LATIN AMERICAN EXPORT SPECIALIZATION IN RESOURCE-BASED PRODUCTS: IMPLICATIONS FOR GROWTH

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Given Latin America's general specialization in resource-based products, this paper focuses on the question of whether or not a country specialized in resource-based products can have high rates of export and economic growth. To examine this question, an attempt is made to develop and apply a new taxonomy to a sample of resource-based products exported by Latin American countries to the United States. This taxonomy is based on the role played by prices in the mechanism through which countries compete in specific international product markets. Resource-based products are then classified as homogeneous, differentiated, or highly differentiated goods. The paper argues that exports of countries specialized in differentiated or highly differentiated goods tend to be much more dynamic than of those specialized in homogeneous goods.

I. INTRODUCTION

The main objectives of this paper are to examine the patterns of export specialization of Latin American countries and try to see if they are related to the export performance of these countries. It is assumed that better export performance will foster economic growth. Given Latin America's general specialization in resource-based products, the paper focuses on the question of whether or not a country specialized in resource-based products can have high rates of export and economic growth.

There are many ways of classifying products and hence defining patterns of specialization. The conventional practice has been to apply some measure of technology intensity to define countries' patterns of specialization. However, very few resource-based products are actually classified as high-tech products. In this paper an attempt is made to classify resource-based products according to the role played

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by prices in the mechanism through which countries compete in specific international product markets and, eventually, gain or loose market shares in these markets.

The remainder of this paper is organized as follows. Section II reviews some possible theoretical effects of trade integration on specialization, technological progress, and economic growth. It also reviews the OECD's classification of high-tech products. Section III analyzes the development of world trade by groups of products, classified according to their degree of manufacturing and technology intensity. The performance of Latin American countries' exports to the United States is also examined using a constant market share analysis. Section IV describes the methodology for a new taxonomy of traded goods based on their degree of differentiation and applies it to a group of fifty-one resource-based products and to twelve machines used in the production of resource-based goods. The dynamics of each group of product is then used to analyze the performance of some Latin American countries' exports to the United States. The fifth section sums up the conclusions of the paper and discusses some policy implications.

II. SPECIALIZATION, TECHNOLOGICAL PROGRESS, AND GROWTH

A. Theoretical Framework

The principal theoretical reference of this paper is to be found in the literature that attempts to integrate trade and growth theories. A large number of dynamic models have been developed in this literature. Grossman and Helpman (1991) sum up some of these models and work out the effects of integration on innovation and growth in a two-country general equilibrium framework. I review some of their results here.

Economic growth in the long run is the result of technological progress. In traditional neoclassical growth models, technological progress is assumed to be exogenous. This would be an adequate assumption "if advances in industrial know-how followed automatically from fundamental scientific discoveries and if basic research was guided mostly by nonmarket forces" (Grossman and Helpman 1991, p. 334).

One way of making technological progress endogenous is by assuming that market forces can allocate resources to R&D, generating innovation and growth. In Grossman and Helpman's (G&H) models, new technologies are endogenous and result from the intentional actions of economic agents that perceive profit opportunities. Firms allocate resources to R&D when they expect a return. These returns come most often in the form of economic rents in product markets operating in imperfect competition. Therefore, monopoly profits provide the basis for economic growth in these models.

Innovation successes materialize into two types of new products or inputs: those that are imperfect substitutes and those that are perfect substitutes of the existing products or inputs. With the first type of new product or input, the economy expands horizontally as new products are added to the existing ones. With the second type, the economy expands vertically as new and better-quality products or inputs make the existing ones obsolete. The model of expanding variety captures the first type of innovation, while the rising product quality model (quality ladders) captures the second type. In the real world, of course, economies can expand horizon-tally and vertically at the same time as both types of products coexist.

G&H build on these models by adding three sectors: the traditional sector (where no innovation takes place), high-tech industry (where innovation is applied), and the R&D sector (where innovation is created). The R&D sector is assumed to be the most intense in human capital, whereas the traditional sector is the least intense. Given this set up and assuming that technological spillovers are global, the country's size, human capital endowment, and stock of accumulated knowledge all contribute to the country's competitiveness in research.

Research successes create export opportunities to the extent that innovators learn how to produce goods that are better, different, or cheaper than those of their competitors abroad. In the long run, the country's pattern of specialization and economic growth are both the result of this competitiveness in research. When technological spillovers are national, the initial conditions, historically determined, become crucial for the country's pattern of specialization and growth in the long term.

Therefore, one possible outcome is that countries that are small and/or poorly endowed with human capital and have a relatively small stock of country-specific knowledge would tend to specialize in traditional and non-innovative sectors, export low-tech products, and grow more slowly. On the other hand, large economies, well endowed with human capital and with relatively large stocks of countryspecific knowledge, would tend to specialize in innovative sectors, export hightech products, and experience high rates of innovation and growth.

B. Empirical Questions

A large number of empirical questions can be derived from the above theoretical framework. If indeed countries that are more competitive in research are expected to grow faster and export high-tech products, one should empirically find a positive relationship between rates of economic growth and specialization in high-tech sectors and goods across countries. However, in order to address this empirical question, it is necessary to be able to define, measure, and identify high-tech sectors and products in a meaningful and practical way.

A theoretical and conceptual discussion on how to define and measure technology could take us well beyond the scope of this work. Thus for the purpose of this paper it is sufficient to say that a high-technology industry is the one producing technology (better, different, or cheaper products or inputs) or using it intensively. They are also expected to be "those expanding most strongly in international trade and their dynamism helps to improve performance in other sectors (spillover)" (Hatzichronoglou 1997, p. 4).

A number of factors may be used to measure the technological level of a sector. Hatzichronoglou (1997, p. 8) lists the following: R&D intensity; scientific and technical personnel; technology embodied in patents, licenses, and know-how; strategic technical cooperation between companies; the rapid obsolescence of the knowledge available; quick turnover of equipment, etc.

