Some Effects of Commercial Policy on International Trade, the Location of Production, and Factor Movements

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This paper examines the effects of commercial policy on international trade, the location of production, and factor movements in an international as well as an interregional context. In the course of the discussion, the author analyzes the implications for developing country trade of tariff escalation in the developed, and protection in the developing countries. Also, calculations are made to explain the effects of tariffs on imports and on industrial specialization in a group of 21 developed and developing countries.

These estimates are, however, subject to limitations as they neglect the historical experience of the country's economy responding to changes in protection over time, disregard the effects of quantitative restrictions on imports, and leave out of account the risks due to the possibility of the imposition of trade barriers and changes in exchange rates. In order to indicate the effects of all the relevant factors, comparisons of international and interregional trade have been made. Data for two areas with otherwise similar characteristics -- Northern Ireland and the Republic of Ireland -- show export-production and import-consumption ratios and the degree of industrial specialization to be substantially higher in the former, which admitted British goods duty free, than in the latter, whose economy was heavily protected. U.S. regions, too, are more specialized -- less diversified -- industrially than comparable European countries, Canada, and Japan.

The results point to the importance of commercial policy in determining the pattern of international trade and the location of production. At the same time, the experience of the European Common Market fails to show the reversibility of the effects of commercial policy on the industrial structure.

Tariffs and other commercial policy instruments affect not only trade but also international factor movements. There is evidence that tariffs have led to the inflow of capital in the protected industries of some countries and the inflow of labor in others, although the results are inconclusive in several cases.

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For purposes of this paper, commercial policy is defined to include tariffs and other restrictions on imports as well as taxes and subsidies on exports. Since a devaluation is equivalent to the simultaneous application of tariffs on imports and subsidies on exports at equal rates, it will be considered together with commercial policy measures.

In order to indicate the possible effects of commercial policy on international trade and the location of production, one first needs to examine the relationship between interregional and international trade. This will be done in Section I, with attention given to efforts made to place the theory of international trade in the framework of location theory.

In turn, Section II will consider the impact of commercial policy measures on imports and on industrial composition in particular countries. Also, empirical tests will be offered to explain intercountry differences in imports and in the degree of industrial specialization in terms of per capita incomes, population, and the level of protection.

Section III will investigate differences in import shares and in the degree of industrial specialization in interregional vs. international relationships, with a view to analysing the effects of national frontiers on the location of production. For this purpose, use will be made of data for Northern Ireland and the Republic of Ireland as well as for nine U.S. regions and comparable industrial countries.

If commercial policies influenced the location of production, the question remains as to how the elimination of tariffs would affect locational patterns.
This question will be examined in Section IV in the context of the European Common Market, with further attention given to the impact of trade liberalization in the United States.

Finally, Section V will deal with the effects of trade barriers on factor movements. Consideration will be given to both capital and labor movements, with reference made to available empirical evidence for the European Common Market, the United Kingdom, Australia, and Canada.

I

The *locus classicus* on the relationship between interregional and international trade is Bertil Ohlin's *Interregional and International Trade* (1933). Ohlin considers international trade theory as a special case of the theory of interregional trade, "where the regions are different countries" (p. 68). In turn, the theory of interregional trade is regarded as a form of location—in Ohlin's terminology, localization—theory (Chapter XII), thus linking international trade theory and location theory.

This linkage is made explicit in the statement that places the theory of international trade in the framework of location theory. "When ... the costs of transport within regions and countries are taken into account, there is need for a general localization theory, which considers at the same time regions and districts of many different kinds, among which are the various countries;... A theory of international trade must, therefore, be founded upon the general localization theory; indeed, it consists of a localization theory which gives special attention to the circumstances arising from the existence of a number of countries" (p. 243).
Taking Ricardo and his followers to task for having neglected transport costs in formulating the doctrine of international specialization, Ohlin reiterates that "the theory of international trade is nothing but internationale Standortslehre [international location theory]" (p. 589). And, he considers one of the principal objectives of his work "to demonstrate that the theory of international trade is only a part of a general localization theory ..." (p. vii).

According to Isard and Peck, "the inspiration for Ohlin's statement can be traced to Alfred Weber's criticism of classical trade theory for ignoring the significant amount of industry which is transport-oriented ..." (1954, p. 97). Weber's ideas (1911) were further developed by Lüsch (1956), who suggested replacing the classical doctrine of international specialization by location theory.

In Lüsch's view, "National economies have no inner unity as the theory of comparative costs postulates. Nor is the mobility of the factors of production obstructed by political frontiers as such. Contrary to widespread opinion, national currency differences have been shown to be harmless ... In essence, the processes of national and international trade are the same" (p. 63). Instead of comparative cost theory, Lüsch purports to explain international specialization in locational terms, with reference to supply and market areas being located on two sides of the frontier. And while he admits that "tariff boundaries alter the number and position of location centers, particularly near the frontier" (p. 53), tariffs play a subordinate role in his analysis and exchange rates do not enter at all.

Tariffs and exchange rates receive no mention in Isard's Location and Space Economy (1956), which represents a further extension of Lüsch's work. At
the same time, Isard regards international trade theory as a special case of the general theory of location and space economy: "One proceeds from the latter to the former by assuming a given locational structure of economic activities, by erecting appropriate barriers to correspond to the boundaries of nations, and so forth" (p. 53).

It appears, then, that location theorists have come to increasingly emphasize the role of transport costs and other locational factors in determining international specialization at the neglect of commercial policies. In so doing, they have departed from Ohlin's tradition, according to whom "protective tariffs bar the different national markets from one another more completely than the other costs of transfer / i.e., transport costs/ could do alone" (p. 296). Ohlin further noted that "varying currency systems cause the mechanism of trade between countries to differ from that of other sorts of trade" (p. 244), that cumbersome customs formalities, government preference for domestic products, and a variety of other factors, too, create obstacles to international trade (pp. 245-6).

The increased emphasis on transport costs and the reduced emphasis on commercial policy in recent contributions to location theory would lead one to expect that transport costs have become more -- and commercial policy less -- important in affecting international specialization. In fact, the opposite has been the case; since Ricardo's time, transport costs have declined in importance while commercial policy has assumed an increasingly greater role.

To begin with, as a result of successive revolutions in transportation, transport costs have decreased more-or-less continuously, leading to a fall in their ratio to production costs. At the same time, the advances made in ocean shipping notwithstanding, compared to Ricardo's time the decline has been more pronounced in the cost of surface transportation, with railways and subsequently
trucks taking the place of more primitive means of transport. Thus, if anything, the "inner unity" of national economies has increased over time.

