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INTRA-INDUSTRY TRADE IN AGRICULTURAL PRODUCTS IN THE WESTERN HEMISPHERE: PRELIMINARY EVIDENCE AND IMPLICATIONS FOR ECONOMIC INTEGRATION

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I. Introduction

In December, 1994, leaders of 34 countries in the Western Hemisphere confirmed their support of a free trade zone that stretches from Canada to Argentina at the Summit of the Americas in Miami. Clearly, economic integration in the Western Hemisphere will inflict adjustment costs on some factors in some industries in some countries. The expected pattern of these adjustment costs will undoubtedly influence the choices of Western Hemisphere policymakers as they select partner countries, design the scope of integration schemes, and negotiate the progression of trade liberalization measures. When apprising policymakers of the likely consequences of alternative integration arrangements, economists will likely rely on traditional Vinerian customs union theory to help them predict the changes in product and factor markets. Standard customs union theory emphasizes the potential gains produced by inter-sectoral adjustments, when the resources in a given country shift from industries that produce import-competing products to those export-oriented industries that have at least an intra-union comparative advantage. These conclusions follow from the core assumptions of neoclassical trade theory: constant returns to scale, homogeneous products, and perfectly competitive markets.

Standard neoclassical trade theory of course predicts *inter-industry trade* between countries with *different* factor endowments; it cannot rationalize trade *within* product categories that has been increasingly observed in trade statistics over the past three decades, particularly in the trade statistics of developed countries with *similar* factor endowments. Economists have developed an entire class of models to explain the concurrent import and export of similar products or *intra-industry trade (IIT)*. However, it has been difficult for economists to integrate these features in the traditional Vinerian customs union theory framework of three countries, two commodities and two factors (Gunter, 1989). Consequently, there is no widely accepted systematic theoretical analysis to explain the links between economic integration and IIT (Greenway, 1989). Nonetheless, there has long been an "association of ideas," (p.31) to use Greenaway's phrase, between economic integration and IIT; in fact, he notes, the first studies of IIT were actually by-products of studies of the impacts of European integration on trade by Verdoon (1960), Balassa (1963), and others.

There are studies providing corroborative evidence of a connection between economic integration and IIT for both developed and developing countries. The empirical results of many of these studies lend support to the hypothesis that economic integration can stimulate intra-industry exchange to a greater degree than inter-industry exchange. The implication of

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the hypothesis is that standard analyses of economic integration that consider only the traditional gains from exchange and specialization may understate potential intra-bloc net welfare gains. Gray observes that "the gains from international trade in differentiated goods are to be found in the wider choice offered to consumers in the different nations, in the possibilities of an exchange of scale economies among nations, and perhaps the most important, in the exposure to foreign competition of domestic industries" (Gray, 1973, p. 27). Pomfret (1979), Drabek and Greenaway (1984), and others have also noted that IIT can reduce the adjustment costs of trade liberalization. If industries are producing differentiated goods, they argue, trade liberalization may not force industries to face the complete restructuring that is implied by an increase in inter-industry trade; the only required adjustment may be to modify existing product lines. Also, changes in income distribution produced by trade liberalization may be less pronounced if IIT is a feature of exchange (Krugman, 1981).

Most empirical work on the links between IIT and economic integration has focused on the manufacturing sector, which excludes raw and processed agricultural goods. Very few studies explicitly explore the connection between IIT and economic integration for agricultural and agroindustrial products. This focus by economists is likely explained by the fact that they expect a country's pattern of trade in these goods to be largely determined by its endowments of the factors of production and natural resources relative to other countries ("Heckscher-Ohlin" trade) rather than by consumers' taste for variety in combination with economies of scale ("Helpman-Krugman-Lancaster" trade). It follows then that for these products, economic integration would be expected to spur inter-sectoral shifts in production and trade in accordance with each country's comparative advantage based only on factor endowments.

There is little doubt that this is true for many products produced by the agricultural sector; nonetheless there are important exceptions. The level of measured IIT between the United States and Canada in fresh, chilled and frozen meat has been shown to far exceed the levels recorded by the majority of manufacturing sectors, including printed matter, electric machinery and telecommunications equipment (Hart and McDonald, 1992). And the value of trade in product categories in which high levels of IIT are observed is not insignificant; the exchange of fresh, chilled and frozen meat between the United States and Canada totaled more than $1 billion in 1991. Even in product categories such as unprocessed oilseeds, IIT between these two trading partners exceeded the IIT registered in most manufacturing sectors.

The present paper examines IIT in primary and processed agricultural products between the United States and its trading partners trade in the Western Hemisphere. Although the agricultural and agroindustrial sectors account for less than 10 percent of the national output of the countries in this sample, reconciling the interests of agricultural constituencies in member countries has proven to be one of the most challenging tasks for policymakers in previous integration negotiations in the Hemisphere (Roberts and Skully, 1994; Behar, 1991; Willmore, 1974). In fact, ratification of previous integration treaties, most notably the North American Free Trade Agreement (NAFTA), has hinged on the support of agricultural interest groups (Orden, 1994; Goodloe, 1990.) In view of the importance of agricultural issues in previous negotiations, the principal question this study seeks to address is, "Does the level and pattern of IIT in primary and processed agricultural industries have important implications for the future of economic integration in the Western Hemisphere?"

The paper is organized as follows: *Section II* surveys the theoretical and empirical IIT literature, focusing on research that examines the determinants of IIT in agricultural and agroindustrial industries; *Section III* details the methodology, sample and data; *Section IV* reports measures of IIT for 58 agricultural and agroindustrial industries for the emerging trading blocs in the Western Hemisphere; and *Section V* presents a summary of the empirical evidence and some concluding remarks. Appendices that contain some detailed information referred to in the report conclude the study.

II. Determinants of Intra-Industry Trade

Many economists have developed models that synthesize elements from both the international and industrial economics literature to explain IIT. The theoretical IIT literature allows a role for economies of scale and products differentiation that generate imperfect market structures, instead of strictly adhering to the core assumptions of the Heckscher-Ohlin-Samuelson trade theory (constant returns to scale, homogeneous products, and perfectly competitive markets). The models feature either consumers that derive utility from variety *per se* or an aggregate demand for variety produced by consumers who individually purchase differentiated goods that embody preferred characteristics; industries with free entry but economies of scale at the firm level; and/or industries with a small number of producers who behave strategically. These models do not to refute the hypothesis that factor endowments matter, but rather that *only* factor endowments matter. A large number of models have been developed which predict IIT. The number and variety of models reflect the fact that economists are trying to rationalize extremely diverse intra-industry trade flows-- ranging from the exchange of automobiles (the exchange of differentiated goods produced by oligopolistic firms) to the exchange of canned tomatoes (the exchange of relatively homogeneous goods produced by a large number of firms). Table 1 provides a list of the principal types of IIT models.

The theoretical literature has established the fundamental importance of product differentiation in accounting for IIT. Both horizontal (i.e., different combinations of a given set of attributes) and vertical (i.e., alternative quality gradings) differentiation are relevant. Other things being equal, the more evenly preferences are distributed over the product spectrum and the greater the overlap of preferences of the trading partners, the greater the potential growth in IIT. Under these circumstances, relatively modest specialization along the horizontal or vertical spectrum in product characteristics space can secure a significant market segment for one's product. An overlap in preferences of consumers in the home and foreign markets implies that successful segmentation of the home market is likely to be reinforced by substantial demand in the partner country subsequent to trade liberalization.

