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## Inaccuracy in Foreign Trade Statistics of LDCs: The Case of the ASEAN Area

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**The foreign trade statistics of developing countries are relatively abundant and generally considered more reliable than data on their national accounts. This study reports the results of an accuracy test applied to export and import data from five developing countries (Indonesia, Malaysia, the Philippines, Singapore and Thailand), all members of ASEAN, a grouping which offers a particularly interesting sample of developing countries for this type of investigation.**

Differing both in terms of levels of economic development and reliance on foreign trade, the countries belonging to the Association of South East Asian Nations (ASEAN) promote mutual trade in the region through the ASEAN Preferential Trading Arrangements.<sup>1</sup> In this respect and others (procedures of data-reporting; the role of entrepôts and middlemen; the nature of direct trade controls), ASEAN trade characteristics reflect those of other developing countries.

The test is based on statistical data reported in the IMF's annual publication, *Direction of Trade*, and on statistics gathered from the data carrying media of the UN statistical office. The choice of time series (1967-77) was determined by the availability of other complementary statistical sources and the necessity of timing field research so that test results could be compared with the realities of customs administration and statistical reporting.<sup>2</sup>

In order to provide for the largest possible comparability of trade flows in specific product categories, 3-5 digit SITC commodity statistics were used. Where practicable, the volume data were used to identify the most significant divergencies in statistical records of bilateral trade flows. Singapore's domestic production statistics served as an additional means of cross-checking basic trade data, especially as concerns the distinction between entrepôt trade and national exports. UNCTAD's *Monthly Commodity Price Bulletin* proved a valuable source for cross-checking trade values in the most doubtful cases.

The reliability of foreign trade statistics is tested by comparing one country's data on exports (imports) to the corresponding data on imports (exports) of the country's trading partners. Comparisons of this kind are rendered difficult by the *ad valorem* incidence of freight and insurance rates (ideally this incidence should be equal to the difference in trade values reported on the basis of c.i.f. and f.o.b. respectively). Where data are derived from the export or import statistics of a trading partner the IMF uses the following method: To allow for cost of freight and insurance (where exports are derived from the imports of the trading partner), the figures derived in this manner are first adjusted by a uniformly applied percentage for such costs, assumed to be 10 per cent of the f.o.b. value of imports. Country A's exports to B are thus multiplied by a factor of 1.1 when shown as imports of B from A, and country A's imports from B are divided by the same factor when shown as exports from B to A.<sup>3</sup> A 10 per cent margin is thus used in this study to convert the value of imports from a c.i.f. to an f.o.b. basis.

Let  $X_{ij}$  stand for  $i$ 's recorded exports to country  $j$  and  $M_{ji}$  stand for  $j$ 's recorded imports from country  $i$ . Discrepancies in the recordings of exports ( $\Delta X$ ) and imports ( $\Delta M$ ) in the two countries' trade statistics may be calculated as follows:

$$(1) \quad \Delta X_{ij} = 0.909 M_{ji} - X_{ij} \text{ (where } 0.909 = 1/1.1 \text{)}$$

and

$$(2) \quad \Delta M_{ji} = 1.1 X_{ij} - M_{ji}$$

If  $X_{ij} > 0.909 M_{ji}$ ,  $\Delta X_{ij}$  carries the negative sign.

If  $X_{ij} < 0.909 M_{ji}$ ,  $\Delta X_{ij}$  carries the plus sign.

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<sup>1</sup> B. W a n : The Economies of the ASEAN Countries: Indonesia, Malaysia, Philippines, Singapore and Thailand, London 1982.

<sup>2</sup> Since 1963, Indonesia no longer publishes official statistics on its trade with Singapore; trade between these two countries has therefore been excluded from the test.

<sup>3</sup> IMF: Direction of Trade Statistics, 1980.

+  $\Delta X_{ij}$  implies that exports recorded in country  $i$  are less than the corresponding imports reported by  $i$ 's trading partner  $j$ .

