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What Do Alternative Measures of Comparative Advantage Reveal About the Composition of Developing Countries' Exports?

Alexander J. Yeats

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Developing countries' "revealed" comparative advantage in labor-intensive exports tends to fall as the requirements increase for natural resources, physical capital, and human capital — including higher per capita wages and more professional or technical personnel.

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This paper — a product of the International Trade Division, International Economics Department — is part of a larger effort in PRE to provide basic information for analyzing the present level and composition of developing countries' exports and projecting future changes in them. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Jean Epps, room S8-037, extension 33710 (29 pages, including tables).

Despite their extensive applications in research and policy studies, no product-level comparisons had been made between Bela Balassa's "revealed" comparative advantage (RCA) index and indices associated with the National Bureau of Economic Research (NBER) that reflect the standard Heckshcr-Ohlin theory of comparative advantage.

Yeats conducted several empirical tests for developing countries' exports of manufactured products, partly to identify factors that often lead to differences between the two indices.

The results show that products in which developing countries have achieved a revealed comparative advantage are highly concentrated in a broad group of labor-intensive products; for other items, their RCAs are generally below unity.

Within the labor-intensive group, however, developing countries failed to develop a revealed comparative advantage for about half of the items.

A regression model suggests that in the labor-intensive group, revealed comparative advantage falls as the requirements increase for natural resources, for physical capital, and for human capital — including higher per capita wages, and more professional or technical personnel.

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What Do Alternative Measures of Comparative Advantage Reveal About the Composition of Developing Countries' Exports?

by
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I. Introduction

In economic policy debates at the national and international level, issues relating to comparative advantage have often been a key concern. World Bank structural adjustment loans, for example, have frequently had the objective of stimulating production and the flow of resources into sectors (industries) where developing countries have, or are acquiring, a comparative advantage. Similarly, much of the debate on structural adjustment policies that has occurred in the World Bank (1986) (1988), OECD (1979), or UNCTAD (1983) has been on ways to facilitate the flow of resources out of developed countries sectors where a comparative advantage has been lost into areas where it has been gained or maintained. Issues relating to comparative advantage have also played an increasingly prominent role in aspects of location theory that deal with the optimal geographic position for establishing firms or subsidiaries of multinational enterprises.

Given the importance attached to comparative advantage issues in these debates, it is not surprising that considerable efforts have been made to empirically assess national comparative advantage. One extensively applied line of analysis is the so called "revealed" comparative advantage (RCA) model which is based on pioneering studies by Balassa (1965) (1968) and tested by UNCTAD

(1983) or UNIDO (1982). A second related line of analyses, often associated with Lary's (1968) work for the U.S. National Bureau of Economic Research (NBER), is based directly on a standard Heckscher-Ohlin model and has been applied by Tuong and Yeats (1981), Erzan and Yeats (1989) or Yeats (1989) for tests of trade theories and country export performance.[1] This approach attempts to determine the relative labor and capital inputs of specific goods, normally defined at the three or four-digit SITC level, and then assumes that developing countries would have a comparative advantage in the production and trade of relatively labor intensive items (Yeats, 1989 provides an empirical verification of this point). However, in view of the number of empirical studies that have been undertaken on comparative advantage, it is surprising that no previous efforts were made to examine the direct link between the Balassa RCA and NBER (Heckscher-Ohlin) measures of developing countries' comparative advantage at the product and industry level.[2] This study conducts several empirical tests relating to this

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[1] For example, Yeats (1989) examined the export performance of developing countries for a group of three, four and five-digit SITC products that Lary (1968) determined were manufactured by labor-intensive production processes in the mid-1960s. The results showed that developing countries achieved a major increase in their market shares (from 8.7 to 21.2 per cent) for labor-intensive goods exported to developed market economy countries while the shares for all other nonfuel goods declined from 21.7 to 14.1 per cent. In the United States, developing countries increased their share of labor-intensive good imports from 17.9 to 40.5 per cent while their share of other nonfuel goods fell from 33.0 to 19.3 percent. See Appendix Table 2 for a comparision of developing countries' export performance for labor intensive and other goods in major OECD markets. These, and various other empirical tests lead to the conclusion that the NBER labor intensity indices provide a useful and accurate guide to the future composition of developing country exports.

[2] Balassa (1979) calculated RCA and capital intensity indices for some 184 four-digit SIC products and analyzed this information after it had been aggregated to the national level for some 36 developed and developing countries. This lead to a "stages" theory of national comparative advantage. Tyers and Phillips (1989) examined RCA indices and measures of labor intensity, technology, and human capital for very broad categories of goods (agriculture, minerals, etc.) at the national level for selected Asian countries.

point and also attempts to identify factors that often lead to differences between the NBER and Balassa RCA indices.

II. The Comparative Advantage Indices

Heckscher-Ohlin measures of comparative advantage are generally similar to labor intensity indices derived by Lary (1968) for the NBER. Lary's analysis employed the criteria of value added per employee, both in the U.S. and other countries, for identification of products which were capital or labor intensive. The general rule followed was to classify labor-intensive products as those which met two conditions, the first being that value added per employee did not exceed the national average for all United States manufacturing by more than 10 per cent.[3] The specific factor intensity index calculated for industry j (L_j) was defined as,

$$(1)\quad L_j = (V_j \div N_j)/ (V_t \div N_t) \times 100$$

where V_j and V_t represent value added in industry j and all United States manufacturing respectively, while N_j and N_t represent the number of workers in

[3] The use of United States data is appropriate for identifying labor intensive products if these items are genrally produced by labor intensive processes in other countries. Lary (1968, Appendix D) analyzed U.S.- U.K., U.S. - Japan, and U.S. - India production data and determined this was generally the case. However, based on these comparisons several additional products were added to the list derived from U.S. statistics.

the industry and in all manufacturing activity.[4] In addition, the NBER imposed a second criteria that imports by developed from developing countries totalled at least $100,000 at the three-digit level of the Standard International Trade Classifications (SITC) system in 1965. According to the NBER reasoning, this approach excluded clearly capital-intensive products while applying the test of the market (as reflected in imports) to items at or near the overall national average. The import value criteria was therefore added in recognition that value added per employee was not an infallible guide to South-North comparative advantage.

In contrast to the Heckscher-Ohlin (NBER) approach, Balassa (1965) developed the concept of "revealed" comparative advantage which is measured by the share of a given product in a country's total exports relative to the good's

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[4] The reader should note that there is an inverse relation between the numeric value of the index defined in equation (1) and the labor intensity of a given product. That is, the lower the numeric value of the index the higher the labor intensity. It also follows that products with very high index values are capital intensive in production. The selection of items based on value added per employee in the U.S. was supplemented by detailed examination of manufactures imported by developed from less developed countries to see if additional products needed to be taken into account. On this basis, several items such as batteries, lamps and miscellaneous manufactures were added to the NBER list since relative value added in other countries appeared below the United States average. However, a major conclusion of this analysis was that products manufactured by labor-intensive processes in the United States were also manufactured by relatively labor-intensive processes in other countries. Lary used these findings to justify extensive use of United States production statistics as a guide to factor proportion.

share in total world exports of manufactures.[5] Specifically, if x_{ij} is the value of country i's exports of j and X_{it} is the country's total exports of manufactures, its revealed comparative advantage index is,

$$(2) \quad RCA_{ij} = (x_{ij} \div X_{it}) \div (x_{jw} \div X_{tw})$$

where the w subscripts refer to world trade totals. The RCA index may take values from zero to infinity with those above unity indicating the country has a comparative advantage in the product. A point of considerable interest would be to determine how the above "revealed" comparative advantage index, for (say) all, or groups of, developing countries compares with the NBER labor-intensity index for a common group of products. A high correlation (i.e., high developing country RCAs for industries with high labor-intensity ratios) would be an important verification of the Heckscher-Ohlin theory.