Table 1: Main features of the recent models of IIT

"Large numbers" models of IIT

Neo-Heckscher-Ohlin models: factor-intensity - factor-endowment concordance criterion at inter- and intra-industry level; vertical product differentiation which is determined by relative factor inputs; inter-industry immobility of the quality-determining factor; reciprocal demand for high and low "quality" products in the trading countries.

Neo-Chamberlinian models: commodities are horizontally differentiated; consumers endeavor to consume as many different varieties as possible; economies of scale are present.

Neo-Hotelling models: horizontal product differentiation of commodities which are defined as combinations of attributes, or characteristics; different consumers have different preferences for alternative varieties of given commodities; the producer of each variety is subject to decreasing costs; identical characteristics of the trading economies.

"Small numbers" models of IIT

Cournot-type models: identical country characteristics, identical cost functions, identical demand functions and zero transportation costs; output as the strategic variable of firms; firms have a zero conjectural variation; the two markets are segmented.

Natural oligopoly and trade in vertically differentiated products models: vertical products differentiation with average variable costs independent of "quality"; sunk costs (R&D) as prerequisite for quality improvement; income distributed unequally among the consumers; differing income levels between the trading countries; assumption of conjectural variation; a "Bertrand type" price competition.

Oligopoly and trade in horizontally differentiated goods models: commodities are horizontally differentiated; clustering of consumers' demand around the ideal varieties in the trading countries; free, but sequential entry of firms into the market; fixed costs are incurred prior to decisions on output level; economies with identical characteristics; semi-reactive Bertrand equilibrium.

Models of intra-firm IIT: differentiation of the varieties supplied by the parent company and the subsidiary, the parent company and the subsidiary each have an advantage in production costs or marketing costs, but not both, for each individual variety of the products produced by the corporation; cost minimization strategy of a multi-national corporation leads to the production of a range of commodities to be produced in each country, with the entire range of products marketed in both countries.

Source: Tharakan, 1989.

These demand conditions are necessary but not sufficient for the emergence of IIT; domestic producers could satisfy any amount of preference diversity in a world of zero set-up costs and constant per unit costs. However, if these demand conditions are combined with the assumption of declining unit costs, one has a sufficient set of conditions for the generation of IIT. The nature of scale economies for each industry affects entry conditions and therefore the equilibrium number of firms and varieties; the literature features both small- and large-number solutions. It has been often argued in the literature that one of the principal benefits of economic integration is that firms in each country can lengthen their production runs and, in effect, "exchange" scale economies.

Empirical tests of specific hypotheses generated by theoretical models of IIT models have been hard to construct. There are, of course, problems with independent variable measurement that are familiar to those who do applied work in industrial organization: how does one capture the strategic behavior of firms or gauge the extent of horizontal or vertical differentiation of the products of a given industry?[2] The inevitable reliance on proxy variables has made the evaluation of competing hypotheses difficult. Greenaway and Milner point out that similarity in per capita incomes has been used as a supply-side proxy for similarity of factor endowments across countries as well as a demand-side proxy for similarity of preferences in the empirical literature. This example illustrates why economists have yet to develop unambiguous tests of the predictions of specific IIT models.

Given the practical difficulties of formal hypothesis testing on this topic, a number of researchers have instead chosen to examine if the pattern of IIT in their samples provides supportive evidence for a set of *general* hypotheses drawn from the theory. Some of the principal generalizations or stylized facts that have emerged from the literature are:

- *IIT will be higher in the exchange of manufactured goods than in the exchange of primary products.* Preference diversity and economies of scale are the necessary and sufficient conditions, respectively, for IIT in a number of models. Given that there is less scope for differentiating products and achieving economies of scale in primary product industries than in manufacturing industries, one would expect to observe more IIT in manufactured products than for unprocessed products of the agricultural, forestry, fishery, and mineral sectors.

- *Average levels of IIT will be lower in less developed countries (LDC's) than in developed market economies (DME's).* It is hypothesized that the demand for "variety" (i.e., for differentiated goods) increases as per capita incomes increase. Therefore we expect trade, including two-way trade, in differentiated goods to constitute a larger share of the total trade of rich countries than poor countries. On the supply side, if primary product industries constitute a larger share of the economies of LDC's than of DME's, then one

[2] Indeed, much of the current empirical IIT literature resembles the empirical IO literature of the 1970's.

might expect that LDC's have proportionally fewer industries in which economies of scale can be achieved, given hypothesis 1 above. The predicted levels of IIT would, therefore, be greater between DME's than between DME's and LDC's or between LDC's.

- *Geographical proximity fosters IIT.* The prediction that one would expect to see more IIT between neighboring countries than between distant countries follows from two assumptions: that information costs are an increasing function of distance and that satisfying a consumer's or firm's demand for final or intermediate differentiated goods, respectively, is more information-intensive than satisfying the demand for undifferentiated commodities.

- *IIT between countries with similar factor endowments will be greater than between countries with dissimilar factor endowments.* The trade flows between two countries with substantial differences in relative factor prices will likely be dominated by "Heckscher-Ohlin" trade. Each country will export the products in which it has a pronounced comparative advantage; trade "overlap" for any given industry will be small or non-existent.

- *IIT will be greater in the trade of countries that participate in some form of economic integration arrangement than in the trade of non-integrated countries.* There is no *a priori* reason to expect that integration *per se* causes IIT. The market structure of the integrating economies will determine the intensity of IIT once countries join a free trade area or customs union (Drabek and Greenaway, 1984). But since it is predominantly neighboring countries with similar demand structures and factor endowments that integrate their economies by lowering the barriers to trade in goods and factors, one would expect intra-bloc IIT to increase for the reasons outlined above.

The vast majority of IIT empirical studies exclude industries in the agricultural and agroindustrial sectors from their samples. This is likely due to the perception that the industries in these sectors are perfectly competitive and that most of the products of these sectors are Heckscher-Ohlin goods. However, a few empirical studies have uncovered evidence of IIT in these sectors. Hart and McDonald (1992) found substantial amounts of IIT in the agricultural and agroindustrial trade data of the United States, Canada and Mexico. Henderson and Handy (1993) discovered evidence of IIT between the U.S. and its trading partners for both branded, differentiated food products and homogeneous processed fruit and vegetable products. Econometric studies of the determinants of IIT in these sectors have focused on the agroindustries in developed countries (DC's) and newly industrializing countries (NIC's). In a recent cross section analysis of 36 U.S. food processing industries, Hartman, Henderson and Sheldon (HSD, 1994) found that IIT was positively and significantly correlated with: the total volume of trade, similarity of tariff barriers between the U.S. and its trading partners, and economies of scope.

