

L. Willmore (1979), "The Industrial Economics of Intra-Industry Trade and Specialisation", in *On the Economics of Intra-Industry Trade*, edited by H. Giersch, J.C.B. Mohr, Tübingen, Germany, pp. 185-205

Larry Willmore*

The Industrial Economics of Intra-Industry Trade and Specialization

For many countries, liberalization of world trade in the post-war period has led to a notable increase in simultaneous exports and imports of manufactures classified in the same "industry" or commodity category. The existence of this phenomenon, known as intra-industry trade, has tempted many students, including the present writer, to infer from this the existence of intra-industry specialization. The purpose of the present paper is first to discuss the various types of specialization that can result from intra-industry trade and secondly to argue that under oligopoly intra-industry trade need not produce specialization at all.

The organization of the paper is as follows. Section one discusses intra-industry trade and specialization in three distinct types of heterogeneous goods. The exchange of goods which can be produced with similar skills and machinery permits the rationalization of production through specialization in a narrower range of product lines. When the goods which enter intra-industry trade have different factor input requirements, specialization may be according to the Heckscher-Ohlin factor proportions theory of comparative advantage. Finally, and most important from the viewpoint of this paper, very similar goods are exchanged between countries because monopolistic competitors or oligopolistic rivals differentiate their products through expenditures on advertising and other forms of nonprice competition.

The second section of the paper is devoted to homogeneous goods. Intra-industry specialization can never arise from intra-industry trade in homogeneous goods, but this type of trade is important in view of the fact that differentiated goods are often quite close substitutes in consumption, hence nearly homogeneous from the viewpoint of the buyer. A concluding section provides a summary of the main arguments of the paper along with some policy implications. The conclusions were influenced greatly by the experience of the Central Amer-

*The views expressed are the personal opinions of the author and do not necessarily reflect the views of the U. N. Economic Commission for Latin America. David Hoelscher, Joseph Mullen and Michael Mortimore provided useful comments on an earlier draft.

ican Common Market (CACM), but it is hoped that they will be relevant for a wide range of countries in the world today.

I. Heterogeneous Goods

Grubel [1967; 1970] has defined intra-industry specialization quite broadly as that which results from the simultaneous production, exportation and importation of commodities that are close but imperfect substitutes in production, consumption or both. This definition encompasses three distinct types of heterogeneous goods that enter intra-industry trade. Type A goods are close substitutes in production in the sense that they can be produced with a similar input mix. Type B goods are close substitutes in consumption, but have very different factor input requirements. Type C goods are close substitutes in both production and consumption, and can only be differentiated by style, quality, appearance or "brand image"¹.

A fourth type of heterogeneous goods are those which are not close substitutes in production or consumption. Trade in such goods is actually inter-industry rather than intra-industry trade. Nevertheless, very different products are sometimes aggregated into the same commodity category, imparting an upward bias to empirical measures of intra-industry trade.

a. Type A Goods and Industry Rationalization

Commodities that are close substitutes in production but not in consumption are what many students of intra-industry trade emphasize when they discuss the phenomenon. Intra-industry trade in Type A goods gives rise to the possibility of industry rationalization, i. e., the achievement of economies through a reduction in the variety of goods produced by individual plants and through the introduction of longer production runs. Balassa [1974, p. 123], to cite but one example, suggests that "intra-industry specialization involves . . . greater product specialization through reductions in the number of product varieties and models manufactured in particular plants (horizontal specialization) . . . accompanied by vertical specialization in the manufacturing of parts, components, and accessories"².

¹ Gray [1973] also identified three types of heterogeneous goods, but his classification scheme is quite different from ours.

² For similar discussions, see Verdoorn [1960], Daly et al. [1968] and Willmore [1972].

Adler [1970], in a study of the pattern of trade in intermediate steel products among member countries of the European Coal and Steel Community, clearly had Type A goods in mind when he referred to the possibility of intra-industry trade without specialization¹. Adler [1970] found evidence of intra-industry specialization, but he also found considerable evidence of intra-industry trade without rationalization, for there was a "continuing exchange of physically identical steel products" and "all countries continued to produce and export all products" [pp. 185, 189]. Verdoorn [1960, p. 311], in a study of the Benelux Union, exercised similar caution in concluding that the presence of intra-industry trade "seems to corroborate the view that specialization of mutual trade between partners - if proceeding at all - as yet is mainly to be found within the same branches of industry" (my emphasis).

