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5 Labor Coefficients in Trade: Results from the Country Studies

The theory presented in the preceding chapter, and the fact that alternative trade strategies induce significant differences in the commodity composition of output and trade, strongly suggests the need for a categorization of commodities beyond the usual importable/exportable dichotomy as a first step in ascertaining differences in factor proportions among activities. That is the task of section 5.1. Section 5.2 presents the labor coefficients for these categories with respect to domestic value added. Chapter 6 gives particulars pertaining to skills, direction of trade, international value added, and other salient features.

5.1 Categories of Commodities, Industries, and Sectors

In theory there are n commodities, each readily identified and associated with particular producing firms. Again in theory, whether a commodity is exported or imported is ascertained simply by examining trade statistics; each is either exported or imported. Moreover, an analytical classification of items into those whose comparative advantage is based upon "land" or "natural resources" availability and those based upon labor and capital endowment is made by assumption.

For empirical work, each of these three assumptions presents difficulties and challenges. The task of assembling and organizing data in a way corresponding to the theory is formidable for a large number of interrelated reasons. First, the classifications employed in trade statistics and in production and employment statistics often do not correspond and must be reconciled. Reconciliation itself can be done in a number of ways, and it is desirable to choose among alternatives in accord with the precepts emanating from theory, though an element of judgment must inevitably enter in. The task is complicated by the fact that the content of individual

items is not completely homogeneous, particularly in the case of manufactures. Second, at any feasible level of disaggregation of the data, it is almost certain (partly for the reason just cited) that there will be cross-flows recorded in the trade statistics—that is, that both exports and imports will appear. Classification of items among the various trade categories must then be made. Finally, there are empirically and analytically difficult problems concerning the appropriate units of measure and weights to be attached to different items in a category. For this last, answers differ depending upon the questions being asked.

Sorting out these issues was one of the major tasks of the project. This section describes how they were resolved, and why, which is useful for interpreting the data reported below and judging the extent to which they are comparable across countries. Naturally, it is also hoped that the lessons learned during the course of the project will be valuable for future research efforts.

5.1.1 The Questions

For purposes of evaluating the implications of alternative trade strategies for the demand of labor, a first and essential task is to identify the commodities whose output would expand or contract significantly in response to alterations in incentives. Consider the problem that would have confronted a researcher or policymaker in South Korea in the late 1950s. The economy was heavily oriented toward import substitution, with a greatly overvalued exchange rate. Its trade deficit was significantly larger than its exports, and such exports as there were consisted 88 percent of primary commodities and 12 percent of manufactures. Even those processed goods that were exported were primarily items arising from temporary excess capacity in individual import substitution industries: the hallmarks of the trade statistics for manufactured items in the 1950s were that exports fluctuated and that there were no commodity categories that exhibited anything like sustained growth.

If researchers in the late 1950s attempted to estimate the probable effect on the demand for labor in South Korea of an alteration in trade strategy, they would have been badly misled had they projected an across-the-board expansion of all exports. Their major challenge, in fact, would have been to identify the commodities whose export would expand rapidly under the export promotion drive.

For the two countries, Brazil and Colombia, for which data were available covering the transition from import substitution to export promotion, authors tried to identify differences in the characteristics of the export bundle under the two regimes. That effort is reported upon below. Here a first task is to try to indicate the alternative measures that might be used to identify different aspects of the relationship between trade strategy and commodity composition of trade.

Consider the following questions:

1. What is the net factor content of a country's total trade?
2. What are the implications for factor markets of
   a. an expansion of exportable production and an offsetting contraction of import-competing production to leave the trade balance unaltered?
   b. an expansion of HOS-exportable production and an offsetting contraction of HOS-importable production to leave the trade balance unaltered?
3. What the the implications for the country's trade balance of
   a. an expansion of exportable production and an offsetting contraction of import-competing production to leave domestic employment unaltered? Or to leave demand for domestic capital services unaltered?
   b. an expansion of HOS-exportable production and an offsetting contraction of HOS-importable production to leave domestic employment unaltered? Or to leave demand for domestic capital services unaltered?

Under some conditions information to answer each of these questions would be much the same; but under other conditions it may be different. Understanding why is important for explaining many of the decisions made about data procedures in the course of the research.

There are three problems: categorization of commodities; choosing weights to find the relevant aggregates; and defining the appropriate units. Each of these is discussed in turn.