Although there is ample documentary and econometric evidence that supports the general hypothesis that membership in a regional trading arrangement tends to increase the level of

IIT (Globerman and Dean, 1990; Greenaway, 1989, for a survey), most of this research again excludes the agricultural and agroindustrial sectors. There are, however a few exceptions. McCorriston and Sheldon (1991) found that the EC-9 countries recorded substantially more IIT than the United States in each of the 10 processed food industries reviewed in the study. If intra-bloc trade was excluded, however, measured levels of IIT in all processed food industries in the EC declined appreciably. The impact of regional trading arrangements was more formally examined in HSD's (1994) econometric study of the determinants of bilateral IIT. They found that membership in the European Community (EC) or European Free Trade Association (EFTA) had a (statistically significant) positive effect on the levels of IIT between countries. Hirschberg and Dayton (1993) examined IITin 49 food processing industries in 30 DC's and NIC's and found that, with few exceptions, membership in the EC or EFTA was positively and significantly correlated with levels of bilateral IIT in these industries.

In this study, we calculate measures of IIT between the United States and five emerging trading blocs in the Western Hemisphere: NAFTA, the Caribbean Basin Initiative (CBI) countries, the Andean Pact, Mercosur and Chile, the lone country in Latin America that has declined to integrate its economy with its neighbors. The variation in IIT for this sample of regions and industries is then assessed to see if it provides supportive evidence for the set of general hypotheses discussed above. The results are then examined to see what they imply about the constraints or opportunities that policymakers face in the course of Western Hemisphere integration.

III. Methdology, Sample and Data

The intensity of IIT is measured in this study using the unadjusted Grubel-Lloyd (GL) index, the index used in most empirical studies of IIT. The GL index measures the absolute value of trade overlap as a proportion of total trade for a given industry/sector/country of a given country/region. The expression for a simple GL index for an industry *i* is

$$GL_{ijk} = \frac{(X_{ijk}+M_{ijk}) - |X_{ijk}-M_{ijk}|}{(X_{ijk}+M_{ijk})} \qquad 0 \le GL_{ijk} \le 1 \qquad (1)$$

which is usually written as

$$GL_{ijk} = 1 - \frac{|X_{ijk}-M_{ijk}|}{(X_{ijk}+M_{ijk})} \qquad 0 \le GL_{ijk} \le 1 \qquad (2)$$

where X_{ijk} and M_{ijk} represent country *j*'s exports to and imports from country *k* of goods produced by industry *i*. GL_{ijk} varies directly with the level of IIT. A value of 0 indicates that no intra-industry trade exists; a value of one indicates that there is complete trade overlap (exports equal imports.)[3]

Two variations of the G-L index are used to succinctly summarize IIT in the Western Hemisphere in this study. The first is a U.S. - regional index for industries classified by the United Nations' (U.N.) Broad Economic Classification (BEC) system (U.N., 1971). The bilateral U.S. - regional index for a group of industries defined as one sector (e.g., processed goods for household consumption) is

$$GL_{sjr} = \frac{\sum_{i=1}^{n}\sum_{k=1}^{t}(X_{ijk}+M_{ijk}) - \sum_{i=1}^{n}\left|\sum_{k=1}^{t}X_{ijk}-\sum_{k=1}^{t}M_{ijk}\right|}{\sum_{i=1}^{n}\sum_{k=1}^{t}(X_{ijk}+M_{ijk})} \qquad 0 \le GL_{sjr} \le 1, \quad k \in r \tag{3}$$

where *M*, *X*, and *i*, are defined as before; *j* is the United States, *r* is one of the five defined regions, and *t* is the number of countries, *k*, in each region. There are four BEC's, denoted by *s*, and there are *n* industries in each sector *s*. These indices are presented in Table 4.

We also calculate a U.S. - regional index for a single industry *i*. It is given by

$$GL_{ijr} = \frac{(\sum_{k=1}^{t}X_{ijk}+\sum_{k=1}^{t}M_{ijk}) - \left|\sum_{k=1}^{t}X_{ijk}-\sum_{k=1}^{t}M_{ijk}\right|}{(\sum_{k=1}^{t}X_{ijk}+\sum_{k=1}^{t}M_{ijk})} \qquad 0 \le GL_{ijr} \le 1, \quad k \in r \tag{4}$$

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[3] Obviously, the more aggregated the trade data -- the empirical equivalent of defining an industry very broadly -- the higher the measured IIT will likely be. We re-calculated the IIT indexes in our sample at the SITC four-digit level to examine the influence of aggregation on our results. We determined that our choice of the three-digit level --- in effect, our definition of industry --- did not seriously prejudice our findings (see discussion in Section IV). An extensive review of the problems of measuring IIT, including potential biases introduced by categorical aggregation and trade imbalances, can be found in the literature (Pomfret, 1979; Greenaway and Milner, 1986).

There are six U.S. - regional indices (five trading blocs plus a Western Hemisphere aggregate) for each industry; they are found in Tables 5 and 6, as well as Appendix Tables 3 and 4.

We use data from the U.N. Trade Data System that recorded 1991 bilateral trade flows between the United States and 34 countries in the Western Hemisphere to construct bilateral trade flows between the United States and five regions (Table 2). We examine only "U.S. Reporter" trade data, which records U.S. exports and imports by country.[4]

Table 2: Composition of Western Hemisphere regions

Regions	U.S. Trading Partners
NAFTA	Canada, Mexico
Caribbean Basin Initiative (CBI)	Antigua & Barbuda, Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nicaragua, Panamá, St. Kitts-Nevis, St. Lucia, St. Vincent & Grenadines, Trinidad & Tobago
Andean Pact	Bolivia, Colómbia, Ecuador, Perú, Venezuela
Chile	Chile
Mercosur	Argentina, Brazil, Paraguay, Uruguay

The trade data are classified according to Revision 1 of the Standard International Trade Classification (SITC) system. Industries here are synonymous with "groups," the U.N. nomenclature for trade data at the three-digit level. There are 58 industries which comprise agricultural, forestry and fishery activities in Sections 0, 1, 2, and 4 of the SITC. A list of the industries in this sample can be found in Appendix Table 1. Detailed information on the U.N.'s classification of these industries into BEC's can be found in Appendix Table 2.

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[4] It is well known that there are sometimes substantial differences between what Country A reports that it exported to Country B, and what Country B reports that it imported from Country A. The convention is to use reported import data exclusively, since it is assumed that revenue-producing import tariffs provide an incentive for countries to accurately record what they import. In this sample, however, we use export data reported by the United States instead of the import data reported by the Latin American countries. All of these countries are classified as LDC's by the World Bank; the data reported by the United States was therefore judged to be more reliable than the data reported by its Latin American trading partners. U.S. and Canadian reports of bilateral trade data have been identical since 1990.

IV. Empirical Evidence

Two-way trade in agricultural, forestry and fishery products between the U.S. and the other countries in the Western Hemisphere totaled $33.7 billion in 1991 (Table 3). U.S. trade with its NAFTA trading partners alone accounted for more than two-thirds of this total. The importance of each region as a trading partner decreases as the distance from the United States increases: the countries that belong to the CBI, the Andean Pact, and Mercosur respectively account for 12, 10 and 9 percent of U.S. trade in these products in the Western Hemisphere. Trade between Chile and the United States totaled $920 million, equal to 2.7 percent of the total.