Before undertaking such an empirical test, however, it is useful to consider factors that might cause the Balassa and National Bureau indices to differ. First, protectionism in major markets could limit developing countries' exports of a labor-intensive product to a sufficient extent that the RCA index is constrained below levels (above unity) that it would reach in the absence of trade barriers. Such a situation might, for example, occur for (say) textile

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[5] Foods and agricultural raw materials have generally been excluded from revealed comparative advantage computations since it is felt that protectionism and subsidization in these sectors distorts trade to an extent that comparative advantage cannot be measured using the Balassa approach. Following standard practice, this study employs a definition of manufactures that includes all items classified in SITC 5 through 8 less 68 (nonferrous metals) plus a few processed food and raw material products items classified in other groups. The latter were added to achieve consistency with the definition used and results presented in the NBER study.

and clothing products when exports from developing countries face discriminatory trade barriers under the Multifibre Arrangement. Second, international transport costs could also be a factor. If freight costs are particularly high for an industry, this may have a locational influence that would override the effects of labor intensity.[6] Third, there are certain products that must normally be located close to centers of raw material production or in areas where relatively cheap energy sources exist (aluminum smelting is an example). For products where these considerations are important, labor intensity may not be the major factor determining the location of production. Fourth, government policies in the exporting countries themselves can have a major influence on revealed comparative advantage. Such would be the case if specific exports were subsidized, if trade barriers (i.e., effective protection) produced major distortions in production incentives, or if other government policies had a substantial anti-export bias. Finally, some labor intensive processes require high skill labor inputs (jewel cutting, lens grinding, fabrication of some high tech instruments, etc.) or special management skills that are in short supply in developing countries.

III. Industry Analysis of RCAs and Heckscher-Ohlin Indices

For a test of the relation between Balassa's RCA index and the National Bureau's index of labor intensity, both measures were computed for

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[6] Transport costs can have two different types of locational effects depending on the nature of the product(s) in question. For items that undergo considerable reduction in weight or bulk with fabrication (which should reduce nominal freight charges) there would be an incentive to locate manufacturing activity close to the raw material inputs. Second, some products (like beverages which require the mixture of syrups with water) greatly expand their bulk and freight costs upon processing. Transport costs for such items could dictate that their production be located close to centers of consumption, a factor that would offset the influence of factor proportions.

labor intensive products previously identified by the NBER as well as all other (capital intensive) manufactured goods. For the initial tests the revealed comparative advantage indices were computed for all developing countries as a group with all developed countries being the destination of exports. This procedure generated 119 distinct three, four and five-digit SITC labor intensive products and 88 similar capital intensive products which had matched RCA and labor intensity indices. Since there was an interest in determining how the relation between the two comparative advantage indices might vary between developing countries at different levels of industrialization, revealed comparative advantage indices were also computed for the 207 labor and capital intensive goods exported from two selected groups of developing countries: Asian semi-industrialized exporters of manufactures (Hong Kong, Republic of Korea, Singapore and Taiwan, China) and a group of "other" South Asian developing countries (Indonesia, Malaysia, Thailand and the Philippines).

Table 1 provides summary statistics on comparisons between the Heckscher-Ohlin indices and matched developing countries' revealed comparative advantage indices for both the NBER labor intensive and other capital intensive products. To determine how the relationship may have changed these comparisons are made for different years; 1965, 1975 and 1985. In addition, the value of imports from developing countries is shown for these three years.[7] To assist

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[7] Erzan and Yeats (1989) examined broad two-digit U.S. Standard Industrial Classification (SIC) changes in factor intensities over this interval and generally found that sectors using relatively labor-intensive techniques in the earlier period employed similar techniques in 1982. Petroleum and coal products (SIC 29) and tobacco products (SIC 21) were exceptions as both sectors experienced a major increase in capital intensity while primary metals (SIC 33) became more labor intensive. Erzan-Yeats also found that textiles and clothing became slightly more labor intensive in spite of high levels of protection under the MFA which was intended to provide the industry with opportunities to implement structural adjustment measures.

Table 1

Summary Statistics on the Correspondence Between Developing Countries' RCA and Heckscher-Ohlin Indices for the National Bureau of Economic Research Labor Intensive Product Group and Other Manufactures

Product/Country Group	Year	% of individual product manufactures with RCAs exceeding unity 1/	Total value of exports to developed countries ($mill)	Individual products with RCAs exceeding unity: Value ($mill)	Individual products with RCAs exceeding unity: % of total
NBER Labor Intensive Manufactures					
All developing countries	1965	30.2	2,945.7	2,499.0	84.8
	1975	45.3	20,864.7	17,592.3	84.3
	1985	51.3	98,785.0	83,186.0	84.2
Asian exporters of manufactures	1965	29.4	956.9	869.6	90.9
	1975	39.5	11,043.1	9,250.6	83.8
	1985	49.5	55,968.4	49,777.4	88.9
Other South-Asian countries	1965	19.7	202.4	191.8	94.8
	1975	33.6	1,330.0	1,179.7	88.7
	1985	29.4	9,267.6	7,734.8	83.5
All Other Manufactured Goods					
All developing countries 2/	1965	6.8	906.5	482.0	53.2
	1975	9.1	4,641.8	1,930.1	41.6
	1985	14.8	26,311.5	8,212.2	31.2
Asian Exporters of manufactures 3/	1965	1.1	41.2	1.0	2.4
	1975	2.3	860.7	241.9	28.1
	1985	6.8	7,033.2	1,919.4	27.2
Other South-Asian countries 4/	1965	3.4	19.1	3.4	17.8
	1975	2.3	97.1	8.6	8.9
	1985	0.0	848.6	0.0	0.0

1/ The NBER labor intensive group is composed of 119 distinct three, four and five-digit SITC products. See Appendix Table 1 for a listing of these items with their corresponding labor intensity and revealed comparative advantage indices. The "all other" (capital intensive) group is composed of 88 three, four and five-digit SITC products.

2/ Outside the NBER labor intensive product group these developing countries had a 1985 RCA above one in the following SITC groups (SITC no. in parenthesis): inorganic chemicals (513); coal and petroleum based chemicals (521); dyes and tanning products (532); explosives (571); unhardened rubber products (69292); cement (6612); nonindustrial diamonds (6672); pig iron (671); iron and steel tubes (6783); iron and steel anchors (6984); television receivers (7241); ships and boats (735); and base metal office supplies (8951).

3/ Outside the NBER labor intensive product group these developing countries had a 1985 RCA above one in the following SITC groups (SITC no. in parentheses): rubber tyres and tubes (6291); iron and steel anchors (6984); nonelectric domestic appliances (7194); television receivers (7241); ships and boats (735); and base metal office supplies (8951).

4/ Coal and petroleum products (SITC 521); medicinal products (541); unhardened rubber products (6293); cameras and projectors (8615); and developed cinema film (863) were the non-NBER products in which these countries developed RCAs greater than one.

in evaluating this information, the percentage of NBER and capital intensive goods (measured both in terms of the number of products and value of exports) for which the developing countries recorded a revealed comparative advantage exceeding unity is given.[8] Appendix Table 1 provides detailed information on the matched RCA and labor intensity indices for each of the 119 products included in the original National Bureau selection.

It is evident from Table 1 that the Balassa RCA and labor intensity indices generally perform as expected for the NBER group of products (where RCAs tend to be above unity) as well as the capital intensive manufactures group (where RCAs are normally below one). This reflects a clear confirmation of the Heckscher-Ohlin theory of comparative advantage.[9] From 1965 to 1985 the percentage of NBER labor intensive products in which developing countries had a revealed comparative advantage increased by more than 20 percentage points and reached 51 per cent. In value terms the association is stronger as developing countries had revealed comparative advantage indices over unity in products that accounted for 84 per cent of total labor intensive shipments in each of the three years while this ratio approaches 90 per cent for the Asian exporters of manufactures. The table also indicates that the "other South-Asian Countries"

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[8] In assessing the results reported in Table 1 more importance should be given to export values than to the number of products since some items are of relatively little importance in trade. Table 1 shows that developing countries have generally achieved high RCAs in the most important labor intensive products.

