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The Importance of "Natural" Barriers to Trade
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from the Transport Cost Content in Brazilian
Imports

by

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THE IMPORTANCE OF "NATURAL" BARRIERS TO TRADE AMONG DEVELOPING COUNTRIES. SOME EVIDENCE FROM THE TRANS- PORT COST CONTENT IN BRAZILIAN IMPORTS*

I. Problem Setting

A survey on current literature analysing the determinants of trade among developing countries (the so-called South-South trade) suggests that transport costs act as an essential deterrent against the rise of South-South trade shares in total world trade [Amsden (1976), Stewart (1976), Indian Institute of Foreign Trade (1976), UNCTAD (1978), Ramsay (1981)]. This argument does not primarily refer to the "natural" protection of domestic production in a specific developing country against competing imports from other developing countries. Above all it suggests that the developing countries' imports from developed countries enjoy a transport cost advantage against competing imports from developing countries.

The range of arguments in case of this advantage is broad covering

- the colonial heritage of well-established liner services between metropolitan countries and their former colonies,
- the economies of scale advantages in North-South shipping (container services) which are based on the large volume of North-South trade,

*Juergen B. Donges provided helpful comments on an earlier draft.

- the dominance of industrialized countries in shipping conferences,
- the foreign direct investments from DCs in developing countries giving rise to North-South intra-firm trade and
- the lack of competition in South-South shipping because of both policy-induced access restrictions in the South-South transport market and excessive governmental port pricing in developing countries.

The purpose of this paper is firstly to test the empirical validity of the South-South/North-South transport cost differentials argument and secondly to compare South-South transport costs with the tariff protection level fixed by the importing developing country. Thus one can assess whether preferential tariffs for South-South trade - as foreseen in the UNCTAD global system of trade preferences - would counterbalance a possible North-South transport cost advantage vis-à-vis South-South shipping. The underlying reasoning of such a compensation of competitive disadvantages in South-South shipping by a lowering of policy-induced barriers to trade lies in a possible "chicken and egg" relationship between trade and shipping: Shipping services in South-South trade may be relatively costly because the volume of trade is small and this volume rests small because shipping is costly [Hävylyshyn/Wolf (1981), Ramsay (1981)]. Hence especially

under conditions of high tariff protection it may be more promising to stimulate additional trade by the lowering of policy-induced barriers and then to hope that better shipping facilities will be established once South-South trade flourishes instead of to expect that these facilities will be established in advance on the basis of potential South-South trade, that means on the expectations of South-South trade expansion in future.

II. Method and Data

What is needed to analyse both aspects, the transport cost differentials argument as well as the relation between freight rates and tariffs in South-South trade is a developing country

- whose imports by goods and partner countries are recorded on a cif and fob or fas¹ level,
- which holds a substantial share in South-South trade beyond pure neighbour trade and
- whose trade is sufficiently diversified as well as its regional and sectoral spread is concerned.

¹ The first-best approach would be the comparison between fas (free alongside ship) and cif (cost, insurance, freight) import values since the difference between the two values would then, contrasting to a cif/fob comparison, include the costs of loading the cargo on board in the exporting developing country. Since this cargo working (stevedoring and crantage) covers a substantial share of total costs of using ports - e.g. more than 50 percent of total payments by ship in a developed country port [Bennathan and Walters (1979), p. 25] - the cif/fob comparison is likely to underestimate the real transport costs, particularly in South-South shipping where port facilities may be still less efficient than those in exporting developed countries.