However, one should bear in mind that researchers are restricted by the data that are available for the existing international classifications of sectors and products. To the best of my knowledge, the main systematic effort to classify sectors and products according to their technological content has been pursued by the OECD.¹ It is largely recognized that there is no perfect way to identify the technology content of an industry or product, measure it, and determine the cut-off points between different categories.

The OECD's classification of sectors by technology content applies the concept of R&D direct and indirect intensity. The former is measured by the ratio of R&D expenditure to output or value added by industry and tries to capture an industry's effort for producing technology. The latter measures R&D expenditure embodied in intermediates and capital goods purchased by an industry through the use of input-output matrices, and it is an attempt to capture technology diffusion or how intensively technology is used in a particular industry. The sum of direct and indirect R&D intensity is then calculated to rank manufacturing industries into four groups: high technology, medium-high technology, medium-low technology, and low technology.

In order to identify high-tech products, the OECD calculates R&D expenditure over total sales by product at the 5-digit level of the Standard International Trade Classification (SITC), Revision 3. Indirect R&D intensity is not applied at this level of disaggregation to define high-tech products. In principle, high-tech products do not have to belong to a high-tech industry. Hence, the true proportion of an industry's high technology could be calculated by excluding all non-high-tech products. However, at this level of aggregation, many products manufactured by medium- and low-technology sectors, but with high R&D expenditure over total sales, could not justifiably be considered high-tech and were excluded from the OECD list on the basis of expert opinion. As a result, the OECD only publishes a list of high-tech products which are largely consistent with the industries classified as high-tech,² though it includes some products manufactured by medium-high-technology industries.

¹ See Mani (2000) and Hatzichronoglou (1997) for a brief history of the classification efforts by the OECD and others.

² The concordance between SITC, Revision 3 (product classification) and the International Standard Industrial Classification (ISIC), Revision 2 (sectoral classification) gives the list of products by sectors classified by their R&D intensity.

It is worth noting that sectors can be more technology-intensive in one country, but less so in another. That is why the OECD classifies the technology content of each manufacturing industry on the basis of a weighted average of a large number of their member countries. On the other hand, the technology content of products is regarded as independent of the country where they are manufactured.

Hatzichronoglou (1997) recognizes some of the main limitations of the method applied by the OECD to classify sectors and list groups of high-tech products by their technology contents. First, R&D intensity is a very important characteristic of high technology, but it is not the only one. Second, R&D intensity measurements are biased against the sectors and periods in which turnover or production increases more rapidly than R&D expenditure on account of strong demand in growth or exceptionally vigorous marketing. They are also biased because all research in each sector is attributed to the principal activity of the firms making up the sector. Hightech products cannot be selected exclusively by quantitative methods unless a relatively high level of aggregation is adopted. Resorting to expert opinion helps to mitigate this problem, but the results cannot readily be reproduced in their entirety by other panels of experts. Since the choice is not based exclusively on quantitative measurements, it is difficult to classify products in increasing or decreasing order. Finally, the data are not comparable with other industrial data, as information published by other agencies on, for example, value added, employment, and gross fixed capital formation are not available at the product level.

The lack of sufficiently disaggregated data is another limitation, forcing the method to be applied to industries and products defined at still high levels of aggregation. A firm that has a high level of R&D expenditure to sales may produce a product whose final assembly may consist of simple operations that can be located in any cheap-labor country. In this case, although the product is very likely classified as high-tech according to the OECD's classification, it should not have been considered a high-tech product.³ Therefore, "countries with low technological capabilities can appear technologically advanced, giving a misleading picture of industrial performance. This problem is not possible to solve by refining available data on MVA [manufacturing value added] and exports" (UNIDO 2002, p. 30, box 2.1).

III. APPLYING CONVENTIONAL ANALYSIS

A. Dynamism and Structure of World and U.S. Imports

The examination of world and U.S. import growth since the late 1980s in Table I reveals that resource-based products have tended to expand much more slowly than

³ This is one reason why indirect R&D intensity ought not to be applied to define a high-tech product, as opposed to a high-tech industry, even if it could be measured at this high level of disaggregation.