This is indicated by data on transportation costs for pig iron, reported in Appendix A. Taking account of freight, insurance, and the interest cost involved in shipping, we find that the ratio of the cost of land to sea transport per ton mile decreased from 80 to 130 in the second half of the eighteenth century to 8 in 1976. During the same period, the cost of ocean transportation between the U.S. Atlantic Coast and London, expressed as a percentage of the factory price of pig iron, decreased from 18-29 percent to 11 percent while that of land transportation, calculated for a distance of 100 miles, fell from 70 to 3 percent.

The decline in transport costs has been reinforced by changes in the commodity composition of world trade that entailed a fall in the relative share of transport intensive commodities in world trade through the rise in the proportion of manufactured goods in total trade and the increase in the share of commodities with a higher value of weight ratio within manufacturing. The described changes have further been enhanced by innovations in communication, greatly reducing their cost as well as elapsed time.

In turn, commercial policies have come to assume a greater role. Despite reductions in tariffs undertaken during the postwar period, tariffs in the developed countries are higher today than they were at the time of Ricardo and John Stuart Mill, not to speak of the period of practically free trade in Western Europe during the second half of the nineteenth century (Bairoch, 1972). Furthermore, developed countries limit the importation of various commodities by formal and informal quotas that was not the case in the nineteenth century.

Apart from the actual use of quotas, international trade is affected by the risk of their imposition. This is of particular importance for
developing countries who fear that new exports will be subjected to quantitative restrictions once they enter developed country markets in substantial quantities, as it has happened in regard to textiles (Balassa, 1965, p. 70). The flexibility of exchange rates also creates uncertainty in international trade that did not exist under the gold standard.

The effects of uncertainty due to the risk of the imposition of quotas and changes in exchange rates deserve emphasis since they have been neglected in most contributions to international trade theory. With producers being by-and-large risk-aversers, uncertainty as regards changes in relative prices resulting from such actions will provide inducement to expand domestic sales at the expense of foreign sales. In particular, risk considerations will influence decisions on new investment, thereby affecting the industrial structure.

These effects may be especially pronounced in developing countries which have not yet embarked on the exportation of various manufactured goods. The development of export industries in developing countries is also discouraged by the high level of protection in these countries, which greatly exceeds levels of protection present-day developed nations had at any stage of their existence (Little, Scitovsky, Scott 1970, ch. 5). In addition to tariffs, protection in developing countries takes the form of quantitative restrictions, foreign exchange licensing, and import prohibitions, all of which tend to differentiate international from domestic transactions.

Various other forms of government interventions, too, tend to favor domestic production over imports in developed as well as in developing countries. They include, among other things, public procurement rules, production subsidies, regional policy measures, and health and sanitary regulations. These measures have assumed increasing importance in recent years and they further distinguish the processes of international trade from those of interregional trade.
We may conclude that, paradoxically, locational theory would have had greater relevance for international specialization in Ricardo's time than today. In turn, the emphasis on the distinction between international and domestic trade prevalent in the writings of Ricardo and John Stuart Mill is more appropriate under present-day conditions than it was in their life-time.

II

The conclusions, according to which the greater role of commercial policy and the reduced importance of transport costs tend to increase the cleavage between international and interregional trade, should not be interpreted to mean that transport costs would have no bearing on international specialization. In fact, following earlier efforts by the German Statistical Office (1929), applications of gravitational models by Savage and Deutsch (1960), Pöyhönen (1963), Pulliainen (1963), and Linneman (1966) have shown the role of transportation costs, more exactly distance, in affecting trade flows.

These gravitational models did not incorporate the level of protection on the grounds that its "average or normal trade-reducing effect is incorporated in the definition of potential foreign trade ..." (Linneman, p. 31). However, in explaining bilateral trade flows in 1959, Linneman successfully used variables expressing preferential trade ties among the countries of the British Commonwealth, the constituent parts of the French Community, as well as between Belgium and Portugal and their colonies. Subsequently, introducing dummy variables to represent the creation of the EEC and EFTA in gravitational models estimated for the years between 1951 to 1967, Aitken (1973) showed the effects of European integration on trade flows.

The use of dummy variables to denote preferential ties cannot be interpreted in terms of elasticities. In turn, estimates of price elasticities of import demand, reviewed most recently by Stern, Francis and Schumacher (1975),
have often been used to calculate the expected effects of tariff reductions on imports (Officer and Hurtebise, 1969). But these estimates will not appropriately indicate the responsiveness of imports to tariffs as they relate imports to variations in prices, irrespective of whether these are autonomous or result from tariff changes, although there is reason to believe that users react differently to autonomous price changes than to changes in tariffs. This is largely because they tend to consider the former to be temporary and the latter to be permanent.

Given the cost of adjustment, reactions to temporary changes may be small while users will respond to changes they consider permanent (Balassa, 1966, p. 187). Also, with effective tariffs exceeding nominal tariffs on most commodities and production responding to effective rather than to nominal rates, a change in nominal tariffs on a particular product will have a greater impact on imports than a price change of equal magnitude that resulted from higher input costs. As Kreinin notes (1967), this result will apply also under all-round tariff reductions as long as larger reductions apply to the product than to its inputs.

Correspondingly, in order to indicate the effects of commercial policy on international trade, the impact of tariff changes on imports needs to be directly investigated. In making estimates in a time-series context, Johnston and Henderson (1969) found that the import surcharge imposed at a rate of 15 percent in October 1964, reduced to 10 percent in April 1965, and abolished the following year, had no lasting effect on U.K. imports. This result may be largely explained by the fact that the import surcharge was imposed on a temporary basis; the same comment applies to estimates of the effects of a temporary surcharge on Canadian imports (Officer and Hurtebise, 1969). At any rate, time series estimates of the elasticities of import demand with respect to price and tariff changes are subject to a downward bias for reasons which are all too well-known to mention here.
These objections do not apply to estimates of the effects of permanent tariff reductions that may involve comparing trends before and after tariff reductions, analysing cross-section data, or making use of control groups. The application of the first of these methods gave tariff-elasticity estimates of -4.5 for the United Kingdom in the early thirties (Scott, 1962, pp. 168-69) and -9 for Germany in the mid-sixties (Wemelsfelder, 1960). In turn, Krause (1962) obtained tariff elasticities (-4.5) much exceeding price elasticities (-1.5) in a sample of 91 commodities for the United States in the 1947-54 period when substantial tariff reductions took place.

Also for the United States, Kreinin (1961) derived a tariff elasticity of -6 for commodities on which tariffs were reduced, using a control group of duty free imports. The control group method was further applied by Finger in estimating the effects of tariff concessions in the Dillon Round (1974) and in the Kennedy Round (1976). Confining ourselves to the results pertaining to the Kennedy Round when tariff reductions were substantially larger, Finger's estimates of tariff elasticities were -9.5 and -14.8 for U.S. imports, -5.4 and -3.9 for EEC imports and -8.0 and -11.9 for Japanese imports from developed and from developing countries, respectively (1976, p. 89).