[9] While the aggregate results reported in Table 1 are fully consistent with, and provide an empirical verification of, factor proportions theory it may be viewed as surprising that developing countries were not able to establish a revealed comparative advantage in approximately one-half of the products which were identified by the NBER as being labor intensive. There are exceptions, but subsequent analyses will show (see Section IV of this paper) that, within the NBER group, developing countries had their highest RCAs in the most labor intensive products.

were far more specialized within the labor intensive group as they only had a revealed comparative advantage in 29 per cent of the NBER products (by number), yet these items accounted for almost 84 per cent of their total 1985 value of shipments of labor intensive manufactures.

In contrast to labor intensive products, Table 1 shows that, for the majority of items with moderate to high capital intensities, developing countries mostly failed to establish a revealed comparative advantage. In 1985 these countries achieved a revealed comparative advantage in only 14.8 per cent of these items. Furthermore, the underlying data indicate two types of products were largely responsible for these results. The first were capital intensive items whose production location may be influenced by the existence of a natural resource base (i.e., cement, coal and petroleum based chemical products, dyes and tanning products, etc.,) or whose production characteristics changed from capital to labor intensive over the 1965 to 1985 interval.

A question of considerable interest is why, within the labor intensive product group, developing countries failed to develop a revealed comparative advantage in approximately one-half of the NBER items. One possibility is that high RCAs generally prevail among the most labor intensive of these products with revealed comparative advantage indices below unity clustered in those items that require higher capital inputs. Figure 1 tests this hypothesis. Here, all products are ranked in terms of increasing labor intensity (i.e., decreasing capital intensity) as one moves from left to right on the horizontal axis while the vertical axis records the revealed comparative advantage indices developing countries achieved for each product. While there is a significant relationship between the RCAs and labor intensity, the large variations from product-to-product clearly show that other factors have a major

of these products with revealed comparative advantage indices below unity

Figure 1. Comparison of Matched Developing Country RCA and Labor Intensity Indices for the 119 SITC Products in the NBER Labor Intensive Product Group

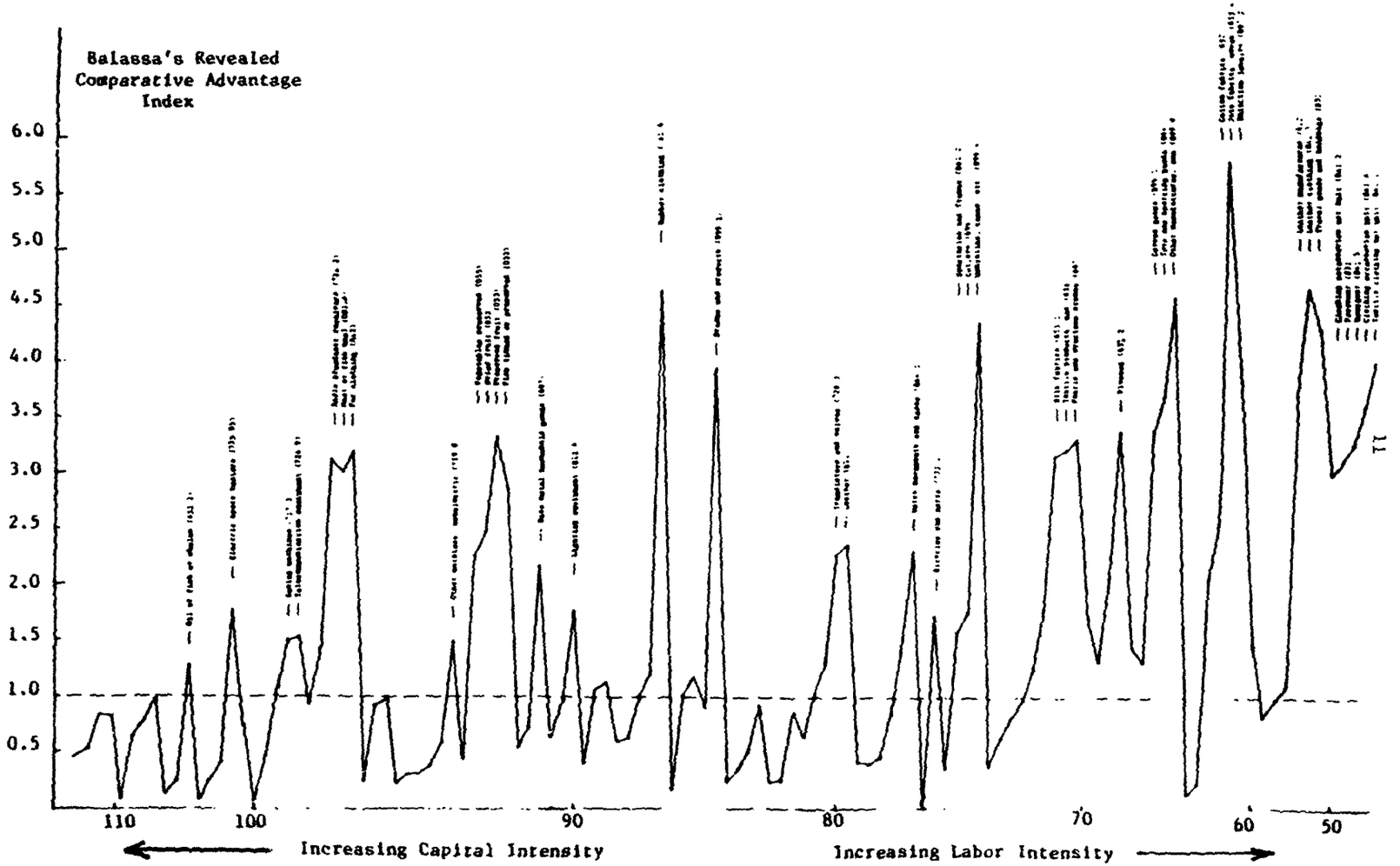

Table 2

Tabulation of Products with High Labor Intensities and Developing Countries' RCAs Below Unity

SITC	Description	NBER index a/ value added/employee (mfg=100) 1965	NBER index a/ value added/employee (mfg=100) 1982	Value of imports by developed countries ($mill) 1965	Value of imports by developed countries ($mill) 1985	Developing countries RCA Index 1965	Developing countries RCA Index 1975	Developing countries RCA Index 1985
631.8	Wood simply worked	54	55	41.4	973.0	4.11	0.83	0.98
661.3	Building stone worked	57	65	58.5	944.4	0.53	0.94	0.84
633	Cork manufactures	64	65	51.3	234.1	0.95	0.42	0.21
631.4	Reconstituted wood	64	62	55.7	858.5	0.13	0.05	0.14
653.6	Woven regenerated fabrics	71	62	377.2	961.7	0.27	0.75	0.82
655 b/	Special Textile products	71	60	364.9	3,274.5	1.49	1.23	0.63
653.2	Woven wool fabrics	71	62	550.6	1,390.7	0.24	0.30	0.39
662	Clay refractory products	73	76	282.1	2,264.7	0.36	0.33	0.34
732.9	Motorcycles and parts	76	72	230.2	1,706.0	0.07	0.07	0.00
717.1	Textile machinery	76	76	726.4	3,352.4	0.02	0.05	0.85
895.2	Pens and pencils	77	93	78.6	782.5	0.25	0.35	0.47
892 c/	Printed matter	78	77	182.7	1,517.9	0.39	0.43	0.40
657	Floor covers	79	50	487.7	3,226.6	5.34	3.77	0.41
642 d/	Articles of paper	81	103	249.5	4,446.6	0.15	0.46	0.63
693	Wire products	82	73	152.8	1,359.2	0.11	0.53	0.85
663	Mineral manufactures, nes	82	85	285.8	2,714.3	0.37	0.27	0.24
653.9	Woven fabrics, nes	84	62	54.2	131.9	0.75	1.06	0.92
062	Sugar preparations	84	140	76.9	740.2	0.04	0.65	0.52
653.3	Linen and hemp woven fabrics	84	62	18.8	145.4	0.21	0.20	0.34
653.7	Knitted or crocheted fabrics	84	62	187.1	1,081.0	0.32	0.24	0.24
661.8	Mineral building products	85	85	53.5	329.9	0.79	0.25	0.91
718.1	Paper mill machinery	87	99	224.7	1,844.1	0.01	0.05	0.16
Memo Item	(high labor intensive high RCA products)							
841.1	Textile clothing not knit	49	50	835.5	21,758.0	4.74	5.26	4.03
841.4	Clothing accessories knit	49	50	872.1	14,856.8	3.49	5.12	3.62
851	Footwear	55	50	538.2	12,702.8	1.53	2.89	3.14
841.3	Leather clothing	53	52	80.2	2,135.4	2.96	6.71	4.68

a/ For some products it was necessary to estimate labor intensities as a range due to the fact that a direct concordance between the SIC and SITC does not exist (See Appendix Table 1 for details). In these cases, the above figure show the average o thge ihgh and low labor intensity ratios.