–  $\Delta X_{ij}$  signifies that exports recorded in country  $i$  are greater than the corresponding imports reported by  $i$ 's trading partner  $j$ .

If  $\Delta M_{ji} < 0.909 X_{ij}$  then  $\Delta M_{ji}$  carries the minus sign. If  $\Delta M_{ji}$  carries the plus (minus) sign, this signifies that  $i$ 's recorded imports are less (more) than the corresponding exports reported by  $i$ 's trading partner  $j$ .

To estimate the comparability of data, trade matrices are compiled separately for export and import trade. Every matrix is composed of entries grouped into rows and columns. The sum of entries of any column or row is known as a margin. The sum of entries of any column or corresponding row may be different. However, the sum of horizontal and vertical margins will be the same and is known as the identity of the matrix. The matrices are compared at the level of entries, margins and identities.

### Unacceptable Inaccuracies

Statistics referring to ASEAN countries' trade with non-ASEAN partners were compared at the margin level.

This comparison showed that the average margin of error in non-ASEAN trade is close to 14.5 per cent for the 1968-77 period. Given that a 10 to 20 per cent misrepresentation of the quantity and/or value of trade is considered normal for developing countries<sup>4</sup>, this result may be considered relatively satisfactory. It should be underlined, however, that in calculating margins of error in non-ASEAN trade with individual ASEAN countries, non-ASEAN partners have been taken as a unit. Consequently, positive and negative errors for individual ASEAN partners may cancel each other out and tend to underestimate the overall margin of error. Moreover, the perceived average margin of error may be small compared with the large distortions shown for some of the bilateral discrepancy ratios (especially for several non-ASEAN developing countries in Asia).

The reliability of statistical data referring to intra-ASEAN trade proves significantly less satisfactory than those covering ASEAN trade with non-ASEAN partners.

The most striking feature of the study's findings is the under-reporting of imports. During the period examined, recorded intra-ASEAN imports represented only some 82 per cent of recorded intra-ASEAN exports. Consequently, the ratios of non-recorded intra-ASEAN imports to total intra-ASEAN imports have particularly high coefficients (39.9 per cent average). The ratios of

intra-ASEAN exports not reported at importation by other ASEAN trading partners are also very high (about 32 per cent average).

The margins of error calculated at the entries' level are considerably higher than those computed at the margin level. The average ratio of statistical error when computed at the entries' level is close to 55.3 per cent. This compares with a 45.9 per cent average for matrix margin computations. Both ratios testify to an unacceptable degree of inaccuracy in statistics on intra-ASEAN trade.

The reasons for inaccuracy in the data studied are in many respects also valid for a larger group of developing countries and will be briefly considered below.

### Origin of Exports

The distinction between national exports and re-exports depends on the rule of origin. Since many developing economies rely heavily on entrepôt trade (consisting of goods re-exported from customs bonded warehouses and/or goods under drawback) the rule of origin is of major importance. Comparisons show that close to 90 per cent of non-recorded intra-ASEAN imports were shipped or consigned from Singapore and that inaccuracies in Singapore's entrepôt trade

**Table 1**  
**Structure of Total Exports of Singapore in 1977**  
**by Value-Added Component**

	Million Singapore dollars Value-added	
Total value of exports	20,090	
Domestic exports	11,652	
Direct industrial exports	11,411	2,829
Direct manufactured exports	10,969	2,797
Value of direct industrial exports with VA > 60 %	180	111
Value of direct industrial exports with VA > 50 %	714	382
Value of direct industrial exports with 60 % > VA > 40 %	1,893	968
Value of direct industrial exports with 40 % > VA > 25 %	2,465	766
Value of direct industrial exports with VA < 25 %	7,114	984
<b>Hypothetical Values of Singapore's Entrepôt Trade</b>		
Total exports minus local value-added	17,261	
Total exports minus domestic exports	8,438	
Total exports minus domestic exports with VA > 60 %	19,910	
Total exports minus domestic exports with VA > 50 %	19,376	
Total exports minus domestic exports with VA > 40 %	18,017	
Total exports minus domestic exports with VA > 25 %	15,552	

Sources: Yearbook of Statistics, Singapore 1977/78, Department of Statistics, Singapore; own calculations based on Report on the Census of Industrial Production 1977, Department of Statistics, Singapore, November 1978.