Table 3: Profile of U.S. two-way trade in agricultural, forestry and fishery products with other Western Hemisphere regions, 1991

	Primary products for industrial use (PI)	Primary products for household use (PH)	Processed products for industrial use (PRI)	Processed products for household use (PRH)
	($1,000,000)			
Western Hemisphere	**7,951**[1]	**7,936**	**10,156**	**7,689**
NAFTA Partners	4,735	4,362	7,936	5,589
CBI Countries	1,065	1,328	892	772
Andean Pact Countries	1,140	1,286	560	225
Chile	99	576	92	153
Mercosur	912	384	676	949

[1] Numbers may not sum to total because of rounding.

Table 3 also presents data on the value of bilateral U.S. - Western Hemisphere regional trade in each of four BEC's.[5] The United States exchanged more products classified as intermediate processed (PRI) goods, such as shaped wood, sugar, and vegetable oils, with countries in the Western Hemisphere than products in any other category. The value of trade of products in processed goods for household consumption (PRH), intermediate primary products (PI), and primary goods for household consumption (PH) was approximately the same for all three categories.

The value of the aggregate Western Hemisphere G-L index calculated for all industries in the agricultural and agroindustrial sector is equal to .46, higher than the value of the U.S. multilateral index (.37) for these sectors reported in the Hart and McDonald study.[6] This result principally reflects the relatively high level of IIT between the United States and NAFTA (.51) and the fact that NAFTA accounts for 67 percent of U.S. - WH trade in these products. The aggregate indices for the other four regions in the Hemisphere are low.

A more detailed view of IIT in the Hemisphere is found in Table 4 where the U.S. - regional G-L indices for the four BEC's are presented. The level of IIT between the U.S. and its trading partners in the Western Hemisphere in PRH goods is nearly twice as high that for PI products, but the levels for PH and PRI goods are nearly identical. From the discussion in Section II, one would expect the G-L indices for the PRI products to be higher than those for the PH goods. Although the magnitudes differ, the ordinal rank of the G-L indices for the NAFTA trading partners is identical to that of the Western Hemisphere; in fact it is likely the WH results again largely reflect the pattern of U.S.-NAFTA IIT since NAFTA accounts for such a large share of U.S.-WH trade.

Both Chile and Mercosur countries register low levels of IIT in all four categories. The highest G-L index between Chile and the United States is observed for the PI category; the highest for the Mercosur countries is for PRI products. The levels of IIT between the United States and these two regions for processed final goods is extremely low in comparison to the other regions in the Hemisphere. The pattern of IIT conformed to *a priori* expectations for only one region: the Andean Pact. The G-L indices were higher for both categories of processed products than for primary products in this region.

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[5] An explanation of the logic behind the U.N.'s classification system can be found in (United Nations, 1986).

[6] These indices are weighted averages of the three-digit G-L indexes; the weights are industry-specific shares of gross trade.

Table 4: Profile of IIT in agricultural, forestry and fish industries between the United States and other Western Hemisphere (WH) regions, 1991

	Per capita income	PI Goods [23][1]	PH Goods [5]	PRI Goods [13]	PRH Goods [17]
	($)	------------------ G-L indices ------------------			
Western Hemisphere	**3,222**	**.33**	**.45**	**.44**	**.65**
NAFTA Partners	6,936	.41	.60	.43	.66
Mercosur	2,426	.07	.06	.11	.07
Chile	2,296	.20	.00	.14	.03
Andean Pact	1,422	.04	.04	.17	.41
CBI	1,251	.13	.20	.07	.45

[1] The number in brackets refers to the number of SITC 3-digit industries in each BEC.

Although the largest G-L indices in all four categories were observed for the region with the highest per capita income, the NAFTA partner countries, IIT is otherwise uncorrelated with income. Note, for example, that the G-L index for PRH goods is substantially higher for the CBI countries than for Chile or the Mercosur countries, even though per capita incomes in the latter two regions are twice as high as the CBI average.

A GL index that equaled or exceeded .5, (i.e., where IIT rather than inter-industry exchange accounted for most of the trade in a given industry) was found for seventy of the 290 individual industries in this sample (58 industries in 5 regions). A list of these industries, together with the value of U.S. - regional trade by region and by industry, can be found in Appendix Tables 3 and 4. These tables present evidence of a wide variation among the regions in the value of trade generated by the industries with high G-L indices; substantial variation among the regions in the individual industries in which IIT was found; and great regional variation in the types of products (intermediate, final; primary, processed) produced by industries with high G-L indices. The total number of industries with G-L indices greater than or equal to .5 in each region, ranging from 25 for the NAFTA partner countries to 4 for Chile, was perfectly correlated with the value of regional trade with the United States. The PRH category had more regional industries (26) with G-L indices that equalled or exceeded .5 than any other category.

The G-L index calculated for U.S. - Western Hemisphere trade exceeded .5 for twenty-three industries. Excluding those industries that recorded less than $100 million in trade reduced this sample to sixteen industries (Table 5). Nine of the sixteen industries produced PRH goods; the PRI and PI categories each contain three industries. Only one group, fresh, chilled, or frozen meat, fell into the PH category. In the following discussion we examine the data to detect which factors might have influenced this pattern of U.S. - WH IIT: categorical aggregation, seasonal trade of homogeneous products, horizontal or vertical product differentiation, and government policies.[7]

Categorical aggregation: An analysis of the industries showing high IIT indices data at a less aggregate level may reveal cases where there is complete inter-industry specialization at the four-digit level. For example, a high G-L index for "Household type equipment" (SITC 775) could be produced by Country A exporting $10 million of refrigerators (SITC 775.2) and importing $9 million of electric shavers (SITC 775.4) from Country B, but no simultaneous exchange of refrigerators or electric shavers. This could appear to be the case for SITC 421, "Fixed vegetable oils and fats." The G-L index of .7 for SITC 421 is the result of U.S. exports of soybean and cottonseed oil (421.2 and 421.3) and U.S. imports of rapeseed and sunflowerseed oil (421.6 and 421.7); the simultaneous exchange of products at the four-digit level is minimal (Table 6). One could therefore conclude that the "evidence" of IIT in SITC 421 is merely a statistical artifact, produced by defining an "industry" broadly. This conclusion is justified in this instance if one's view of an industry is based on similarities in material inputs or a range of products produced by the same capital equipment (e.g., a "soybean" industry) There are alternative definitions of an industry, however. If one defines an industry on the basis of demand relationships -- such as the collection of firms that produce commodities that enter the utility function as the arguments of a weakly separable sub-utility function -- one might identify fixed vegetable oils and fats as an "industry."[8] Therefore, while one might conclude that a high G-L index is only the result of categorical aggregation in the "Household type equipment" example, the same conclusion for "Fixed vegetable oils and fats" is justified only if one chooses a narrow definition of "industry" based on certain supply relationships.

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[7] Other factors, including measures of industry concentration, minimum efficient scale, economies of scope, or other industry characteristics, are not examined here. Data on these industry characteristics are published by the U.S. Commerce Department in the Census of Manufactures using the Standard Industrial Classification (SIC) system. SITC trade data must therefore be reclassified using SIC nomenclature before the influence of industry characteristics can be analyzed, a task not undertaken in this study.