One country which fulfils the conditions mentioned above is Brazil which in 1977 ranked first among a sample of thirty-three leading developing countries engaged in non-fuel South-South trade². Brazil records its imports cif and fob (in US-\$) at an eight-digit tariff item level³, by goods and countries, and hence provides detailed information with respect to the transport cost content of its imports. The high disaggregation level may justify the assumption of product homogeneity within the individual tariff items irrespective of the countries of origin. Our sample consists of 235 items where in each of them imports from both non-Latin American developing countries and developed countries occurred in 1978⁴. This criterion of item selection allows for a South-South/North-South transport cost comparison. Furthermore the selection of items was determined by the volume of imports. Since the variance of cif/fob ratios increases with decreasing volumes of trade [de Wulf (1981)], a minimum cut-off point of \$ 1 thousand cif value of item imports from an individual

²In 1977 Brazil comprised about 15 percent of non-fuel exports to developing countries by the 33 LDC sample [Havrylyshyn/Wolf (1981)]. Exports to the countries of the former Latin American Free Trade Association accounted for 43 percent of this share.

³The eight-digit Brazilian Nomenclature of Goods is a national extension of the internationally established Customs Co-operation Council Nomenclature (CCCN).

⁴One may assume that intra-Latin American trade is less hampered by "natural" barriers than imports from developing areas outside Latin America because of its larger volume, the existence of common shipping agreements within LAFTA and because of the availability of alternative transportation media apart from sea transport, especially in neighbour trade. This assumption is clearly confirmed by ad valorem freight rate calculations for Brazilian imports from Argentina, Mexico and Chile at a two-digit CCCN level. Imports from Argentina exhibited by far the lowest freight rates compared to any other partner country. In order to conserve space, copies of these results are made available through the author upon request. Intra-Latin American trade is hence excluded from the further analysis.

country has been chosen. The remaining error margin is a cost which is commensurate with a comprehensive sample coverage⁵.

The individual items were grouped to sectoral frequency distributions, where a sector is defined at the three-digit ISIC level. Hence the tabulated North-South/South-South freight rate ratios, the Brazilian import freight rates and tariff rates are averages calculated from sectoral sub-samples. The major criterion of regional disaggregation was to cover, whenever possible, the major South-South shipping routes and to separate relatively transport cost-intensive regional trade flows from less transport cost-intensive ones. Individual partner countries were grouped to areas unless one individual country proved to be either very important as a Brazilian trading partner (i.e. US, Japan, South Korea), so that direct liner services may have been established, or isolated (Israel). In case imports from several countries belonging to one area occurred in one item, the cif/fob comparisons were made for the exporting country with the largest volume of trade in the respective item. Thus three developed areas and eight developing areas or countries form the regional

⁵ The sample items comprise 91 percent of total Brazilian imports from South Korea. The percentage shares for the other areas are: 70 percent Hongkong/Taiwan, 96 percent ASEAN, 99 percent India/Middle East, 60 percent East Africa, 67 percent West Africa, 55 percent North Africa and 57 percent Israel.

network of Brazilian import flows in our analysis⁶.

We first tackle the South-South/North-South freight rate differentials argument and then turn to the comparison between "natural" freight rate barriers and "policy-induced" tariff barriers in Brazilian imports from developing countries.

III. Results

Table 1 presents the sectoral averages of ratios between Brazilian imports measured cif and fob from the various developing areas and from the US - as the major Brazilian trading partner among the developed countries - in the same item. The ratio indicates a South-South freight rate disadvantage against competing products imported from the North if it exceeds unity and vice versa.

Above all the sectoral frequency distributions of the ratios exhibit a clear bias towards Brazilian imports from Southeast Asian countries in metal products, electrical and non-electrical machinery, transport equipment and professional goods which comprise the bulk of the sample items.

⁶These are US, Japan and Western Europe from the developed world. The latter group comprises the EC 9 countries, Switzerland and Sweden. The eight developing areas are North Africa (the Maghreb countries, Libya and Egypt), West Africa (the coastal countries from Mauretania in the North to Zaire in the South), East Africa (the coastal countries from Somalia in the North to Madagascar in the South), India/Middle East (the gulf states, Pakistan and India) the five ASEAN countries (Indonesia, Malaysia, Philippines, Singapore, and Thailand), Hongkong/Taiwan and South Korea.