b/ Excludes 655.1 felt and articles n.e.s. and elastic fabric not knit.

c/ Excludes 892.2 newspaper and periodicals.

d/ Includes 641.7 handmade papers.

influence on developing countries comparative advantage.[10] For example, developing countries achieved RCAs over 3.0 for several of the most highly capital intensive products on the NBER list (i.e., products with a factor intensity index of 95.0 or more) including radio broadcast receivers, meat or fish meal, and fur clothing while they failed to achieve a revealed comparative advantage in a number of highly labor intensive products (i.e., items with an NBER labor intensive index of 80.0 or lower). This indicates that other factors may often negate or override the competitive edge that high labor intensity provides for developing countries.[11] A question of importance concerns the nature of the product characteristics that have these offsetting effects.

In an initial attempt to account for the RCA variations, Table 2 lists the most highly labor intensive products for which developing countries failed to achieve RCAs over unity. Several possible factors may explain the developing countries' relatively poor performance in these items.[12] First, the

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[10] A nonlinear (quadratic) regression fitted to the labor intensity and RCA indices in Figure 1 took the form:

$$(3) \quad RCA_j = 4.88927 - \underset{(4.43)}{0.05523L_j} - \underset{(3.13)}{0.00016L_j^2} \qquad (R^2 = 0.28)$$

where L_j is the labor intensity for product j and t values are shown in parenthesis. Labor intensity, by itself, accounts for 28 per cent of the total variation in the revealed comparative advantage indices with 72 per cent of the total variation remaining unexplained.

[11] Meat or fish meal and fur clothing are classified by UNIDO as natural resource intensive products. A required natural resource base -- such as the availability of anchovies in Peru and several other Latin American countries -- is no doubt a factor offsetting the influence of labor intensity.

[12] See the notes to Table 1 for a list of capital intensive products in which developing countries had high revealed comparative advantage indices. These appear to be mainly composed of natural resource intensive products (i.e., coal and petroleum based chemicals, rubber manufactures, cement, etc.,) or certain types of iron and steel products which often received government subsidies.

value of trade in several products may be too low (under one-half billion) to stimulate development of required produciton capacity. Developing countries may have consciously focussed on higher value fast growing products. As the table indicates (see the memo item), developing countries have developed high RCA's in high value labor intensive products like footwear and clothing where trade approaches $50 billion in spite of quotas and other NTBs that are applied to these goods. Second, several products like paper articles, sugar preparations, pens and pencils, and paper mill machinery became less suitable for developing countries over 1965-1982 since they shifted to relatively more capital intensive production techniques. Third, a "natural resource" production orientation may affect some items as UNIDO (1982) classifies several products i.e., cork, clay products, worked building stone, etc.,) as having a strong pull toward raw material sources.[13]

IV. Source of Variation in Revealed Comparative Advantage

While the previous analysis showed that developing countries' revealed comparative advantage was concentrated within a group of products manufactured by labor intensive processes, a surprising point was that they failed to develop RCAs above unity for about one half of these items. This

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[13] While the RCA indices reported in Table 2 are relatively stable over 1965-85, there are three products for which they went from above to below unity. The results for simply worked wood (SITC 631.8) appear to be due to a major shift by developing countries out of this item into "upstream" products like plywood, veneers, and wood manufactures. Floor covers witnessed a major expansion of trade in linoleum and synthetic fiber floor covers (SITC 657.4 and 657.6) -- items that appear to be manufactured by relatively capital intensive processes. The labor intensive component product (knotted carpets and rugs - SITC 657.5) experienced a declining share in the total trade in floor covers. Cordage is the major component of special textile products (SITC 655). Here, trade in capital intensive synthetic fibre cordage has rapidly displaced exports of (labor intensive) natural fiber (jute, sisal, etc.) cordage.

suggests that other factors offset the advantages associated with lower labor costs in developing countries. In an attempt to identify these factors, production information was collected on the following variables which other studies (Baldwin (1971), Helleiner (1976) and Hufbauer (1970) indicate have influenced the level and structure of trade:

(1) Two Human Capital Variables - (a). The share of the labor force accounted for by professional or technical personnel, and (b). average per capita wages in the industry. Average per capita wages is part of the NBER measure; the rest is non-wage value added that represents physical capital. The assumption is that most developing countries would not have a comparative advantage in sectors requiring high human capital inputs.

(2) A Market Size Variable - Developed market economy imports measured in 1985 US dollars. The purpose is to determine whether developing countries "target" items with larger markets, ceteris paribus, when establishing a production base for exports.

(3) Capital Requirements - The value of fixed plant and equipment per capita immediately employed in making the commodity. Developing countries comparative advantage should be inversely related to this variable.

(4) A Product Differentiation Variable - Measured by the coefficient of variation in unit values of the industry's goods destined for different countries. To determine if developing countries are less likely to have a comparative advantage in more differentiated products.

(5) Consumer Orientation (Goods) Ratio - Percentage of industry output (and imports) directly purchased by final consumers. Has developing countries' comparative advantage differed in consumer as opposed to producer goods?

(6) Resource Based Production Variable - UNIDO (1982) identified goods whose production location is normally based near raw material supplies. A dummy variable takes a value of one for these items or zero otherwise. Do natural resource requirements significantly influence patterns of developing countries' revealed comparative advantage?

(7) A Product Cycle Variable - The approximate date that the item was first traded internationally according to Hufbauer (1970). Is developing countries comparative advantage weighted towards older more established products?

(8) An Industry Scale Variable - Identifies industries where economies of scale appear to be operative (see the notes to Table 3). Is developing countries comparative advantage adversely affected by larger scale production requirements.

These variables were then matched with the labor intensity and revealed comparative advantage indices at the level of product detail indicated in Appendix Table 1.[14] Correlations were then run with these explanatory variables and the RCA indices.

Table 3 shows Spearman correlation coefficients for these explanatory variables and the industry RCA values for all developing countries as well as those for the two groups of Asian countries. In all three country groups the labor intensity variable is statistically significant at the 99 per cent level and takes the expected (negative) sign.[15] The human capital (per capita wage) and physical capital variables are also highly correlated with the developing countries' revealed comparative advantage and the signs associated with these variables are as expected -- as physical and human capital requirements increase

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[14] The reader should note that the NBER measure (equation 1) represents capital intensity that combines physical and human capital. Variables (1) and (3) above attempt to independently measure the effects of human and physical capital. The human capital, physical capital and product differentiation variables are all based on U.S. Department of Commerce, Census of Manufactures data, while the market size variable was estimated using United Nations, Series D Commodity Trade Statistics. UNIDO (1982) was the source of resource based product information, while Hufbauer (1970) identified the first trade dates for the different products. In some cases, these dependent variables were derived for three-digit product groups and it was necessary to apply these values to underlying four and five-digit products listed in Appendix Table 1. See Balassa (1979, pp. 260-262) for suggestions of other variables that might be tested, as well as a discussion of the use of stock and flow variables for the capital measures.

[15] The negative sign was expected since an inverse indicator is involved - that is, the higher the value of the index the less labor intensive (i.e., more capital intensive) is the production process. As such, Table 3 shows that, as one moves to less labor intensive production processes developing countries' revealed comparative advantage indices decline.