**Table 2**  
**Ratio of Recorded Malaysian Imports from**  
**Singapore to Corresponding Direct Exports**  
**of Singapore, 1977**

	Ratio (%)	Difference (US \$'000)
Fish and other seafood curing	267	1,453
Wearing apparel, except footwear	231	1,953
Radio and television sets	386	3,396
Watches and clocks	905	1,474
Umbrellas	1,107	1,975
Wire nettings, cables	2,962	2,862
Iron and steel	585	7,563
Zinc and other non-ferrous metals	172	2,344
General hardware	332	966
Metal furniture and fixtures	373	965

Source: Own computations based on U.N. Statistical Office data and Report on the Census of Industrial Production 1977, Department of Statistics, Singapore, November 1978.

statistics are to be blamed to a considerable extent. The discrepancies were due both to lack of a common practice regarding rule of origin and difficulties in maintaining satisfactory records by customs authorities.<sup>5</sup>

In 1977, the local value-added content of over 60 per cent of Singapore's national exports fell below the 14 per cent level; under most national rules of origin goods so constituted would not be considered products of Singapore.

Table 1, which shows the structure of these exports by value-added component, illustrates the importance of the problem. For countries compiling their statistics on a stricter rule of country origin, this lack of uniform statistical standards resulted in under-reporting of ASEAN imports from Singapore. (Particularly disturbing discrepancies appear for Malaysia and Thailand.) However, it should also be noted that the imports of many industrial products from Singapore, as reported by ASEAN countries, stand *above* the levels for this category in Singapore's national exports. (The most important cases for Malaysia are presented in Table 2.) By contrast, despite a strong entrepôt trade component, the Philippines' import statistics, based on a strict rule of origin, show (with the exception of petroleum products) a high degree of comparability with Singapore's export records.

When comparing the ASEAN trade data on the three-digit SITC level, one finds that the statistics are particularly reliable in cases where the product's nature, labelling or trademark facilitate the identification of its

origin. For Malaysia, this applies especially to products such as non-alcoholic beverages, textiles, household equipment and furniture; for the Philippines, to soap and cleansing preparations, medical products, textile fabrics, power generators and office supplies.

On the other hand, poor recording of imports is observed in the case of bulk trade. Commodities such as fish, coffee, cocoa, tea, spices, mineral tar and chemical elements, even if of different origin, are frequently placed in the same bulk shipment. It is, thus, often difficult to identify particular portions of the bulk shipments in terms of their origins.

Many of the discrepancies in ASEAN trade data also may be attributed to the important role of small wholesalers and retailers in regional foreign trade activities. When the participation of several middlemen in the realization of a given transaction is combined with loose customs controls (see below) the identification of a product's origin may be rendered very difficult indeed.

### Valuation Standards

From an examination of the valuation standards applied by ASEAN countries one discovers that, except for the Philippines, the Brussels' definition of value is used. In the case of the Philippines, export duties and domestic fiscal charges are not included in the value of exported goods. This results in not more than a 2.3-8.8 per cent undervaluation of the Philippines' exports of certain individual products (especially copra, sugar, gold, molasses, coconut products, unmanufactured tobacco, shrimps and prawns, cement and several others). The analysis of a unit value of Singapore's trade with Malaysia and the Philippines in 1977 reveals a remarkable overall comparability. It is difficult to spot any major cases of erroneous valuation, with the exception of some agricultural products such as rice. There are important discrepancies in the valuation of rice exports from Thailand to Indonesia in 1977.<sup>6</sup>

The trade data used in this study<sup>7</sup> are compiled by the IMF from national statistics reported in domestic currencies. These are then converted (by the IMF) into dollar equivalents using official exchange rates. As the official exchange rates of the ASEAN countries tend to be overvalued, such a procedure might generate statistical discrepancies.