Table 1 - South-South/North-South Freight Rate Differentials in Brazilian Imports 1978

ISIC Industries		Average Ratios (R̄) between Brazilian cif/fob Import Value Ratios for Imports from Developing Areas and from the United States										Average Brazilian Import Tariff on the Products concerned						
		Developing Areas																
		South Korea		Hongkong/ Taiwan		ASEAN		India, Middle East		Israel			East Africa		West Africa		North Africa	
		R̄	n	R̄	n	R̄	n	R̄	n	R̄	n		R̄	n	R̄	n	R̄	n
111	Agricultural and livestock production	--		1.187	1	1.072	3	1.344	3	1.622	1	0.954	1	--		--		27.9
121	Forestry	--		1.072	2	--		1.265	2	--		--		--		--		32.3
230	Iron and non-ferrous ore mining	--		--		1.164	2	--		--		--		--		--		0
290	Chemical and fertilizer mineral mining	--		--		--		--		1.252	1	0.989	2	--		0.913	1	10.0
311/12	Food products	0.665	1	0.857	1	0.897	1	0.763	1	0.976	1	--		--		--		51.7
313	Beverages	--		--		--		--		0.931	1	--		--		--		105.0
314	Tobacco	--		--		--		--		--		--		--		--		--
321	Textiles	1.046	2	0.983	7	--		1.406	3	0.899	2	--		--		--		87.9
322	Wearing apparel	--		1.070	7	1.226	1	1.286	2	--		--		--		--		105.0
323	Leather and products	--		1.182	3	--		1.195	1	--		--		--		--		105.0
324	Footwear	--		1.033	2	--		--		--		--		--		--		70.0
331	Wood products	--		0.950	4	--		1.247	2	--		--		--		--		77.5
332	Furnitures and fixtures	--		--		--		--		--		--		--		--		--
341	Paper and products	--		--		--		--		--		--		--		--		--
342	Printing, publishing	1.143	1	1.176	2	0.980	1	--		--		--		--		--		63.3
351	Industrial chemicals	0.982	2	1.093	11	--		1.004	3	0.980	11	0.939	1	1.070	1	0.985	1	23.3
352	Other chemical products	--		0.853	1	--		0.913	1	1.002	2	--		--		--		46.9
353	Petroleum refineries	--		--		--		0.895	1	--		--		--		--		20.0
354	Petroleum, coal products	--		--		--		--		--		--		--		--		--
355	Rubber products	--		1.979	2	--		--		--		--		--		--		85.0
356	Plastic products	--		3.779	1	--		--		0.979	1	--		--		--		80.0
361	Pottery, china and earthenware	--		0.815	2	--		--		--		--		--		--		70.0
362	Glass and products	--		0.998	2	--		--		--		--		--		--		70.0
369	Non-metallic mineral products, n.e.c.	--		1.110	1	--		--		--		--		--		--		55.0
371	Iron and steel	0.951	1	0.974	4	1.058	1	--		--		--		--		--		41.8
372	Non-ferrous metals	--		--		1.031	1	0.967	2	0.953	1	--		0.975	5	--		21.2
381	Fabricated metal products	0.918	1	1.123	16	--		1.523	5	0.971	1	--		--		--		61.4
382	Non-electrical machinery	1.042	3	1.021	21	1.119	4	--		--		--		--		--		47.8
383	Electrical machinery	1.056	8	1.055	30	1.293	6	1.003	1	--		--		--		--		73.8
384	Transport equipment	--		1.034	4	1.250	1	--		--		--		--		--		60.8
385	Professional goods	1.075	2	1.057	7	1.031	3	--		1.021	2	--		--		--		32.7
390	Other industries	--		1.060	7	1.056	1	1.342	2	--		--		--		--		73.8
Total		1.022	21	1.081	138	1.135	25	1.236	29	1.013	24	0.961	31	0.991	61	0.949	21	54.0
$R_i = (V_C^D / V_F^D) / (V_C^{US} / V_F^{US})$		where V_C^D and V_F^D as well as V_C^{US} and V_F^{US} respectively are the 1978 Brazilian cif or fob values of imports from a developing area D and from the United States respectively in an eight-digit Brazilian tariff item i. $\bar{R} = \frac{1}{n} \sum_{i=1}^n R_i$																
n = number of items																		

Sources: See table 3.