The cited results point to the fact that tariffs affect imports to a considerable extent, thereby favoring import-competing industries at the expense of export industries. The location of production is further influenced by the structure of tariffs. As Ohlin noted, "in the case of high import duties, raw materials free of duty or slightly taxed are sent instead of manufactured goods with heavy duty charges" (1933, p. 211).

This question is of particular importance for developing countries as the escalation of tariffs from raw materials and unprocessed goods to finished products imported by the developed nations discriminates against their exports of processed goods. In 1964, on the average, nominal tariffs in the
developed countries were 4.5 percent on products in the first stage of transformation, 7.9 percent in the second stage, 16.2 percent in the third stage, and 22.2 percent in the fourth stage, with the corresponding effective tariffs being 4.6, 22.6, 28.7, and 38.4 percent.

Tariff discrimination against the imports of processed commodities from the developing countries tends to offset the cost advantages these countries possess on account of decreases in transportation costs as a proportion of export value from lower to higher stages of transformation. This may in large part explain the fact that the structure of imports into the developed nations is inversely correlated with the height of nominal and effective tariffs.

In 1964, the relative shares of developing country exports from the first through the fourth stage of transformation were 71.2, 23.8, 2.9, and 2.1 percent, respectively. Among the importing countries, the share of processed commodities (stages two through four) was the highest (45.5 percent) in Sweden, where tariffs escalate the least, while it was only the smallest (9.5 percent) in Japan, where tariff escalation is the most pronounced (Balassa, 1968a, p. 589).

Tariffs have been reduced in the framework of the Kennedy Round without, however, appreciably affecting the degree of escalation. While average tariff rates in the developed countries have declined somewhat more on commodities in the second (29 percent) and in the third (30 percent) stage of transformation than on those in the first stage (26 percent), products in the fourth stage (24 percent) have experienced the smallest decline (Balassa, 1968b, p. 207). At the same time, the bias against the processed exports of the developing countries is aggravated by the imposition of quantitative restrictions on the imports of several of these commodities.
The data of Appendix B show that the developing countries have continued to export a relatively small proportion of their raw materials and foodstuffs in processed form in 1970, following the virtual completion of the Kennedy-Round tariff reductions. Comparisons with the composition of exports from the developed countries are particularly noteworthy as a substantial part of trade among the developed countries takes place under tariff-free conditions in the framework of the EEC and EFTA.

In discriminating against the exports of processed goods from the developing countries, tariff protection in the developed nations thus affects the location of production, with developing countries having a smaller share of processing activities than what they would have had in the absence of tariff escalation. In turn, protection in the developing countries tends to increase the use of their domestic resources in protected industries as compared to a free trade situation. In this connection, the effects of the structure of protection on industrial composition in the developing countries is of particular interest.

In an empirical investigation of Pakistani industries, Guisinger (1970) showed that protection was positively correlated with the expansion of production although it was not associated with import shares. In turn, Westphal and Kim (1976) found a positive correlation between subsidies to exports and export expansion in a cross-section study of Korean industries; however, the relationship between protection rates and the growth contribution of import substitution was not statistically significant, and protection rates and import shares were positively correlated. According to Westphal and Kim, the latter results may be interpreted as suggesting that import substitution progressed the least in the most inefficient industries, which needed high protection to survive. At any rate, the use of the null hypothesis in these investigations
(i.e., assuming import shares of all industries to be the identical in the absence of protection) will hardly be appropriate for examining the effects of protection on import structure and industrial composition.

A different benchmark was used by Leamer (1974) who assumed that, in the absence of protection, trade in particular commodity categories among pairs of thirteen developed countries would be explained by their gross national product, population, and distance. Having further introduced tariff variables in the models for 28 commodity categories, Leamer obtained tariff elasticities above -5 in absolute value in ten cases, elasticities of between -2 and -5 in seven cases, and between -1 and -2 in five cases, tariff elasticities were less than -1 or positive in six cases. While the t-values exceed 1 in only eleven cases, we may accept Leamer's conclusion: "The fact that most of the estimates of the tariff elasticities are negative and comparable in magnitude gives us a feeling of greater confidence than seems justified by the standard errors on individual coefficients" (1974, p. 8). This conclusion is strengthened if we consider that tariff elasticities with a positive sign have t-values clustering around .3.

In influencing the volume as well as the composition of imports, tariffs affect the industrial structure of individual countries and the location of production in the world economy. Confining our attention to the country's own tariffs, we would expect that tariffs will reduce the actual extent of trade -- imports as well as exports -- below its potential level under free trade and will also increase the degree of industrial diversification by limiting possibilities for international specialization.

These propositions have been tested by the present author in a sample of 21 industrial and industrializing countries. In explaining intercountry
differences in imports, a protection variable representing average tariffs on manufactured goods\(^1\) has been added to the per capita income and population variables that have been conventionally used for this purpose (Chenery, 1960). The same independent variables have been utilized to explain intercountry differences in industrial specialization as measured by the Theil coefficient of inequality which has desirable theoretical properties (Theil, 1967, pp. 91-93). The higher the coefficient of industrial specialization, the more specialized (the less diversified) is a country's industrial structure\(^2\).

The results of the regression analysis excluding and including the tariff variable are shown in equations (1) and (2)\(^3\). It appears that the elasticity of imports with respect to per capita income and population are somewhat lower than those obtained by Chenery (.98 for per capita income and .72 for population). The differences may be explained by the fact that Chenery's sample contained a larger proportion of developing countries.

\[
\begin{align*}
(1) \quad \log M &= .45 + .81 \log \frac{Y}{P} + .58 \log P \quad R^2 = .86 \\
&= (1.17) (7.05) (7.93)
\end{align*}
\]

\[
\begin{align*}
(2) \quad \log M &= 1.03 + .76 \log \frac{Y}{P} + .63 \log P - .45 \log T \\
&= (2.63) (7.66) (9.67) (2.75) \quad R^2 = .90
\end{align*}
\]

Adding the protection variable increases the explanatory power of the regression and raises the absolute value as well as the statistical significance.

\(^{1/}\) In the case of industrializing countries, the averages also reflect the tariff-equivalent of quotas.

\(^{2/}\) The Theil measure equals \(y_i \log y_i N_i\), where \(y_i\) refers to the \(i\)th industry's share in total manufacturing output and \(N\) denotes the number of industries. It has been calculated in a 27 industry breakdown corresponding to the three-digit International Standard Industrial Classification for the 21 countries included in the sample.