TABLE I

WORLD AND U.S. IMPORTS

 $(0/_{0})$

| | | | | | (,-) |
|----------------|--|--|---|--|--|
| Annual Gro | wth Rates ^a | | Struct | ure of | |
| World Imports, | U.S. Imports, | World | Imports | U.S. | Imports |
| 1987–2000 | 1989–2002 | 1987 | 2000 | 1989 | 2002 |
| 5.0 | 6.6 | 37.0 | 29.0 | 29.0 | 24.0 |
| 3.3 | 4.1 | 10.4 | 6.2 | 5.2 | 3.2 |
| 5.0 | 5.6 | 11.1 | 10.3 | 11.2 | 9.4 |
| 5.0 | 1.6 | 6.0 | 6.0 | 7.6 | 4.7 |
| s 3.7 | 9.1 | 3.9 | 2.9 | 2.9 | 2.9 |
| 8.5 | 16.7 | 1.2 | 1.4 | 0.7 | 1.8 |
| 5.2 | 6.9 | 5.4 | 4.0 | 3.5 | 3.0 |
| 6.4 | 8.5 | 9.6 | 8.9 | 9.0 | 8.5 |
| N.A. | 8.6 | N.A. | 8.7 | 8.9 | 8.4 |
| N.A. | 3.2 | N.A. | 0.2 | 0.2 | 0.1 |
| 8.0 | 8.2 | 61.0 | 67.0 | 71.0 | 71.0 |
| N.A. | 7.6 | N.A. | 48.9 | 56.3 | 53.7 |
| N.A. | 10.0 | N.A. | 18.1 | 14.8 | 17.7 |
| 11.0 | 23.5 | 2.0 | 4.0 | 1.0 | 4.5 |
| 7.1 | 8.2 | 100.0 | 100.0 | 100.0 | 100.0 |
| | Annual Gro World Imports, 1987–2000 5.0 3.3 5.0 5.0 s 3.7 8.5 5.2 6.4 N.A. N.A. N.A. N.A. 11.0 7.1 | Annual Growth Ratesa World Imports, 1987–2000 U.S. Imports, 1989–2002 5.0 6.6 3.3 4.1 5.0 5.6 5.0 1.6 s 3.7 9.1 8.5 16.7 5.2 6.9 6.4 8.5 N.A. 8.6 N.A. 3.2 8.0 8.2 N.A. 10.0 11.0 23.5 7.1 8.2 1 | Annual Growth Ratesa World Imports, 1987–2000 U.S. Imports, 1987 5.0 6.6 37.0 3.3 4.1 10.4 5.0 5.6 11.1 5.0 1.6 6.0 s 3.7 9.1 3.9 8.5 16.7 1.2 5.2 5.2 6.9 5.4 6.4 8.5 9.6 N.A. 3.2 N.A. 8.0 8.2 61.0 N.A. 7.6 N.A. 11.0 23.5 2.0 7.1 8.2 100.0 | $\begin{tabular}{ c c c c } \hline Annual Growth Rates^a & Struct \\ \hline World Imports, 1987–2000 & 1989–2002 & 1987 & 2000 \\ \hline 1987–2000 & 1989–2002 & 1987 & 2000 \\ \hline 5.0 & 6.6 & 37.0 & 29.0 \\ \hline 3.3 & 4.1 & 10.4 & 6.2 \\ 5.0 & 5.6 & 11.1 & 10.3 \\ 5.0 & 1.6 & 6.0 & 6.0 \\ s & 3.7 & 9.1 & 3.9 & 2.9 \\ 8.5 & 16.7 & 1.2 & 1.4 \\ 5.2 & 6.9 & 5.4 & 4.0 \\ 6.4 & 8.5 & 9.6 & 8.9 \\ N.A. & 8.6 & N.A. & 8.7 \\ N.A. & 3.2 & N.A. & 0.2 \\ \hline 8.0 & 8.2 & 61.0 & 67.0 \\ N.A. & 7.6 & N.A. & 48.9 \\ N.A. & 10.0 & N.A. & 18.1 \\ \hline 11.0 & 23.5 & 2.0 & 4.0 \\ \hline 7.1 & 8.2 & 100.0 & 100.0 \\ \hline \end{tabular}$ | $\begin{tabular}{ c c c c c } \hline Annual Growth Rates^a & Structure of \\ \hline World Imports, 1987–2000 1989–2002 1987 2000 1989 \\ \hline 1987–2000 1989–2002 1987 2000 1989 \\ \hline 5.0 6.6 37.0 29.0 29.0 3.3 4.1 10.4 6.2 5.2 5.0 5.6 11.1 10.3 11.2 5.0 5.6 11.1 10.3 11.2 5.0 1.6 6.0 6.0 7.6 s 3.7 9.1 3.9 2.9 2.9 8.5 16.7 1.2 1.4 0.7 5.2 6.9 5.4 4.0 3.5 6.4 8.5 9.6 8.9 9.0 N.A. 8.6 N.A. 8.7 8.9 N.A. 3.2 N.A. 0.2 0.2 \\ \hline 8.0 8.2 61.0 67.0 71.0 N.A. 7.6 N.A. 48.9 56.3 N.A. 10.0 N.A. 18.1 14.8 \\ \hline 11.0 23.5 2.0 4.0 1.0 \\ \hline 7.1 8.2 100.0 100.0 100.0 \\ \hline \end{tabular}$ |

Source: Based on the United Nations Conference on Trade and Development (UNCTAD) and USITC data (SITC, Revision 3, 3- to 5-digit levels).

^a Growth rates were calculated as the coefficient of a trend line adjusted by OLS to the import data in logarithmic form.

non-resource-based products.⁴ Within resource-based products, primary commodities (excluding crude petroleum) have had the worst performance. Trade of resourcebased manufactures was the best performing group of resource-based products, though they have expanded more slowly than world imports in aggregate. Agroindustrial products have tended to grow slightly above the average of resourcebased products.

Indeed, it may be said that, excluding energy-related products, trade has tended to be more dynamic for groups of products that are less related to natural resources, as we move from primary commodities to agro-industrial products, resource-based manufactures, and non-resource-based manufactures.

As a result of the slow growth of import demand for resource-based products, exports of developing countries have tended to expand more slowly the higher the

⁴ Appendix Table I shows how products were classified. See Chami Batista (2003) or Lall (2000) for a more detailed analysis of world trade by products classified by manufacturing and technology intensity.





Share of resource-based products, 1996-2000

share of these products in these countries' exports. In point of fact, Figure 1 shows that the growth rates of exports in the period between 1990 and 2000 were negatively related to the share of resource-based products in total exports for the major countries in Latin America and East Asia in the period between 1996 and 2000. Mexico and Costa Rica, the two best export performers in Latin America in the period, have the lowest shares in the region of resource-based products in their exports. Brazil's export performance was disappointing, considering that it has a much lower share of resource-based products than countries that outperformed it, like Argentina and Chile.

Within non-resource-based products, imports of high-tech manufactures have been the most dynamic of all categories, though the rate of import expansion of this group of products into the United States declined sharply in the first two years of the twenty-first century.

As a consequence of these differences in the rates of expansion of trade, the share of resource-based products in world imports declined from almost 40 percent in the mid-1980s to less than 30 percent in the early 2000s. The proportion of resource-based products in U.S. imports has been even smaller, falling to less than a quarter in the early 2000s as the U.S. economy itself is well endowed with natural resources. Primary (excluding crude petroleum) and agro-industrial goods accounted for only 6 and 3 percent, and 4 and 3 percent of world and U.S. imports, respectively, in the early 2000s. Resource-based-high-tech manufactures account for a tiny and decreasing share of world imports, but non-resource-based-high-tech products doubled their share in world imports between 1993 and 2000 and now account for almost one-fifth of the total. Nevertheless, non-resource-based-low-tech manufactures, though declining, still account for almost half of world imports, while

resource-based-low-tech manufactures maintain a firm 9 percent share of world imports.⁵

Latin America reveals a well-established comparative advantage⁶ in non-manufactured-resource-based products. However, Mexico accounts for almost half of Latin American exports and has an export structure that is quite different from the other countries of the region. Mexico reveals a comparative advantage only in crude petroleum among the resource-based product groups, and in low-tech manufactures among the non-resource-based product groups. Excluding Mexico, Latin America's revealed comparative advantages are well defined within the resourcebased products. Brazil is the main country responsible for Latin America's comparative advantage in resource-based-high-tech manufactures and, together with Chile, for its comparative advantage in resource-based-low-tech manufactures. Costa Rica is the only Latin American country to reveal comparative advantage in nonresource-based-high-tech manufactures.

