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BULLETIN
FACILITATION OF TRADE AND TRANSPORT IN LATIN AMERICA AND THE CARIBBEAN



Issue No. 191, July 2002

THE COST OF INTERNATIONAL TRANSPORT, AND INTEGRATION AND COMPETITIVENESS IN LATIN AMERICA AND THE CARIBBEAN

1) *International Trade and Transport Profiles of Latin American Countries*, by Jan Hoffmann, Gabriel Pérez, and Gordon Wilmsmeier, ECLAC, Serie 19 Manuales www.eclac.cl/transporte/perfil/bti.asp;

2) *Globalization – the Maritime Nexus*, by Jan Hoffmann and Shashi Kumar, in *Handbook of Maritime Economics*, London, LLP, due to be published in October 2002; and

3) *Port Efficiency and International Trade*, by Ricardo J. Sánchez, Jan Hoffmann, Alejandro Micco, Georgina Pizzolitto, Martín Sgut, and Gordon Wilmsmeier, to be submitted at the “IAME Panama 2002” Conference, November 2002.

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Improvements in international transport services are one of the main features of economic globalization. Together with progress in telematics, standardization and trade liberalization, faster, more reliable and cheaper transport services are contributing to the integration of production processes at the global level. This article seeks to examine the causal links between trade and the cost of international transport services.

The impact of the cost of transport on foreign trade and economic development

International freight has an impact on trade equivalent to customs tariffs or the exchange rate: a reduction in the cost of transport directly stimulates exports and imports, just as an increase in the exchange rate (the rate at which the national currency may be exchanged against another) makes

exports more competitive, and a reduction in national customs tariffs lowers the cost of imports. Spurred by trade liberalization, customs tariffs have dropped to levels where in many cases any additional reduction would now no longer have a significant impact. It is perhaps for that reason that new and interesting studies have been produced in recent years analysing the impact of transport costs on trade patterns and globalized production.

The impact on trade: the price of the vast majority of traded goods is exogenous for developing countries. If the shipping of imports becomes more expensive, higher inflation ensues as a result of the increased cost of imported goods; in the case of intermediate and capital goods, this also increases the costs of local production. If exports become dearer to ship, the result is a drop in earnings for the exporting country or simply the loss of a market, depending on the elasticity of demand and the availability of substitutes. Econometric estimates suggest that the doubling of an individual country's transport costs leads to a drop in its trade of 80% or even more (N. Limao and A. J. Venables, *Infrastructure, Geographical Disadvantage, and Transport Costs*, World Bank Economic Review 15, 2001. David Hummels, *Toward a Geography of Trade Costs*, University of Chicago, 1999).

The impact on economic growth: empirical studies have concluded that greater transport costs lead to lower levels of foreign investment, a lower savings ratio, reduced exports of services, reduced access to technology and knowledge, and a decline in employment. It is estimated that a doubling of transport costs leads to a drop in the rate of economic growth of more than half a percentage point (S. Radelet and J. Sachs, "Shipping Costs, Manufactured Exports, and Economic Growth", Harvard, 1998). This impact may appear low, but it should be noted that lower growth over the long term results in sizeable variation in per capita income. Geographical variables related to transport costs may account for 70% of the statistical variation in per capita income between countries (S. Redding and A. J. Venables, *Economic Geography and International Inequality*, London, 2001).

The impact of transport costs is increasing

On average, 7.94% of the value of merchandise imported by the countries of Latin America and the Caribbean is spent on freight and insurance costs relating to their international carriage; this figure is almost 50% more than the world average. Major differences persist within the region, with the Caribbean economies recording the highest indices.

Table 1: Freight and insurance costs as a percentage of imports (c.i.f.)

	(all modes of transport)		
	1980	1990	1999
Latin America and the Caribbean	8.85	8.17	7.94
World	6.64	5.22	5.39
Developing Countries	10.44	8.6	8.21

Source: UNCTAD, *Review of Maritime Transport*, Geneva, 2001

Growing relative importance: Compared to tariffs, transport costs have been increasing in relative importance for export competitiveness. For example, on average, exports from Latin America and the Caribbean to the United States attract customs duties of 1.86%, compared to the 4.45% share of their value accounted for by international transport costs. (A. Micco and N. Pérez, *Maritime Transport Costs and Port Efficiency*, IDB, Washington, 2001; data from 1999).

Increasing component of GDP: The freight and insurance costs of international transport are also

tending to increase as a percentage of Gross Domestic Product (GDP). The reason for this is that, both globally and in Latin America and the Caribbean, trade is growing at a faster pace than GDP. In the 1990s, the rate of growth of world exports was more than double that of GDP, and was triple in Latin America and the Caribbean (ECLAC, Globalization and development, April 2002). Therefore, though transport costs have fallen as a percentage of the value of trade, trade itself has expanded, and with it international freight's share of GDP.

