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I. Introduction

Barriers to international trade posed by transport costs have been analyzed empirically over the last decade with respect to two major objectives. A first and dominant group of analyses tried to estimate to what extent transport costs provide protection for domestic producers. More specifically, investigations focused on comparisons between transport cost-induced barriers to trade compared to those erected through tariffs and on changes of the effective rate of protection due to escalation or de-escalation of transport costs with stage of processing. On balance, the results - most of them on US imports - showed first that ad valorem transport costs were of roughly the same average magnitude as tariffs and bore more heavily on the exports of developing countries than of developed countries. However, as the calculations did not include non-tariff barriers such as quantitative restrictions, "natural" protection stemming from transport costs was overrated relative to artificial protection through tariff

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and non-tariff barriers. Second, the hypothesis of transport costs generally falling with increased fabrication did not receive strong empirical support for all products. For those products where transport costs were found to increase with the stage of fabrication, escalation was smaller than that of tariffs [Finger, Yeats, 1976; Yeats, 1977b; Clark, 1981].

A second group of analyses has aimed at explaining the impact of transport costs on the direction of trade flows rather than on the competition between domestic and foreign suppliers. In theory, transport costs have been shown to provide insight as to why the observed pattern of trade between countries with different resource endowment occurs [Deardorff, 1983]. Empirically, it was demonstrated that transport costs exert a crucial impact on bilateral trade flows [Geraci, Prewo, 1977] and that a developing country like India has suffered from a sizeable transport cost disadvantage relative to its competitors on the US market [Yeats, 1977a]. With respect to the direction of trade flows empirical evidence reveals that South-South trade has faced generally higher transport costs than South-North trade though this disadvantage has been estimated to be relatively small and not as crucial as tariff barriers [Langhammer, 1983]. In detail, the impact of transport costs on trade flows is determined by demand or cost variables of individual products such as unit value, shipping distance, stowage factor, and total traffic volume and varies considerably among countries [Prewo, 1978].

The following analysis tries to elaborate on the second type of

analysis, that is the influence of transport costs on the direction of trade. It is investigated whether Japan owes part of its outstanding export performance on the rapidly growing markets of ASEAN countries to a locational advantage reflected in transport cost differentials vis-à-vis US and European competitors.

II. Data and Methodology

The analysis is based on the Philippine trade statistics which provide imports valued in US $ both on a "free-on-board" (fob) as well as on a "cost-insurance-freight" (cif) basis. The ratio of cif to fob values is a measure of the ad valorem incidence of transport costs[1]. The Philippines are the only ASEAN country for which cif/fob import values are available. This country is best suited for such an analysis of transport cost differentials, because Japanese foreign affiliates which could bias the comparison of Japanese, US, and European exports through intra-firm trade, are not as dominant in the Philippines as in other ASEAN countries.

Estimates of the ad valorem incidence of transport costs in Philippine imports from different sources of origin are based on a

[1] This ratio excludes the costs of loading in the exporting country's port and thus is inferior to the ratio of cif-"free alongside ship" value applied in the analyses on the US imports cited above. However, as one can assume costs of stevedoring and cranage in the ports of the major industrialized countries to be roughly the same, there is not much distortion in applying cif-fob ratios.

sample of about 160 manufactured commodities imported in 1970 and 1983, at the highest level of disaggregation (seven-digit level). This level helps to exclude product heterogeneity to the largest possible extent. Only those commodities were included in the sample which were imported from Japan as well as from the US and the EEC in the respective year. This allows for calculating relations between cif-fob ratios for imports from two exporting countries as a proxy for transport cost differentials in identical commodities. Averages of such differentials are estimated by using common weights. Both the selection of commodities imported from several industrialized countries and the use of common weights aims at preventing calculations on average transport cost differentials to be distorted by different product compositions and by different weights in imports from industrialized countries[1].

For each exporting country, the US, Japan, West Germany and the largest individual EEC supplier next to West Germany, first an average import-weighted ad valorem rate of transport costs (T) is calculated:

$$T = \frac{\sum_i \left(\frac{M_i^{cif}}{M_i^{fob}} - 1 \right) \cdot M_i^{cif}}{\Sigma M_i^{cif}} \cdot 100$$

[1] See for a controversy between Sapir and Yeats on the product composition effect in the estimates of Indian transport cost disadvantages on a three-digit product group level [Sapir, 1983; Yeats, 1983].

where M_i^{cif} and M_i^{fob} are Philippine import values in the commodity i on a cif and fob basis respectively. This rate reflects the level of transport costs and allows for comparing the changes in transport costs for each exporting country over time. However, due to different import weights it does not yet allow for calculating transport cost differentials between exporting countries.