<sup>4</sup> S. Naya, T. Morgan: The Accuracy of International Trade Data: The Case of Southeast Asian Countries, in: Journal of the American Statistical Association, June 1969, pp 452-467.

<sup>5</sup> See also Lie Siao S i n g : Singapore Trade Statistics, in: Singapore Statistical Bulletin, Vol. 14, No. 1, 1975; Ng Hean W e n g : External Trade: Trend, Composition and Direction, in: Yon Pok S e n g , Lim Chong Y a h (eds.): The Singapore Economy, Singapore 1971.

<sup>6</sup> Cf. D. C. N e w t o n . ASEAN Co-operation in Import Procurement, UNCTAD Doc. ST/ECDC/11, 1978.

However, due to a general tendency to overvalue ASEAN currencies against the dollar, the impact of these practices on statistical errors in trade data is negligible for our sample. A similar test conducted by Naya and Morgan for South-East Asian countries is even more affirmative. It reveals that the bilateral recording of ratios derived from "free" exchange rate data generally show more deviation than the unadjusted ratios.

By and large, the more rigid the exchange controls, the greater the incentive for national companies to underprice their exports or to overprice their imports. This technique enables investors to export capital abroad despite rigid rules on profit repatriation. It also allows them to cut through the painful and time-consuming procedures involved in obtaining foreign exchange visas when imports are urgently required.

Our field interviews suggest that these practices are generally thought to be quite prevalent in the ASEAN countries. However, the authors have no reliable empirical evidence at their disposal to support such suspicions.

On the whole, commodity trade analysis suggests that the incomparability of the trade data was less the result of undervaluation than of failure to record physical quantities.

### Non-Recording of Trade Flows

The non-recording of physical quantities traded is particularly frequent for goods which are either traded freely or, on the contrary, subjected to particularly stringent trade restrictions. The logic underlying that statement might appear somewhat contradictory and requires a brief discussion.

There is evidence to suggest that the inaccuracy in trade data is positively related to the degree of restriction implemented by customs controls, at least once that degree exceeds a certain level.

The import substitution type of economic development and fiscal policies adopted by the ASEAN countries from the mid-sixties on (with the exception of Singapore) were accompanied by heavy tariffs and rigid quotas, mainly on consumer goods. This situation, combined with an extensive seacoast and poorly policed boundaries, rendered smuggling an extremely profitable business activity. It also gave friendly customs officers a natural incentive to under-report values and volumes of imports.

A product-by-product comparison (three digit SITC) of Singapore's national exports against the import statistics of Thailand reveals such a tendency. The recorded imports of consumer products subject to high import duties, such as alcoholic beverages and manufactured tobacco, were considerably lower than comparable categories in the national exports of Singapore.

Several examples of the type of goods and the ratios and values of discrepancies observed are presented in Table 3.

The customs officials of developing countries are motivated far more by fiscal considerations than by the requirements of foreign trade statistics and their validity for economic analysis or balance-of-payments accounts.<sup>8</sup> Consequently, the reliability of foreign trade statistics based on customs records suffers in the case of commodities which are free of import charges or quantitative restrictions.

Singapore's customs authorities clearly have little incentive to keep careful records on their country's imports from the ASEAN countries, composed to more than 80 per cent of primary commodities traded free of duty. Singapore's imports from the area are, thus, crudely undervalued, especially for Malaysia and for commodities such as coffee, bran, natural rubber, pepper, lumber, tea and some minerals. The fact that there are few duties on raw materials and agricultural commodities in Singapore also explains the lack of interest in keeping reliable records distinguishing between national exports and entrepôt trade.