Other scholars have not been as careful in distinguishing between the measurement of intra-industry trade and the concept of intra-industry specialization. Lerner [1973] measured intra-industry trade and assumed this to be evidence of the rationalization of Canadian industry, i. e., of trade and specialization in Type A goods². Kravis and Lipsey [1971, p. 35] in a similar vein suggest that the amount of intra-industry trade "be regarded as an index to the heterogeneity of commodity classifications."

b. Type B Goods and Heckscher-Ohlin Theory

Intra-industry trade also takes place in goods which are close substitutes in consumption but have very different factor input requirements. Examples are trade in leather boots for rubber boots, wooden furniture for metal furniture and butter for margarine. Grubel [1970, p. 38] devotes little attention to such trade on the grounds that it is

¹ "A rise in intra-industry specialization implies that intra-industry trade will also increase. But the reverse implication need not hold. . . . No intra-industry specialization will have occurred if all countries continue to produce all steel products in pre-union proportions" [Adler 1970, p. 177, n. 3].

² This may well be true for much of the trade between Canada and the United States, given the common ownership of many plants on each side of the border and given the competitiveness of the U. S. market. The point to be made here is simply that one cannot assume that there is a one-to-one correspondence between intra-industry trade and industry rationalization.

adequately explained by the conventional Heckscher-Ohlin theory of comparative advantage, and trade in Type B goods receives virtually no mention elsewhere in the literature¹.

For some products, factor proportions vary significantly from country to country in response to variations in relative factor prices. An example is electronic equipment, which can be produced with labour-intensive methods (hand-wired circuits) or capital-intensive techniques (printed circuitry). Such products are not Type B goods. They are Type A goods if they are poor substitutes in consumption (e.g., the exchange of radios for television sets) and Type C goods to the extent that they are good substitutes in consumption (e.g., the exchange of one brand of television set for another).

It should be stressed that Heckscher-Ohlin theory does not explain intra-industry trade when factor proportions vary due to factor substitutability. If the factor intensity rankings of industries do not change when factor prices change, then a country will reveal either a comparative advantage or a comparative disadvantage in a particular industry. In other words, either exports or imports will be registered, but not both. If factor intensity rankings reverse, so that a commodity is labour-intensive in one country but capital-intensive in another, an important assumption of the Heckscher-Ohlin theorem is violated. When factor-intensity reversals occur, it is not possible to predict where a country's comparative advantage will lie on the basis of its relative factor endowment.

Heckscher-Ohlin theory can provide an adequate explanation of intra-industry trade only if different combinations of factor inputs affect the product so that it is differentiated in the eyes of the consumer (e.g., the use of wood rather than metal in the manufacture of furniture). If product differentiation is not a by-product of the production process, but rather requires conscious effort on the part of the producer and seller, then any resulting intra-industry trade is trade in Type C goods, regardless of the extent to which the factor input mix varies from country to country.

¹ Possible exceptions to this statement are Ohlsson [1974] and Finger [1975], but both emphasize the general heterogeneity of products included within a commodity classification rather than substitutability in consumption.

c. Type C Goods and Product Differentiation

Type C goods are the only products that are "differentiated" in the sense in which the industrial economist normally uses that term. Sellers offering what are physically and functionally very similar goods can differentiate their products from those of rivals through such devices as styling changes, attractive packaging, brand labels and advertising. For reasons that are elaborated below, intra-industry trade in this category of goods is apt to result in an increase in the number of differentiated products offered to the consumer rather than a reduction in the number of product lines produced in individual plants.

If Type C goods are quite similar from the point of view of both the producer and the consumer, a question arises as to why domestic producers do not satisfy the demand for the variety of goods being imported, and thus halt intra-industry trade. There are two answers to this question. The first, emphasized by Grubel [1967; 1970], is that when products are differentiated by differences in style or quality there are start-up costs and scale economies associated with the production of a particular product line. A second and possibly more fundamental reason is that patent and copyright laws, along with industrial secrecy, prevent a company from producing and marketing a product that is identical to that of a rival firm.

Stykolt and Eastman [1960, p. 342] emphasized some years ago that the existence of differentiated products combined with low barriers to entry of firms means that tariff protection is apt to produce over-crowding in oligopolistic industries, i.e., a "market structure ... in which several firms of sub-optimal scale resort to non-price competition to sell differentiated products which are close substitutes"¹. Canadian economists in particular frequently attribute the low productivity of manufacturing plants to a lack of specialization in production. Each Canadian industry, in the words of English [1964], tends to be a "miniature replica" of its counterpart in the larger United States economy, with production of the same number of product lines and consequent excess costs associated with frequent changeovers and short production runs². If the Canadian provinces were united through

¹ Complete freedom of entry into, and exit from, an industry produces a market structure of monopolistic competition rather than differentiated oligopoly.