Table 3
Spearman Rank Correlation Coefficients Between Revealed Comparative Advantage Indices and Ten Explanatory Variables

Explanatory Variable 1/	All Developing Countries	Asian Exporters of manufactures	Other South Asian Countries
1) Labor intensity variable	-0.542*	-0.499*	-0.559*
(2) Developed country imports ($ mill.)	-0.119	-0.078	-0.021
(3) Capital per worker	-0.547*	-0.494*	-0.492*
(4) Skill variable	-0.338*	-0.254	-0.377*
5) Average per capita wage	-0.617*	-0.584*	-0.615*
6) Scale variable	-0.271*	-0.248	-0.259
7) Consumer good ratio	0.476*	0.492*	0.427*
8) First trade date	-0.289*	-0.276	-0.226
(9) Product differentiation variable	-0.326*	-0.259	-0.286*
(10) Resource based product dummy 2/	-0.183	-0.017	-0.159

* Statistically significant at the 99 per cent level.

1/ The explanatory variables are defined as follows:

(1) Labor intensity - average per capita value added in the industry relative to that for all United States manufacturing activity.

(2) Developed country imports - a measure of the size of the market for the product. Measured in 1985 US dollars.

(3) Fixed plant and equipment immediately employed in making the commodity. Measured in US dollars on a per capita basis.

(4) Percentage of the industry's labor force accounted for by professional, technical and scientific personnel.

(5) wage bill divided by total employees immediately occupied in making the commodity. A measure of human capital.

(6) The exponent in the regression equation $V = KN^a$, where V is the ratio between value added in plants employing N persons and the average value added for the industry.

(7) Percentage of industry output (and imports) directly purchased by final consumers.

(8) Hufbauer's (1970) estimate of the first date (year) that the product was traded internationally.

(9) Measured by the coefficient of variation in unit values of industry goods destined for different countries. Differentiated goods have higher coefficients of variation.

(10) Taken from UNIDO (1982). Products dependent on available natural resources take a value of one. Other goods take a value of zero.

2/ Since more than 85 per cent of the NBER labor intensive products are not considered to be natural resource based, and hence take a value of zero for this dummy, the rank correlation coefficient is a very weak statistical test for causality. A dummy variable produces a very weak ranking as it merely separates the data into two alternative levels.

developing countries' comparative advantage falls.

Table 3 indicates that several variables are not affecting developing countries' revealed comparative advantage, with the market size variable failing to achieve significance for each of the three groups of exporters.[16] Relatively weak results are also achieved for the scale variable and first trade data -- these terms are not significant for either of the two Asian country subgroups -- while the product differentiation variable does not appear to influence the RCA profiles of the Asian exporters of manufactures. These three variables are, however, significant for the runs for all developing countries.

To what extent can the variables listed in Table 3 jointly account for differences in developing countries' revealed comparative advantage? While a high degree of inter-correlation between some of the independent variables made estimation difficult, a series of linear multiple regressions were run to provide an approximate answer.[17] Representative results for these regressions are summarized in Table 4.

Table 4 shows that labor intensity, by itself, accounts for about 24 per cent of the total variation in developing countries revealed comparative advantage with the relationship improving when nonlinear regression forms were

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[16] While results for the resource based production variable are shown in Table 3 the basis for running rank correlations on this term are weak. This dummy variable establishes a dichotomy between industries, by taking value of zero or one, and therefore establishes only a very weak ranking. More appropriate regression tests are given in Table 4 and these show that natural resource requirements have an important influence on developing countries comparative advantage.

[17] The author will provide interested readers with full Pearson and Spearman correlation coefficients between the RCA indices and explanatory variables listed in Table 3 upon request.

Table 4

Regression Results for All Developed Countries Revealed Comparative Advantage Indices Against Selected Explanatory Variables
(t values shown in parenthesis)

Dependent Variable	Constant	Independent Variables: Labor intensity	Consumer good ratio	Average per capita wage	Resource dummy	Capital per worker	Scale variable	First trade date	R^2
RCA 1/	2.045	-0.018	--	--	--	--	--	--	0.236
	(10.31)	(6.06)*							
RCA	1.659	-0.010	0.002	--	--	--	--	--	0.386
	(4.48)	(3.47)*	(5.36)*						
RCA	5.414	-0.002	--	-0.0007	--	--	--	--	0.437
	(12.17)	(0.47)		(6.49)					
RCA	4.659	-0.004	0.0008	-0.0005	-1.577	--	--	--	0.525
	(6.26)	(2.41)*	(1.71)	(4.05)*	(4.27)*				
RCA	4.719	-0.005	0.0008	-0.0006	-1.593	0.00003	--	--	0.527
	(6.26)	(2.45)*	(1.73)	(4.05)*	(4.27)*	(0.56)			
RCA	4.612	-0.005	0.0007	-0.0005	-1.621	--	-0.001	--	0.528
	(6.17)	(2.36)*	(1.55)	(3.85)*	(4.34)*				
RCA	42.156	-0.004	0.0007	-0.0006	-1.622	--	--	0.019	0.530
	(1.15)	(1.24)	(1.49)	(4.09)	(4.36)			(1.02)	

1/ In a double log form this regression produces a somewhat better fit as the coefficient of determination increases to 28 per cent.

tested.[18] When other combinations of explanatory variables were added the relationship improves to the point that over 50 per cent of the variation in developing countries' RCA indices are accounted for. In these runs the natural resource, consumer good ratio, and human capital (per capita wage) variables appear to make the strongest contribution toward improving the regression's explanatory power.

When the regressions shown in Table 4 were repeated for the two Asian developing country sub-groups rather different results (not shown) were achieved. The pattern for Indonesia, Malaysia, Thailand and the Philippines corresponded closely to that for all developing countries, but there were marked differences for the Asian exporters of manufactures (Rep. of Korea, Hong Kong, Singapore, and Taiwan, Province of China). Here, there was a deterioration in the explanatory power of the labor intensity and physical and human capital variables.[19] The weaker results suggest that these countries have advanced to a stage where lower labor costs are no longer providing a major stimulus to

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[18] When a double log form was used the results improved slightly (R^2 = 0.28) -- about the same level of explanatory power was achieved using a quadratic form (see equation 3). Given that several of the independent variables take negative values or are zero-one dummys, it was not possible to utilize a standard nonlinear form for the multiple regressions although several variables appeared not to take a linear form.

[19] For example, the regression between the Asian NICs revealed comparative advantage indices and the labor intensity variable took the form:

$$(4) \quad RCA_j = \underset{(4.44)}{3.236 - 0.018L_j} \qquad (R^2 - 0.14)$$

which was much weaker than the corresponding equation for all developing countries shown in Table 4. Also, the explanatory variables shown in the table were only able to account for 33 per cent of the variation in the NICs results while they "explained" over half of the variation in all developing countries RCA industries.

exports, nor does a shortage of capital serve as the constraint it is in other developing countries.

V. Summary and Conclusions

Economic theory postulates that developing countries should have a comparative advantage in labor intensive products in their trade with developed market economy countries. This study examined the validity and strength of this proposition by comparing indices of labor intensity for three, four and five-digit SITC products with matched indices of developing countries' revealed comparative advantage. The findings have important implications, ranging from a test of factor proportions theory to the establishment of a methodology for identifying potential "successful" developing country export. The results also provide quantitative evidence on the extent to which labor intensity, and several other production and market characteristic variables, influence the product composition of South-North trade.

The results show that products in which developing countries have a revealed comparative advantage are in fact highly concentrated within the labor intensive group. This provides a strong verification of factor proportions theory. In particular, where relatively low RCAs occur in the labor intensive group human and physical capital requirements, as well as natural resource requirements appear to be explanatory factors. Regressions were tested which explained over 50 per cent of the variation in RCA indices. The explanatory variables in these tests largely related to differences in production functions and it appears the results could be improved by testing factors relating to demand -- particularly, measures that reflect trade barriers or the market power of domestic firms. Three (or five) firm concentration ratios for sales or production have been extensively employed as measures of market power in the

industrial organization literature and these indices could be tested in connection with variations in RCA indices.