B. Export Performance of Latin American Countries in the U.S. Market, 1996–2002

To examine the performance of Latin American exports by groups of products classified by resource and technology intensity, a constant market share analysis is here applied to U.S. imports from Latin American countries. The constant market share (CMS) model accounts explicitly for the effects of import demand, product composition, and competitiveness on the change in export revenues from a particular country in a given market. The model can be expressed as follows:

$$\underbrace{\sum_{i}(X_{i}^{t}-X_{i}^{t-1})}_{\text{Variation}} \equiv r \sum_{i}^{X_{i}^{t-1}} + \underbrace{\sum_{i}(r_{i}-r)X_{i}^{t-1}}_{\text{Product composition}} + \underbrace{\sum_{i}(X_{i}^{t}-X_{i}^{t-1}-r_{i}X_{i}^{t-1})}_{\text{Competitiveness}},$$
(1)

where

 X_i is the value of the focus country's exports of product *i*;

r is the growth rate of U.S. imports between periods t and t-1; and

 r_i is the growth rate of U.S. imports of product *i* between periods *t* and *t*-1. Considering that:

$$r_i \equiv \frac{M_i^t - M_i^{t-1}}{M_i^{t-1}}; \text{ and } r \equiv \frac{M^t - M^{t-1}}{M^{t-1}},$$
 (2)

where M is U.S. imports, identity (1) can be replaced by:

⁵ The share of manufactured goods in world imports rose to about 80 percent in the early 2000s from approximately 55 percent of total world trade in 1980. Mani (2000) makes the same observation.

⁶ Revealed comparative advantage is measured here as the ratio of the world share of a country's exports in a particular group of products and the world share of this country's (or group of countries) total exports.

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$$\underbrace{\left(\frac{X^{t}}{M^{t}}-\frac{X^{t-1}}{M^{t-1}}\right)\cdot M^{t}}_{\text{Export variation less}} \stackrel{}{=} \underbrace{\sum_{i} \left[\left(\frac{M^{t}_{i}}{M^{t-1}_{i}}-\frac{M^{t}}{M^{t-1}_{i}}\right)\cdot X^{t-1}_{i}\right]}_{\text{Product composition}} + \underbrace{\sum_{i} \left[\left(\frac{X^{t}_{i}}{M^{t}_{i}}-\frac{X^{t-1}_{i}}{M^{t-1}_{i}}\right)\cdot M^{t}_{i}\right]}_{\text{Competitiveness}}\right]. (3)$$

Therefore, the model breaks down into two basic effects: the difference between the change in the value of a country's exports over a given period (*the export varia-tion*) and the change that would be required in order for that country to maintain its constant share of the market (*the demand effect*). A positive difference means that the country has increased its share of the market, while a negative difference indicates a reduction in that share (left-hand side of identity 3). The effect identified as the *product composition effect* calculates to what extent market share gains (losses) can be attributed to the concentration of exports in goods for which demand is growing more rapidly (or slowly) in relative terms. The effect identified as the *competitiveness effect* estimates to what extent factors other than the product effect can explain gains or losses in the share of the market shares for individual products weighted by the size of their individual markets at the end of the period of analysis.⁷

Latin American countries gained market share in U.S. imports in 2002 compared with 1996, and this gain was equivalent to U.S.\$22 billion or 10.6 percent of their exports to the United States in 2002.⁸ However, as Table II reveals, the group of non-resource-based products was responsible for this positive effect, whereas the group of resource-based commodities negatively contributed to Latin American gains. Table II also shows that exports of primary and energy products accounted for Latin American market share losses in resource-based products.

Table III shows the product composition effects.⁹ Note that for Latin America (LA), in general, the lack of dynamism in U.S. imports of resource-based products accounted for over 80 percent of the region's loss in this sector. LA's losses in primary and energy-related goods were the result of lack of both competitive-ness¹⁰ and dynamism in these commodities. LA's gain in agro-industrial products was the result of competitiveness gains, since the product composition effect for this group of commodities was also negative. However, LA's gains in resource-based manufactures resulted from positive competitiveness and product composition effects, except for resource-based-high-tech manufactures which revealed low dynamism.

However, Tables II and III also show that there are major differences among the

¹⁰ Competitiveness effects can be calculated as the difference between the figures in Tables II and III.

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⁷ See Leamer and Stern (1976) for a detailed analysis of the constant market share model and Chami Batista and Azevedo (2002) for a recent application of this model to U.S. imports.

⁸ Calculations were based on U.S. imports by products classified by the Standard International Trade Classification (SITC) at the 5-digit level.

⁹ The export variation, and demand and competitiveness effects are shown in Appendix Table II.

| | Latin America | Mexico | Brazil | Guatemala | Argentina |
|------------------------|------------------|-----------|----------|-----------|-----------|
| Resource-based | -7,601.86 | -1,087.49 | 633.85 | -278.52 | -103.80 |
| Primary | -5,474.57 | -1,725.45 | -747.30 | -203.88 | -336.39 |
| Agro-industrial | 604.11 | 952.40 | 36.24 | -125.59 | -101.80 |
| Energy | -3,550.66 | -255.34 | 904.06 | 63.64 | 138.97 |
| Manufactures | 819.26 | -59.10 | 440.85 | -12.69 | 195.40 |
| Low-tech | 786.01 | -72.78 | 416.31 | -12.69 | 187.55 |
| High-tech | 33.25 | 13.67 | 24.54 | 0.00 | 7.86 |
| Non-resource-based | 27,831.47 | 25,156.11 | 1,823.63 | 652.29 | 71.33 |
| Low-tech manufactures | 15,672.10 | 16,021.28 | -772.80 | 638.92 | 67.91 |
| High-tech manufactures | 12,159.37 | 9,134.83 | 2,596.42 | 13.36 | 3.43 |
| Unallocated | 1,864.94 | 1,514.30 | 247.04 | 19.98 | 12.54 |
| Total | 22,094.56 | 25,582.92 | 2,704.52 | 393.76 | -19.93 |

EXPORT VARIATION LESS THE DEMAND EFFECT OF THE GAINS AND LOSSES

Source: Based on USITC data.