² See the industry case studies in Daly et al. [1968]. For additional evidence in support of the hypothesis that oligopolistic investors tend to ignore scale requirements, see Knickerbocker [1973, Ch. 6].

a customs union rather than a political confederation, the international (interprovincial) trade statistics would no doubt show considerable intra-industry trade as a result of the operation of the "miniature replica" effect.

d. Intra-Industry Trade in Type C Goods

Although there is no simple method to measure the aggregate importance of intra-industry trade in Type C goods relative to trade in Type A or B goods, one could hazard the guess that it represents a substantial portion of intra-industry trade in manufactured goods that takes place through the market, i. e., that it is not an intra-firm transfer of a transnational corporation. Moreover, trade in Type C goods probably increases in importance when preferential trading arrangements give high levels of protection to oligopolistic producers because non-price competition is apt to be stronger than price competition.

The tire industry in the CACM is a clear, almost pure illustration of intra-industry trade in Type C goods, i. e., of trade which does not result in any rationalization of industry output. Not surprisingly, the two plants which comprise the industry are under independent ownership, and the duopolists receive substantial protection from overseas import competition. In 1965, an existing tire plant in Guatemala was allowed duty free access to all CACM countries except Honduras, and a common external tariff was imposed that amounted to an ad valorem equivalent duty of over a hundred per cent on imports from the main external supplier (Ramsett 1969, p. 71). Despite the existence of excess capacity in the small Guatemalan plant, Firestone in 1967 decided to build an even smaller plant in Costa Rica to supply tires to the same market¹. This is a good example of the miniature replica effect operating to thwart the realization of scale economies through longer production runs, for each plant produces and exports a full line of popular tires².

¹ According to Ramsett [1969, pp. 101-103], the production capacity of the Guatemalan plant was 300,000 tires and tubes per annum and less than two-thirds of the capacity was utilized at the time that Firestone made its decision to enter the market with a 100,000 capacity plant.

² Something similar seems to have occurred in the Central American textile industry. Despite flourishing intra-regional trade, the region's 50 odd plants are characterized by excess capacity and "an excessive diversification in the types of textiles produced" [SIECA 1972, pp. 22-26].

Ramsett [1969, p. 74] predicted that the establishment of a second plant in Costa Rica would, presumably because of distribution costs, result in the end of trade in tires between that country and Guatemala. Contrary to such expectations, a flourishing intra-industry trade developed between Guatemala and Costa Rica, as can be seen in Table 1.

Table 1 - Central America: Intra-Industry and Inter-Industry Trade in Tires between Guatemala and Costa Rica, 1967-1973

Year	Total trade turnover ^a	Inter-industry trade ^b	Intra-industry trade ^c	
	U.S. \$ 1000			per cent of total trade
	small tires ^d			
1967	653	653	0	0
1968	1158	275	883	76.3
1969	1221	575	646	52.9
1970	1298	148	1150	88.6
1971	1445	246	1200	83.0
1972	1917	192	1725	90.1
1973	2023	358	1666	82.3
	large tires ^e			
1967	1042	986	56	5.4
1968	1660	928	732	44.1
1969	2348	1583	765	32.6
1970	1831	931	900	49.1
1971	2503	1116	1387	55.4
1972	3863	692	3171	82.1
1973	3578	779	2799	78.2

^a Sum of exports plus imports in trade between Guatemala and Costa Rica. - ^b Intra-industry trade plus inter-industry trade may not sum to total trade because of rounding. - ^c The net exports of Guatemala plus the (identically equal) net imports of Costa Rica except for 1972 when Costa Rica showed a positive trade balance with Guatemala in small tires. - ^d Value of the exchange of tires for tires between the two countries. - ^e Tires weighing twenty kilos or less per unit and of sizes produced by the Guatemalan plant, NAUCA 629-01-02-02. - ^f Tires weighing more than twenty kilos per unit and of sizes produced by the Guatemalan plant, NAUCA 629-01-02-09.

In countries located between the two tire plants, transportation costs do appear to have had some effect on trade flows, for Guatemala tends to have a relatively larger share of the market in neighboring El Salvador than in distant Nicaragua¹ (see Table 2). In Honduras, the remaining CACM country, Costa Rica's market share tends to be almost as large as that of Guatemala but neither producer ever enjoyed preferential treatment in that market. Central American tires in Honduras must compete on equal terms with imports from outside the region, and the two firms combined supply less than thirty per cent of total sales in Honduras.

Table 2 - Central America: Ratios^a of Guatemalan Tire Exports to Costa Rican Tire Exports in the Salvadorean and Nicaraguan Markets, 1968-1976

Year	Small tires ^b		Large tires ^c	
	El Salvador	Nicaragua	El Salvador	Nicaragua
1968	0.76	2.75	3.52	2.30
1969	2.30	2.01	4.47	2.25
1970	3.64	2.06	3.89	2.59
1971	3.90	1.53	4.07	2.86
1972	2.76	0.94	4.26	1.52
1973	3.10	1.16	5.18	1.56
1974	2.47	1.98	4.28	3.48
1975	1.93	1.76	1.79	1.45
1976	2.41	1.37	2.86	1.72

^aRatios based on the c. i. f. value of exports in current dollars. -

^bTires weighing twenty kilos or less per unit, NAUCA 629-01-02-02. -

^cTires weighing more than twenty kilos per unit, NAUCA 629-01-02-09.