Such differentials are derived in the next step in which an average import-weighted deviation of transport costs in European and US exports to the Philippines from the respective costs in the competing country's exports is estimated, i.e. the relation between the cif/fob value ratios (minus unity) in imports from different origins in identical items. For the average commodity ratios a common weight, the value of imports from Japan, is used in order to exclude a possible source of distortions. Algebraically, the average import-weighted transport cost differential TCD can be written as

$$TCD = \sum_i \frac{\frac{R_{ia}}{R_{ib}} \cdot M_{i,jap}^{cif}}{\Sigma M_{i,jap}^{cif}}, \text{ where}$$

R_{ia} and R_{ib} are cif/fob value ratios in Philippine imports of commodity i from country a and country b respectively, and $M_{i,jap}$ is the value of imports from Japan in commodity i. The transport cost differential is tested for its statistical significance in order to conclude on the extent and stability of different transport costs in imports from different sources of origin.

In a third step for those product groups for which a statistically significant deviation in the ratios from unity could be observed the average cost advantage is calculated. This rate represents a preferential tariff margin enjoyed by countries with lower transport costs.

Finally, changes in transport cost differentials over time are compared to the actual development of trade flows during the same period in order to conclude on their effectiveness in influencing changes in trade shares between Japanese, US, and EEC suppliers on the Philippine market.

III. Empirical Results

Table 1 displays the weighted average ad valorem incidence of transport costs in Philippine manufactured imports from the US, Japan and EC suppliers in 1970 and 1983.

Four major results emerge. First, in spite of rocketing prices for fuels in seaborne transport during this period, transport costs in general decreased or at least stagnated. Only in the case of Japan, whose exports to the Philippines in general faced lower transport costs than those of their competitors, there was an increase in transport costs in machinery exports. This increase was not fully offset by decreasing transport costs in other products. Second, transport costs largely vary among products especially for long-distance suppliers. Though they are in

Table 1 - Weighted Average Ad Valorem Incidence of Transport Costs[1] in Philippine Manufactured Imports from the US, EEC and Japan 1970 and 1983

Imports from	Total manufactures (SITC 5-8)		Chemicals (SITC 5)		Manufactured goods classified chiefly by material (SITC 6)		Machinery and transport equipment (SITC 7)		Miscellaneous manufactured articles (SITC 8)	
	1970 (n=159)	1983 (n=157)	1970 (n=40)	1983 (n=41)	1970 (n=39)	1983 (n=40)	1970 (n=40)	1983 (n=44)	1970 (n=40)	1983 (n=32)
US	10.6	8.5	15.2	13.9	12.5	11.9	7.6	4.7	15.3	6.3
West Germany	7.7	7.4	12.5	7.2	9.2	12.1	5.5	5.2	11.7	4.6
EEC[b]	10.0	10.0	12.3	13.8	12.0	8.0	8.6	5.8	9.4	5.6
Japan	6.9	7.0	9.3	8.4	7.5	6.6	5.3	6.7	8.4	5.9

[1]

$$T = \frac{\sum_i \left(\frac{M_i^{cif}}{M_i^{fob}} - 1 \right) \cdot M_i^{cif}}{\sum_i M_i^{cif}} \cdot 100$$

where T is the import-weighted ad valorem rate of transport costs, M_i^{cif} and M_i^{fob} are the Philippine US $ import values in the seven-digit SITC item on a cif and fob basis respectively. - [b]Imports from the largest individual EEC supplier.

Source: Republic of the Philippines, Foreign Trade Statistics of the Philippines 1970, 1983. - Own calculations.

general lower for sophisticated high-value products (SITC 7) than for less processed goods such as in the chemical sector, it depends on the individual product how large the difference is. In any case, the estimates do not allow for straightforward conclusions on the direction of changes in transport costs with increased processing.

Third, long-distance suppliers such as West Germany do not seem to face consistently higher transport costs than Japanese suppliers. This may be due to the high degree of sophistication in West German products which have a higher unit value than those originating from Japan, but may also be explained by massive technological innovations (containerization) introduced in the dense sea transport network between Europe and Southeast Asia during the 1970s.

Finally, with respect to the protection aspect, the ad valorem incidence of Philippine tariffs is by far higher than that of transport costs. In 1978, simple averages of nominal tariffs in the Philippines amounted to 41.1 per cent, 52.0 per cent, 23.0 per cent and 68.9 per cent for the SITC categories 5 to 8 respectively [Bautista, 1981, Table 5].