5.1.2 Categories of Commodities

The theory outlined in chapter 4, and knowledge that countries' exports of manufactures grow even more rapidly than exports of primary commodities, both motivated a delineation of traded commodities into "HOS goods" and primary commodities. Authors were first asked to use their judgment in deciding which commodities were primary (NRB, or natural resource based). All others were then classified as HOS. Within the HOS classification, however, there were some processing activities where authors judged that the country's ability to process the good economically hinged in large part on the domestic availability of the primary commodity. In those instances authors then formed a subcategory within the HOS classification, called PCB (primary commodity based) HOS goods.

The next step, and one of the most troublesome, was to identify for each country which industries and activities produce "exportables" and which are "import-competing." One means is to use the existing trade pattern and weights derived from it. The difficulties with this procedure are several: (1) to the extent that import substitution regimes have

provided prohibitive protection to industries, use of recorded trade figures completely omits an important component of import-competing activities—a serious problem if consideration is being given to what might happen under a switch in trade policies; (2) in many import substitution regimes, there are very few manufactured (HOS) exports, and there is a problem of identifying which sectors and activities might have a comparative advantage if trade strategies were shifted; and (3) as already mentioned, there are grounds for believing that traditional exports would not expand as rapidly as nontraditional ones upon alteration of trade strategies. The experience of Brazil, Colombia, and South Korea in their export drives certainly lends credence to this view.

Using net trade figures simplifies the problem of identifying particular commodities as importable or exportable, but for purposes of the project the disadvantages were judged to outweigh the advantages. Instead an alternative procedure was chosen. Define a statistic, T_i as:

$$T_i = \frac{C_i - P_i}{C_i}, \tag{1}$$

where C_i = domestic utilization and P_i = domestic production. Each commodity or sector was classified as:

exportable if $T_i < X_0$;

import-competing if $X_0 \leq T_i < X_1$; and

noncompeting if $X_1 \leq T_i \leq X_2$,

where the X's were chosen by the country authors.[1] T_is were then used by country authors to classify commodities. It was not deemed desirable or sensible to have common cutoff points: the range of T_is within countries varied substantially with the degree of disaggregation of the available production and trade statistics; the higher the level of aggregation, the more crossflows are likely to be recorded in a particular category.[2]

Data limitations precluded the use of comparable categories of commodities or levels of aggregation across countries. Moreover, there were inevitably sectors where authors' knowledge of policies and other factors led them to reclassify particular sectors despite the criterion set out above. It should be recalled, therefore, in all that follows that the present state of knowledge and data availability prevented the delineation of comparable categories across countries and that such comparisons as are made are subject to these qualifications.

Several substantive points about the T_is should be noted. First, and perhaps most interesting, T_is alter over time with the changing nature of the trade and payments regime. Thoumi carefully analyzed the ways in which the commodity composition of trade was changing for Colombia over the period 1970–73 period as firms had time to respond to altered

incentives. Some changes were associated with specific events, such as changing world commodity prices of some of Colombia's exports. Overall, however, sectors that were subject to low rates of effective protection were far more likely to switch to exporting than were sectors with higher rates of effective protection (Thoumi 1981, p. 159). Thus four industries that appeared to be import-competing in 1970 had an average rate of effective protection of 11 percent; they turned into exporting industries by 1973. Conversely, four industries that had been classified as exporters in 1970 had changed to the import-competing classification by 1973. Their average effective protection level was 16 percent. For import-competing industries that remain in the same classification, the average rate was 18 percent.[3]

Second, an alternative to classification by a trade statistic such as the T_is would have been to classify commodities according to their effective rates of protection, classifying those with the lowest rates as the potential exporting industries. As will be seen, some authors did this. Difficulties with this procedure are several: in some countries there is systematic discrimination between effective protection granted for sale in the home market and the protection given to exports of identical commodities.[4] A second difficulty arises because effective rate of protection estimates are generally available only at the level of aggregation of the input-output table. This was not available for the appropriate period in the case of Uruguay, and it was fairly aggregated in some other countries. Use of the T_i statistics permitted greater disaggregation than would otherwise have been possible.

Finally, effective rates of protection reflect two things: on one hand, they reflect excess of production costs over international value added; on the other hand, they may also reflect elements of monopoly profit accruing to producers who are enabled to sell their output behind a wall of protection without significant competition. Nonetheless, in some countries authors judged a classification according to the level of effective protection to be meaningful and included it in their analysis (see table 8.1 below).