[8] A single definition of an industry has eluded industrial organization economists for decades; any partitioning of production and consumption activities into mutually exclusive and proper subsets inevitably excludes "familiar" industries or produces awkward hybrids. In general the issue of trade data classified into categories that do not correspond to any definition of "industry" except at the most abstract level is more often a problem for industrial goods than for raw and processed products of the agricultural, forestry and fishery sectors. The products of these sectors that are classified by SITC groups and subgroups (i.e., the three- and four-digit levels) can nearly always be considered substitutes in consumption or production or both.

Table 5: Industries with United States - Western Hemisphere G-L indices > .5 and trade > $100 million, 1991

	G-L index	Value of trade	BEC category
		($1,000)	
Tobacco manufactures	0.96	355,401	PRH
Chocolate and other food preparations	0.95	294,299	PRH
Sugar confectionery and other sugar prep.	0.88	194,251	PRH
Cereal preparations	0.85	683,569	PRH
Vgtbls, roots & tubers, pres. or prep. n.e.s.	0.84	224,719	PRI
Nonalcoholic beverages, n.e.s.	0.83	215,138	PRH
Vegetables, fresh, frozen or simply pres.	0.80	2,086,227	PRH
Meat, fresh, chilled and frozen	0.79	1,759,898	PH
Crude vegetable materials, n.e.s.	0.70	844,493	PI
Fixed vegetable oils and fats	0.70	250,050	PRI
Crude animal materials, n.e.s.	0.66	133,355	PI
Meat and meat preparations, n.e.s.	0.64	466,523	PRH
Hides and skins, undressed	0.62	253,770	PI
Fruit, preserved and fruit preparations	0.59	955,815	PRH
Fish and fish preparations, n.e.s.	0.58	284,519	PRH
Sugar and honey	0.54	989,037	PRI
Total		10,417,541	

The effects of categorical aggregation for the remaining 15 SITC groups are minimal. There are a few cases where IIT at the four-digit level is almost nonexistent (e.g. SITC 122.2 "Cigars and Cheroots") but these industries always account for a minor share of trade. The evidence of IIT at the three-digit level therefore cannot be explained by inter-industry specialization at the four-digit level for this sample.

Seasonal trade: A related issue, especially relevant for agricultural products, is the exchange of homogeneous products between countries in different seasons. This is not, strictly speaking, concurrent trade; it is in fact, a artifact of the unit of measurement, *annual* trade data. The one unequivocable case of seasonal trade producing a high G-L index in this sample is found in fresh tomatoes (SITC 054.5). U.S. exports and imports of fresh tomatoes with its NAFTA partners accounts for about 25 percent of SITC 054, "Vegetables, fresh, frozen or simply preserved" an industry which registered a G-L index of .8 (Table 5). The only other category for which seasonal trade could plausibly produce a high G-L index at the four-digit level is fresh potatoes (SITC 054.1). But inspection of the data at a more detailed level shows that U.S. exports of russet potatoes (primarily used for baking) and U.S. imports of non-russet potatoes (for boiling or processing) explains the high G-L index of .89.

Horizontal product differentiation: Products are horizontally differentiated if they share certain common, core characteristics while exhibiting alternative attributes which distinguishes one product from another in the eyes of the consumer. Horizontal product differentiation seems to be a very plausible explanation for IIT in fresh potatoes, for example. Horizontal product differentiation would seem to be a likely cause of IIT in other industries which appear to produce a narrow range of products for household consumption at the four-digit level in this sample, including nonalcoholic beverages (a G-L index of .84 for $212 million of trade); prepared breakfast foods (a G-L index of .81 for $151 million of trade; and fish and fish preparations (a G-L index of .57 for $283 million of trade).

Vertical product differentiation: Vertically differentiated products possess different absolute amounts of the core characteristics of all of the products of an industry which present consumers with a choice of alternative qualities of a products. Two proxies of vertical product differentiation were calculated for SITC 011.1, "Meat of bovine animals, fresh, chilled or frozen" to see if product differentiation offered a plausible explanation of the .77 G-L index for this industry in which U.S. - WH trade totaled $926 million in 1991. The first proxy, the frequently used Hufbauer (1970) index is

$$H = \frac{\sigma_{ij}}{\overline{P}_{ij}}$$

where σ_{ij} is the standard deviation of export unit values for shipments of good i to country j, and $\overline{P}_{ij}$ is the unweighted mean of those unit values. In other words, the Hufbauer index is the coefficient of variation of the export unit values of a product category. A Hufbauer index is assumed to reflect differences in the quality of a product shipped to different destinations. The greater the coefficient, the greater the extent of product differentiation. A large Kol-Rayment (1989) index, which is simply the percentage difference between the import and export unit value of a product group, can provide additional evidence of vertical product differentiation. The values for both proxy variables calculated from the export and import unit values for fresh, chilled or frozen beef strongly suggest that vertical product differentiation explains the IIT for this product group. The Hufbauer index was equal to 57.9, while the value of the Kol-Rayment index reveals that export unit values were, on average, 104 percent higher than import unit values in 1991. A more systematic investigation of these sixteen industries for evidence of vertical product differentiation was not possible since quantity data (and therefore unit values) were not reported for most of the sample.

Government policies. Product, market, and industry characteristics are not the only determinants of IIT flows; occasionally government policies create IIT. Prominent examples include U.S. - Western Hemisphere IIT in sugar and sugar containing products. Without government programs, which typically account for more than fifty percent of U.S. sugar producers' gross revenues (USDA, 1994), it is likely that the United States would import a substantial proportion of the refined sugar

Table 6: Selected cases of high U.S. - WH intra-industry trade at SITC 3 digit level analyzed by 4 digit groups 1/

SITC Group and sub-group		GL index	Value of trade
			($1,000)
122	Tobacco manufactures	.96	355,401
122.1	Cigars and cheroots	.02	44,290
122.2	Cigarettes	.82	266,965
122.3	Tobacco, manufactured	.50	41,489
073	Chocolate and other food preparations	.95	294,299
073.0	Chocolate and other food preparations	.95	294,228
062	Sugar confectionery and other sugar prep.	.88	194,251
062.0	Sugar confectionery and other sugar preps (ex choc)	.88	194,530
048	Cereal preparations	.85	683,569
048.1	Cereal grains, flaked (prep break food)	.81	151,550
048.2	Malt	.38	23,106
048.3	Macaroni, spaghetti, noodles, etc.	.75	66,677
048.4	Bakery products	.96	357,554
048.8	Preparation of cereals, flour and starch, n.e.s.	.84	224,719
111	Nonalcoholic beverages, n.e.s.	.83	215,138
111.0	Nonalcoholic beverages, n.e.s.	.84	212,890
054	Vegetables, fresh, frozen or simply pres.	.80	2,086,227
054.1	Potatoes, fresh	.89	122,888
054.2	Beans, peas, lentils, etc.	.47	105,101
054.4	Tomatoes, fresh	.56	381,704
054.5	Other fresh vegetables	.93	1,079,107
054.6	Vegetables, frzn or temp prsvd	.46	333,492
054.8	Vegetable products n.e.s., fresh	.94	68,046
011	Meat, fresh, chilled and frozen	.79	1,759,898
011.1	Meat of bovine animals, fr, ch, or frzn	.77	926,642
011.2	Meat sheep and goats, fr, ch, or frzn	.02	9,936
011.3	Meat of swine, fr, ch, or frzn	.39	399,647
011.4	Poultry, fr, ch, or frzn, including offals	.03	254,779
011.5	Meat of horses, mules, etc., fr, ch, or frzn	.00	12,638
011.6	Edible offals of animals in 011.1, .2, .3, & .5	.17	139,312
011.8	Other fr, ch, or frzn meat and edible offals	.46	12,136
292	Crude vegetable materials, n.e.s.	.70	844,493
292.1	Plants and parts of plants for dyeing, tanning	--	--
292.2	Natural gums, resins, balsam and lacs	.76	11,293
292.3	Vegetable materials of tyeps for plaiting	.76	449
292.4	Plans, seeds, flowers, etc. for perfumes, pharmacy, etc.	.93	16,626
292.5	Seeds, fruit and spores	.59	160,518
292.6	Bulbs, tubers and rhizomes	.83	160,659
292.7	Cut flowers and foilage	.18	386,673
292.9	Material of vegetable origin, n.e.s	1.00	107,262