As an overall result table 1 yields that there is no clear evidence in case or against the hypothesis of a South-South freight rate disadvantage.

Whereas the total average ratios for Brazilian imports from Hongkong/Taiwan (1.081), ASEAN (1.135) and India/Middle East (1.236) significantly differ from unity⁷, the tests for South Korea (1.022) and Israel (1.013) suggest that the Null hypothesis (no significant deviation from unity) can be accepted. Hence only in three of eight cases (including the few ratios for East-, West-, and North Africa which are below unity) there is some evidence that the South-South freight rate disadvantage is significant.

Furthermore the cross-sectoral ratios display a larger variability than the cross-country ratios.⁸ This supports the hypothesis that freight-rate disadvantages in South-South shipping - if there are any - are product-specific rather than country-specific. In other words, there does not seem to exist a general geographically determined trade resistance or distance factor in South-South shipping which would negatively affect the competitiveness of Brazilian imports from remote countries like South Korea against imports from closer trading partners. Instead, especially for bulk commodities, it is the volume of trade

⁷ Following a right-tail t-test at the 1 percent level.

⁸ The coefficient of variation of the sectoral averages of the ratios amounts to 0.282, whereas the coefficient of variation of the country averages is only 0.092.

which seems to determine differentials between cif/fob value ratios for imports from developing countries and from the US; in this case to the detriment of the US, whose export volumes in bulk commodities to Brazil (mineral ores and non-ferrous metals) are by far lower than competing exports shipped from North and West Africa to Brazil.

The importance of the sectoral structure of trade flows for South-South / North-South freight rate differentials instead of a country-specific distance factor is underlined by a comparison of changing differentials due to changing reference areas from the developed world, the commodity baskets held constant (table 2). These differentials do not change significantly if instead of the US a Western European country or even Japan serves as the reference area. As far as the latter country is concerned, the freight rate advantage of North-South shipping shrinks in two of the four cases (ASEAN and South Korea) compared to Brazilian imports from the US in the same items. Only in the case of India/Middle East the freight rate disadvantage of South-South shipping becomes more pronounced if the comparison includes Western Europe and especially Japan instead of the US. Since the Brazilian imports from this developing area focus on India (as measured by the number of imported items and not by the volume of trade), the high freight rate disadvantages of the Indo-Brazilian

Table 2 - Freight Rate Advantages (FRA) of Brazilian Imports from Developed Areas against Imports from Selected Developing Areas^a

Brazilian Imports from	U S	Western Europe	Japan	Number of Items in the Commodity Basket
India/Middle East	30.8	32.1	39.7	10
ASEAN	16.3	13.9	12.7	16
Hongkong/Taiwan	5.9	6.3	6.0	81
South Korea	4.1	5.9	2.7	15

$$^a \text{ FRA} = \left(\frac{1}{n} \sum_i \frac{I_i^D}{I_i^I} \right) - 1$$

where I_i^D is the cif/fob import value ratio for Brazilian imports from a developing area D in item i and I_i^I is the cif/fob import value ratio for Brazilian imports from a developed area I (US, Western Europe, Japan). The basket for the items i (i = 1, ..., n) is identical for each of the three coefficients in a table line.

Sources: See table 3.

trade channels may reflect exceptional costs of sea transportation between the two countries⁹, but also a strong tendency towards underinvoicing of exports and overinvoicing of imports as it may occur when the currency of the importing country is chronically overvalued [de Wulf (1981)]. However, there is no *a priori* reason why such practices should be confined to the Brazilian imports from India.