\(^{3/}\) In the equations \(M\) denotes imports, \(C\) the coefficient of localization, \(Y\) the gross domestic product, \(P\) population, and \(T\) average tariffs on manufactured goods; \(t\)-values are shown in parenthesis. The underlying data are reported in Appendix C.
of the constant term of the regression equation. Its introduction further reduces the coefficient of the per capita income variable and increases that of the population variable while raising the level of statistical significance of both of the variables.

The protection variable itself has the expected negative sign and it is significantly different from zero at the 1 percent level. The relevance of the protection variable for intercountry differences in imports can further be indicated by calculating from the regression equation hypothetical values of imports at different levels of protection.

For a country with a per capita income of $2241 and population of 35.6 million, corresponding to mean values in the 21 country sample, estimated import values are $35.7 billion for a zero tariff on manufactured goods, $12.6 billion for a tariff level of 10 percent, $9.3 billion for a tariff level of 20 percent, and $7.7 billion for a tariff level of 30 percent. For the same tariff levels, the ratios of estimated imports to the gross national product are 36.8 percent, 13.0 percent, 9.6 percent, and 7.9 percent, respectively. These figures compare to average imports of $10.3 billion and an average import share of 10.6 percent in the sample.

In turn, one would expect that the degree of industrial specialization decreases -- the degree of industrial diversification increases -- with per capita incomes, population size, and tariff levels. Per capita incomes may be considered to express the degree of technological sophistication which leads to a more diversified industrial structure. Population size will have the same effect as economies of scale can be appropriated in the framework of a larger market. Finally, by discriminating against export industries and providing protection to import-competing industries, tariffs on manufactured goods tend to reduce the degree of specialization within the manufacturing sector according to comparative advantage.
These _a priori_ expectations are borne out by the regression results that are shown in equations (3) and (4).1/ The explanatory power of the regression increases by nearly one-third when we add the protection variable. At the same time, the protection variable, as well as the per capita income and population variables, are significantly different from zero at approximately the 2.5 percent level.

\begin{align*}
(3) \quad C &= 71.73 - 7.46 \log \frac{Y}{P} - 7.32 \log P \quad R^2 = .35 \\
&\quad \quad \text{(4.92)} \quad \text{(1.72)} \quad \text{(2.65)}
\end{align*}

\begin{align*}
(4) \quad C &= 87.40 - 8.72 \log \frac{Y}{P} - 5.79 \log P - 12.30 \log T \quad R^2 = .46 \\
&\quad \quad \text{(5.39)} \quad \text{(2.11)} \quad \text{(2.12)} \quad \text{(1.91)}
\end{align*}

The negative correlation between levels of protection and the degree of industrial specialization can be represented by using equation (4) to calculate the coefficient of industrial specialization for the hypothetical country with average per capita incomes and population in the sample of 21 countries. The estimated coefficients are .491 for nil tariffs, .358 for tariff levels of 10 percent, .331 for tariff levels of 20 percent, and .310 for tariff levels of 30 percent.

III

In the preceding section, we examined the effects of tariffs on international trade and on the location of production taking countries as units. These estimates do not indicate, however, the full impact of commercial policies on international specialization as they relate imports to the level of tariffs at a

1/ Since this paper was prepared, it has been pointed out to the author that in an unpublished study Seev Hirsch (1976) correlated export, import, and output concentration with per capita incomes and population, without, however, adding a protection variable.
given point of time, or to changes in tariffs over a short time interval. In so doing, one neglects the historical experience of the country's economy responding to changes in tariffs over time; disregards the effects of quantitative restrictions on imports; and leaves out of account the risk element due to the possibility of the imposition of trade barriers and changes in exchange rates.

In order to gauge the effects of all these factors, we need to reintroduce the distinction made between the processes of international and interregional trade. Interregional trade is characterized by the absence of tariffs and other policy instruments affecting trade flows as well as by fixed exchange rates in the form of a common currency. Accordingly, comparisons of trade shares and the extent of industrial diversification between countries and regions with similar characteristics may shed light on the effects national policies in general, and commercial policy in particular, have on trade and industrial specialization.

Such comparisons have been made for Northern Ireland and the Republic of Ireland by McAleese (1976). These two areas offer a good standard of comparison, since they are at similar levels of economic development; their manufacturing sectors are of about equal size; they share a common language and culture; their currencies have been at parity since 1922; and both have enjoyed free access to the British market during the postwar period. However, they differ in the availability and use of commercial policy instruments: while Northern Ireland admits British goods duty free, until the mid-sixties the manufacturing sector of the Republic of Ireland was heavily protected, with nominal and effective rates of protection, respectively, averaging 25.5 and 85.0 percent (McAleese, 1971, p. 23).
Using data for Northern Ireland pertaining to 1963 and for the Republic of Ireland in the year 1964, McAleese found substantial differences in trade ratios and in the extent of diversification in their manufacturing sector. Thus, average import-consumption ratios were 45.7 percent and 16.5 percent, and average export-production ratios 59.7 percent and 21.2 percent, for Northern Ireland and the Republic of Ireland, respectively. In turn, in a 29 industry breakdown, the Florence coefficient of industrial specialization\(^1\) for value added was estimated at 45.6 percent and 23.2 percent in the two cases, indicating the specialized character of the regional economy of Northern Ireland as against the diversified industrial structure of the Republic of Ireland. Northern Ireland is also characterized by a high degree of intraindustry specialization as twenty out of its twenty-nine manufacturing industries had both export-production and import-consumption ratios exceeding 30 percent, while there was not even a single such case in the Republic of Ireland.

It may be added that the liberalization of trade during the second half of the sixties, entailing reductions of import tariffs by roughly one-half, has led to an increased opening of the economy of the Republic of Ireland. Between 1964 and 1971, average import-consumption ratios rose from 16.5 percent to 19.6 percent while export-production ratios increased from 21.1 percent to 28.3 percent. During the same period, the coefficient of specialization increased from 23.2 to 25.0 percent. Nevertheless, these ratios remain considerably lower than in Northern Ireland.

\(^1\) For the purpose at hand, McAleese redefined the coefficient of localization introduced by P. Sargent Florence to indicate the extent of industrial specialization as

\[
\frac{1}{2} \sum \left| \frac{y_i - 100}{N} \right|
\]

This coefficient is interpreted in the same way as the Theil measure and the same notation is employed.
Information on interregional trade is not available for the United States. However, net trade balances for individual regions can be derived from data on production and consumption. This has been done for four regions (North-east, North, Central, South and West) in a six-industry breakdown (metals, machinery, transport equipment, chemicals, textiles and clothing, and other manufactured goods) by Hufbauer and Chilas (1974). These authors have calculated specialization indices by relating the sum of the absolute values of net trade in the individual commodity categories to value added in manufacturing. The specialization indices average .65 as against .16 for the European Common Market whose larger member countries are comparable in size to the four U.S. regions. Hufbauer and Chilas also found that interindustry specialization is much greater in the United States than in the Common Market (1974, p. 8).