--Continued

Table 6: Selected cases of high U.S. - WH intra-industry trade at the SITC 3 digit level analyzed by 4 digit groups--Con't 1/

SITC Group and sub-group		GL Index	Value of trade
			($1,000)
421	Fixed vegetable oils and fats	.70	250,050
421.1	Soya bean oil	.00	59,677
421.3	Cotton seed oil	.00	17,143
421.4	Groundnut (peanut) oil	.00	5,242
421.5	Olive oil	.62	3,699
421.6	Sunflower seed oil	.25	64,529
421.7	Rape, colza and mustard oils	.01	98,352
291	Crude animal materials, n.e.s.	.66	133,355
291.1	Bones, ivory, horns, hoofs, claws, etc.	.49	38,539
291.9	Material of animal origin, n.e.s.	.68	114,260
013	Meat and meat preparations, n.e.s.	.64	466,523
013.3	Meat extracts and meat juices	.50	7,305
013.4	Sausages	.36	47,275
013.8	Other presvd and prep meat	.52	410,512
211	Hides and skins, undressed	.62	253,770
211.1	Bovine and equine hides	.59	221,568
211.2	Calf skins and kip skins	.75	5,880
211.4	Goat skins and kip skins	.00	563
211.6	Sheep and lamb skins, w/wool	.00	3,465
211.7	Sheep and lamb skins, w/o wool	.87	5,375
211.8	Waste and used leather	.70	920
211.9	Hides and skins, n.e.s.	.76	13,315
053	Fruit, preserved and fruit preparations	.59	955,815
053.2	Fruit, fruit peel, prsvd by sugar	.73	886
053.3	Jams, marmalades, jellies, purees and pastes	.78	25,318
053.5	Fruit juices and vegetable juices, unfermented	.52	698,697
053.6	Fruit, temporarily preserved	.57	83,672
053.9	Fruit and nuts, prep and prsvd	.84	146,275
032	Fish and fish preparations, n.e.s.	.58	284,519
032.0	Fish and fish preparations, n.e.s.	.57	283,293
061	Sugar and honey	.54	989,037
061.1	Raw sugar, beet and cane	.04	530,286
061.2	Redefined sugar and other products	.33	196,841
061.5	Molasses	.29	71,010
061.6	Natural honey	.06	22,808
061.9	Sugars and syrups, n.e.s.	.98	169,315

1/ Groups were selected if the G-L index calculated at the SITC 3-digit level equalled or exceeded .5 and total bilateral trade between the United States and the Western Hemisphere equalled or exceeded $100 milllion.

and sugar-containing products that it consumes. U.S. exports of refined sugar would likely be nonexistent; U.S. exports of sugar-containing products would likely be restricted to a few highly differentiated (i.e., brand familiar) items. However, the combination of U.S. quotas on imports of sugar and sugar-containing products and U.S. re-export programs for refined sugar and processed sugar products create incentives for trade flows that would not exist in the absence of government intervention.

Consider the example of observed IIT in SITC 061.2, "Refined sugar and other products of refining cane and beet sugar (not including syrups)." The value of the G-L index for this category is .33, a value that would surely be lower if the U.S. government did not 1) maintain a quota on sugar and sugar products that fosters a domestic refining industry, and 2) operate a program which permits sugar refiners who obtain a license to import 50,000 tons of raw sugar each year as long as the sugar is is re-exported in refined form.

A more striking example of the way in which government policies can create intra-industry trade flows can be found in SITC 062.0, "Sugar confectionery and other sugar preparations (excluding chocolate)". The United States imported $108.5 million in sugar-containing products under quota in 1991 from the Western Hemisphere; regional exports of products in this category totaled $86 million, largely because of the U.S. Sugar Licensing Program. Under this program, a refiner is permitted to import raw sugar at world market prices if it is re-exported in sugar-containing products. These trade flows resulted in a G-L index of .88, a level that would be considered high even for industrial products.

V. Summary and Concluding Remarks

This overview presents evidence of the magnitude, breadth and diversity of IIT flows between the United States and its trading partners in the Western Hemisphere in agricultural and agroindustrial products. Some of the principal findings are:

- U.S. - WH IIT in raw and processed agricultural goods is, on average, higher than U.S. IIT with the rest of the world. This finding prinicpally reflects the high levels of IIT between the United States and its NAFTA trading partners, Canada and Mexico. This result provides supportive evidence for the importance of high incomes, proximity, and economic integration (the 1989 U.S. - Canadian free trade agreement) in fostering IIT.

- The ordinal rank of the U.S. - regional G-L indices in the Hemisphere suggests that proximity, rather than per capita income, is the most reliable predictor of IIT that has been examined in this study. This observation, together with the observation that current trade barriers between the United States and Chile for processed agricultural products are low, leads to the conclusion that a free trade agreement with Chile will likely produce negligible increases in IIT in these products.

■ Despite the distance from American markets, the region that appears to have the greatest potential for increases in IIT with the United States is Mercosur. IIT between the United States and Mercosur in 1991 was quite low; in fact, IIT between the United States and the CBI countries was more extensive than between the United States and Mercosur. These low levels of IIT were observed even though 1) average per capita income in Mercosur is more than double the average in the CBI; and 2) the United States' resource base is more similar to that of the Mercosur countries than the CBI countries. Inspection of the data reveals that the low G-L indices were the result of negligible U.S. exports to the region. Mercosur has substantially lowered trade barriers since 1991, which has led to sharply increased exports of U.S. processed agricultural products to the region over the past three years (USDA/FAS, 1994). Given 1) Mercosur's large middle class and 2) policy reforms that are expected to substantially increase regional growth, integration with Mercosur should produce an opportunity to significantly increase the mutual exchange of processed agricultural products such as vegetable oils, cheeses, and cereal preparations.

■ Intra-industry trade in low-value bulk commodities (PI) was uniformly low for all regions. This category accounted for $7.9 billion of U.S. - WH regional trade in 1991. If, in fact, most of the products in this category are "Heckscher-Ohlin" goods, a significant amount of inter-sectoral adjustment will follow Western Hemisphere trade liberalization in categories where current trade barriers are high. It should be noted, however, that most of the trade in this category ($4.7 billion) is with the NAFTA trading partners. One could conclude that trade liberalization negotiations with the remaining Western Hemisphere regions will be less arduous than the NAFTA negotiations.

