justice and the Court of First Instance of the European Communities." [available at <http://curia.eu.int/en/act/act00/0009en.htm>]
- Estache, Antonio. 1999. "Privatization and Regulation of Transport Infrastructure in the 1990s: Successes and Bugs to Fix for the Next Millennium." World Bank, Washington, D.C. [available at <http://www.worldbank.org/wbi/regulation/pdfs/2248bugstofix.pdf>] Processed.
- Fay, Marianne. 2000. "Financing the Future: Infrastructure Needs in Latin America, 2000–05." World Bank, Washington, D.C. Processed.
- Fink, Carsten, A. Mattoo, and I. C. Neagu. 2001. "Trade in International Maritime Services: How Much Does Policy Matter?" Policy Research Working Paper No. 2522. World Bank, Washington, D.C.
- Gausch, Luis J., and J. Kogan. 2001. "Inventories in Developing Countries: Levels and Determinants, a Red Flag on Competitiveness and Growth." World Bank, Washington, D.C. Processed.
- Geraci, Vincent J., and W. Prewo. 1977. "Bilateral Trade Flows and Transport Costs." *Review of Economics and Statistics* 59(1): 67–74.
- Gillen, David, R. Harris, and T. H. Oum. 1999. "A Model for Measuring Economic Effects of Bilateral Air Transport Liberalization." Working Paper No. 99-08. Wilfrid Laurier University, Waterloo, Ontario, Canada. Processed.
- Gonenc, Rauf, and G. Nicoletti. 2000. "Regulation, Market Structure and Performance in Air Passenger Transportation." *Economics Department Working Paper* No. 254. Organisation for Economic Co-operation and Development, Paris.
- Graham, Edward, and E. Wada. Forthcoming. "Foreign Direct Investment in China: Effects on Growth and Economic Performance." In Peter Drysdale, editor. *Achieving High Growth: Experience of Transitional Economies in East Asia*. Oxford: Oxford University Press.

- Hanson, Gordon H. 1998. "North American Economic Integration and Industry Location." *Oxford Review of Economic Policy* 14 (2): 30–44.
- Hummels, David. 1999a. "Toward a Geography of Trade Costs." University of Chicago. Processed.
- . 1999b. "Have International Transportation Costs Declined?" University of Chicago. Processed.
- . 2000. "Time as a Trade Barrier." Purdue University, W. Lafayette, Ind.
- International Civil Aviation Organization. Various issues. *Statistical Yearbook*. Montreal, Canada.
- Keller, Wolfgang. 2001. "The Geography and Channels of Diffusion at the World's Technology Frontier." University of Texas. Processed.
- Laaser, Claus-Friedrich, H. Sichelschmidt, R. Soltwedel, and H. Wolf. 2000. "Global Strategic Alliances in Scheduled Air Transport—Implications for Competition Policy." Kiel Discussion Paper No. 370. Kiel Institute of World Economics, Germany.
- Lakshmanan, T.R. 2001. "Transport and Trade in Mercosur." In T. R. Lakshmanan, U. Subramanian, William P. Anderson, and F. A. Léautier, editors, *Integration of Transport and Trade Facilitation*. Washington, D.C.: World Bank.
- Limão, Nuno, and A. J. Venables. 1999. "Infrastructure, Geographical Disadvantage, and Transport Costs." Policy Research Working Paper No. 2257. World Bank.
- Marín, Pedro L., and R. Sicotte. (2001). "Exclusive Contracts and Market Power: Evidence from Ocean Shipping." CEPR Discussion Paper No. 2828. London, United Kingdom.
- Mattoo, Aaditya. Forthcoming. "The Maritime Negotiations in the WTO." In *Trade Policy for Developing Countries in a Global Economy*. Washington, D.C. World Bank.
- Naughton, Barry. 2001. "Problems of Lagging Regions in China." Background Paper submitted to the World Bank Beijing Resident Mission.