We thus have the following categories for exportables: HOS-PCB, HOS-other, and NRB. Deciding which category each exportable belonged to was left in part to the judgment of country authors. In particular, there is a fine line between HOS-PCB manufacturing industries and other HOS industries. South Korea, for example, has imported lumber (primarily from Indonesia) and developed a sizable plywood industry for export. It is evident that the industry is not, in South Korea, based upon any cost advantage derived from raw material availability, and it should be regarded as an HOS-other exportable. If Indonesia developed such an industry, the question would naturally arise, Does its presence derive from the cost advantage associated with the raw material, or is it an

industry whose comparative advantage stems from other factors of production? There is no easy answer to these questions, and country authors were asked to use their judgment in dividing industries between the two groups: in cases where they believed there was considerable margin for doubt, estimates were often presented including and excluding the questioned activities.

For imports, there are items for which there is no domestic competing production (noncompeting imports), and there are imports that compete with domestic production. Among both noncompeting imports and import-competing industries, there are primary commodities and HOS goods. However, a further breakdown is called for, especially among HOS goods. There are industries that would be import-competing even under free trade, and there are industries whose existence depends upon sufficiently high levels of protection.[5] Thus, HOS import-competing goods were further broken down into "natural" import-competing industries and "protected" import-competing industries.

5.1.3 Weights and Units

Returning to the questions posed in section 5.1.1, we now have identified commodity categories. For purposes of estimating the influence on the demand for labor of a shift in trade strategies (at constant factor input prices), it is probably HOS exportables and HOS import-competing goods that are of primary concern.

Indentifying which commodities and industries belong to each trade category is only the beginning of an answer to the problem posed in section 5.1.1. It is also necessary, once data are available for individual components of the various categories, to find meaningful ways of aggregating them into an average for the classification as a whole. And, just as trade weights (subject to a qualification discussed in section 5.1.3.2) are appropriate for estimating the net factor content of trade while the T_i statistic may be more suitable for classifying commodities to estimate the probable magnitude of the effect of a shift in trade strategies, so too the question of appropriate classification and weights may have a different answer depending upon the problem at hand, and even upon the situation pertaining in individual countries.

5.1.3.1 Trade or Production Weights?

It is evident that if one is considering the question of how the demand for labor might shift with a reallocation of resources into exportable production from import-competing production, one would ideally like to know not only which industries would expand and contract, but by how much. As a first approximation to that question, and subject to the caution suggested by the Colombian and South Korean experience cited above, it seems reasonable to take the bundle of commodities identified

as HOS exportables by the T_i statistic as an indication of the ones that would expand with a switch in trade strategy. For weighting the various items, trade weights would then appear appropriate.

For the contraction of import-competing activities, however, it does not seem reasonable to use trade weights, especially when imports consist primarily of goods that are no longer domestically produced. Instead, production weights across existing import-competing HOS industries are more appropriate.

By contrast, if one were considering the effects of switching from an outer-oriented trade strategy to an import substitution one, it would be reasonable to use trade weights for both HOS import-competing and exportable goods, since further import substitution would imply the development of industries where demand was currently met primarily with imports.[6]

Thus, whereas trade weights seem to be appropriate for exports for evaluating all the questions posed at the outset, production weights may be more suitable for import-competing goods if contraction of the import-competing sector is under consideration.

5.1.3.2 Units: Value Added

There are several reasons why value added, rather than output, is the appropriate unit for weighting and for measurement. First, intermediate goods can be traded, and evaluation of the labor coefficients attaching to a shift in trade strategy will accurately reflect probable outcomes if use is made of value added as the unit under consideration, especially if the shift in question is toward an export orientation.

There is a second reason, however, that was equally important in some of the project countries and was relevant because trade was initially imbalanced. If interest was in the net factor content of trade, in the presence of initially balanced trade, output could be the unit of measure. Aggregation could be performed with weights corresponding to the shares of individual exports and imports in their respective totals. Taking domestic coefficients for labor and capital employed per unit of output in each industry, L_i and K_i, one could then simply perform the aggregations

$$(2) \qquad L_x = \sum_i e_i L_i \qquad K_x = \sum_i e_i K_i \qquad i = 1, \ldots, n$$

$$(3) \qquad L_m = \sum_i m_i L_i \qquad K_m = \sum_i m_i K_i, \qquad i = n+1, \ldots, s$$

where commodities 1 to n were exports, $n+1$ to s were imports, e_i is the share of the ith exportable in total exports ($= E_i / \Sigma E_i$), and m_i is the share of the ith importable in total imports. L_x, L_m, K_x, and K_m would represent the average input of labor and capital in import-competing and export industries. The net factor content of trade would then be defined by subtracting L_m and K_m from L_x and K_x: one could conclude that the

country was a net exporter of labor if $L_x - L_m > 0$, and a net importer of capital if $K_x - K_m < 0$. The model set forth in chapter 4 predicts that a labor-abundant, capital- and land-scarce country would be a net exporter of labor and a net importer of capital.