These results on the extent of interregional specialization are consistent with the observation that industries tend to be more concentrated within the United States than within Western Europe. Thus, while U.S. textile, clothing, shoe, automobile, electronics, and aircraft industries are regionally concentrated, textile, clothing and shoe industries can be found in even the smallest European countries and half-a-dozen European countries have their national automobile, electronics, and aircraft industries.

More detailed comparisons of industrial structure have been made in the 27 industry breakdown used in the regression analysis. Nine U.S. regions have been selected for this purpose: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific. These regions vary in terms of population from 8.3 million for the Mountain region to 40.3 million in East North Central.
and in terms of per capita gross product from $3558 in East South Central to $5425 in the Middle Atlantic region.\(^1\)

Defining economic size in terms of gross national product (or regional product), the U.S. regions are comparable to the major European countries, Canada, and Japan, although the comparisons are influenced by the apparent overvaluation of the U.S. dollar in 1970. Appendix C shows data on population, per capita gross product, and total gross product for the nine U.S. regions as well as for the 21 country sample. Average tariffs on manufactured goods, the value of imports, and coefficients of industrial specialization derived utilizing the Theil measure of inequality are also shown in the table.

The results conform to the pattern observed in Northern Ireland and the Republic of Ireland. U.S. regions generally have the highest coefficients of industrial specialization, indicating that they are less diversified industrially than European countries, Canada and Japan. An exception is one of the smallest European countries in the sample, Sweden, which has a higher localization coefficient than some of the U.S. regions. In turn, for reasons noted below, the East South Central Region has the lowest coefficient of specialization.

Comparisons have been made for four groups of geographical areas selected on the basis of their economic size. In the first group, average specialization coefficients for the Middle Atlantic (gross product of $202 million) and the East North Central ($200 million) regions are about one-third higher than those for Japan ($199 million) and Germany ($194 million). The same relationship

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\(^1\) Population and income data relate to 1970 and have been taken from the *Statistical Abstract of the United States*; per capita gross product data have been derived by multiplying personal income figures for the individual regions by the ratios of GNP to personal income in the United States.
holds between the Pacific ($135 million) and the South Atlantic ($133 million) regions on the one hand, and France ($157 million) and the United Kingdom ($127 million), on the other.

Differences between regional and national specialization coefficients are even greater in the next group, composed of Italy ($94 million), Canada ($78 million), West South Central ($78 million), West North Central ($73 million), and New England ($61 million). They range from 36 percent to 120 percent.

Finally, in the fourth group, the coefficient of industrial specialization for the Mountain region ($36 million) exceeds that for Sweden ($32 million), the Netherlands ($32 million), and Belgium ($26 million) by 17 to 84 percent. In turn, as noted earlier, the East South Central region has the smallest coefficient of industrial specialization in the group. This may be explained by the fact that the region, consisting of Kentucky, Tennessee, Alabama, and Mississippi, is more agriculturally oriented than any other U.S. region and it has primarily assembly and other "finishing touch" industries ranging across the manufacturing sector, its largest industry being printing and publishing.

East South Central is also the only region whose coefficient of industrial specialization is smaller than that for the United States taken as a whole. In turn, the average specialization coefficient for the nine regions (.470), calculated by weighting with value added in manufacturing, is one-third higher than for the U.S. (.356), and there are five regions whose coefficients of industrial specialization are at least two-fifths higher than the U.S. coefficient.

We have further calculated hypothetical values of specialization coefficients for the eight U.S. regions from equation (4). Calculations have been made assuming zero tariffs for the regions as well as a tariff of 11.5 percent, corresponding to the U.S. tariff. These represent possible extreme values since the trade of each region with other United States regions is not subject to duties while U.S. tariffs apply to its trade with foreign countries.
Coefficient of Industrial Specialization

<table>
<thead>
<tr>
<th>Region</th>
<th>Actual</th>
<th>Hypothetical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Zero Tariff 11.5 percent Tariff</td>
</tr>
<tr>
<td>New England</td>
<td>.496</td>
<td>.394</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>.387</td>
<td>.320</td>
</tr>
<tr>
<td>East North Central</td>
<td>.577</td>
<td>.319</td>
</tr>
<tr>
<td>West North Central</td>
<td>.569</td>
<td>.380</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>.357</td>
<td>.341</td>
</tr>
<tr>
<td>East South Central</td>
<td>.225</td>
<td>.404</td>
</tr>
<tr>
<td>West South Central</td>
<td>.443</td>
<td>.373</td>
</tr>
<tr>
<td>Mountain</td>
<td>.554</td>
<td>.424</td>
</tr>
<tr>
<td>Pacific</td>
<td>.519</td>
<td>.343</td>
</tr>
</tbody>
</table>

Except for the aberrant East South Central region, the hypothetical coefficients of specialization are always lower than the actual coefficients. If comparison is made with the zero tariff alternative, differences equal approximately the standard error of the estimate (.086) in three cases, one-and-a-half times of the standard error in one case, and two standard errors in three cases. Should we instead make comparisons with the 11.5 percent tariff alternative, the differences between actual and hypothetical values range between 1.7 and 3.7 standard errors of the estimate.

The results support the hypothesis that tariffs do not fully reflect the obstacles to international trade. At the same time it should be emphasized that the results for U.S. regions underestimate the degree of industrial specialization. This is because the definition of regions is an administrative rather than an economic one; it cuts across economic regions by dividing several metro-
politan areas between different administrative regions and by combining natural economic units into one region.

IV

The comparisons of trade shares and industrial structure in the intercountry vs. interregional context reported here indicate the importance of commercial policy in determining trade patterns and industrial specialization. The estimates further provide support to the proposition that one tends to understate the effects of commercial policy by limiting attention to tariffs alone.

The question remains, however, if the relationship between commercial policy, on the one hand, and international trade and the location of production, on the other is fully reversible. Should this be the case, the elimination of tariffs would lead to the restructuring of production so as to establish a situation that would have existed if tariff barriers had never been imposed. In this connection, the experience of the European Common Market since its establishment offers particular interest.

In the Common Market, tariffs and other protective measures were abolished over the 1958–67 period and a common commercial policy was established on the EEC level. It would be too early for the full effect of these measures on industrial location to have taken place during the short period that has elapsed since. Nevertheless, it is possible to discern the direction of changes that have occurred.

The traditional theory of international trade would lead us to expect that the elimination of tariffs gave rise to interindustry specialization through the reallocation of resources from import–competing to export
industries, with consequent changes in the location of production. As the author first noted in 1963, this had not in fact happened following the Common Market's establishment; instead of interindustry specialization, the expansion of intra-EEC trade was characterized by intraindustry specialization, i.e. increases in the mutual trade of the member countries within particular commodity categories (Balassa 1963, p. 179).