Source: See p. 205

¹ The Guatemalan plant is an "integration industry" and as such was to have received tariff protection from the products of any "non-integration" plant built in the CACM. Nonetheless, a perusal of country statistics shows that Costa Rican tires were exempted from all or most of the statutory duty in Guatemala, El Salvador and Nicaragua.

In sum, there is no evidence of a geographic division of the tire market in Central America despite the fact that the two producers are located at opposite ends of the CACM. Nor is there evidence of specialization in particular product lines, for the products are differentiated by brand name and image rather than by variety or size.

The cross-hauling of similar, though differentiated, products across common borders increases distribution costs. In oligopolistic markets these extra costs are likely to be absorbed by the producer rather than the consumer for two reasons. First, geographical price discrimination is profitable compared to the alternative of uniform f. o. b. factory prices, so oligopolists frequently charge "what the market will bear," and this depends on the delivered price of competing products. Secondly, many of the expenses incurred in expanding sales to another geographical market are fixed costs which are not very sensitive to the volume or value of sales. This is particularly true of advertising, and to a lesser extent of warehouses and other distributional facilities.

Insofar as tires are concerned, Honduras remained outside of the preferential trading arrangements of the CACM. The competitive Honduran market thus provides a convenient reference point for testing the hypothesis that producers rather than consumers absorb the differential costs of distribution and that delivered prices are subject to competitive pressure (i. e., the height of the external tariff) rather than plant location.

The available evidence is indeed consistent with this hypothesis. Table 3 shows the unit values (value/weight ratios) of Guatemalan tires in El Salvador, Nicaragua and Costa Rica relative to unit values in Honduras. Unit values are crude proxies for prices, but they have the advantage of being readily available in international trade statistics. In 1967 and 1968 it appears that prices in the protected CACM market were quite uniform, regardless of distance from the Guatemalan plant, and approximately ten per cent higher than prices for the same products in Honduras. In 1969 and later years the price differential increased to more than thirty per cent on average, an event that occurred simultaneously with the implementation of a thirty per cent surcharge on dutiable imports into the CACM¹.

¹ Protocolo al Tratado General de Integración Económica (Medidas de Emergencia de Defensa de la Balanza de Pagos) San José, Costa Rica, June 1, 1968. This surcharge was intended to last for five years for balance of payments rather than protectionist reasons. The protocol became effective in March 1969 and was renewed for an additional five years in 1973 and again in 1978. Unless renewed, it will thus expire in 1984.

Table 3 - Guatemala and Costa Rica: Unit Values^a of Tire Exports to Central American Countries, 1967-1976 (index numbers, Honduras = 100)

Year	Guatemala			Costa Rica		
	El Salvador	Nicaragua	Costa Rica	Nicaragua	El Salvador	Guatemala
1967	109	108	108	.	.	.
1968	111	111	113	97	98	98
1969	124	129	135	93	95	92
1970	135	134	143	114	111	115
1971	154	151	158	126	126	125
1972	147	143	155	119	104	143
1973	143	144	148	114	111	103
1974	109	105	120	110	111	n. a.
1975	132	129	134	125	126	n. a.
1976	139	140	144	148	161	n. a.

^a Calculated from c. i. f. import data. - n. a. = not available.

Source: See p. 205

Table 3 also reports similar statistics for Costa Rican exports of tires to other Central American countries. Prior to 1970, prices for consumers in Nicaragua, El Salvador and Guatemala were no higher than those for customers in the competitive Honduran market. This undoubtedly reflects the need for a new producer to use low prices initially in order to penetrate markets dominated by an established firm. In later years it appears that the Costa Rican producer, like its Guatemalan rival, priced its products in relation to the external tariff, lowering the delivered price only to meet overseas competition in Honduras. In sum, in the case of both firms the available evidence suggests that it is the producer (or consumer in general) rather than the distant customer that has absorbed the differential costs of distribution over a wide geographical area.

II. Homogeneous Goods

When products are perfect substitutes from both the producer's and the consumer's point of view, there is no possibility of specialization in production and exchange, for variety simply does not exist. Intra-industry trade in homogeneous goods can never give rise to intra-industry specialization.