Consider now the situation in which trade was not initially balanced (for any of a variety of reasons including the existence of capital inflows or debt-servicing obligations, the effect of weather fluctuations on the quantity of agricultural exports and imports, or the stage of the business cycle in world markets). In the presence of imbalance, several alternative procedures are possible. One could replace the e_is and m_is with E_is and M_is in equations (2) and (3). If this were done, a sufficiently large trade imbalance in either direction might result in a finding that the country was a net importer (in the case of a trade deficit) or exporter (with a trade surplus) of *both* labor and capital.[7] While it is well known that a current account imbalance is the way resources move between countries, it is not obvious what economic interest attaches to the "net factor content of trade" when computed in this particular manner.

Consider instead the implications of the first procedure in the presence of trade imbalance. It is tantamount to scaling down all exports (in the case of trade surplus) or imports (in deficit) by the same proportion. *If* exports and import-competing goods were produced only with primary domestic factors of production and without intermediate goods, such a procedure would appear to present a satisfactory solution to the problem. When intermediate goods are employed in production processes, however, $1 million of output of exports may represent a very different amount of net domestic product than $1 million of imports.

If production of all exports were reduced (increased) by a given amount, imports of intermediate goods would decline (increase). Thus the net trade balance would change by a smaller amount than the change in exports. Thus, to assume increasing exports and imports initially by a like amount, without taking into account changes in trade in intermediate goods, would not be appropriate.

To state the matter the other way around, under the conditions stated a $1 increase (decrease) in exports would lead to improvement (deterioration) of less than $1 in the trade balance, since value added in the export industry was less than the value of output. In the presence of balanced trade, this phenomenon creates no difficulties,[8] but with imbalanced trade when exportables and import-competing industries have markedly different ratios of value added to output, the problem is of some importance.

There remains the question of what value-added concept should be used. There is, after all, value added by a firm, by an industry, and within a country. Total domestic value added in producing steel, for example, can vary depending on whether imported or domestic ore is used: output

from two steel plants might have different total domestic value added because one imported its raw materials and the other obtained them from domestic suppliers.

Under import substitution regimes, firms are very often required to obtain their inputs domestically whenever possible, and actual domestic value added includes value added not only by the firm but also by domestic producers of intermediate goods supplied to the firm. In a perfectly closed economy, of course, inputs—direct plus indirect—equal the value of output, and one is back in the position where no harm is done by taking coefficients per unit of output, direct plus indirect.

Experience has shown, however, that an export strategy requires that firms with export potential be enabled to obtain their inputs from the cheapest possible source, domestic or international. In terms of domestic value added, all that is relevant is the value added by the firm (direct) and the purchase by the firm of home goods that, by their very nature, cannot be obtained from abroad. If firms choose to purchase intermediate goods from other domestic firms, it is presumably because those other firms have at least enough comparative advantage so that they can compete with imports.

For the country studies, therefore, authors were asked to compute direct input requirements per unit of direct value added, and also direct-plus-home-goods-indirect requirements per unit of direct-plus-home-goods value added.[9] Some authors, in addition, computed total direct plus indirect inputs for various categories of goods in addition to home goods. Such calculations can be useful for indicating what is in fact happening under an import substitution regime (and might even be realistic for purposes of evaluating what would happen under that regime if output in that sector were to expand), but they do not help in indicating the probable effects of an alteration in trade strategy: very often it is the fact that domestic producers are required to purchase high-priced domestic inputs that precludes their ability to export profitably under import substitution.

Deciding that units of value added, rather than of output, are appropriate still leaves one final issue unresolved: whether value added should be evaluated in terms of domestic prices or international prices. It is at this juncture that there is a difference in the answer, depending on whether question 2 or question 3, posed at the outset, is at issue. Recall that question 2 pertained to the implications for factor markets, whereas question 3 related to the trade balance. To see what is involved, it is helpful to put aside the problem of value added for the moment and examine directly the implications of divergences between domestic and foreign prices. Naturally, if there were free trade and if domestic factor markets functioned perfectly, it would be unnecessary to pose the two questions separately, because international and domestic prices would be equal, and an expansion of output (or value added) of one currency unit's

worth of exportables or contraction of one currency unit's worth of importables would be the same regardless of whether domestic or foreign prices were used in the valuation.