Increasing component of the cost of logistics: spending on transport is also increasing because improved quality of service is sought, especially greater dependability and "just in time" delivery. As a result, the inventory component within the overall cost of logistics declines, while the transport component rises. In the case of the United States, for instance, it is estimated that during the 1990s spending on transport rose from 9.5% to 10% of GDP, while spending on inventories slipped from 4.3% to 3.5% (M. Gorman, http://www.ascet.com/documents.asp?d_ID=995; includes domestic transport).

Increasing importance in the value of traded goods: lastly, even as a percentage of the value of imported goods, the incidence of the cost of international transport is increasing in many cases. Whereas in the past exports consisted primarily of raw materials and manufactured goods, today trade is increasingly in intermediate goods. For example, the import price of a Mexican-made car imported into Peru includes not only the cost of transporting the vehicle from Veracruz, Mexico, to Callao, Peru, but also the transport cost of importing a number of inputs sourced from a wide range of countries that supply Mexico.

Transport costs: causes and effects

Analysis and reduction of transport costs is a quite complex issue. Demand for transport services is dependent on trade, which is itself influenced by a number of variables that also have an impact on the cost of transport.

Supply versus demand: The cost of transport is essentially the price of a service, and is determined by the supply and demand for that service. In the above-mentioned studies of the impact of transport costs on trade, the cost of transport is always included as an exogenous variable; in other words, the causal relationship is considered as operating in one direction - from transport onto trade. However, an expanding volume of trade reduces the unit costs of transport, allowing for greater differentiation between different services in terms of speed, frequency, reliability and security.

Quality versus cost: As with goods, the production of transport services is also subject to the impact of technological advances. With the use of new information and communication technologies, improvements in infrastructure, and by taking advantage of the growing rate of containerization, today the same freight and insurance per tonne of cargo can buy a quicker, more reliable service with less variation in delivery time than a decade ago. In addition, it is worth noting that greater commercial demands as regards speed have at the same time given rise to an increase in the share of air transport as compared to maritime transport, and may entail an increase in the average cost of transport.

Direct impacts versus indirect impacts: the distance separating countries impacts on trade between them in different ways. The main models used to explain international trade flows can be described as “gravitational”: countries trade with one another depending on their patterns of production, income, and whether they belong to economic blocs, with the distance between them also having some bearing. That gives an advantage to countries located in the “centre of gravity”, and hence the name of the model. There is an assumption of a close link between distance and transport costs, which would explain why countries closer to one another trade more than with countries further away. In practice, distance may also have a bearing on other characteristics of countries, which leads them to trade more. For instance, countries located nearer to one another tend to have more similar histories, cultures and languages. Lastly, geographical closeness provides scope for alternative modes of transport to sea and air, thereby boosting competition and reducing prices for services. In other words, shorter distances entail lower costs and more trade. Increased trade in turn makes for economies of scale, leading to even further reductions in transport costs. In the case of intra-Latin American sea-borne trade, a partial correlation coefficient of -0.463 is estimated between distance and the volume of bilateral trade, with a coefficient of +0.178 between distance and the cost of transport per tonne.

Choice of the mode of transport

The fact that the average cost of freight and insurance rose worldwide in the 1990s (see Table 1) should not be interpreted as a worsening of the international transport system, but rather as a reflection of greater use of air transport and improvements in other transport services.

Table 2: Foreign trade of seven Latin American countries, 2000

Total volume of trade: thousands of metric tonnes					
	Sea	Air	Land and other	% sea	% air
Argentina	93,957	682	20,111	81.9%	0.6%
Brazil	324,991	694	12,138	96.2%	0.2%
Chile	88,924	514	9,690	89.7%	0.5%
Colombia	76,028	431	2,985	95.7%	0.5%
Mexico	198,857	1,031	885,890	18.3%	0.1%
Peru	25,376	153	699	96.8%	0.6%
Uruguay	6,121	20	2,330	72.2%	0.2%
Total value of trade: millions USD					
	Sea	Air	Land and other	% sea	% air
Argentina	30,803	6,610	12,847	61.3%	13.2%
Brazil	77,131	20,737	13,279	69.4%	18.7%
Chile	25,121	4,060	4,407	74.8%	12.1%
Colombia	16,320	5,004	2,573	68.3%	20.9%
Mexico	53,293	27,744	259,642	15.6%	8.1%
Peru	10,567	2,731	409	77.1%	19.9%
Uruguay	2,980	636	1,954	53.5%	11.4%
Value of cargo: USD per tonne					
	Sea	Air	Land and other		

Latin America's foreign trade: In terms of volume (tonnes), trade using air transport accounts for barely 0.1-0.6% of the foreign trade conducted by the countries of Latin America; in terms of value (USD), however, this mode represents anywhere between 8 and 21% (Table 2). The table also indicates that sea-borne and air transport are used particularly in foreign trade conducted by Argentina, Brazil, Chile, Colombia and Peru, while in Mexico (significant trade with the United States) and Uruguay (significant trade with Brazil and Argentina), the overland mode plays a relatively greater role.