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Appendix Table 1: COMPARATIVE ANALYSIS OF BALASSA'S REVEALED COMPARATIVE ADVANTAGE INDEX FOR DEVELOPING COUNTRIES AND INDICES BASED ON LABOR INTENSITY OF SELECTED INDUSTRY GROUPS

SITC	Description	NBER Index Value Added/Employee (mfg=100) g/		Revealed Comparative Advantage Index								
				All Developing Countries			Asian Exporters of Manufactures k/			Other South-Asian Countries l/		
		1965	1982	1965	1975	1985	1965	1975	1985	1965	1975	1985
032	Fish, tinned or prepared	93	102	2.72	3.14	2.89	0.78	2.16	1.94	2.66	8.61	13.70
052	Dried fruit	90-100	134	4.55	4.19	2.49	0.09	0.05	0.05	0.03	0.07	0.24
053	Fruit preserved	90-100	116	4.59	3.78	3.34	3.17	0.84	0.34	16.34	13.09	7.37
055	Vegetables preserved	90-100	116	5.02	3.69	2.25	7.72	4.31	1.70	17.72	1.20	0.45
062	Sugar preparations	84	140	0.04	0.65	0.52	0.22	0.22	0.19	0.09	0.50	0.13
081.4	Meat or fish meal	93-102	120	9.04	3.82	3.02	0.02	0.07	0.06	0.06	0.00	0.04
099	Food preparations, nes	108	182	1.28	1.32	0.79	1.60	1.16	0.50	0.50	0.93	0.91
122.1	Cigars and cheroots	80	60	0.79	0.90	1.30	0.00	0.00	0.00	2.90	0.95	0.28
243	Wood shaped	44-65	70	2.13	1.93	1.13	0.74	0.56	0.21	9.81	14.20	7.97
411.1	Oil of fish or whales	102	120	3.70	2.97	1.27	0.03	0.08	0.01	0.00	1.25	1.23
551	Essential oils	NA h/	NA	4.57	2.40	1.38	2.26	0.53	0.13	7.06	5.32	1.67
611	Leather	80	69	4.44	3.91	2.36	0.03	0.03	0.13	0.06	0.80	1.35
612	Leather manufactures	50-55	53	1.40	2.45	3.71	0.53	1.60	2.03	0.13	1.48	2.97
613	Fur skins tanned or dressed	100	NA	0.99	2.00	0.45	0.04	0.08	0.10	0.00	0.00	0.01
621	Materials of rubber	NA h/	NA	0.32	0.17	0.21	0.03	0.05	0.11	3.61	1.64	0.81
629.9	Other rubber articles, nes	76-96	76-96	0.29	0.46	1.03	0.06	0.25	1.33	0.28	1.41	1.39
631.1	Veneer sheets	68	55-57	2.79	2.99	2.08	0.12	0.51	0.02	25.18	9.93	0.66
631 2	Plywood	68	55-57	4.78	5.41	3.40	8.02	9.20	1.83	18.18	10.29	25.14
631.4	Reconstituted wood	48-80	44-80	0.13	6.05	0.14	0.01	0.05	0.03	0.00	0.07	0.11
631.8	Wood simply worked	44-65	55	4.11	0.83	0.98	0.30	0.29	0.32	5.41	3.52	4.51
632	Wood manufactures, nes	48-80	44-80	1.51	2.64	2.07	0.94	3.00	2.54	4.31	10.45	4.29
633	Cork manufactures	48-80	65	0.95	0.42	0.21	0.02	0.06	0.07	0.06	0.02	0.00
642 a/	Articles of paper	73-88	80-125	0.15	0.46	0.63	0.11	0.47	0.50	0.03	0.05	0.06
651	Textile yarn	60	49	0.88	1.54	1.47	0.42	0.13	0.69	0.03	0.43	0.97
652	Cotton fabrics	60-67	49-51	4.89	3.80	2.54	7.55	3.26	1.43	1.06	2.30	2.76
653.1	Silk fabrics	67-75	57-67	2.06	8.10	3.19	0.96	9.44	2.44	3.68	9.30	1.06
653.2	Woven wool fabrics	71	62	0.24	0.30	0.39	0.42	0.34	0.33	0.00	0.00	0.00
653.3	Linen, etc. fabrics	81-87	57-67	0.21	0.20	0.34	0.01	0.12	0.05	0.00	0.14	0.00
653.4	Jute fabrics, woven	63	49	15.71	10.86	5.83	0.01	0.01	0.08	0.00	3.89	0.08
653.5	Synthetic fabrics	67-75	57-67	0.19	1.01	1.25	0.41	1.79	1.49	0.00	1.64	2.72
653.6	Woven regenerated fabrics	67-75	57-67	0.27	0.75	0.82	0.26	1.03	0.81	0.06	0.02	0.85
653.7	Nonelastic knit fabrics	81-87	57-67	0.32	0.24	0.24	0.94	0.34	0.31	0.00	0.07	0.04
653.9	Woven fabrics, nes	81-87	57-67	0.75	1.06	0.92	0.04	0.13	0.42	1.88	0.16	0.05
654	Lace, ribbons, tulle	57-85	51 68	0.54	1.00	0.98	0.53	1.19	1.02	0.09	0.27	0.53
655 b/	Special textile products	57-85	51-68	1.49	1.23	0.63	0.41	0.44	0.46	2.00	2.43	0.64
656	Textile products, nes	57-85	51-68	5.79	3.54	3.21	6.30	2.14	1.87	2.25	3.43	1.65
657	Floor covers	78-80	37-62	5.34	3.77	0.41	7.94	0.34	0.36	0.34	0.36	0.47
661.3	Building stone worked	57	65	0.53	0.94	0.84	0.03	1.11	1.88	0.03	0.07	0.18
661.8	Mineral building products	84-86	83-86	0.79	0.25	0.91	0.00	0.07	0.03	0.00	0.02	0.03
662	Clay refractory products	71-75	76	0.36	0.33	0.34	0.01	0.26	0.11	0.00	0.20	0.53
663	Other nonmetal products	82	85	0.37	0.27	0.24	0.22	0.12	0.15	0.00	0.02	0.08
664	Glass	139 h/	128	0.21	0.21	0.54	0.30	0.23	0.48	0.00	0.16	0.17
665	Glassware	84-94	107	0.53	0.69	0.63	0.26	0.40	0.47	0.03	3.52	0.14
666	Pottery	69	48-72	0.34	0.83	1.70	0.44	0.77	2.49	0.03	0.30	0.50
667 c/	Pearls and precious stones	55-87	84	5.66	5.76	3.32	3.35	2.46	1.26	5.56	18.14	11.25
678.5	Iron tube fittings	92	101	0.22	0.31	0.73	0.00	0.36	0.98	0.00	0.05	0.29
693	Wire products	82	73	0.11	0.53	0.85	0.19	0.72	1.26	0.02	0.14	0.03
694	Steel, Copper nails, etc.	100	88	0.36	0.40	1.06	1.59	0.62	1.58	0.00	0.02	0.13
695	Hand tools	98	102	0.19	0.46	0.94	0.10	0.42	1.23	0.06	0.05	0.08

Appendix Table 1 COMPARATIVE ANALYSIS OF BALASSA'S REVEALED COMPARATIVE ADVANTAGE INDEX FOR DEVELOPING COUNTRIES AND INDIA BASED ON LABOR INTENSITY OF SELECTED INDUSTRY GROUPS (Cont'd)