However, if significant protection is accorded to domestic import-competing industries, contraction of a unit of import-competing output evaluated at domestic prices will be greater than the same contraction evaluated at international prices. Thus, to effect a contraction of import-competing activities and an expansion of exportables by an amount to keep the trade balance constant will generally free some domestic resources: valued at domestic prices, more resources will be released in the import substitution activity than will be absorbed in the export activity to maintain balanced trade.

As will be seen below (section 6.1), this problem is of considerable importance empirically: using international prices to value outputs (and value added), some country authors found that a dollar's worth of import-competing activity required more of all types of resources (labor, capital, and even skills) than did a dollar's worth of export activity.

As the preceding discussion indicates, answers to question 2—implications for factor markets—require the use of domestic prices in evaluating various baskets of goods. In particular, when value added is used as the basis for evaluation, as it should be when intermediate goods are important, domestic value added (DVA) is the appropriate unit of measure. The basic question pertains to employment of the country's resources, and for purposes of analyzing domestic factor markets, domestic prices (of value added and of factors) are the appropriate unit of measure.[10]

For answering question 3, however, international value added is the appropriate unit. This is because maintaining balanced trade would occur only when international value added in the expanding sector equaled that in the contracting sector.

For the data presented in section 5.2 and later chapters, therefore, value added is always used as a basis for weighting, and it is always indicated whether domestic or international value added is the unit and whether direct or direct-plus-home-goods-indirect value added is the basis. Classification of commodities into trade categories was made in accordance with the T_i statistic except as otherwise noted. Finally, the weights are generally trade weights, except in those instances where further import substitution was considered the relevant alternative.

5.2 Labor Coefficients by Trade Categories

5.2.1 Direct Labor Coefficients

For reasons indicated in chapters 2, 3 and 4, observed labor coefficients are the joint outcome of underlying comparative advantage, the incen-

tives accorded by the trade regime, and conditions in domestic factor markets. Nonetheless, they are of interest in their own right and are presented here and in chapter 6. It remains for chapters 7 and 8 to undertake an analysis of the reasons for the findings and the ways trade strategies and factor market imperfections influenced the observations.

Table 5.1 gives estimates of labor inputs per unit of DVA in various exportable trade categories expressed as a ratio of the labor per unit of DVA in HOS import-competing industries. For Brazil, for example, the average labor input per unit of DVA in HOS exportables was 2.07 times as much as the labor input per unit of DVA in import-competing HOS activities.

The first two columns give comparable estimates, again as a ratio to the figure for import-competing industries, for non-primary-commodity-based HOS exportables and PCB-HOS exportables separately.[11] A final

Table 5.1 **Direct Labor Coefficients per Unit of DVA (Ratio of Coefficients in Designated Trade Category to Coefficients in HOS Import-Competing Activities)**

		HOS Exports			
Country	Period	Manufactures Not PCB	PCB Manufactures	Total	NRB Exports
Argentina	1963	n.a.	n.a.	1.24	n.a.
	1973	n.a.	n.a.	1.30	n.a.
Brazil	1970	n.a.	n.a.	2.07	2.02
Chile	1966–68	1.50	n.a.	.80	n.a.
Colombia	1973	n.a.	n.a.	1.88	n.a.
Indonesia	1971	1.58	n.a.	2.09	n.a.
Ivory Coast	1972				
Modern sector		n.a.	n.a.	1.35	2.28
Total		n.a.	n.a.	1.16	9.04
Pakistan	1969–70	1.23	1.69	1.42	n.a.
Thailand	1973	3.20	1.58	2.07	n.a.
Tunisia	1972	2.08	.79	1.28	3.31
Uruguay	1968	n.a.	n.a.	1.53	1.45

Notes:

Ivory Coast: Modern sector ratios are relative to modern sector employment in modern sector HOS importables; total employment (including artisans) is relative to employment in all HOS importables.

Tunisia: Crude and refined oil are excluded from the individual exportable estimates; manufactured consumer goods were used for protected imports; import-competing sectors exclude those with negative IVA.

Uruguay: Data are for total workers per DVA (Bension and Caumont 1981, table 11.12).

column gives estimates, for those countries for which they are available, of the labor coefficients for NRB exportables. The Ivorian estimates provide an indication of some of the complexities of attempting to associate particular groups of industries with alternative trade strategies. In that country, natural resource based exports have predominated. For those commodities, "artisanal" labor is employed, and expansion of NRB exports (and NRB import-competing production) would entail increased demand for artisanal labor (some of which comes from immigration from neighboring countries). Artisanal labor is naturally unskilled, and most NRB export activities are highly labor intensive. Contrasting the labor coefficients for NRB exports with that for total labor in all HOS import-competing activities shows that NRB exports require more than nine times as much labor per unit of domestic value added. It is also true that labor per unit of DVA in NRB imports is higher, though not as high as that for NRB exports.