■ The most significant IIT occurs in processed consumer products. The G-L indexes for some categories were quite high, especially considering that all of the countries in the sample, excluding Canada, are low or middle income countries. This finding provides support for the general hypothesis that IIT is expected to be higher for manufactured goods than for primary products.

■ On the other hand, IIT in unprocessed consumer goods was higher than that for processed intermediate goods for the two regions that recorded the highest bilateral trade with the United States, the NAFTA partners and the CBI countries. Horizontal or vertical differentiation, rather than seasonal trade, seems to be the more likely explanation for the relatively high level of IIT in PH agricultural goods. Higher IIT in PH goods than in PRI goods is probably related to the fact that the PRI category is dominated by products such as shaped wood, wood pulp, and animals feedstuffs. Even though these items are products of the manufacturing sector, one would not expect to observe high levels of IIT in these industries; they are not the kind of industrial products for which a corporation could minimize costs by making transnational subcontracting arrangements for vertically adjacent stages of production.

■ The regional variation in the number of industries with relatively large G-L indices was perfectly correlated with the regional variation in the value of trade with the United States, a correlation reported in other empirical studies.

■ Closer examination of the data for possible causes of the observed IIT in 16 industries in which at least $100 million of goods were exchanged yields a number of plausible hypotheses, ranging from seasonal trade to vertical product differentiation. However, seasonal trade does not appear to be the principal explanation for IIT flows between the United States and Western Hemisphere regions, as one might hypothesize for agricultural goods. In at least a few select industries, government policies have created IIT flows, which would likely disappear in the event of regional trade liberalization.

■ The amount of U.S. - WH trade in product categories in which IIT is significant is large, accounting for more than $10.5 billion in 1991. Only a small amount of this measured IIT is spurious (i.e., produced by categorical aggregation, seasonal trade or government programs). The fact that 9 of 16 of the industries in this sub-sample produce PRH goods suggests that a substantial amount of Western Hemisphere IIT is produced by a combination of consumers' preferences for variety in combination with declining unit costs in the agricultural and agroindustrial sectors. This implies that trade liberalization will produce the opportunity to simutaneously increase the diversity of products available and the scale at which many products are produced. If Western Hemisphere policymakers take advantage of this opportunity, clearly the welfare gains from regional integration will be larger than standard trade models would predict. The difference would be more pronounced for some product categories and some regions.

Given the lack of systematic analysis in this study, conclusions must be tentative. Without information on tariff and non-tariff barriers it is impossible to make qualitative predictions about intersectoral shifts in resources in the Western Hemisphere as economic integration proceeds, or how the presence of IIT might affect these shifts. However, the evidence of significant levels of IIT in some industries in some regions suggests that it is important for the policy and welfare implications of such trade to be explicitly considered when evaluating alternative regional integration schemes.

This study suggests that although there might be *a priori* reasons for U.S. policymakers to expect pronounced inter-industry trade adjustment effects with freer trade with the LDC's of the Western Hemisphere, in fact there are substantial opportunities for the creation of IIT, even for location-specific industries in the agricultural sector. The sequence of changes in trade barriers and domestic agricultural policies in the Western Hemisphere will certainly influence whether IIT increases as a proportion of total trade in agricultural and agroindustrial products; changes in food processing and transportation technologies will play a role as well. But before policymakers make decisions to prevent "losing" an industry in the course of regional integration, they should consider that a possible outcome of freer trade will be that domestic producers of a given type, grade, or variety of product will gain the opportunity to sell their products to foreign consumers at the same time that domestic consumers have the opportunity to enjoy a wider sample of an industry's products. Future IIT research should carefully examine industry charactertics, domestic agricultural policies, and tariff and non-tariff barriers to sharpen their predictions about IIT creation, thereby providing information that policymakers can use to reduce the costs and frictions related to economic integration.

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Appendix Table 1: Standard International Trade Classification (SITC) Codes (Revision 1) for Agricultural, Forestry and Fish Products

Division Code	Group Code	Division and Group Headings
00		LIVE ANIMALS
	001	Live Animals
01		MEAT AND MEAT PREPARATIONS
	011	Meat, fresh, chilled or frozen
	012	Meat, dried, salted or smoked, whether or not in airtight containers
	013	Meat in airtight containers, not elsewhere specified (n.e.s.) and meat preparations, whether or not in airtight containers
02		DAIRY PRODUCTS AND EGGS
	022	Milk and cream
	023	Butter
	024	Cheese and curd
	025	Eggs
03		FISH AND FISH PREPARATIONS
	031	Fish, fresh and simply preserved
	032	Fish, in airtight containers, n.e.s. and fish preparations, whether or not in airtight containers (including crustacea and mollusks)
04		CEREALS AND CEREAL PREPARATIONS
	041	Wheat (including spelt) and meslin, unmilled
	042	Rice
	043	Barley, unmilled
	044	Maize, unmilled
	045	Cereals, unmilled, other than wheat, rice, barley, and maize
	046	Meal and flour of wheat or of meslin
	047	Meal and flour of cereals, except meal and flour of wheat or of meslin
	048	Cereal preparations and preparations of flour and starch of fruits and vegetables

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Appendix Table 1: Standard International Trade Classification (SITC) Codes (Revision 1) for Agricultural, Forestry and Fish Products--Continued

Division Code	Group Code	Division and Group Headings
05		FRUITS AND VEGETABLES
	051	Fruit, fresh, and nuts (not including oil nuts), fresh or dried
	052	Dried fruit (including artificially dehydrated)
	053	Fruit, preserved and fruit preparations
	054	Vegetables, fresh, frozen or simply preserved (including dried leguminous vegetables); roots, tubers and other edible vegetables, n.e.s., fresh or dried
	055	Vegetables, roots and tubers, preserved or prepared, n.e.s., whether or not in airtight containers
06		SUGAR, SUGAR PREPARATIONS AND HONEY
	061	Sugar and honey
	062	Sugar confectionery and other sugar preparations (except chocolate confectionery)
07	COFFEE, TEA, COCOA, SPICES, AND MANUFACTURES THEREOF	
	071	Coffee
	072	Cocoa
	073	Chocolate and other food preparations containing cocoa or chocolate, n.e.s
	074	Tea and mate
	075	Spices
08	FEEDING STUFF FOR ANIMALS (NOT INCLUDING UNMILLED CEREALS)	
	081	Feeding stuff for animals (not including unmilled cereals)
09	MISCELLANEOUS FOOD PREPARATIONS	
	091	Margarine and shortening
	099	Food preparations, n.e.s.
11	BEVERAGES	
	111	Nonalcoholic beverages, n.e.s.
	112	Alcoholic beverages

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Appendix Table 1: Standard International Trade Classification (SITC) Codes (Revision 1) for Agricultural, Forestry and Fish Products--Continued