Students of the phenomenon generally recognize this fact, and for this reason have paid little attention to intra-industry trade in standardized or perfectly homogeneous commodities. Grubel [1970, pp. 36 f.] lists a number of causes of such trade, including the minimization of transportation costs, joint production of services such as shipping with another traded product, and seasonal fluctuations in output or demand as is common in the case of fresh fruits and vegetables, concluding that such cases "can readily be fitted into the framework of the Heckscher-Ohlin model" but "formal extensions of the . . . model in these directions are rather obvious and do not promise to yield very interesting results."

When markets are competitive, Grubel's conclusions are perfectly valid. With an oligopolistic market structure, however, the interesting possibility arises that rival producers may absorb the freight costs for commodities shipped to distant customers with the result that identical goods are "cross-hauled" across a common border. Cross-hauling reduces group profits to the extent that distribution costs increase so oligopolists colluding perfectly would prefer an agreement that restricted sales to each producer's home territory. Oligopolists in practice often agree on the maintenance of a price structure but fail to agree on the distribution of market shares. Attempts to increase market shares may result in cross-hauling.

The consumer may or may not benefit from the cross-hauling of identical products in an oligopolistic industry. He will benefit if the geographic price discrimination represents unsystematic and competitive price-cutting. He will be no better off than he was with local monopolies or oligopolies if the discrimination is systematic in the form of a delivered price system. Such systems preserve the oligopolistic price structure (though not group profits) because each producer ships products into the other's home territory but charges the same delivered price that would be required if the order were filled locally.

In the United States, delivered price systems and cross-hauling of homogeneous goods have existed at one time or another in steel, ce

ment, copper, lead, zinc, plate glass, floor and wall tiles, lumber, beet sugar and numerous other industries¹. In international trade there are fewer examples of the cross-hauling of what are obviously homogeneous products. Kravis and Lipsey [1971, p. 250] found intra-industry trade in unwrought aluminum between the United States and Europe, and ascribed this to price competition between oligopolistic producers of a homogeneous product: "Price cutting appears to have been common in sales made by major producers of one country in the markets of other major producing countries. . . . As a result there was cross-shipping of identical products between the United States and Europe; indeed, more than one reliable source reported occasional purchases of U. S. aluminum in Europe for reshipment to the United States."

Such practices are detrimental to industry profits, so there is an incentive for producers to collude in order to minimize transportation costs. In recent years the aluminum companies have thus tended to swap orders so as to reduce unnecessary cross-hauling across the Atlantic, but these swap deals are now under attack from the competition department of the Commission of the European Communities².

The present writer [1974] discovered a similar instance of cross-hauling of identical products - in this case, portland cement - among member countries of the CACM. As can be seen in Table 4, intra-industry trade in cement existed in the early years of the integration programme, but increased sharply - both in absolute terms and as a proportion of the total trade turnover in cement - in the 1967-1969 period. Following the short "Migration War" between El Salvador and Honduras in July 1969 and Honduras' withdrawal from the CACM at the end of 1970, intra-industry trade in cement came to a virtual halt.

¹ For a discussion and more extensive list of industries, see Stigler [1949], Scherer [1970, pp. 262-272] and the references cited therein.

² "Transport costs become significant when aluminum is sold in Europe, say, by a California producer. So there is a smoothly working old-boy network which arranges for a European producer to supply the goods instead, while the Californians do likewise in America." [The Economist, September 23, 1978, p. 97].

Table 4 - Central America: Intra-Industry and Inter-Industry Trade in Cement, 1960-1974

Year	Total trade turnover ^a	Inter-industry trade ^b	Intra-industry trade ^c	
	U. S. \$ 1000			per cent of total trade
1960	664	482	182	27.4
1961	1442	982	459	31.9
1962	1867	1252	614	32.9
1963	2893	2061	832	28.8
1964	3134	2147	987	31.5
1965	4773	4240	533	11.2
1966	2640	2238	403	15.2
1967	3136	1521	1615	51.5
1968	4427	1221	3206	72.4
1969	4912	383	4529	92.2
1970	1513	300	1213	80.2
1971	599	139	460	76.8
1972	348	68	280	80.5
1973	1378	1222	156	11.3
1974	512	315	196	38.4

^aSum of intra-regional exports plus intra-regional imports of NAUCA 661-02: $\Sigma(X_i + M_i)$, where the subscript "i" refers to the five Central American countries. - Intra-industry trade plus inter-industry trade may not sum to total trade because of rounding. - ^bSum of the absolute value of net intra-regional exports (imports) of cement in each country: $\Sigma |X_i - M_i|$. - ^cSum of the exchange of cement for cement in Central America: $\Sigma(X_i + M_i) - \Sigma |X_i - M_i|$

Source: See p. 205

Table 5 provides more detailed figures on intra-CACM trade in cement for three representative years. In 1962, which is representative of trade flows in the period prior to 1967, El Salvador was an importer of cement from its trading partner to the north (Guatemala) and the south (Honduras); nonetheless El Salvador simultaneously ex-