Hence we may roughly conclude for the first aspect of our analysis that the Brazilian data indeed indicate some freight rate disadvantages for South-South shipping in manufactures, but not in bulk commodities. For the majority of the items, however, these differentials amount to less than 10 percent of the cif values of imports from developed countries given identical fob values of Brazilian imports from both developed and developing economies in identical items.

The same sample of items is used to discuss the second aspect of our analysis, that is to determine the share of freight rates and MFN tariff rates, both measured on a cif basis, in the total nominal protection of Brazil against imports from developing countries (table 3).

The calculations principally display the clear preponderance of tariff barriers in South-South trade over "natural" freight

⁹ A report on Indo-Brazilian trade [Indian Institute of Foreign Trade (1976)] notes that in 1976 no direct shipping service existed between India and Brazil. Cargo from Calcutta had to be carried to Buenos Aires for further transshipment to Brazilian ports, whereas shipments from Bombay had to be effected through transshipment at Japanese ports.

Table 3 - Nominal Protection of Brazil against Imports from Selected Developing Areas disaggregated by Freight and Tariff Components, 1978

ISIC	Industries	Developing Areas												Areas											
		South Korea			Hongkong/Taiwan			ASEAN			India, Middle East			Israel			East Africa			West Africa			North Africa		
		Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection	Average Freight Rate ^a	Average Tariff Rate	Total Nominal Protection
111	Agricultural and livestock production	--	--	--	24.5	34.7	59.2	19.2	78.5	47.7	37.9	25.8	63.7	43.3	0	43.3	11.3	0	11.3	3.9	30.0	33.9	--	--	--
121	Forestry	--	--	--	19.5	26.0	45.5	--	--	--	31.7	30.0	61.7	--	--	--	--	--	--	--	--	--	--	--	--
230	Iron and non-ferrous ore mining	--	--	--	--	--	--	23.0	0	23.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
290	Chemical and fertilizer mineral mining	--	--	--	--	--	--	--	--	--	--	--	--	39.8	0	39.8	21.9	30.0	41.9	--	--	--	17.4	0	17.4
311/12	Food products	41.6	60.0	101.6	20.2	52.5	72.7	15.3	37.5	52.8	16.5	70.0	86.5	4.5	45.0	50.5	--	--	--	--	--	--	--	--	--
313	Beverages	--	--	--	--	--	--	--	--	--	--	--	--	21.8	105.0	126.8	--	--	--	--	--	--	--	--	--
314	Tobacco	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
321	Textiles	13.0	88.3	101.3	15.2	93.8	109.0	--	--	--	35.1	100.0	135.1	8.3	55.0	63.3	--	--	--	--	--	--	--	--	--
322	Wearing apparel	--	--	--	16.7	105.0	121.7	30.2	105.0	135.2	30.7	105.0	135.7	--	--	--	--	--	--	--	--	--	--	--	--
323	Leather and products	--	--	--	26.3	105.0	131.3	--	--	--	24.9	105.0	129.9	--	--	--	--	--	--	--	--	--	--	--	--
324	Footwear	--	--	--	23.7	70.0	93.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
331	Wood products	--	--	--	18.5	77.5	96.0	--	--	--	40.4	77.5	117.5	--	--	--	--	--	--	--	--	--	--	--	--
332	Furniture and fixtures	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
341	Papers and products	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
342	Printing, publishing	27.2	85.0	112.2	25.5	85.0	110.5	4.3	20.0	24.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
351	Industrial chemicals	8.8	30.0	38.8	24.5	29.9	54.4	--	--	--	17.9	30.0	47.9	10.4	16.4	26.8	12.9	15.0	27.9	24.4	0	24.4	15.8	15.0	31.8
352	Other chemical products	15.3	30.0	45.3	14.1	87.5	101.6	--	--	--	34.3	60.0	94.3	9.9	27.5	18.7	--	--	--	--	--	--	--	--	--
353	Petroleum refineries	--	--	--	--	--	--	--	--	--	9.6	20.0	29.6	--	--	--	--	--	--	--	--	--	--	--	--
354	Petroleum, coal products	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
355	Rubber products	--	--	--	56.2	85.0	141.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
356	Plastic products	--	--	--	74.3	105.0	179.3	--	--	--	--	--	--	15.5	55.0	70.5	--	--	--	--	--	--	--	--	--
361	Pottery, china and earthenware	--	--	--	17.6	70.0	87.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
362	Glass and products	--	--	--	23.4	70.0	93.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
369	Non-metallic mineral products, n.e.c.	--	--	--	14.7	55.0	69.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
371	Iron and steel	7.9	20.0	27.9	8.1	41.8	49.9	14.0	37.0	51.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
372	Non-ferrous metals	--	--	--	--	--	--	6.3	37.0	43.3	6.6	18.5	25.1	1.8	20.0	21.8	--	--	--	7.9	19.4	27.3	--	--	--
381	Fabricated metal products	13.3	55.0	68.3	23.1	62.1	85.2	--	--	--	47.0	68.1	115.1	4.6	45.0	49.6	--	--	--	--	--	--	--	--	--
382	Non-electrical machinery	11.7	56.0	67.7	11.7	47.7	59.4	17.0	37.5	54.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
383	Electrical machinery	13.6	70.6	84.2	16.3	73.4	89.7	25.9	60.0	85.9	4.8	70.0	74.8	--	--	--	--	--	--	--	--	--	--	--	--
384	Transport equipment	--	--	--	8.2	60.0	68.2	24.7	70.0	94.7	11.0	55.0	66.0	--	--	--	--	--	--	--	--	--	--	--	--
385	Professional goods	9.7	22.3	32.0	7.7	33.0	40.7	5.5	27.3	32.8	--	--	--	7.7	36.0	43.7	--	--	--	--	--	--	--	--	--
390	Other industries	--	--	--	17.4	73.8	91.2	--	--	--	39.9	81.7	121.6	--	--	--	--	--	--	--	--	--	--	--	--
Total average		14.5	56.6	71.7	19.7	61.1	80.8	18.7	40.6	59.3	34.6	63.6	98.2	13.2	30.4	43.6	15.7	11.7	27.4	11.1	16.2	27.3	16.6	7.5	24.1