**Table 3**  
**Examples of Under-Valuation of Malaysian Imports**  
**from Singapore**  
(1977)

	Ratio <sup>1</sup> (%)	Value Difference (US \$'000)
Condensed, powdered, evaporated milk	53	304
Refined edible oil, excluding coconut oil	46	1,928
Leather footwear	15	633
Paper and paper products	72	804
Perfumes, cosmetics	40	440
Pottery, china, glass products	25	2,233
Calculators, office machines	58	652
Air conditioning, refrigerating machinery	10	1,267
Phonograph records	24	1,694
Insulation cables, wires	53	777

<sup>1</sup> Value difference divided by value of imports effectively taking place.

Sources: Own computations based on U N Statistical Office data and Report on the Census of Industrial Production 1977, Department of Statistics, Singapore, November 1978.

<sup>7</sup> Cf. IMF, op. cit.

Similar considerations affect the statistical reporting on trade of petroleum products by several other countries in the area. The comparisons of commodity trade (1977) indicate, for example, that some 80 per cent of Singapore's national exports to the Philippines were composed of such products, whereas the import record of this share dwindles to only 20 per cent. This is by no means an exceptional case. Trade statistics for petroleum in developing countries with major port activities are rarely comparable with the statistical records of partner countries. Since a considerable portion of petroleum imports is recorded under "Bunker and Stores" with little more specification, no detailed investigation is possible.

### Artificial Accounting

Goods shipped for temporary use create a special brand of problems in the statistical trade records of developing countries. A particularly important case is movement of heavy building equipment owned by multinational companies and shipped for temporary use under large project contracts. Such goods are most frequently shipped for a period of a few months and, once the work is completed, re-shipped.

Movements of this sort are frequently reported in developing countries' trade statistics and may seriously bias their data on export of industrial equipment. Similarly, "goods in transit" (e.g. Singapore's transit flows to and from Malaysia) tend to be included under the heading of entrepôt trade. Important statistical problems result from various other statistical practices such as those concerned with recording the movement of gold and other precious metals, the classification of goods coming under aid or relief programs, commodity classification standards and time lags between export shipments and arrival of imports at their destination.<sup>9</sup>

Finally, one should not neglect the extreme harshness with which trade data are censored by some

authorities. Concerned by their bargaining position in bilateral trade negotiations, some governments do not let the data speak for themselves when trade surpluses are involved. There is at least one country of the ASEAN area which is thought to recur to this type of practice.

### Conclusion

ASEAN country data on foreign trade give only a crude approximation of the trade flows concerned. They are much less reliable for trade among the ASEAN countries (average margin of error of 55.3 per cent) than for non-ASEAN trade (14.5 per cent). Consequently, quantitative analysis of ASEAN trade is practically useless unless a serious effort is made to adjust for major statistical discrepancies.

The non-recording of physical quantities traded bears a major responsibility for the statistical inaccuracies observed. The risk of under-reporting is particularly high for freely traded goods (especially minerals and agricultural commodities traded in bulk). Under-reporting of imports is very high for heavily taxed consumer goods (particularly due to smuggling and corruption). Entrepôt trade – a frequent occurrence in many Third World areas – also introduces a high degree of inaccuracy in foreign trade statistics.

Finally, due to lack of uniformity in statistical standards (e.g. valuation, rules of origin, fictitious pricing, artificial accounting) significant inaccuracies appear in recordings of values and volumes of some major commodities.

Consequently, the accuracy of developing country trade data should be checked, at least for some of the most dubious commodity groups and for export-import reciprocals, before they are used for economic analysis. Our comparisons reveal that the high margins of error may be considerably reduced if adjustments for several major discrepancies are made.

<sup>8</sup> M. Kostecki, D. Seck: Treasury Revenue and Foreign Trade Taxation, in: *Weltwirtschaftliches Archiv*, Vol. 118, No. 8, 1981, pp. 166-173.

<sup>9</sup> M. T y m o w s k i: ASEAN Trade Development and Cooperation: Reconciliation and Standardization of the Foreign Trade Statistics of ASEAN Member States, UNCTAD Document/ECDC/48, Project RAS/77/015, Geneva 1980.

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