SITC	Description	NBER Index Value Added/Employee (mfg=100) g/ 1965	NBER Index Value Added/Employee (mfg=100) g/ 1982	Revealed Comparative Advantage Index: All Developing Countries 1965	All Developing Countries 1975	All Developing Countries 1985	Revealed Comparative Advantage Index: Asian Exporters of Manufactures h/ 1965	Asian Exporters of Manufactures h/ 1975	Asian Exporters of Manufactures h/ 1985	Other South Asian Countries i/ 1965	Other South Asian Countries i/ 1975	Other South Asian Countries i/ 1985
696	Cutlery	73	121	0.57	1.49	1.76	1.62	2.54	2.92	0.13	0.84	0.18
697	Base metal household goods	82-99	79	0.76	1.80	2.17	1.15	2.55	3.55	0.09	0.32	0.20
698.1	Locksmiths wares	90	NA	0.24	0.48	0.97	0.69	0.79	1.58	0.00	0.02	0.05
698.3	Iron chains and parts	91-102	82	0.15	0.56	0.91	0.45	0.86	1.24	0.41	0.43	0.08
698.5	Pins, hooks, etc.	80	120	0.69	0.78	1.02	0.73	1.32	1.65	0.09	0.20	0.77
698.8	Misc. base metal goods	91-102	82	0.30	0.52	0.25	0.15	0.59	0.29	0.00	0.00	0.22
698.9	Other base metal goods	91-102	82	0.39	0.36	0.98	0.16	0.11	1.58	0.02	0.25	0.13
712 d/	Agricultural machinery	100	122-124	0.04	0.04	0.06	0.03	0.01	0.30	0.02	0.02	0.01
714.2	Accounting machines	89	122-134	0.02	2.56	1.20	0.05	5.55	2.50	0.00	4.86	0.02
714.3	Statistical machines	89	122-134	0.28	0.28	0.00	0.00	0.04	0.96	0.00	0.00	0.11
714.9	Office machines, nes	89	122-134	0.06	0.82	1.00	0.01	0.70	1.59	0.00	0.59	0.03
715.1	Machine tools for metal	97-105	92	0.04	0.12	0.40	0.01	0.10	0.65	0.00	0.00	0.00
715.2	Metalworking machinery	97-105	92	0.02	0.04	0.08	0.01	0.04	0.05	0.00	0.00	0.00
717.1	Textile machinery	76	76	0.02	0.05	0.85	0.01	0.03	0.09	0.00	0.02	0.01
717.3	Sewing machines	99	71	0.09	0.62	1.50	0.14	1.05	2.33	0.00	0.07	0.01
718.1	Paper mill machinery	87	99	0.01	0.05	0.16	0.00	0.00	0.03	0.00	0.00	0.01
718.3	Food machinery	105	96	0.05	0.09	0.13	0.00	0.07	0.09	0.00	0.09	0.07
719.2	Pumps and centrifuges	108	113	0.06	0.15	0.63	0.05	0.11	0.98	0.02	0.05	0.05
719.5	Power tools, nes	89-103	80-113	0.03	0.12	0.52	0.00	0.06	0.19	0.00	.00	0.01
719.6	Nonelectric machines, nes	89-103	77-88	0.05	0.11	0.23	0.07	0.10	0.25	0.00	0.02	0.10
719.8	Other machines, nonelectric	89-103	77-88	0.03	0.12	1.48	0.01	0.05	0.18	0.00	0.05	0.08
719.91	Foundry moulds, etc.	89-103	77-88	0.15	0.26	0.31	0.18	0.39	0.47	0.00	0.05	0.06
719.92	Cocks, values, etc.	89-103	77-88	0.07	0.17	0.39	0.01	0.09	0.13	0.02	0.05	0.03
722	Electric power machinery	72-107	95-100	0.14	0.61	1.06	0.71	0.05	1.11	0.02	0.14	0.45
723.2	Electric insulating equipment	80-104	72-107	0.05	0.25	0.55	0.00	0.04	0.29	0.00	0.02	0.03
724.2	Radio receivers	98	96	1.25	5.53	5.12	4.64	6.48	4.16	0.02	1.50	2.53
724.9	Telecommunication equipment	95-102	105-120	0.26	1.38	1.53	0.52	1.20	2.07	0.19	0.23	0.74
725.03	Domestic electric goods	98	92	0.04	0.26	1.41	0.12	0.42	2.41	0.00	0.00	0.04
725.05	Electric space heaters	101	90	0.05	0.93	1.76	0.01	1.44	3.06	0.00	0.00	0.34
729.1	Batteries, accumulators	121	110	0.81	0.59	0.81	2.83	0.94	0.87	0.16	0.11	0.28
729.2	Electric lamps, bulbs	130	132	0.22	0.70	0.82	0.83	0.80	1.34	0.00	1.84	0.08
729.3	Transistors, values, etc.	80	95	0.39	5.19	2.28	1.45	4.07	2.02	0.00	13.14	12.87
729.4	Automotive electrical equipment	72-107	102	0.11	0.42	0.40	0.27	0.11	0.39	0.02	0.09	0.12
729.9	Other electrical machinery	72-107	102	0.19	1.15	1.12	0.42	1.58	1.42	0.02	1.70	1.04
731 .	Railway vehicles	101	100	0.12	0.42	0.25	0.02	0.69	0.31	0.06	0.00	0.01
732.8	Motor vehicle parts	103	120	0.03	0.19	0.25	0.01	0.01	0.09	0.00	0.05	0.05
732.9	Motorcycles and parts	73-78	72	0.07	0.07	0.00	0.00	0.08	0.03	0.00	0.00	0.01
733.1	Bicycles and parts	73-78	72	0.23	1.18	1.74	0.34	1.84	3.30	0.00	0.00	0.06
812.4	Lighting equipment	90	96	0.16	1.05	1.76	5.59	1.41	2.86	0.02	0.18	0.39
821	Furniture	63-74	48-70	1.40	0.82	1.32	1.25	0.70	1.57	0.38	0.80	1.42
831	Travel goods and handbags	46-57	48-63	3.12	4.99	4.31	10.78	7.24	6.66	0.19	0.70	0.83
841.1	Textile clothing not knit	42-55	36-64	4.74	5.26	4.03	14.38	7.35	4.30	4.38	2.91	3.77
841.2	Clothing accessories not knit	42-55	36 64	2.94	3.60	3.01	4.63	3.18	1.62	16.16	7.68	5.72
841.3	Leather clothing	39-67	43 61	2.96	6.71	4.68	1.47	8.22	5.10	29.91	3.20	5.03
841.4	Clothing accessories knit	42-55	36 64	3.49	5.12	3.62	11.84	8.61	4.83	1.97	7.61	2.98
841.5	Headgear	42-55	36 64	0.68	2.58	3.26	1.42	4.04	0.52	0.44	0.43	1.88
841.6	Rubber clothing	79 96	82	0.19	0.24	4.67	0.59	0.10	6.35	0.09	0.00	12.15
842	Fur clothing	97	90	0.42	3.21	3.20	0.05	2.98	5.16	0.16	0.14	0.06

Appendix Table 1: COMPARATIVE ANALYSIS OF BALASSA'S REVEALED COMPARATIVE ADVANTAGE INDEX FOR DEVELOPING COUNTRIES AND INDICES BASED ON LABOR INTENSITY OF SELECTED INDUSTRY GROUPS (Cont'd)

SITC	Description	NBER Index Value Added/Employee (mfg=100) g/		Revealed Comparative Advantage Index								
				All Developing Countries			Asian Exporters of Manufactures k/			Other South-Asian Countries l/		
		1965	1982	1965	1975	1985	1965	1975	1985	1965	1975	1985
851	Footwear	46-63	46-54	1,53	2,89	3,14	4,04	0,39	4,42	0,16	1,09	0,74
861,2	Spectacles and frames	73	79	0,16	0,67	1,58	0,38	1,08	2,82	0,00	0,18	0,08
861,3	Optical instruments	96	109	0,43	0,54	0,58	1,58	0,94	0,81	0,03	0,02	0,05
861,4	Still cameras	108	210 i/	0,33	1,39	0,98	1,19	2,89	1,71	0,00	0,07	6,24
861,6	Photographic equipment	108	210 i/	0,08	0,18	0,08	0,28	0,52	0,09	0,00	0,02	0,01
861,7	Medical instruments	95	117	0,17	0,30	0,45	0,05	0,13	0,30	0,03	0,45	0,59
864,1	Watches, movements, cases	63 89	66	0,13	1,93	2,52	0,49	3,40	4,02	0,00	2,05	2,61
86 ?	Clocks and parts	63-89	66	0,21	1,30	1,40	0,19	2,25	2,08	0,00	1,36	1,76
891	Sound recorders	74-106	64-160	0,18	0,89	0,64	0,06	1,52	1,04	0,03	2,72	0,08
892 e/	Printed matter	74-81	71-82	0,39	0,43	0,40	0,19	0,52	0,56	0,16	0,09	0,04
893	Articles of plastic	76-96	81-87	1,04	1,57	1,17	3,62	2,99	1,90	0,06	0,80	0,50
894 f/	Toys and sporting goods	55-74	86	2,40	3,13	3,72	7,82	5,53	5,85	0,06	0,57	1,31
895,2	Pens and pencils	72-81	92-94	0,25	0,35	0,47	0,40	0,46	0,74	0,03	0,14	0,24
897,1	Real jewelry	55-87	79-84	0,80	1,67	1,78	0,94	1,64	1,20	0,91	3,27	2,15
897,2	Imitation jewelry	62	65	3,04	4,28	3,80	10,94	7,74	6,52	0,28	3,66	2,52
899,1	Carved goods	62-67	80	2,75	6,04	3,40	6,58	6,37	4,10	3,90	4,20	12,42
899,2	Brooms and products	85	71	4,02	5,06	3,95	4,08	3,20	2,94	2,34	10,20	5,96
899,3	Candles, matches, etc.	59-71	80	0,65	0,77	1,54	1,05	1,15	1,68	0,00	0,07	2,29
899,4	Umbrellas, canes, etc.	72	80	1,68	6,43	4,77	6,19	6,69	9,14	0,03	1,52	0,52
899,5	Toilet goods	62-67	272 j/	0,75	0,62	1,31	2,20	1,00	2,35	1,78	1,61	0,39
899,6	Hearing aids	99-102	99-116	0,41	1,69	0,73	0,00	0,13	0,06	0,00	0,00	0,03
899,9	Other manufactures, nes	62-67	80	9,76	6,71	4,60	34,28	13,05	5,91	0,72	1,14	4,74