Subsequent statistical testing carried out in a 91 commodity group breakdown has confirmed these conclusions (Balassa, 1966a and 1974). The tests involved estimating rank correlation coefficients between the export composition of particular pairs of countries and calculating "representative ratios" of trade balances. The latter has been defined as the unweighted average of the ratios of the absolute differences between exports and imports to the sum of exports and imports in each commodity category.¹ Should interindustry specialization predominate, we would expect this ratio to approach unity since the country would export or import a particular commodity (commodity group). Conversely, in the event of intraindustry specialization, the ratio would approach zero as exports and imports would tend toward equality within each category.

Rank correlation coefficients of export composition in the individual member countries rose to a considerable extent following the Common Market's establishment, pointing to increasing similarity of the

¹/ Denoting intra-EEC exports in commodity category i by \(X_i\), and imports by \(M_i\) the formula for the representative ratio is

\[
\frac{\frac{1}{N} \sum_{i=1}^{N} \frac{|X_i - M_i|}{X + M}}{\frac{1}{N} \sum_{i=1}^{N} \frac{X_i + M_i}{X + M}}
\]
export structure of the participating countries. Thus, unweighted averages of the rank correlation coefficients calculated for all pairs of countries rose from .53 in 1958 to .67 in 1963 and, again, to .76 in 1970 (Balassa 1974, p. 120).

In turn, while the "representative ratios" for the individual EEC countries were in the .39-.58 range in 1958, they were between .32 and .52 in 1963 and between .27 and .41 in 1970. From 1958 to 1970, the average decrease in the ratio for all the EEC countries was 30 percent, the largest decline taking place in Germany (38 percent) and the smallest in Belgium (26 percent). The elimination of tariffs, then, has led to increasing intraindustry rather than interindustry specialization.

These results can be explained if we consider the importance of product differentiation in trade among developed countries. Only a few manufactured goods (e.g. steel ingots, aluminium, and paper) traded among these countries are standardized products while the large majority are differentiated products that can be protected and exported. In the presence of national product differentiation, then, the elimination of tariffs would tend to lead to the exchange of consumer goods and to increased specialization in narrower ranges of machinery and intermediate products.

The increased exchange of consumer goods is compatible with unchanged production in the consumer goods industries of each of the participating countries while changes in product composition can be accomplished in the framework of existing machinery and intermediate products industries. Correspondingly, the elimination of tariffs in trade among the developed countries does not necessitate radical changes in their industrial structure.
These findings are confirmed by the experience of the United States. Following multilateral reductions in tariffs, the "representative ratio" for the United States, calculated for the same 91 industry commodity breakdown, fell from .59 in 1958 to .45 in 1970. Nevertheless, the 24 percent decline in the U.S. ratio was less than for any of the Common Market countries, indicating that the elimination of tariffs has a greater effect on intraindustry specialization than partial reductions in tariffs.

One may conclude that, once manufacturing industries have been established, the elimination of protective measures on trade among developed countries does not appear to reverse the effects these measures had on industrial composition and the location of industry. This conclusion points to the importance of the learning-by-doing process that takes place during the period of acclimatization of an industry. It also indicates the role played by product differentiation in trade among the developed countries.

It cannot be assumed, however, that these conclusions would apply to trade between developed and developing countries, where differences in factor endowments and production costs are greater and exports of standardized products are more important. Correspondingly, the elimination of barriers to the mutual trade of these countries may lead to substantial shifts in resources. But, the effects of tariff changes on the location of production between the two groups of countries awaits further study.
Thus far, we have considered the effects of commercial policy on international trade and on the location of production without giving attention to international factor movements. However, as Ohlin first pointed out, international factor mobility is a substitute for commodity trade to the extent that intercountry differences in factor endowments are reduced as a result (1933, ch IX). Ohlin further suggested that obstacles to commodity trade tend to encourage the international movement of the factors of production. Thus, "the tariff policy of recent decades, by placing obstacles in the way of international trade, has in many cases induced firms which were exporting a given commodity to establish production in the protected country" (1933, p. 334).

The effects of commercial policy on international factor movements were formulated in a rigorous fashion by Mundell (1957). In the framework of a two country - two commodity - two factor model he showed that, if the assumptions of factor-price equalization are fulfilled, under perfect factor mobility a small tariff will remove the conditions for commodity trade. In turn, Schmitz and Helmberger (1970) noted that trade and factor movements may be complementary if the model is amended to introduce intercountry differences in natural resource availabilities, in which case increased factor movements may lead to more rather than to less trade.

There is a considerable amount of scattered evidence on tariff protection giving rise to the inflow of capital in the United Kingdom (Dunning, 1958), Australia (Brash, 1966) and Canada (Dales, 1966). Also, in a statistical study, Horst (1972) found that tariff discrimination was
positively related to the ratio of sales by the subsidiaries of U.S. companies located in Canada and in the United Kingdom to total U.S. sales (U.S. exports plus sales by U.S. subsidiaries) in these countries.

However, while the effects of EEC tariff discrimination on U.S. investment have been subject to much research in recent years, the results are far from clear cut. A statistical investigation carried out by the present author did not show a positive correlation between the rate of tariff discrimination and the expansion of U.S. investment in the Common Market, irrespective of the statistical formulation employed (1964, p. 9). Results by Scaperlanda (1967) and by Scaperlanda and Mauer (1969) have confirmed this conclusion. Thus, using the ratio of U.S. exports to intra-area exports in the EEC as the tariff discrimination variable, Scaperlanda and Mauer did not find evidence that increased tariff discrimination against American goods would have affected U.S. investments in the Common Market.

In turn, Schmitz and Bieri (1972) defined the tariff discrimination variable in terms of the share of the EEC in total U.S. exports and found that changes in this share were positively correlated with changes in the share of the Common Market in U.S. foreign direct investment. These results have been taken as evidence for the effects of tariff discrimination on American investment in the EEC.

The conclusion reached by Schmitz and Bieri is open to objections on several grounds. To begin with, changes in the EEC share in U.S. exports cannot be used as evidence of the existence of tariff discrimination, since the results are affected by changes in international competitiveness and growth in non-EEC markets. In fact, the present author has found that the United States experienced external trade creation rather than trade diversion in its manufactured exports to the Common Market (1974, p. 128).
For similar reasons, the EEC's share in U.S. foreign direct investments will not appropriately represent the effects of tariff discrimination on U.S. direct investment. And, even if we find that U.S. direct investment in the Common Market rose more rapidly than exports, this is compatible with the thesis put forward by the present author that increases in the market area open to producers consequent upon the fusion of national markets has been the principal factor in the rise of U.S. direct investments in the EEC (1964, p. 8).