- Obstfeld, M., and K. Rogoff. 2000. "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?" NBER Working Paper No. 7777. Cambridge, Mass.
- Pálsson, Gylfi. 1997. "Containerized Maritime Trade Between West Africa and Europe: Multiple Ports of Call versus Hub-and-Spoke." World Bank, Washington, D.C. Processed.
- Productivity Commission. 1998. "International Air Services." Inquiry Report No. 2. Australian Productivity Commission, Canberra, Australia.
- Radelet, Steven, and J. Sachs. 1998. "Shipping Costs, Manufactured Exports, and Economic Growth." Harvard Institute for International Development. Processed.
- Redding, Stephen, and A. J. Venables. 2001. "Economic Geography and International Inequality." Centre for Economic Performance Discussion Paper No. 495. London School of Economics.
- Rose, Andrew K. 2000. "One Money, One Market: The Effect of Common Currencies on Trade." *Economic Policy* 15 (30): 7–46.
- Subramanian, Uma. 2001. "Transport, Logistics, and Trade Facilitation in the South Asia Subregion." In T. R. Lakshmanan, Uma Subramanian, William P. Anderson, and Frannie A. Léautier, editors. *Integration of Transport and Trade Facilitation*. Washington, D.C.: World Bank.
- Thoen, Ronaldt, Steven Jaffee, Catherine Dolan, and Lucy Waithaka. 2000. "Equatorial Rose: The Kenyan-European Cut Flower Supply Chain." [Available at http://www1.worldbank.org/wbiep/trade/c_papers/Roses2KenyaSupplychain.pdf]. Processed.
- Trujillo, Lourdes, and Antonio Estache. 2001. "Surfing a Wave of Fine Tuning Reforms in Argentina's Ports." World Bank, Washington, D.C.
- Trujillo, Lourdes, and Gustavo Nombela. 1999. "Privatization and Regulation of the Seaport Industry." Policy Research Working Paper No. 2181, World Bank, Washington, D.C.
- UNCTAD Review of Maritime Transport. Geneva.
- U.S. Bureau of Census. Washington, D.C.
- Vamvakidis, Athanasios. 1998. "Regional Integration and Economic Growth." *The World Bank Economic Review* 12(2): 251–70.
- Venables, Anothony J., and Nuno Limão. 1999. "Geographical Disadvantage: a Heckscher-Ohlin-von Thunen Model of International Specialization." Policy Research Working Paper No. 2256. World Bank, Washington, D.C.
- Witt, Stephen F., and Christine A. Witt. 1995. "Forecasting Tourism Demand: A Review of Empirical Research." *International Journal of Forecasting* 11: 447–75.
- World Bank. 1996. "Container Transport Services and Trade: Framework for an Efficient Container Transport System." Report No. 15303-CHA.
- . 1997. "Multimodal Freight Transport: Selected Regulatory Issues." Report No. 16361-BR.
- . 2000. "The Evolution of Ports in a Competitive World." Port Reform Toolkit, Module 2. [available at <http://www.worldbank.org/transport/ports/toolkit.htm>].
- . 2001a. "Alternative Port Management Structures and Ownership Models." Port Reform Tool-

- kit, Module 3. [available at <http://www.worldbank.org/transport/ports/toolkit.htm>].
- . 2001b. “Labor Reform.” Port Reform Toolkit, Module 7. [available at <http://www.worldbank.org/transport/ports/toolkit.htm>].
- World Trade Organization. 1998a. “Maritime Transport Services.” Background Note by the Secretariat. (S/C/W/62).
- . 1998b. “Air Transport Services.” Background Note by the Secretariat. (S/C/W/59).
- . 2000. “Communication from the European Community and its Member States.” (WT/WGTCP/W/140).
- Yeats, Alexander. 1981. *Shipping and Development Policy: An Integrated Assessment*. New York: Praeger Scientific Publishers.