Division Code	Group Code	Division and Group Headings
12		TOBACCO AND TOBACCO MANUFACTURES
	121	Tobacco, unmanufactured
	122	Tobacco manufactures
21		HIDES, SKINS AND FUR SKINS, UNDRESSED
	211	Hides and skins (except fur skins), undressed
	212	Fur skins, undressed
22		OILSEEDS, OIL NUTS AND OIL KERNELS
	221	Oilseeds, oil nuts and oil kernels
23		CRUDE RUBBER, INCLUDING SYNTHETIC AND RECLAIMED
	2311	Natural rubber, gums
24		WOOD, LUMBER AND CORK
	241	Fuel wood and charcoal
	242	Wood in the rough or roughly squared
	243	Wood, shaped or simply worked
	244	Cork, raw and waste
25		PULP AND PAPER
	251	Pulp and waste paper
26		TEXTILE FIBERS (NOT MANUFACTURED INTO YARN,THREAD, OR FABRICS) AND THEIR WASTE
	261	Silk
	262	Wool and other animal hair
	263	Cotton
	264	Jute
	265	Vegetable fibers, except cotton and jute

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Appendix Table 1: Standard International Trade Classification (SITC) Codes (Revision 1) for Agricultural, Forestry and Fish Products--Continued

Division Code	Group Code	Division and Group Headings
27		CRUDE FERTILIZERS AND CRUDE MINERALS (EXCLUDING COAL, PETROLEUM AND PRECIOUS STONES)
	271	Crude fertilizers
29		CRUDE ANIMAL AND VEGETABLE MATERIAL, N.E.S.
	291	Crude animal materials, n.e.s.
	292	Crude vegetable materials, n.e.s.
41		ANIMAL OILS AND FATS
	411	Animal oils and fats
42		FIXED VEGETABLE OILS AND FATS
	421	Fixed vegetable oils and fats
	422	Other fixed vegetable oils
43		ANIMAL AND VEGETABLE OILS AND FATS, PROCESSED, AND WAXES OF ANIMAL OR VEGETABLE ORIGIN
	431	Animal and vegetable oils and fats, processed, and waxes of animal and vegetable origin

Source: United Nations, *Standard International Trade Classification*, Revised, Statistical Papers, Series M, No. 34, 1961.

Appendix Table 2: Classification Into Broad Economic Categories at the Three-digit (Group) Level[1]

SITC, Revision 1

Primary, Mainly for Industry	Primary, Mainly for Household Consumption	Processed, Mainly for Industry	Processed, Mainly for Household Consumption
001	011	046, 047	012, 013
025[2]	031	052, 055	022 - 024
041, 043 - 045	051	061	032
071	074, 075	072	042, 048
121		081	053, 054
211 - 212		241, 243	062
221		-251	073
2311		411	091, 099
242, 244		421, 422	111, 112
261 - 265		431	122
271			
291 - 292			

[1] The U.N. classifies trade data into Broad Economic Categories (BEC's) at the four-digit (sub-group) level. The classification system presented here is therefore approximate. The entire Group was assigned to a category if the majority of trade (measured in terms of dollars) occured in the subgroups assigned to that BEC. The groups in this table include all of those in the category "Food and Beverages," many groups from "Industrial supplies not elsewhere specified," and one group from "Consumer goods not elsewhere specified."

[2] Since most of the United States' trade with Western Hemisphere countries is in eggs for hatching, eggs have been classified in this report as "Primary, mainly for industry," instead of the U.N. classification of "Primary, mainly for household consumption".

Source: United Nations, *Classification by Broad Economic Categories*, Series M, No. 53, New York, 1971.

Appendix Table 3: U.S. trade with NAFTA partners and CBI countries in industries with GL indices > .5 in 1991, by region

SITC Groups	U.S. trade w/NAFTA partners ($1,000)	U.S. trade w/CBI countries ($1,000)	Broad Economic Category
Chocolate and other food	253,417		PRH
Spices	37,248		PH
Fur skins, undressed	55,535		PI
Cereal preparations	605,838		PRH
Animal and vegetable oil and fats	65,758		PRI
Sugar confectionery and other	137,111		PRH
Cocoa	33,481		PRI
Fruit, preserved and fruit	406,775		PRH
Fruit, fresh, and nuts	1,188,036		PH
Vegetables, roots and tubers, pres.	167,120		PRI
Sugar and honey	337,653		PRI
Vegetables, fresh, frozen or simply	1,848,620		PRH
Crude vegetable materials, n.e.s.	427,379		PI
Wheat and meslin, unmilled	111,884		PI
Nonalcoholic beverages, n.e.s.	190,384		PRH
Meat, fresh, chilled and frozen	1,472,216		PH
Fish and fish prep, n.e.s.	233,955		PRH
Cheese and curd	25,481		PRH
Meal and flour of wheat	15,843		PRI
Crude animal materials, n.e.s	111,076		PI
Eggs	51,932		PI
Feeding stuff for animals	788,494		PRI
Hides and skins, undressed	238,136		PI
Food preparations, n.e.s.	473,999		PRH
Meat and meat preparations, n.e.s.	181,812		PRH
Alcoholic beverages		52,502	PRH
Sugar confectionery and other		10,127	PRH
Spices		5,905	PH
Vegetables, roots and tubers, pres.		35,768	PRI
Tobacco manufactures		107,596	PRH
Fruit, preserved and fruit		89,968	PRH
Meat, fresh, chilled and frozen		264,310	PH
Vegetables, fresh, frozen or simply		151,749	PRH
Natural rubber, gums		2,349	PI
Tobacco, unmanufactured		99,723	PI
Tea and mate		482	PH
Chocolate and other food preps		9,794	PRH
Fish and fish preps		4,253	PRH
Crude vegetable materials, n.e.s.		62,129	PI
Total	9,459,183	900,105	

Appendix Table 4: U.S. trade with South American regions in industries with GL indices >.5 in 1991, by region

SITC Groups	U.S. trade w/Andean Pact ($1,000)	U.S. trade w/ Chile ($1,000)	U.S. trade w/Mercosur ($1,000)	Broad Economic Category
Jute	141			PI
Crude animal materials n.e.s.	2,500			PI
Fur skins, undressed	9			PI
Other fixed vegetable oils	5,651			PRI
Silk	105			PI
Alcoholic beverages	10,310			PRH
Vegetables, roots and tubers, pres.	7,394			PRI
Cereal preparations	23,352			PRH
Food preparations, n.e.s.	35,183			PRH
Vegetables, fresh, frozen or simply	33,370			PRH
Wood in the rough or roughly	387			PI
Cheese and curd	458			PRH
Hides and skins, undressed	1,210			PI
Sugar and honey	97,226			PRI
Animal oils and fats		2,990		PRI
Oilseeds, oil nuts and oil kernels		529		PI
Chocolate and other food		1,175		PRH
Cereals, unmilled		26		PI
Oilseeds, oil nuts and oil kernels			14,643	PI
Natural rubber, gums			3,995	PI
Vegetables, fresh, frozen or simply			21,906	PRH
Vegetable fibers, except cotton and			258	PI
Cereals, unmilled, n.e.s.			472	PI
Alcoholic beverages			18,902	PRH
Cereal preparations			4,188	PRH
Dried fruit			2,213	PRI
Crude animal materials, n.e.s.			15,070	PI
Vegetable roots and tubers, pres.			6,847	PRI
Crude vegetable materials, n.e.s.			28,627	PI
Meal and flour of cereals			4	PRI
Total	217,296	4,720	117,125	