In interpreting these results, it should be noted that in Mundell's model, the tariff will lead to the inflow of a particular factor of production if its relative remuneration increases as a result. Thus, depending on the effects of protection on factor prices, the inflow of capital or that of labor may result.

Labor mobility is of considerable importance in the European Common Market, where the protection of labor-intensive industries appears to have led to immigration at the expense of the importation of labor-intensive products. A systematic treatment of this question, however, awaits further study. More generally, there is need for research on the interrelationship of trade and factor movements under protection.

Conclusion

This paper has examined the effects of commercial policy on international trade, the location of production, and factor movements. In the discussion, emphasis has been given to the increased importance of commercial policy in its impact on the processes of international as against interregional trade.
Given the inadequacy of import demand elasticity estimates to gauge the effects of tariffs on imports, direct estimates of tariff elasticities have been utilized for this purpose. Calculations have further been made to explain the effects of tariffs on imports and on industrial specialization in an inter-country context. But these estimates too, are subject to limitations as they neglect the historical experience of the country's economy responding to changes in protection over time, disregard the effects of quantitative restrictions on imports, and leave out of account the risks due to the possibility of the imposition of trade barriers and changes in exchange rates.

In order to indicate the effects of all the relevant factors, comparisons of international and interregional trade have been made. Data for two areas with otherwise similar characteristics -- Northern Ireland and the Republic of Ireland -- show export-production and import-consumption ratios and specialization coefficients to be substantially higher in the former, which admitted British goods duty free, than in the latter, whose economy was heavily protected. U.S. regions, too, engage in more trade and are more specialized -- less diversified -- industrially than comparable European countries, Canada, and Japan.

These results point to the importance of commercial policy in determining the pattern of international trade and the location of production. At the same time, the experience of the European Common Market fails to show the reversibility of the effects of commercial policy on the industrial structure. Rather than leading to the reallocation of resources among industries, the elimination of trade barriers on intra-EEC trade has given rise to intraindustry specialization through the exchange of consumer goods
and different varieties of machinery and intermediate products. This conclusion may find explanation in the process of learning-by-doing through acclimatization of industry and in the prevalence of product differentiation in trade among the developed countries.

Tariffs and other commercial policy instruments affect not only trade but also international factor movements. There is evidence that tariffs have led to the inflow of capital in the protected industries of some countries and the inflow of labor in others. However, further research on the effects of commercial policy on factor movements and on the interrelationship of trade and factor movements would be desirable.
APPENDIX A

A Note on Transport Costs*

The vicissitudes of transportation during the colonial period in North America are well-indicated in the "Diary of a Journey of a Moravian from Bethlehem, Pennsylvania to Bethabara in Wachovia, North Carolina 1753". According to the author, the 55-mile wagon trip between Bethlehem and the present Womelsdorf took 2-3 days under normal conditions. However, the going was much slower following rains, with weather conditions affecting not only the speed at which wagons could move but also how much they could carry. Even as late as 1798, the heavy stage wagons that travelled through Philadelphia only attained speeds of five to six miles per hour "over good roads ... when pulled by four horses".

In 1760, the cost of transporting pig iron from Colebrookdale Furnace in Berks County, Pennsylvania to Philadelphia was estimated at £1.2 pound sterling over a 40-mile distance, corresponding to a per ton mile figure of £0.03 or 0.6 shillings. This compares to the price of pig iron at the furnace of about £4.5. On a two-day journey the interest cost was negligible while the cost of insurance may have amounted to 3 percent of the value of the pig iron.


3/ Bining, Arthur C., Pennsylvania Iron Manufacture in the 18th Century, Harrisburg, Pennsylvania Historical Commission, 1938, p. 31 -- All data referred to here and hereafter have been expressed in terms of British pounds.
shipment\(^1\), i.e., £0.135 for the 40-mile distance or 0.07 shillings per ton mile, raising the per ton mile cost to 0.67 shillings.

In turn, in 1751 the cost of shipping pig iron from Baltimore to London was £0.5 per ton or 0.003 shillings per ton mile for the 3200 mile distance. The journey took three months on the average while the cost of insurance was 6 percent of the value of the shipment\(^2\). Calculating with an interest rate of 5 percent\(^3\) on a price of £4.5 for a ton of pig iron, the interest cost of the shipment was 1.1 shillings per ton and the cost of insurance 5.4 shillings per ton, thus increasing the cost per ton mile to 0.005 shillings.

The cost of ocean shipping cited here was on the low side, however. Pig iron was shipped from Baltimore to London on vessels carrying tobacco, "the pigs and bars being stowed among the tobacco hogsheads in the hold ... This method of shipment limited the size of the consignments but also made freight inexpensive, since the rate for iron was based on cargo space rather than weight\(^4\). For shipments of pig iron through the port of New York, Hasenclever shows marketing charges of £3.02 per ton in 1764 for pig iron produced in the New Jersey iron works and sold in London. This amount includes also the costs

\(^1\) In the absence of information on the cost of insurance on land transport, it has been assumed that this was one-half of insurance on sea transport.

\(^2\) Johnson, Keith, "The Baltimore Company Seeks English Market – A Study of the Anglo-American Iron Trade, 1731-1755", *William and Mary Quarterly*, January 1959, pp. 37-60. -- It should be added that the 6 percent rate applied in peace time; in times of conflicts, the rate was 10, 12, 14, and even 20 percent.


\(^4\) Johnson, *op. cit.* p. 44.

\(^5\) Hasenclever, Peter, *The Remarkable Case of Peter Hasenclever Merchant*, New York, 1773, N.Y. Public Library, Special Collection, pp. 76, 79-82.
of inland transportation to New York and the cost of repeated loading and unloading; adjusting for these cost items, the cost of sea transport (including insurance) may have been around £1.3

In turn, in mid-1976, freight on pig iron shipments between Troy and New York (154 miles) was $7.39 per ton, insurance 20 cents per $100, and the interest charge negligible, resulting in a total cost of 5.04 cents per ton mile. At the same time, freight to London was $20.5 per ton, insurance 15-30 cents per $100, and the real interest rate 2 percent calculated for a 15 day period, resulting in a total cost of 0.65 cents per ton mile. By comparison, the ex factory price of pig iron was $187.67 per ton.

These data are summarized in the following. The results indicate a decline in the ratio of land to sea transport per ton mile from 80-130 in the second half of the eighteenth century to 8 in 1976. Parallel with these changes, the cost of ocean transportation as a percentage of the price of declined from 18-29 percent to 11 percent while that of land transportation, calculated for a distance of 100 miles, fell from 70 to 3 percent.