Table 5 - Central America: Intra-Regional Trade in Cement^a, 1962, 1968 and 1974 (c.i.f. value of shipments in thousands of U.S. dollars)

To \ From	Guatemala			El Salvador			Honduras			Nicaragua			Costa Rica		
	1962	1968	1974	1962	1968	1974	1962	1968	1974	1962	1968	1974	1962	1968	1974
Guatemala	-	-	-	150	367	-	-	-	-	-	-	-	-	-	-
El Salvador	-	798	-	-	-	-	153	219	-	-	-	-	-	-	-
Honduras	-	-	23 ^b	629	818	-	-	-	-	-	-	98	-	-	21
Nicaragua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	113
Costa Rica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

^aEmpty cells (-) indicate the value of trade was less than \$ 10,000. - ^bThe 1974 Guatemalan import data are f.o.b. Honduras rather than c.i.f. Guatemala because published trade statistics were not available for Guatemala.

Source: See p. 205

ported an identical product to Honduras. This is evidence of geographic price discrimination through the absorption of freight costs for shipments to Honduran customers of the Salvadorean plant. In the 1967-1969 period, El Salvador continued to import cement from both countries, but exported an identical product to Guatemala as well as to Honduras.

In 1974, a new type of intra-industry trade emerged in which Nicaragua imported cement from the north (Honduras) and simultaneously exported cement to the south (Costa Rica). This is intra-industry trade without cross-hauling of goods, and is consistent with a perfectly collusive oligopoly (multi-plant monopoly) or, for that matter, with a competitive market structure. Such trade may well result in reduced transportation costs, for it is both socially and privately profitable for the Honduran plant to supply customers in northern Nicaragua while the Nicaraguan plant supplies customers in Costa Rica. At

worst, transportation costs are no higher than they would have been in the absence of intra-industry trade.

The cross-hauling of portland cement in the 1967-1970 period appears to have been induced by the existence of excess capacity in El Salvador. In 1966, the Salvadorean cement company began production at a second plant¹, thus displacing intra-regional imports as well as imports from outside the CACM (see Table 6).

Beginning in mid-1967, the Salvadorean producer began to absorb the freight costs for shipment to distant customers in Guatemala and Hon-

Table 6 - El Salvador: Production and Trade in Cement, 1961-1974 (thousands of metric tons)

Year	Annual production	Exports to CACM	Imports from CACM	Other imports
1961	73.3	2.8	17.4	2.1
1962	63.8	3.8	22.9	1.7
1963	76.7	4.8	38.0	1.4
1964	88.3	7.5	44.1	2.1
1965	79.2	3.6	69.7	23.5
1966	150.7	3.0	33.4	6.2
1967	159.9	14.7	34.7	2.2
1968	154.4	38.2	38.2	1.7
1969	141.7	43.6	48.2	1.7
1970	161.7	11.9	15.0	1.6
1971	185.8	5.4	4.8	1.5
1972	217.8	3.0	3.0	1.6
1973	235.2	15.6	1.5	1.8
1974	291.5	0.0	0.0	1.3

Source: See p. 205

¹ The first plant is located near Acajutla and the second at Metapan. Both locations are closer to the Guatemalan than the Honduran border.

duras rather than compete, via price, with imports in the local market. In 1968 and 1969, El Salvador exported more than a quarter of its cement production and imported simultaneously a similar amount from its CACM partners. In the absence of export subsidies, such trade flows are only possible under oligopoly. Under competition a firm would supply nearby customers before exporting, for this provides a larger revenue net of transportation costs. A monopolist with spatially separated plants would similarly minimize transportation costs and thus avoid costly cross-hauling.

III. Conclusion and Policy Implications

Intra-industry trade, i.e., the simultaneous importation and exportation of products classified in the same commodity category, may involve either homogeneous goods or three distinct types of heterogeneous goods that we have labelled Type A, B and C depending on whether the goods are close but imperfect substitutes in production, consumption or both.

In the discussion that follows, Type B goods are ignored for these are conceptually of more interest to the international trade specialist than to the industrial economist. To the extent that inputs differentiate the final product in the eyes of the consumer, recorded intra-industry trade flows simply reflect the heterogeneity of commodity classifications. The determinants and welfare implications of intra-industry trade are, in this case, no different than those of inter-industry trade¹. To the extent that differentiation is a result not of intermediate and factor inputs (e.g., wood, metal or plastic furniture) but rather of persuasive advertising or style and quality variations designed to create "brand name" appeal, the goods are best classified as Type C rather than Type B regardless of the factor proportions employed in the production process.