$$^a \frac{1}{n} \sum_{i=1}^n \frac{V_{C_i}^D - V_{F_i}^D}{V_{C_i}^D}$$

where $V_{C_i}^D$ and $V_{F_i}^D$ are the 1978 Brazilian cif and fob values of imports from the developing area D in an eight-digit tariff item i.

rate-induced barriers. This result visibly contrasts to the findings of similar studies on the freight rate component in US protection against imports from India [Yeats (1977)] and in total OECD countries' protection against imports from all less developed countries [Finger/Yeats (1976)]¹⁰. Only for few cases of primary commodities which mostly enjoy a duty-free access to the Brazilian market, exceptions from this finding can be noted (table 4)¹¹. The large differences between the two shares give rise to the conclusion that cutting the tariff barriers would be by far the most promising way to stimulate the Brazilian South-South trade within the short run.

As it could be expected from the preceding tables, the Indo-Brazilian trade is particularly hampered by freight rates, but even in this case tariff protection accounts for about two third of total nominal protection against Indian imports.

Our sample does not directly allow for tackling the aspect on which most of the recent studies concerned with the freight rate element in total protection focus, that is the question whether freight rates increase or decrease with the stage of fabrication [Yeats/Finger (1976), Yeats (1977a),

¹⁰Whereas the Finger/Yeats results of higher freight rate components compared to tariff rate components are based on mid-sixties data, a recent study applying the same methodology and data sources concludes on the basis of mid-seventies data that this relationship has changed [Clark (1981)].

¹¹Table 4 does not include Brazilian imports from developing countries in the few items which enjoy preferential treatment within the framework of the "GATT protocol" of multilateral tariff concessions among developing countries [Langhammer (1980)].