However, consider the case when attention turns to the modern sector in the Ivory Coast. HOS exportables produced in that sector are about one-third more labor intensive than are HOS import-competing goods produced in the moden sector, while modern NRB exportables are more than twice as labor intensive as HOS importables Thus, expansion of either NRB exports or HOS exportables would entail a greater demand for labor, given existing factor proportions, than would expansion entailing the same increase in DVA in the corresponding import-competing activities. If, however, expansion of DVA in the modern sector were to come about by pulling resources out of the traditional sector (and assuming that average and marginal coefficients are equal), it appears that the total demand for labor would decline. To be sure, this raises many of the problems discussed earlier, and in particular the question whether marginal labor requirements, especially in the traditional sector, can be approximated by average labor coefficients.[12] Nonetheless, it seems clear that an export-oriented strategy that encourages both types of exportable activities will lead to a greater increment in the demand for labor under Ivorian conditions than would an import substitution strategy.

It is of interest that, in all countries except Chile, total HOS exports had labor coefficients per DVA that exceeded those in the corresponding import-competing sectors. In the Chilean case, pulp and paper is a significant component of HOS exports;[13] when pulp and paper was treated as a PCB industry, Chilean HOS-other manufactures required 1.5 times as much labor as Chilean import-competing HOS activities. The differences between labor coefficients for total HOS exports and HOS import-competing industries are sizable for many of the countries, exceeding a factor of two for Brazil, Indonesia, and Thailand, and also exceeding that number in Tunisia when PCB-based manufacturing is excluded.

It is perhaps somewhat more surprising that, in those cases for which data were available, NRB exports turned out to be more labor-using per unit of DVA than were HOS import-competing industries.[14] In most cases this result is simply a reflection of the fact that most NRB exports originate from the agriculture sector, in which output per worker is very low and techniques of production are very labor intensive. As was discussed in chapter 2, there are important and unresolved questions about the functioning of rural labor markets and the interpretations of the observed labor coefficients. The predominance of NRB, labor-intensive exports in the total export bundle is yet another reason why labor coefficients should be estimated separately for NRB and HOS goods.

The reader will have observed that data for South Korea were not included in table 5.1. The reason for this omission is that estimates of the factor content of South Korea's trade have been made in terms of labor and capital inputs per unit of output rather than per unit of DVA. Hong's estimates for South Korea are for total trade, including both NRB and other trade in one category. A major difficulty with this is that the Westphal-Kim estimates[15] show the primary industries are generally considerably more labor intensive than manufacturing, as was true of the other countries. However, import-competing primary activities (which in the case of South Korea includes some major food grains) were about twice as labor intensive as were exporting primary activities.[16] Table 5.2 therefore reproduces the Westphal-Kim estimates for manufacturing sectors only. In light of South Korea's lack of raw materials, it is likely that there are few manufacturing sectors deriving their comparative advantage from raw material availability, so that the figures can be taken as representative of HOS categories.

As can be seen, South Korea's manufactured exports were on average less labor-intensive than her manufactures sold in the domestic market in 1960, although they were about one-third more labor-intensive than import-competing manufacturing. That year marked the start of the South Korean export promotion drive. By 1963 exports had increased their labor intensity relative to import-competing goods, and also relative to domestic output. By 1968 the labor/capital ratio in exporting had increased to 3.55, while that in import-competing industries was 2.33: all

Table 5.2 **Manufacturing Factor Proportions in South Korea, 1960–68 (Labor/Capital Ratios)**

	1960	1963	1966	1968
Domestic output	2.97	2.89	2.67	2.64
Exportables	2.72	3.02	3.24	3.55
Import-competing production	2.09	1.93	1.98	2.33

Source: Westphal and Kim 1977, table 7.10.

manufacturing except that destined for the domestic market had increased its labor/capital ratio over the course of the shift to export promotion.[17]

Data for Hong Kong are also of interest and are presented in table 5.3. Hong Kong has virtually no raw materials, so all exports can be regarded as HOS goods. Sung (1979) based his data on value of trade but made adjustments for differences in value-added ratios between exports and import-competing goods. It is of interest that in Hong Kong, as in South Korea, the domestic value added/output ratio was substantially higher in import-competing than in export industries. In the South Korean case this is in part a reflection of the fact that the authorities were very liberal in permitting exporters to import needed raw materials, but much more restrictive in their treatment of producers of goods destined for sale on the home market. In part, however, it may also reflect the fact that both South Korea and Hong Kong, situated at considerable distances from their major markets, have tended to find production for export most profitable in lines in which they could import raw materials without heavy transport costs. For activities where high transport costs precluded importing raw materials and intermediate goods, reliance upon domestic sources probably led to a competitive disadvantage in their trade.