Intra-industry trade in Type A goods brings traditional cost-reduc-

¹ The adjustment costs following trade liberalization are not necessarily low either when intra-industry trade is in Type B goods. Suppose, for example, that intra-industry trade of the "edible oil industry" takes the form of exports of butter and imports of margarine. The resulting expansion of dairy businesses and contraction of vegetable oil plants is not what one normally associates with intra-industry specialization.

tion gains from trade combined with very low adjustment costs, for establishments can shift easily from the production of import substitutes to the production of exportables. The products traded may not be substitutable at all from the viewpoint of the consumer (e.g., tires for buses and tires for passenger cars), yet substitution on the production side can be easily effected if similar skills and machinery can be employed. This rationalization of production is most likely to occur under strong price competition or when plants in individual countries are under common ownership. Most of the successful cases of industry rationalization - of which the Automotive Agreement between Canada and the United States is an outstanding example [see Beigie 1970] - involve plants that are owned by the same transnational firm. Fewer models or varieties of goods are produced in each country, but the consumer has access to at least the same variety of goods, at a potentially lower price, than was the case prior to intra-industry trade. There is thus a clear welfare gain from increased trade and specialization.

When national plants are under independent ownership in monopolistically competitive or oligopolistic industries in which price competition is weak and nonprice competition strong, intra-industry trade is likely to involve products that are close substitutes in both production and consumption. Intra-industry trade in Type C goods, like that in Type A goods, results in very low adjustment costs, but individual plants are not likely to reduce the variety of sizes or product lines that they produce. Reduced costs from specialization and longer production runs are therefore not likely to occur.

Intra-industry trade requires resources for increased distribution costs, so it is reasonable to ask what are the benefits when such trade takes place in goods which are close substitutes but differentiated by quality, trademarks, style and advertising? If production costs remain unchanged while distribution costs increase, the producer will not benefit. The consumer, however, may benefit in two ways. First, the interpenetration of oligopolistic markets may result in price competition and a larger industry output. If price competition is intense enough, the result may even be industry rationalization and intra-industry trade in Type A goods rather than Type C goods. Secondly, to the extent that the products involved are truly differentiated in the eyes of the buyer, consumers may gain through the provision of greater choice.

To the extent that Type C goods are good substitutes in consumption, the gains from trade are necessarily small relative to the volume of

trade¹. Nonetheless, if the consumer absorbs the extra distributional costs of intra-industry trade, one might interpret this as clear evidence of welfare gain, the benefits of product diversity more than compensating the costs of providing such diversity. Unfortunately, this is not necessarily the case, for interpenetration of markets by oligopolistic rivals or monopolistic competitors is associated with image differentiation and other forms of nonprice competition on the part of all producers. As a result, a consumer may find a simple, unadvertised product transformed into one with attractive packaging, advertising and jointly supplied with an entry into a contest for a trip to Acapulco. In such cases, as Agmon emphasizes in his contribution to this volume, product differentiation is not the cause of intra-industry trade but rather the means by which firms penetrate each other's markets.

More importantly, delivered price systems are very common - particularly when transportation costs and tariffs are low - so it is often the producer rather than the consumer who absorbs the incremental distribution costs of intra-industry trade. In the case study presented above, for example, the evidence suggested that relative prices of competing brands of tires were the same throughout Central America despite the fact that the two tire factories are located at opposite ends of the common market. This fact means that it is not possible to infer successful product differentiation from the existence of intra-industry trade. In the discussion of intra-industry trade in homogeneous goods, the point was emphasized that under oligopoly, delivered price systems can result in the cross-hauling of identical products across a common border. It is quite possible for something approaching this to occur under differentiated oligopoly.

The achievement of scale economies and a greater division of labour in import-competing sectors is one of the great hopes of proponents of customs unions among small economies. The experience of nearly two decades of integration in Central America suggests that the extension of the size of a protected market attracts the entry of new firms, but does not produce commensurate increases in specialization when industries are imperfectly competitive. Potential gains from increased market size could be captured if competitive pressure were brought to bear on the prices and costs of oligopolistic firms. Such

¹ Perhaps Gray [1973, p. 27] had Type C goods in mind when he suggested that the gain per unit of intra-industry trade is likely to be less than the gain per unit of inter-industry trade.

price competition may result in a reduction in the range of product lines supplied by each establishment and in the real resources devoted to the advertising and cross-hauling of goods which are near-perfect substitutes in consumption and production. Reductions in the external tariff is often a useful way to achieve price competition and has the additional advantage of ensuring that efficiency gains are passed on to consumers.