Transport Costs for Pig Iron

<table>
<thead>
<tr>
<th>Second Half of Eighteenth Century</th>
<th>Mid-1976</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>British Shillings</td>
</tr>
<tr>
<td>Land (100 miles)</td>
<td>62.7</td>
</tr>
<tr>
<td>Sea (3200 miles)</td>
<td>16.5-26</td>
</tr>
<tr>
<td>Factory Price of Pig Iron</td>
<td>90</td>
</tr>
</tbody>
</table>

1/ The cost of transportation to the port was assumed to be the same as between Colebrookdale Furnaces and Philadelphia (£1.2) while the cost of lighterage and wharfage in Baltimore was estimated at 3.5 shillings by Johnson (op. cit.). The latter amount has been tripled to account for the repeated loadings and unloadings.
APPENDIX B

EXPORTS OF SELECTED COMMODITIES IN PROCESSED AND UNPROCESSED FORM, 1970

<table>
<thead>
<tr>
<th>SITC No.</th>
<th>Shares of</th>
<th>Proportions For</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Developed</td>
<td>Developing</td>
</tr>
<tr>
<td>1. MEAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh and Frozen Meat</td>
<td>011</td>
<td>80.4</td>
</tr>
<tr>
<td>Meat Preparations</td>
<td>013</td>
<td>74.6</td>
</tr>
<tr>
<td>2. FISH</td>
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<td></td>
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<tr>
<td>Fresh and Frozen Meat</td>
<td>031</td>
<td>73.5</td>
</tr>
<tr>
<td>Fish Preparations</td>
<td>032</td>
<td>86.3</td>
</tr>
<tr>
<td>3. FRUIT</td>
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<td></td>
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<td>Fresh Fruit</td>
<td>051</td>
<td>57.5</td>
</tr>
<tr>
<td>Preserved Fruit</td>
<td>053</td>
<td>74.5</td>
</tr>
<tr>
<td>4. VEGETABLES</td>
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<tr>
<td>Fresh Vegetables</td>
<td>054</td>
<td>70.7</td>
</tr>
<tr>
<td>Preserved Vegetables</td>
<td>055</td>
<td>85.8</td>
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<td>Shares of</td>
<td>Proportions for</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>Developed</td>
<td>Developing</td>
</tr>
<tr>
<td></td>
<td>Developed</td>
<td>Developing</td>
</tr>
<tr>
<td>5. COCOA</td>
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<tr>
<td>Cocoa Beans</td>
<td>072.1</td>
<td>0.9</td>
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<td>Cocoa Powder</td>
<td>072.2</td>
<td>79.8</td>
</tr>
<tr>
<td>Chocolate</td>
<td>073</td>
<td>97.9</td>
</tr>
<tr>
<td>6. LEATHER</td>
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<td></td>
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<tr>
<td>Hides and Skins</td>
<td>211</td>
<td>70.8</td>
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<tr>
<td>Leather</td>
<td>611</td>
<td>70.5</td>
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<tr>
<td>Leather Manu-factures</td>
<td>612</td>
<td>91.2</td>
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<td>7. GROUND NUTS</td>
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<td>Groundnuts</td>
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<td>421.4</td>
<td>17.0</td>
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<td>8. COPRA</td>
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<td>Copra</td>
<td>221.2</td>
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<td>Coconut Oil</td>
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<td>10.9</td>
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<td>-----------------</td>
</tr>
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<td>9. PALM KERNEL</td>
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<td>10. RUBBER</td>
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<td>Natural Rubber</td>
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<tr>
<td>Rubber Products</td>
<td>621</td>
<td>97.2</td>
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<td>11. WOOD</td>
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<td></td>
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<tr>
<td>Wood in the Rough</td>
<td>242</td>
<td>45.3</td>
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<tr>
<td>Wood, Shaped</td>
<td>243</td>
<td>84.9</td>
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<tr>
<td>12. PULP AND PAPER</td>
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</tr>
<tr>
<td>Pulpwood</td>
<td>251</td>
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</tr>
<tr>
<td>Paper &amp; Paper Board</td>
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<td>99.0</td>
</tr>
<tr>
<td>Articles of Paper</td>
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<td>95.6</td>
</tr>
<tr>
<td>13. TOBACCO</td>
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<tr>
<td>Tobacco Unmanufactured</td>
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<td>Tobacco Manufactured</td>
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<td>-----</td>
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<td></td>
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<tr>
<td>14.</td>
<td>COTTON</td>
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</tr>
<tr>
<td></td>
<td>Cotton</td>
<td>263</td>
</tr>
<tr>
<td></td>
<td>Cotton fabrics, woven</td>
<td>652</td>
</tr>
<tr>
<td>15.</td>
<td>JUTE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jute</td>
<td>264</td>
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<tr>
<td></td>
<td>Jute fabrics, woven</td>
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<tr>
<td>16.</td>
<td>WHEAT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wheat unmilled</td>
<td>041</td>
</tr>
<tr>
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<td>Wheat, meal or flour</td>
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</tr>
<tr>
<td>17.</td>
<td>IRON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron ore</td>
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</tr>
<tr>
<td></td>
<td>Pig iron</td>
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<tr>
<td></td>
<td>Iron steel, primary forms</td>
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<td>Iron steel, shapes</td>
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<tr>
<td>----------------</td>
<td>----------</td>
<td>-----------</td>
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<tr>
<td>18. COPPER</td>
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<td>19. PETROLEUM</td>
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<td>Crude Petroleum</td>
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<td>Petroleum Products</td>
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<td>Aluminum Unwrought</td>
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<td>94.6</td>
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</tr>
<tr>
<td>Zinc Alloys, Unwrought</td>
<td>6861</td>
<td>80.5</td>
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</table>

### APPENDIX C

**Representative Data for 19 Industrial and Industrializing Countries and 9 U.S. Regions**

<table>
<thead>
<tr>
<th>Countries</th>
<th>Population million</th>
<th>Per Capita Product US$</th>
<th>Gross Product US$ billion</th>
<th>Tariffs percent</th>
<th>Imports US$ billion</th>
<th>Coefficient of Localization</th>
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<td>United States</td>
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<td>4670</td>
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<td>11.5</td>
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<td>3700</td>
<td>79.2</td>
<td>16.0</td>
<td>13.8</td>
<td>.326</td>
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<td>2720</td>
<td>26.3</td>
<td>11.0</td>
<td>11.4</td>
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<td>3190</td>
<td>15.7</td>
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<td>3100</td>
<td>157.4</td>
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<td>Germany, Fed. Rep.</td>
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<td>2930</td>
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<td>30.0</td>
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<td>1760</td>
<td>94.5</td>
<td>11.0</td>
<td>14.9</td>
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<td>198.5</td>
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</tbody>
</table>

**Source**


Tariffs (average tariffs on manufactured goods, various years): To be provided on request.


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