a/ Includes 641,7 handmade papers.

b Excludes 655,1 felt and articles n,e,s, and 655,5 elastic fabrics not knit.

c/ Excludes 667,2 nonindustrial diamonds not set.

d/ Excludes 712,3 dairy farm equipment.

e/ Excludes 892,2 newspapers and periodicals.

f/ Excludes 894,3 nonmilitary arms and 894,5 amusements for fairs.

g/ Due to the fact that the SITC classification of the United States has undergone a number of major revisions, and the fact that an exact concordance to the SITC system does not exist, it has been necessary to express some of the factor proportions indices as a likely range rather than a specific average for the SITC group. See Lary (1968, pp. 191-212) for an SITC-SIC concordance relating to the 1960s.

h/ Although factor intensity indices could not be computed for these products they were included in the original NBER list on the basis of the import value criterion and factor proportions data drawn from non-United States sources.

i/ The corresponding SIC product is 3861 "photographic equipment and supplies" which employed 119,300 workers in 1982 and produced a value added of $14,059,1 million. As such, it moved from about average to very high capital intensity in production over 1965-1982.

j/ Available concordances between the SITC and SIC place this product in SIC group 2844 "toilet preparations". In 1982, this SIC group had 60,400 employees and produced a value added of $7,130,6 million which accounts for the very high value added per employee ratio.

k/ Hong Kong, Republic of Korea, Singapore, Taiwan, Province of China.

l/ Indonesia, Malaysia, Thailand, Philippines.

Appendix Table 2

Comparative Analysis of Selected Developed Countries Imports of Labor Intensive and Other Non-Fuel Products: 1965 to 1986

Year	All Developed			Canada			EEC(10)			Japan		
		Manufactures			Manufactures			Manufactures			Manufactures	
	Total Nonfuel	Capital Intensive	Labor Intensive	Total Nonfuel	Capital Intensive	Labor Intensive	Total Nonfuel	Capital Intensive	Labor Intensive	Total Nonfuel	Capital Intensive	Labor Intensive
	(import values expressed in terms of US $ million)											
1965	80,315	31,407	38,076	5,964	2,370	3,442	43,101	14,682	19,342	5,744	944	799
1970	133,487	63,858	72,167	6,487	4,539	6,113	69,252	30,861	36,318	12,285	2,338	2,692
1975	288,176	148,577	172,919	15,628	11,244	14,235	153,438	75,983	90,245	25,568	4,338	6,645
1980	620,339	336,690	406,005	26,698	18,353	23,867	342,356	185,099	223,043	53,934	12,320	15,966
1984	581,995	340,516	444,094	33,117	24,321	35,114	280,310	156,399	191,939	55,912	16,352	18,009
1985	612,180	371,274	476,362	35,282	27,001	35,554	293,974	168,370	207,740	53,284	15,970	18,438
1986	733,593	458,669	603,917	37,827	28,774	38,040	368,422	220,115	277,979	59,152	19,601	23,368
	(share of developing countries in total imports of the product group)											
1965	21.7	1.7	8.7	8.2	0.2	2.8	21.1	1.2	8.2	34.4	9.4	10.4
1970	17.8	2.1	9.4	5.7	0.2	3.9	16.4	1.6	7.0	31.3	5.9	16.2
1975	14.9	2.4	12.7	4.4	0.8	5.6	12.9	2.1	9.1	29.5	7.1	32.9
1980	15.2	4.0	16.8	5.0	1.3	7.6	12.4	3.2	11.7	33.9	13.9	37.0
1984	15.8	6.0	22.4	6.5	3.7	9.8	12.4	3.6	12.8	33.1	17.3	41.1
1985	15.1	5.9	21.7	5.5	2.9	9.7	12.2	3.8	12.2	33.3	16.0	41.7
1986	14.1	4.7	21.2	6.2	3.4	11.2	10.7	3.4	12.3	34.2	17.3	43.7

Appendix Table 2 (Continued)

Comparative Analysis of Selected Developed Countries Imports of Labor Intensive and Other Non-fuel Products: 1965 to 1986

Year	Norway			Sweden			Switzerland			United States		
		Manufactures			Manufactures			Manufactures			Manufactures	
	Total Nonfuel	Capital intensive	Labor intensive	Total Nonfuel	Capital intensive	Labor intensive	Total Nonfuel	Capital intensive	Labor intensive	Total Nonfuel	Capital intensive	Labor intensive
	(Import values expressed in terms of US $ million)											
1965	1,404	945	639	2,293	1,365	1,605	2,192	1,170	1,338	12,942	4,426	6,203
1970	2,248	1,508	1,169	3,477	2,151	2,782	3,617	2,292	2,504	23,014	11,351	13,862
1975	5,704	4,260	3,045	8,224	5,742	6,733	6,764	4,203	5,140	43,371	23,890	27,129
1980	7,825	5,455	6,169	12,954	8,737	12,399	16,506	10,091	15,588	98,545	59,251	69,531
1984	6,854	5,149	5,609	10,934	7,593	10,274	13,050	9,101	13,535	139,134	94,882	135,802
1985	7,067	5,400	6,187	11,726	8,235	11,418	13,598	9,598	13,984	152,754	107,726	150,269
1986	9,822	7,654	9,284	14,615	10,514	14,382	18,800	13,846	19,984	168,544	120,062	173,051
	(share of developing countries in total imports of the product group)											
1965	9.1	3.0	2.7	13.1	0.6	4.1	10.1	0.8	4.7	33.0	3.1	17.9
1970	9.1	5.8	2.9	10.9	1.2	4.6	8.4	0.7	4.7	24.6	3.2	20.9
1975	7.3	4.1	3.6	7.2	1.0	6.3	8.0	1.3	7.0	23.7	4.8	30.9
1980	9.1	5.2	4.6	7.9	1.4	8.2	7.3	0.9	7.9	22.8	6.9	39.6
1984	10.0	7.1	5.2	8.4	2.9	8.8	5.7	1.0	10.2	20.4	10.1	42.1
1985	9.4	6.6	5.1	7.1	1.7	8.3	6.0	1.3	8.8	19.0	9.8	40.2
1986	8.1	4.9	5.4	7.1	1.5	8.6	5.3	1.2	7.8	19.3	10.2	40.5

Source: All statistics were compiled from United Nations Series D Commodity Trade Tapes. Appendix Table 1 provides a tabulation of products in the labor intensive group in terms of the SITC classification system. The "other imports" group shown in this table includes all other SITC products with the exception of items falling in SITC 3.

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