Differences in average transport costs between imports from different sources give rise to the hypothesis that such costs differ between exporting countries in <u>identical</u> commodities. This hypothesis is analyzed in Table 2, where pairwise transport cost differentials in commodities imported from each of the two indus-

Table 2 - Weighted Average Transport Cost Differentials[a] in Philippine Manufactured Imports from Different Suppliers 1970 and 1983 - Tests of Significance of Differentials[b]

Country a/ Country b	Total manufactures (SITC 5-8)		Chemicals (SITC 5)		Manufactured goods classified chiefly by material (SITC 6)		Machinery and transport equipment (SITC 7)		Miscellaneous manufactured articles (SITC 8)	
	1970	1983	1970	1983	1970	1983	1970	1983	1970	1983
US/Japan	1.73*	1.82*	1.73*	1.83*	1.75*	2.79*	1.67*	1.12	2.28*	1.43*
US/EEC	1.20	2.23*	1.30*	1.26	1.20*	3.09*	1.15	2.10	1.36	2.08
US/West Germany	1.30*	1.41	1.13	1.73*	1.16	1.43*	1.48*	1.07	1.22	2.44
EEC/Japan	1.71*	1.34*	1.45*	1.68*	1.63	1.03	1.74	1.36	3.63*	1.53*
West Germany/Japan	1.63*	1.63*	1.64*	1.57*	1.90*	2.13*	1.26	1.33	3.98*	1.33
EEC/West Germany	1.24	1.19	0.97	1.43	1.01	0.67	1.54	1.46	1.05	1.21

$$TCD = \frac{\sum_i \frac{R_{ia}}{R_{ib}} \cdot M^{cif}_{i,jap}}{\sum M^{cif}_{i,jap}},$$

where TCD is the transport cost differential, R_{ia} and R_{ib} are cif/fob value ratios minus unity in Philippine imports of item i from country a and country b respectively. $M_{i,jap}$ is the value of imports from Japan in item i as the common weight. For the number of items see table 1. - [b] Right-tail t-test of significance of deviation from unity at the one per cent level. - * Deviation statistically significant.

Source: See Table 1.

trialized countries are tested with respect to whether the ratios significantly differ from unity. Above all, these tests yield that US manufactures face a significant transport cost disadvantage not only vis-à-vis Japanese substitutes in the range of about 70 to 80 per cent on the average, but in many cases also vis-à-vis EEC suppliers. This result holds for 1970 as well as for 1983. However, though average transport costs facing US suppliers generally exceed those facing European suppliers, the deviations of individual products from the average have been large so that in some cases even a large excess over unity (for instance in SITC 7 in 1983) did not pass the test of statistical significance.

Japan's competitive edge due to transport cost advantages has been the highest vis-à-vis the US, but exists vis-à-vis European suppliers too. It is, however, interesting to note that in the most important product category, machinery and transport equipment, Japan has enjoyed a significant transport cost advantage neither against West Germany and other EEC suppliers in both years nor against the US in 1983. The excess of the competitor's transport costs over those of Japanese suppliers in this product category has not been systematic, but at random.

Table 2 also displays an increasing dispersion in transport cost differentials, especially between low-value bulky goods clustered in category 6 and high-value sophisticated goods represented in category 7. Rising differences in the degree to which product groups are suited for transport cost-saving technologies to be

applied in particular after the oil price hikes may account for growing dispersions.

Finally, transport cost differentials between goods shipped from West Germany and other EEC member states are not significant.

The major conclusion to be drawn from the tests is that differentials do not seem to reflect geographical proximity but product pecularities and differences in transportation media and technology.

Transport cost-induced price disadvantages incurred by the US and West German exporters[1] vis-à-vis Japan and by the US producers vis-à-vis the West German competitors range between 2 and 23 per cent with an average rate of 4-5 per cent for all manufactures (Table 3). This rate is equivalent to a hypothetical preferential tariff treatment of Japanese goods versus US and EEC goods. On average, the preference margin appears to have declined vis-à-vis West Germany but has slightly increased vis-à-vis the US.

[1] West Germany as the largest individual EEC supplier on the Philippine market has been taken as a proxy for the competitive position of the European Community with respect to transport costs. This seems justified by statistically insignificant transport cost differentials between exports shipped from West Germany and other EEC countries to the Philippines (Table 2).

Table 3 - Estimated Average Transport Cost Disadvantages[a] of West German and US Suppliers vis-à-vis Japan and of US Suppliers vis-à-vis EEC Suppliers on the Philippine Market 1970 and 1983

	Total manufactures (SITC 5-8)		Chemicals (SITC 5)		Manufactured goods classified chiefly by material (SITC 6)		Machinery and transport equipment (SITC 7)		Miscellaneous manufactured articles (SITC 8)	
	1970	1983	1970	1983	1970	1983	1970	1983	1970	1983
West Germany vis-à-vis Japan	4.1	4.1	5.4	4.4	6.3	7.0	n.s.	n.s.	23.1	n.s.
US vis-à-vis Japan	4.7	5.4	6.2	6.4	5.2	11.1	3.4	n.s.	9.9	2.4
US vis-á-vis West Germany	2.1	n.s.	n.s.	4.9	n.s.	4.6	2.5	n.s.	n.s.	n.s.