TABLE

TABLE

PRODUCT COMPOSITION EFFECTS OF THE GAINS AND LOSSES OF

| | Latin America | Mexico | Brazil | Guatemala | Argentina |
|------------------------|------------------|-----------|-----------|-----------|-----------|
| Resource-based | -6,179.11 | -1,138.44 | -962.01 | -509.71 | -536.34 |
| Primary | -4,316.49 | -883.81 | -933.78 | -372.64 | -309.74 |
| Agro-industrial | -290.82 | 443.83 | -243.14 | -114.32 | -83.80 |
| Energy | -2,142.47 | -1,408.95 | 48.62 | -19.09 | -144.24 |
| Manufactures | 570.67 | 710.48 | 166.29 | -3.66 | 1.43 |
| Low-tech | 603.70 | 720.49 | 179.11 | -3.66 | 1.95 |
| High-tech | -33.03 | -10.01 | -12.82 | 0.00 | -0.51 |
| Non-resource-based | 9,564.14 | 9,048.09 | -663.17 | -59.67 | -139.48 |
| Low-tech manufactures | 7,607.34 | 7,307.97 | -793.32 | -58.95 | -142.23 |
| High-tech manufactures | 1,956.80 | 1,740.13 | 130.15 | -0.72 | 2.75 |
| Unallocated | 964.17 | 1,044.63 | -77.00 | 9.57 | 20.59 |
| Total | 4,349.19 | 8,954.28 | -1,702.17 | -559.82 | -655.23 |

Source: Based on USITC data.

| | | | | | (U. | S.\$ million) |
|--------|----------|------------|-----------|-----------------------|-----------|--------------------|
| Chile | Honduras | Costa Rica | Colombia | Dominican Republic | Venezuela | Other Countries |
| 237.89 | -231.73 | -172.48 | -969.41 | -274.19 | -4,019.23 | -1,336.76 |
| 106.11 | -225.06 | -145.80 | -711.41 | -108.70 | -153.28 | -1,223.41 |
| 116.91 | 0.63 | -54.95 | 1.26 | -140.55 | -16.14 | -64.30 |
| 46.91 | 0.00 | 8.68 | -386.20 | -0.97 | -4,084.26 | 13.84 |
| -32.03 | -7.30 | 19.59 | 126.94 | -23.97 | 234.46 | -62.89 |
| -32.39 | -7.30 | 19.59 | 126.94 | -23.99 | 239.11 | -54.35 |
| 0.35 | 0.00 | 0.00 | 0.00 | 0.02 | -4.66 | -8.54 |
| 128.63 | 692.02 | 346.35 | -63.23 | -920.47 | -201.57 | 146.38 |
| 131.21 | 691.31 | -178.06 | -55.89 | -889.83 | -202.19 | 220.23 |
| -2.57 | 0.71 | 524.41 | -7.34 | -30.63 | 0.61 | -73.85 |
| -28.71 | 117.51 | 58.67 | -53.35 | -45.42 | 33.02 | -10.64 |
| 337.82 | 577.80 | 232.54 | -1,085.99 | -1,240.07 | -4,187.78 | -1,201.02 |

OF LATIN AMERICA'S MARKET SHARE IN U.S. IMPORTS, 1996–2002

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III Latin America's Market Share in U.S. Imports, 1996–2002

| | | | | | (U.S | S.\$ million) |
|--------|----------|------------|----------|-----------------------|-----------|--------------------|
| Chile | Honduras | Costa Rica | Colombia | Domenican Republic | Venezuela | Other Countries |
| 52.94 | -94.45 | -123.49 | -750.39 | -242.23 | -776.93 | -1,098.05 |
| 122.83 | -93.98 | -104.61 | -731.49 | -96.17 | -131.66 | -781.44 |
| 16.15 | -6.29 | -32.20 | -26.60 | -140.33 | 17.16 | -121.28 |
| 3.42 | 0.00 | 0.00 | -42.50 | 0.35 | -740.77 | 160.69 |
| -89.45 | 5.82 | 13.32 | 50.21 | -6.08 | 78.34 | -356.03 |
| -89.60 | 5.82 | 13.32 | 50.21 | -6.08 | 80.22 | -348.07 |
| 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | -1.88 | -7.96 |
| 42.70 | 404.00 | 237.18 | 49.40 | 224.34 | -35.34 | 456.07 |
| 46.94 | 403.98 | 224.18 | 48.31 | 235.26 | -35.98 | 371.17 |
| -4.24 | 0.02 | 12.99 | 1.09 | -10.92 | 0.64 | 84.90 |
| -54.64 | 9.69 | 12.16 | 15.52 | -12.56 | 28.56 | -32.35 |
| 41.00 | 319.25 | 125.85 | -685.47 | -30.45 | -783.71 | -674.34 |

countries that make up Latin America. On the one hand, Mexico, Honduras, Brazil, Guatemala, Chile, and Costa Rica were big winners in the U.S. import market;¹¹ meanwhile, the Dominican Republic, Venezuela, and Colombia were big losers in the same market, while Argentina experienced a small loss of market share in total U.S. imports.

It should be noted that the countries that had the largest gains in absolute value, as well as in proportion to their exports to the United States, also had large gains in non-resource-based manufactures. Mexico, Honduras, Guatemala, and Costa Rica only gained because of their gains in non-resource-based manufactures.

Mexico and most Latin American countries, in point of fact, benefited from large and positive product composition effects in their exports of non-resource-based manufactures, especially of low-tech products. However, Brazil, Argentina, Guatemala, and Venezuela had negative product composition effects in non-resourcebased manufactures, indicating that being an exporter of this group of products provides no guarantee that markets will be dynamic.