Air transport's share is higher in long-distance trade; accordingly, although total trade decreases with distance, there is virtually zero correlation (-0.001) between distance and the volume of trade using air links

Argentina	328	9,687	639	(estimate for intra-Latin American trade).
Brazil	237	29,869	1,094	
Chile	283	7,891	455	
Colombia	215	11,608	862	
México	268	26,889	293	
Peru	416	17,837	586	
Uruguay	487	30,343	839	

Source: ECLAC, Maritime Profile, www.eclac.cl/transporte/perfil

Transport costs of intra-Latin American trade

Table 3: Intra-Latin American transport costs as a percentage of the value of imports, c.i.f., 2000

Origin:

Destination:	Argentina	Brazil	Chile	Colombia	Ecuador	Mexico	Paraguay	Peru	Uruguay	Venezuela	Average
Argentina		4.3	13.2	6.3	20.9	7.7	10.3	6.9	3.8	8.4	9.1
Brazil	4.1		5.9	6.0	7.5	6.2	4.1	5.6	9.0	9.2	6.4
Chile	10.2	7.9		6.0	15.8	6.9	8.7	6.7	9.4	9.9	9.1
Colombia	10.7	6.5	8.4		4.5	6.0	11.9	4.7	8.6	6.2	7.5
Ecuador	11.6	7.1	7.5	4.8		7.9	25.4	5.9	9.6	7.6	9.7
Mexico	5.4	5.7	6.9	4.7	9.6		5.2	8.6	7.0	7.6	6.7
Paraguay	6.3	14.0	10.5	6.5	7.6	10.2		15.6	3.4	9.2	9.3
Peru	13.2	8.2	5.6	5.6	3.9	6.3	11.0		9.4	8.1	7.9
Uruguay	4.9	7.3	38.8	5.2	31.3	13.1	2.1	7.8		7.5	13.1
Average (non-weighted)	8.3	7.6	12.1	5.6	12.6	8.0	9.8	7.7	7.5	8.2	

Source: ECLAC, based on data extracted from the International Transport Database (BTI) www.eclac.cl/transporte/perfil/bti.asp. Excludes oil and coal.

For the 10 countries included in Table 3, Chilean exports to Uruguay have the highest transport costs as a percentage of the value of trade, followed by Ecuador's exports to Uruguay and Paraguay's to Ecuador. On average, the country with the highest transport costs for its imports from other Latin American countries is Ecuador, followed by Chile. Trade between Paraguay and Uruguay has the cheapest transport costs, followed by that between Argentina and Uruguay, and Argentina and Brazil

(Table 3). It is not possible, using these figures, to reach hasty conclusions about the efficiency of the respective transport services, nor to conclude that transport in one country is more “expensive” than in another. It should be noted that these figures are averages that cover all modes of transport and many different types of goods. Some initial conclusions –confirmed by more detailed analysis– point to low density of regular shipping services (liner services), together with the natural barrier of the Andes, as part of the reason why transport between countries on the west and east coasts of South America tends to more expensive than transport along the same coast.

What factors determine transport costs?

An analysis of multiple variables: Using statistics available from the International Transport Database (BTI) maintained by ECLAC, an analysis has been conducted of the freight and insurance components of imports transported by sea and air originating from 15 exporting countries in Latin America and destined for a subgroup of 8 importing countries (Table 4).

Table 4: Regressions concerning the transport costs of intra-Latin American trade

(Freight and insurance per tonne, 2000)

	Regression 1	Regression 2	Regression 3	Regression 4
Mode of transport:	Seaborne (only potentially containerizable cargo)			Air
Adjusted R ² (No. of observations)	0.566 (70492)	0.562 (70492)	0.561 (71656)	0.422 (77366)
Variable (logarithm)	estimated parameter (t value)			
Constant	.997 (20.9)	.956 (16.5)	.755 (14.9)	3.537 (76.6)
Value per tonne of merchandise (USD) of the transaction	.358 (163.8)	.355 (161.2)	.357 (162.3)	.256 (139.9)
Volume of the transaction (kg)	-.122 (-114.2)	-.123 (-115.0)	-.123 (-115.7)	-.163 (-123.8)
Maritime distance (km) between main ports; direct distance by air between capitals for Regression 4	.221 (46.6)	.282 (68.7)	.267 (66.9)	.245 (52.9)
Liner services per month	-.096 (-28.4)			

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