Overall, the descriptive statistics—labor input per unit of domestic value added—tend to support the notion that HOS exportables, at least in the countries covered in the project, tend to be more labor-using than HOS import-competing production. This conclusion holds regardless of the influences of policy measures and other phenomena upon factor proportions and the commodity composition of trade. To be sure, these

Table 5.3 **Factor Proportions in Hong Kong's Trade (per Million Hong Kong Dollars Value Added of Trade, Current Prices)**

	1962		1973	
	Exports	Import-Competing	Exports	Import-Competing
Direct				
Depreciation (HK $000)	34	49	55	71
Profits (HK $000)	303	290	223	315
Labor (man-years)	265	279	74	60
Professional labor (man-years)	.87	1.98	.56	1.10
Direct Plus Home Goods				
Depreciation (HK $000)	34	47	60	74
Profits (HK $000)	301	290	263	346
Labor (man-years)	244	256	68	56
Professional labor (man-years)	1.44	2.59	.85	1.36

Source: Sung 1979.

statistics provide only a glimpse into the possible orders of magnitude of the potential impact on employment of a shift in trade strategy. Certainly, however, they suggest that a shift toward an outer-oriented trade strategy would generally not be inconsistent with the goal of increasing employment opportunities.

5.2.2 Direct-Plus-Home-Goods-Indirect Labor Coefficients

The pattern of factor demand implied by alternative trade strategies appears in general to be little affected by whether direct or direct-plus-home-goods-indirect coefficients are used. Data for Hong Kong were reported on both bases in table 5.3 above; as can be seen, all orders of magnitude are much the same except for the professional category, which will be discussed below. For the project countries, data on labor coefficients when home goods demands are taken into account are summarized in table 5.4.[18]

As can be seen, exportable HOS activities are more labor-using per unit of domestic value added than are the import-competing sectors. In most countries, inclusion of direct and home-goods-indirect inputs tends to result in a somewhat smaller differential between HOS exportable and import-competing sectors. This is only to be expected: unless there are underutilized factors of production or an NRB sector with extreme factor proportions, a country's overall capital/labor ratio will be a weighted average of the ratios in each sector. Only if the home goods ratio lies outside the ratio in either exporting or import-competing goods (as it apparently did in South Korea in 1960) could inclusion of labor utilized indirectly in home goods for production of exportables or import substitutes accentuate differences in direct labor coefficients.

5.2.3 Coefficients for Noncompeting Imports

As we saw in chapter 4, there are good analytical grounds for expecting that large differences between the factor intensity of a particular industry and a country's factor endowment are likely to be reflected in patterns of specialization in production. In the absence of protection, one would observe only "competitive" import-competing production, which would generally be expected to consist largely of goods whose factor intensities were not too "far away" from the country's factor endowments. Exceptions would be primarily among goods with relatively high transport costs per unit of value added. With protection of some import-competing industries, this association would be less strong; nonetheless, one would still anticipate that, by and large, the greater the divergence between the country's factor endowment and the factor intensity of a commodity, the less inclined the authorities would be to grant adequate protection to make the industry profitable domestically.

Table 5.4 **Direct-Plus-Home-Goods-Indirect Labor Coefficients per Unit of DVA (Ratio of Coefficients in Designated Category to Coefficients in HOS Import-Competing Activity)**

Country	Period	HOS Exports			NRB Exports
		Manufacturing Not PCB	PCB Manufacturing	Total	
Argentina	1973	n.a.	n.a.	1.15	n.a.
Brazil	1970	n.a.	n.a.	1.65	1.97
Chile	1966–68	n.a.	n.a.	1.64	n.a.
Indonesia	1971	1.58	n.a.	1.92	n.a.
Ivory Coast	1972				
Modern		n.a.	n.a.	1.35	2.21
Total		n.a.	n.a.	1.17	8.54
Pakistan	1969–70	1.30	1.57	1.41	3.86
South Korea	1968	n.a.	n.a.	1.09	n.a.
Thailand	1973	1.88	1.32	1.53	n.a.
Tunisia	1972	1.67	.93	1.24	2.41
Uruguay	1968	n.a.	n.a.	1.13	1.10

Notes:
Argentina: Data from Nogues, 1980, chap. 2, table 2.8.
Chile: HOS exports to developed countries.
Colombia: No data are available.
Ivory Coast: See note to table 5.1.
South Korea: Hong correspondence—data are per unit of output.
Uruguay: Ratios are for the wage bill per million dollars of DVA in table 5.1. See Bension and Caumont 1981, table 11.12.