References:

- Adler, Michael, "Specialization in the European Coal and Steel Community." *Journal of Common Market Studies*, Vol. 8, Oxford, 1970, pp. 175-191.
- Balassa, Bela, "Trade Creation and Trade Diversion in the European Common Market: An Appraisal of the Evidence." *The Manchester School of Economic and Social Studies*, Vol. 42, Manchester, 1974, pp. 93-135.
- Beigie, Carl E., *The Canada-U.S. Automotive Agreement: An Evaluation*. Private Planning Association of Canada, Montreal, 1970.
- Daly, Donald J., B. A. Keys, E. J. Spence, *Scale and Specialization in Canadian Manufacturing*. Economic Council of Canada, Staff Study, No. 21, Ottawa, 1968.
- English, H. Edward, *Industrial Structure in Canada's International Competitive Position*. Private Planning Association of Canada, Montreal, 1964.
- Finger, J. M., "Trade Overlap and Intra-Industry Trade." *Economic Inquiry*, Vol. 13, Long Beach, 1975, pp. 581-589.
- Gray, H. Peter, "Two-Way International Trade in Manufactures: A Theoretical Underpinning." *Weltwirtschaftliches Archiv*, Vol. 109, Tübingen, 1973, pp. 19-39.
- Grubel, Herbert G., "Intra-Industry Specialization and the Pattern of Trade." *Canadian Journal of Economics and Political Science*, Vol. 33, Toronto, 1967, pp. 374-388.
- , "The Theory of Intra-Industry Trade." In: I. A. McDougall, R. H. Snape (Eds.), *Studies in International Economics*. Amsterdam, 1970, pp. 35-51.

- Knickerbocker, Frederick T., *Oligopolistic Reaction and Multi-national Enterprise*. Harvard Graduate School of Business Administration, Boston, 1973.
- Kravis, Irving B., Robert E. Lipsey, *Price Competitiveness in World Trade*. NBER, Studies in International Economic Relations, 6, New York, 1971.
- Lerner, George, "Evidence from Trade Data Regarding the Rationalizing of Canadian Industry." *The Canadian Journal of Economics*, Vol. 6, Toronto, 1973, pp. 248-256.
- Ohlsson, Lennart, "On Unit Prices and their Use in the Analysis of the International Specialisation Pattern within Heterogeneous Industries." *Journal of International Economics*, Vol. 4, Amsterdam, 1974, pp. 275-293.
- Ramsett, David E., *Regional Industrial Development in Central America: A Case Study of the Integration Industries Scheme*. New York, 1969.
- Scherer, Frederic M., *Industrial Market Structure and Economic Performance*. Chicago, 1970.
- Secretaría Permanente del Tratado General de Integración Económica Centroamericana (SIECA), *Análisis de la Situación Actual de la Industria Textil Centroamericana*. Guatemala, June 27, 1972.
- Stigler, George J., "A Theory of Delivered Price Systems." *The American Economic Review*, Vol. 39, Menasha, 1949, pp. 1143-1159.
- Stykolt, Stefan, Harry C. Eastman, "A Model for the Study of Protected Oligopolies." *The Economic Journal*, Vol. 70, London, 1960, pp. 336-347.
- Verdoorn, P. J., "The Intra-Block Trade of Benelux." In: E. A. G. Robinson (Ed.), *Economic Consequences of the Size of Nations*, Proceedings of a Conference Held by the International Economic Association. London, 1960, pp. 291-329.
- Willmore, Larry N., "Free Trade in Manufactures among Developing Countries: The Central American Experience." *Economic Development and Cultural Change*, Vol. 20, Chicago, 1972, pp. 659-670.
- , "The Pattern of Trade and Specialisation in the Central American Common Market." *Journal of Economic Studies*, Vol. 1, Glasgow, 1974, pp. 113-134.

Statistical Sources*

- Costa Rica, Ministerio de Economía, Industria y Comercio, Dirección General de Estadística y Censos:
Comercio Exterior de Costa Rica, San José, various issues.
- El Salvador, Ministerio de Economía, Dirección General de Estadística y Censos:
Anuario Estadístico, San Salvador, various issues.
- El Salvador, Ministerio de Planificación:
Indicadores Económicos y Sociales, San Salvador, various issues.
- Guatemala, Ministerio de Economía, Dirección General de Estadística:
Anuario de Comercio Exterior, Guatemala, various issues.
- Honduras, Ministerio de Economía, Dirección General de Estadística y Censos:
Comercio Exterior de Honduras, Tegucigalpa, various issues.
- Nicaragua, Convenio Banco Central de Nicaragua - Ministerio de Economía:
Comercio Exterior de Nicaragua por Productos y Países, Managua, various issues.
- Secretaría Permanente del Tratado General de Integración Económica Centroamericana (SIECA):
Anuario Estadístico Centroamericano de Comercio Exterior, Guatemala, various issues.

* Intra-CACM import rather than import plus export data were used because import data are generally considered to be more reliable than export data in Central America. For the years 1964 through 1973, the source of the import data in Tables 1-6 is SIECA; country sources cover the remaining years.