Table 4 - Freight Rates on Brazilian Imports of Major Primary Commodities from Non-Latin American Developing Countries

Commodity	Exporting Country	Freight Rate	Tariff Rate
Natural calcium phoshates	Morocco	17.5	0
Chromium ores	Philippines	36.6	0
Tin ores	Singapore	2.0	0
Petroleum oils	Saudi Arabia	9.6	20.0
Phosphoric acids	Morocco	15.8	15.0
Ammonia	Kuwait	17.6	0
Aluminium oxide	India	21.2	45.0
Natural rubber latex	Malaysia	16.7	30.0
Natural rubber	Singapore	12.0	30.0
Natural rubber	Nigeria	3.9	30.0
Refined copper	Zaire	4.4	15.0
Unwrought aluminium	Ghana	5.7	37.0
Refined zinc	Zaire	8.1	30.0

Sources: See Table 3.

Yeats (1977b), Clark (1981)]. Given the escalation effect of a tariff increasing with the stage of fabrication and thus causing higher effective rates of protection for finished products than nominal rates, an increase (decrease) of freight rates with the stage of fabrication reinforces (reduces) the escalation effect of the graduated tariffs¹².

On a sectoral basis table 3 lends some support to the hypothesis of an escalation effect which is reinforced by freight rates. The freight rates in the Brazilian consumer goods industries (ISIC 311 - 342, 356, 361, 362) are estimated to be higher on the average than those in the intermediate goods industries (ISIC 351 - 355, 369, 371, 37) and the capital goods industries (ISIC 381 - 390)¹³. On a product level there are only few goods in our sample which form successive links in a processing chain. Therefore a comprehensive assessment of freight and tariff rates varying with fabrication, similar to that done by Yeats (1977b), has only been possible for three chains: rubber, copper and aluminium. Whereas for rubber and copper Brazilian freight rates increase with the stage of fabrication and hence reinforce the escalation effect of the tariffs, a de-escalation effect for aluminium both as far as tariff and freight

¹² This escalation effect has been closely associated with import substitution strategies in less developed countries [Little/Scitovski/Scott (1970), Balassa and Associates (1971), Donges (1976), Krueger (1978)].

¹³ For the Brazilian import flows from Hongkong/Taiwan for instance the average freight rates in the consumer goods industries amount to 26.1 percent, in the intermediate goods industries to 20.7 percent and in the capital goods industries to 14.1 percent.

components are concerned, emerges¹⁴. In any case one can conclude that the high escalation effects in the Brazilian total nominal protection predominantly base on the tariff component rather than on the freight component.

With regard to the extent of tariffs concessions towards Brazilian South-South imports which would be needed in order to counterbalance the South-South/North-South freight rate differentials, table 3 suggests that on the average a preference margin of about 15 percentage points would for the majority of items be sufficient to erode these differentials. This cut "across the board", however, would neither eliminate the escalation effect and hence the discrimination of manufactured imports from developing countries nor essentially reduce the high ceiling of Brazilian tariffs amounting to 105 percent before the cut. The latter aspect is essential, for one can assume that a tariff reduction, which does not bring the tariff level below a minimum prohibitive rate, does not succeed in fostering additional imports. Large tariff reductions applied to products with high initial tariffs would hence probably have the greatest effect in undercutting the minimum prohibitive level and thus in stimulating imports¹⁵. Such an effect would be

¹⁴ The tariff and freight rates on Brazilian South-South imports for the various fabrication stages within the three processing chains are as follows: Rubber: natural rubber freight rate 12.0 percent and tariff rate 30.0 percent, rubber products 30.8 percent and 85 percent. Copper: unwrought copper 4.4 percent and 15.0 percent, copper products 18.9 percent and 70.0 percent. Aluminium: aluminium oxide 21.2 percent and 45.0 percent, unwrought aluminium 5.7 percent and 37.0 percent, aluminium wires, cables and ropes 11.2 percent and 30.0 percent.