In sharp contrast to Latin America in general, Brazil and Chile gained market share in the group of resource-based products. In the case of Brazil, this gain came from energy-related goods, resource-based manufactures, and agro-industrial products. Brazil's loss in primary commodities was due to the negative product composition effect on these items. On the other hand, Chile's gains in resource-based products came from all items other than resource-based-low-tech manufactures. The gain in primary commodities is quite extraordinary, since Chile was the sole country amongst the largest exporters from LA to gain in this group of commodities. Yet more surprisingly, this gain in primary products came about as a result of a positive product composition effect, as Chile lost competitiveness in these commodities during the period. This suggests that countries may specialize in resourcebased products, or even primary commodities, for which markets can be quite dynamic.

IV. RESOURCE-BASED PRODUCTS BY DEGREE OF DIFFERENTIATION

A. A New Taxonomy for Traded Goods

Given the limitations of the OECD's methodology to classify high-tech products and the fact that the OECD applies it only to manufactured goods, a new taxonomy is here proposed to supplement the OECD's list of high-tech products. The idea is to classify traded goods, especially resource-based products, be they manufactures

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¹¹ These countries were put in descending order according to their gains as a proportion of their exports.

or non-manufactures, as homogeneous, differentiated, and highly differentiated products.

Products that follow the law of one price (LOP) are regarded as homogeneous products. This law states that homogeneous products must be traded at the same price, regardless of where they are sold, as long as prices are expressed in the same currency and taking due account of transfer costs.¹² Any price difference should be rapidly eliminated by commodity arbitrage. Countries would, therefore, specialize either as exporters or importers of these products and would not discriminate between domestic and export markets.

Formally, a strict version of LOP may be expressed as (Chami Batista and Silveira 2003):

$$P_i^* / P_j^* = 1, (4)$$

where P_i^* and P_j^* are the domestic prices paid in a given market for the same good (or perfect substitute goods) imported from countries *i* and *j*, respectively.¹³ These are cif (cost, insurance, and freight) prices plus import duties, so they may be written as:

$$P_i^* = (P_i / E_i) (1 + t_i), \tag{5}$$

where P_i is the cif export price expressed in country *i*'s currency, E_i is the exchange rate relating the value of country *i*'s currency to one unit of the market currency, and t_i is the ad valorem import tariff (plus any non-tariff ad valorem equivalent) for country *i*.

A weaker version of LOP would allow a price difference (premium), but no variations in relative prices:

$$d(P_i^* / P_i^*) / dt = 0. (6)$$

The presumption behind the law of one price is that suppliers are price takers in a perfect competitive market. The intersection between demand and supply curves determines the equilibrium price, and relative prices from different exporting countries must remain constant.

On the other hand, differentiated good models assume that a commodity produced by one country is an imperfect substitute in demand for the "same" commodity produced by another country. Following Armington's (1969) convention we here refer to these commodities as goods and to the good produced by a particular country as a product. It is assumed that changes in the price of a product will change both relative prices and relative quantities demanded by the market.

¹² These include transportation costs and tariff and non-tariff barriers.

¹³ This means that the law of one price holds intra-nationally. If P_i^* and P_j^* were the import price of two different markets (countries), the law of one price would be valid internationally and the markets would be said to be integrated rather than segmented.

Formally, differentiated good models often assume that:¹⁴

$$Q_i^* / Q_j^* = F(P_i^* / P_j^*), (7)$$

where F' < 0, or

$$d(Q_i^* / Q_j^*) / (Q_i^* / Q_j^*) = f[d(P_i^* / P_j^*) / (P_i^* / P_j^*)],$$
(8)

where f' < 0.

Assuming that the long-run price elasticity of substitution is constant, it follows that:

$$d(Q_i^* / Q_i^*) / (Q_i^* / Q_i^*) = \sigma d(P_i^* / P_i^*) / (P_i^* / P_i^*),$$
(9)

where σ is Armington's long-run elasticity of substitution between two products.

Thus, in order to classify resource-based products as homogeneous (LOP), differentiated (DIF), and highly differentiated (HIGH-DIF) products, the time series of monthly U.S. import prices from 1996 to 2003 by products and countries of origin will be tested econometrically. When the time series of relative import price from a pair of countries, exporting a particular product to the United States, is found by ADF test (augmented Dickey-Fuller test) to be stationary, the product is classified as a homogeneous product, since it follows the law of one price (LOP).¹⁵

If the test finds the series of relative import price to be nonstationary, the product is considered differentiated (DIF). Additionally, if the time series of relative quantities of the same product and pair of countries happens to be nonstationary, a number of Johansen cointegration tests are run in order to look for a cointegration equation between the two nonstationary series. If a cointegration equation is found and the long-run elasticity of relative quantities with respect to relative prices is negative, the product is simply classified as differentiated (DIF). This means that countries expand their export volume relatively to competitors by cutting their relative prices.

If the long-run price elasticity of substitution is found to be positive or if no longrun relationship is found between relative prices and quantities, the product is classified as highly differentiated (HIGH-DIF). This means that international competition in these products is not predominantly based on price differences.

B. Economic Growth and the New Taxonomy

What is the relation between this product classification and economic growth?

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¹⁴ Following Armington (1969), we likewise make the assumption of independence; i.e., marginal rates of substitution between any two products of the same kind must be independent of the quantities of the products of all other kinds; and quantity index functions, relating the quantity of a good to the quantities of its products, must be linear and homogeneous.

¹⁵ The time series of relative quantities of the same product from the same pair of countries is also tested to make sure that it is nonstationary, so as to exclude the possibility of complete pricing-tomarket.

The idea is that the returns from new technologies come most often in the form of economic rents in product markets operating in imperfect competition, as it has been seen in theoretical models. These monopoly profits provide the impetus for economic growth in these models. If a product follows the law of one price, it means that firms are price takers operating in perfect competition. Therefore, firms will not get economic rents in the long run. It is presumed that productivity gains in the production of homogeneous products are rapidly diffused among competitors.