[a]Transport cost-induced excess of cif import unit values in per cent of cif import unit values for imports from Japan and West Germany respectively. In algebraical terms: $\frac{T\ (TCD-1)}{100 + T}$. - n.s. Disavantage is not statistically significant.

Source: See Table 1.

IV. Have Transport Cost Differentials Influenced Trade Flows?

Changing directions of trade flows signal changes in relative competitiveness between trading countries. One among many determinants of competitiveness can be transport cost differentials. As it was shown above, they are not large in the case of Philippine imports from industrialized countries. Any preferential trading arrangement between the Philippines and one of the exporting countries would probably have larger discrimination effects for the other countries than the average rate of 4 - 5 per cent estimated above. It is, therefore, not surprising that the comparison of the growth rates in Philippine imports from the US, Japan and West Germany, the corresponding trade shares and their changes (Table 4)[1] and the transport cost disadvantages do not provide support for a causal relationship between the trade figures and transport cost disadvantages.

Both the US and Japan lost ground in manufactured imports, not to West Germany whose share stagnated but to third countries. With respect to the individual categories, West Germany could not benefit from the most pronounced decline of its transport cost disadvantage vis-à-vis Japan, that is in SITC category 8, where the disadvantage rate fell from about 23 per cent in 1970 down to

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[1] For the sake of completeness in the number of goods imported under the individual SITC categories, trade figures were drawn from UN data available, however, till 1981 only. Comparisons between growth rates for all goods till 1981 and for the sample items till 1983 show that while growth rates declined after 1981 the ranking of the rates according to the source of imports remained the same for the 1970-81 period as for the 1970-83 period.

a statistically insignificant level in 1983. Inconclusive relationships also emerge from another outstanding change in transport cost disavantages, that is in the SITC 6 category to the detriment of the US and to the favour of Japan (from 5.2 to 11.1 per cent). In fact, both countries lost shares to third countries in this category, with higher losses for Japan than for the US (Table 4). Further, West German transport cost advantages vis-à-vis the US in chemicals became significant during the 1970s but the US gained in trade shares and West Germany lost sizeably. Just the opposite result emerges for the machinery and transport industry where West German advantages in transport costs declined vis-à-vis the US, whereas West German trade shares slightly increased and those of the US decreased.

V. Concluding Remarks

The case of Philippine imports does not support the view that transport cost differentials between exports from industrialized countries significantly influence the direction of trade flows. This result resembles many findings of the limited impact of preferential tariff margins on the regional composition of imports. Other determinants of changes in relative competitiveness, such as exchange rate changes, marketing efforts, technological adaptability of goods to the needs of local markets, foreign investments and joint ventures seem to be more relevant. Above all, even an analysis at the highest level of disaggregation cannot exclude product heterogeneity in manufactures. Feas-

Table 4 - Average Annual Growth Rates of Philippine Imports from the US, Japan, West Germany and the World, 1970-1981

Imports from in			US	Japan	West Germany	World
Total manufactures (SITC 5)	Growth rate		13.1	13.9	14.6	14.8
	Share in total imports	1970	29.6	37.7	7.6	100
		1981	25.3	34.6	7.6	100
Chemicals (SITC 5)	Growth rate		18.6	13.4	13.0	17.7
	Share in total imports	1970	29.3	32.3	10.5	100
		1981	31.8	21.4	6.7	100
Manufactured goods chiefly classified by material (SITC 6)	Growth rate		8.4	10.3	17.8	12.6
	Share in total imports	1970	21.4	50.2	1.7	100
		1981	14.2	40.2	2.8	100
Machinery and transport equipment (SITC 7)	Growth rate		12.2	15.9	14.5	14.5
	Share in total imports	1970	33.8	32.8	10.6	100
		1981	27.2	37.4	10.7	100
Miscellaneous manufactured articles (SITC 8)	Growth rate		16.5	22.3	20.4	19.3
	Share in total imports	1970	41.8	26.8	3.9	100
		1981	32.0	35.2	4.3	100

Source: UN, Commodity Trade Statistics, Vol. 20, 1970, 1-46 - 1-48; Vol. 31, 1981, 1-19 - 1-21.

ibility studies on possible joint ventures between European and local firms in ASEAN countries have shown that capital goods originating from West Germany or the UK, such as rolls, rolling mills, textile equipment, machine tools, moulding machines for manufacturing plastic products, pumps, a.o. are by far more expensive than Japanese substitutes. Quality advantages are not as pronounced as to compensate importers for higher prices to be paid on European products. Cif-price advantages of Japanese products show a wide dispersion but seem to range on the average between 30 per cent and 100 per cent for the products cited above. Transport cost advantages of 4 - 5 per cent on the average fail to explain such large cif-price differentials. Instead, Japan seems to owe most of its competitiveness on ASEAN markets to production and marketing cost advantages rather than to lower transport costs.

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