A major problem arises, therefore, in attempting to estimate the factor proportions for producing commodities that do not have domestic production counterparts. Where data permitted, country authors were encouraged to attempt such an estimate by locating an input-output table or census of manufactures for a country producing some goods in common but also producing goods that were noncompeting imports within the country. Taking the ratio of inputs in the industries observed in common, it was recommended that authors scale their estimates of what factor requirements would be for the industries where domestic production was classified as noncompeting.

Sung's results for Hong Kong illustrate the procedure and also the order of magnitude of observed differences in factor proportions. He

took spinning, weaving, and dyeing as the most established industry in Hong Kong and computed factor proportions in Hong Kong for 1973 and in the United States for 1947 per million dollars of output. The coefficients in the United States and Hong Kong (in 1973 prices) were as follows:[19]

	Depreciation (HK $000)	Man-Years	Depreciation/ Labor Ratio (HK $000 per man-year)
United States 1947	451	24	18.6
Hong Kong 1973	91	39	2.3

Sung then took the United States coefficients for 1947 for Hong Kong's noncompeting imports and scaled them in the same proportion as the spinning, weaving, and dyeing sector to arrive at an estimate of what the factor intensity might have been. Taking a bundle of HK $1 million of representative noncompeting imports, he was then able to calculate what it would have required for Hong Kong to produce the bundle. His estimates are that, for 1973, the depreciation/labor intensity in Hong Kong that would have been required to produce a bundle of noncompeting imports that would have been 3,227, compared with 1,038 for exports and 1,336 for import-competing production.[20] For Hong Kong, which has free trade with almost no exceptions, the difference between factor intensities of exportable and import-competing production is relatively small compared with that between either of those categories and noncompeting imports. This is, of course, the forecast that was made initially.

Wontack Hong provided a similar estimate for South Korea. His estimate for 1970 of the capital/labor ratio for all exports was $1,478 and that for all (HOS and NRB) import-competing products was $1,554.[21] He then used four different sets of coefficients (all at 1970 prices) to estimate the factor intensity of noncompeting imports: the United States coefficients for 1947 and 1958 and the Japanese coefficients for 1965 and 1970. Using United States coefficients, he derived estimates of $20,551 for factor intensity based upon 1947 coefficients and $22,630 based upon 1958 coefficients. By contrast, the Japanese coefficients were $4,075 and $4,795. Hong concluded, as did Sung, that "the largest difference in factor intensities lies not between exports and import-competing goods but between both of these categories and non-competing imports" (Hong 1981, p. 34).

Nabli was able to make a comparable calculation for Tunisia, using the French input-output table to estimate coefficients. According to his computations, Tunisia's noncompeting imports would have had an L/DVA ratio about 64 percent that of HOS exportables and 82 percent that of import-competing goods. These differences are in the predicted direction

but are far smaller than the differences computed for South Korea and Hong Kong. In part this may reflect the fact that Tunisia's economy has been heavily oriented toward import substitution and use of fairly capital-intensive techniques (see chap. 6 below for discussion of DVA/IVA discrepancies).[22]

A similar result was obtained for Argentina. Nogues noted that the bulk of Argentine noncompeting imports comes from developed countries. He then computed labor intensity from the 1972 United States Census of Manufactures. The weighted average labor intensity was then scaled up according to the differential labor intensity of Argentina's most important exportable industries in relation to similar industries in the United States. These industries are slaughtering, preparing, and preserving meat; dairy products; fats and oils; and grain-mill products. Nogues concluded that labor intensity of exportable industries was 11 percent higher than what noncompeting imports would require if they were to be produced domestically.

The difficulties with computing input coefficients for comparable sectors are sufficiently great that other country authors were not able to obtain estimates of the factor proportions that would be associated with domestic production of the goods currently imported without domestic competition. The data from Argentina, Hong Kong, South Korea, and Tunisia may be taken as suggestive. The findings are certainly not inconsistent with the hypothesis that patterns of specialization, rather than factor proportions between import-competing and exportable industries, reflect differences in factor endowments.

It remains to chapters 7 and 8 to explore the reasons for the results and to study the determinants of the orders of magnitude involved. Before that, however, chapter 6 surveys some of the more detailed statistics emanating from the country studies that shed light on some of the hypotheses set forth in chapter 4.