¹⁵ See for instance for some statistical evidence on the effects of tariff cuts disaggregated by different initial tariff levels in the 1951 GATT Torquay Round [Krause (1959)].

achieved by applying a "harmonizing" tariff cut formula such as the "Swiss" tariff cut formula used during the Tokyo Round¹⁶. Under the Swiss formula the Brazilian upper tariff ceiling of 105 percent would shrink to 12 percent. Hence the relations between freight rate and tariff rate components in total nominal protection would not only be fully reversed. The tariff cut would also contribute to concede South-South imports a clear preference margin against North-South imports outweighing any South-South freight rate disadvantages. Other tariff cut formulas suggested by the EEC, the US and by Japan during the Tokyo Round would have similar results if applied to the Brazilian tariff: Above all Brazilian imports from developing countries in consumer goods would be stimulated and the existing tendency towards capital goods imports from non-Latin American less developed countries which emerge from table 3 would likely to be weakened.

IV. Summary and Conclusions

In general our case study does not confirm the pessimistic view that freight rates seriously hamper trade among developing countries. With regard to trade between those advanced developing countries which account for the lion's share in South-South trade, the Brazilian cif/fob import value diffe-

¹⁶

$Z = \frac{ax}{a+x}$, where Z is the tariff rate after the reduction, x is the rate before the reduction and a is a constant term numbered 14 in the Tokyo Round.

rentials suggest that existing North-South freight rate advantages are rather small and that tariff barriers discriminate South-South imports much more than do freight rate barriers. Measured as a grand total average across all Brazilian trading partners in the developing world and across all sample items, the cif/fob import value ratio only amounts to 1.1, which by the way is exactly the ratio applied by the IMF in order to convert trade data from a cif to a fob basis.

Hence although small preference margins in favour of South-South trade would, for the majority of our sample items, be sufficient to outweigh North-South freight rate advantages, tariff barriers would continue to hamper South-South trade. Reducing tariffs by following one of the Tokyo Round tariff cut formulas would therefore be the most appropriate way to undercut a prohibitive protection level. Our results suggest that this level is tariff- rather than freight rate-induced.

Two caveats should, however, be made. First, a cif/fob comparison instead of a cif/fas comparison is likely to underestimate systematically the costs of transportation in South-South trade, because the former comparison includes the costs of stevedoring and crantage in the exporting developing country in the fob value and does not treat them as costs of transportation. We assume that calculations on a cif/fas level would shift the

freight rate comparisons between South-South/North-South shipping upwards because of higher port efficiencies in the exporting developed countries. Thus freight rate advantages of North-South shipping would probably increase if a cif/fas comparison would be applied. Due to the large differences between tariff and freight rate components in the Brazilian total nominal protection, however, we do not assume that the preponderance of the tariff component would be eroded if freight rates in South-South shipping would be calculated on a cif/fas level.

Second, we do not know to what extent the practices of over- or underinvoicing of imports in South-South shipping distort our findings. Apart from exchange rate influences overinvoicing may also receive incentives from trade between affiliates of the same firm or between the parent company and its affiliates in order to transfer profits. Up to now statistical evidence on the relevance of intra-firm trade in South-South shipping is scarce. As far as Brazil is concerned, the latest 1977 benchmark survey on US majority-owned foreign affiliates (MOFA) records intra-MOFA exports from Southeast Asia to Brazil amounting to \$ 24 millions [US Department of Commerce (1981) Table III 4.8.], that is about 30 percent of total Brazilian imports from this area. Hence the "intra-firm" component in Brazilian South-South imports may not be regarded as a "quantité négligeable". Whether a high share of "intra-firm" trade, however, really influences the tendency to fake

invoices and whether such practices distort cif/fob import value comparisons is open to further empirical investigations.

The same caution should be paid with regard to the generalization of our results. Though Brazil is the leading participant in South-South trade, only similar studies for other less developed countries may help to support or to reject the validity of the "natural" trade barrier argument in South-South trade, irrespective of the evidently striking relevance of this argument for small land-locked "African type" less developed countries.

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