Exporters of differentiated products, on the other hand, operate in imperfectly competitive product markets. Firms have some degree of monopoly power and are price makers. In order to differentiate their products or to maintain the difference of their products from those of their competitors, exporters need to innovate and, presumably, get returns in the form of economic rents. It is true that differentiation may simply result from the marketing and advertising of goods are physically identical, but which consumers perceive as different. Nevertheless, to the extent that the number of perceived varieties increases through differentiation, consumers will get a higher utility, firms will allocate resources to gain market power, and the rate of growth of the economy will rise.

However, to the extent that exporters can gain market share through price cuts, the degree of differentiation may be regarded as relatively small. Hence, when competition is quite insensitive to price changes, products may be regarded as highly differentiated. The rate of innovation is likely to be greater among exporters of these products. In point of fact, although Carlin, Glyn, and Reenen (2001) found that R&D expenditures have not been able to help relative unit labor costs to explain the export performance of OECD countries over the period between 1970 and 1992, they found evidence that the sensitivity of export performance to these costs tends to be smaller in high-tech industries.

Moreover, as it is well known, exporters of a differentiated product may well prefer to maintain the relative stability of their export price and thus change their margin of profits when unit costs change, as happens when, for example, the exchange rate changes. When changes in exchange rates are fully transmitted to relative prices, exporters are said to have passed through completely the change in cost. When exporters absorb at least part of the exchange rate changes into their profit margins to keep their destination price stable, they are said to be pricing-to-market (Krugman 1987).

In this literature, Yang (1998) finds empirical evidence that exporters of highly differentiated products do not price to market as much as exporters in other industries. This is true when product differentiation is measured by the ratio of non-production workers to total employees, the ratio of scientists and engineers to total employees, or by an intra-industry trade index. However, this is not true when product differentiation is measured by advertising intensity. This appears to imply that profit rates are greater for exporters of highly differentiated products which can be

regarded as having a high technology intensity, at least when differentiation is measured by the ratio of scientists and engineers to total employees.

Therefore, countries specialized in homogeneous products are unlikely to catch up with those specialized in differentiated products. Specialization in differentiated and highly differentiated products is likely to require competitiveness in research, resulting in higher rates of innovation and growth in the countries exporting them.

C. The Data

Fifty-one resource-based products and thirteen machines that produce resourcebased products have been tested and classified according to the methodology described above.¹⁶ Monthly U.S. import data by product and by country of origin from 1996 to the end of 2002 and, in some cases, to July 2003 were used for the tests and classification of products.

Most products were defined by the Harmonized System (HS) at the 10-digit level, though in some cases the HS 8-digit level, HS 6-digit level, and SITC 5-digit level were thought to be more appropriate. As seen before, the level of aggregation is extremely important for testing the role of price in the mechanism through which countries gain market share in a particular product. If the level of aggregation is too high, it may include products that compete in different regimes.¹⁷ In other words, it may include a few products that compete following the law of one price and others that may, for example, have a low price elasticity of substitution. The result is an average between an infinite elasticity of substitution and a near zero elasticity.¹⁸ If the level of aggregation is too low, it might miss important product substitutes that might well distort the analysis of the role of prices in competition.

U.S. imports of the products actually classified amounted to U.S.\$296 billion from 1996 to 2002. This is equivalent to 36.5 percent of U.S. imports of resourcebased products, excluding energy-related products, during the period. Concerning the products converted to the SITC 5-digit level, the classified sample would be equivalent to 19 percent of world imports of resource-based products in 1996 to 2000. In fact, the weight of each product in both world imports and U.S. imports was a relevant variable in selecting the sample.

Figure 2 shows the distribution of the sample by the degree of industrial process-

¹⁸ Though this average is a mathematical impossibility, it is quite possible that a figure between zero and infinite may be found for the elasticity of substitution. Some might even apply this elasticity in some simulations of free trade agreements. But, in point of fact, any other arbitrary number could be equally used, probably changing entirely the results of the simulation.

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¹⁶ The lack of a continuous series of monthly U.S. import data prevented the test and classification of a number of other products. The econometric results of these tests are available from the author at the reader's request.

¹⁷ It may also capture product composition effects, which are not expected to be negatively related to relative prices, rather than competitiveness effects, which may be negatively related to relative prices of competing exporters.





ing and technology intensity. It can be seen that the sample has a smaller share of primary and manufactured products and a bigger share in agro-industrial goods than total U.S. imports of resource-based products. But the difference does not appear to be significant enough to distort the overall analysis, though it can in principle distort the trade pattern of specific countries.

D. General Results

Out of the fifty-one products, twenty-one (41.2%) were classified as LOP, fifteen (29.4%) as DIF, and fifteen (29.4%) as HIGH-DIF. However, according to their import value, LOP products accounted for U.S.\$190.1 billion (64% of the total), DIF products for U.S.\$70.5 billion (24%), and HIGH-DIF for U.S.\$35.2 billion (12%). Therefore, most resource-based products, excluding energy-related products, appear to be homogeneous products.

In the machinery sample, there were no LOP products, only two were found to be DIF, while the other eleven were classified as HIGH-DIF. But the two DIF machines accounted for one-third (U.S.\$1.3 billion) of total imports (U.S.\$4.0 billion), while the other eleven products made up the remaining two-thirds (U.S.\$2.7 billion).

Within resource-based products, Latin American countries (excluding Mexico) reveal some comparative advantage in LOP products, but so do developed countries and East Asia. Mexico, on the other hand, reveals comparative advantage in HIGH-DIF products.

An entirely different picture emerges from the distribution of U.S. imports of machinery amongst the exporting countries. Developed countries account for over 90% of total imports into the United States, while Latin America provides less than 5% and East Asia slightly more than 2%. Germany alone accounts for 34% of these U.S. imports, and together with the United Kingdom, Italy, Japan, and Canada, they account for 75% of these U.S. imports. Brazil is responsible for 88.5% of Latin America's U.S.-bound exports, whereas Mexico accounts for 7.1%.

LOP products revealed the lowest dynamism between 1996 and 2002, expanding at 3.5 percent per year in the period. The vast majority of products showed a negative rate of growth in the period, but the high rate of growth for imports of diamonds and its significant weight among the LOP products helped to raise the overall expansion of this group of commodities.¹⁹ Nevertheless, the rate of growth of LOP products was much smaller than that of U.S. imports of resource-based products (excluding energy-related goods).

On the other hand, the dynamism of DIF and HIGH-DIF products was much greater than that of LOP products.²⁰ In fact, DIF products turned out to be more dynamic than HIGH-DIF products during the period, also surpassing the overall growth rate of U.S. imports of all types of manufactures (resource-based and non-resource-based, low-tech and high-tech manufactures).²¹

Examining now the structure of resource-based exports by groups of countries, it can be seen that LOP products account for 74% of exports from Latin American countries, excluding Mexico. This proportion is much larger than the world average of 65%. Mexico, on the other hand, has only 43% of LOP products in its exports of resource-based products, as HIGH-DIF products account for more than one-third of these exports, and DIF products for over 20%. Chile also has a better export distribution of resource-based products among LOP (38%), DIF (33%), and HIGH-DIF (29%) products. The shares of DIF and HIGH-DIF products in Argentina's resource-based exports are quite significant, though the largest part of these exports is classified as LOP products (61%). Most other countries, including Brazil (84%), Colombia (84%), Guatemala (95%), Venezuela (82%), Costa Rica (80%), and Honduras (99%), just to mention some of the largest exporters, have a very large proportion of their exports concentrated in LOP products.

E. The New Taxonomy and Latin American Export Performance

In order to see whether or not the new taxonomy adds anything to explaining the

¹⁹ See Appendix Table III for the rates of growth and total imports of each LOP product.

²⁰ See Appendix Tables IV and V for the rates of growth and total imports of each DIF and HIGH-DIF product.

²¹ U.S. imports of resource-based manufactures expanded at 8.1 percent per year in the period between 1996 and 2002, while non-resource-based manufactures increased at 6.7 percent per year in the same period. Imports of low-tech manufactures rose faster than high-tech manufactures.

TABLE IV

| Countries | Primary | Agro- Industrial | Low-Tech | High-Tech | Total |
|-----------------------------|---------------|---------------------|----------|-----------|-----------|
| A. Product Composition Ef | fects | | | | |
| Argentina | -277.57 | -66.57 | 7.07 | -0.48 | -337.55 |
| Brazil | -847.29 | -198.40 | 221.47 | -11.30 | -835.53 |
| Chile | 198.11 | 36.99 | -55.44 | 0.15 | 179.81 |
| Colombia | -661.46 | -21.29 | 46.37 | 0.00 | -636.38 |
| Costa Rica | -59.31 | -27.75 | 14.29 | 0.00 | -72.77 |
| Dominican Republic | -84.69 | -120.52 | -4.43 | 0.00 | -209.63 |
| Guatemala | -335.44 | -105.52 | -2.18 | 0.00 | -443.14 |
| Honduras | -68.65 | -2.58 | 6.77 | 0.00 | -64.46 |
| Mexico | -640.26 | 523.13 | 864.66 | -9.06 | 738.47 |
| Venezuela | -102.36 | 19.01 | 121.90 | -1.69 | 36.86 |
| Other Countries | -640.51 | -93.71 | -294.59 | -7.50 | -1,036.32 |
| Latin America | -3,519.44 | -57.21 | 925.89 | -29.87 | -2,680.63 |
| B. Export Variation Less De | emand Effects | | | | |
| Argentina | -304.22 | -84.57 | 191.25 | 7.89 | -189.64 |
| Brazil | -660.81 | 80.98 | 430.90 | 26.06 | -122.86 |
| Chile | 181.39 | 137.76 | 1.95 | 0.37 | 321.46 |
| Colombia | -641.37 | 6.57 | 99.94 | 0.00 | -534.86 |
| Costa Rica | -100.49 | -50.51 | 20.39 | 0.00 | -130.61 |
| Dominican Republic | -97.22 | -120.73 | -21.13 | 0.02 | -239.06 |
| Guatemala | -166.68 | -116.79 | -11.19 | 0.00 | -294.65 |
| Honduras | -199.73 | 4.34 | -6.33 | 0.00 | -201.72 |
| Mexico | -1,481.90 | 1,031.70 | 85.72 | 14.62 | -349.86 |
| Venezuela | -123.99 | -14.29 | 281.71 | -4.47 | 138.96 |
| Other Countries | -1,082.48 | -36.74 | 4.05 | -8.09 | -1,123.26 |
| Latin America | -4,677.51 | 837.72 | 1,077.28 | 36.41 | -2,726.10 |

MARKET SHARE ANALYSIS OF U.S. IMPORTS OF RESOURCE-BASED PRODUCTS FROM LATIN AMERICAN COUNTRIES, 1996–2002

Source: Based on USITC data.

Note: The analysis includes all countries, although only the results of Latin American countries are shown.

export performance of resource-based products from Latin American countries to the United States in the period between 1996 and 2002, I have reapplied the constant market share model just to U.S. imports of resource-based products (excluding energy-related goods) and to the sample of products classified by the degree of differentiation. The results are in Tables IV and V.

At the bottom end of both tables, it is possible to observe that Latin America lost market share²² in the United States in total resource-based products (excluding energy-related goods) and in the sample in 2002 compared to 1996. In point of fact, only Chile and Venezuela among the major exporters of Latin America gained mar-

²² Export variation less demand effect.

THE DEVELOPING ECONOMIES

TABLE V

MARKET SHARE ANALYSIS OF THE SAMPLE OF RESOURCE-BASED PRODUCTS BY THE DEGREE OF DIFFERENTIATION, 1996–2002

| | | (U | (.S.\$ million) |
|-----------|--|---|---|
| LOP | DIF | HIGH-DIF | Total |
| | | | |
| -82.76 | 6.11 | 5.85 | -70.83 |
| -344.88 | -18.58 | 11.34 | -352.38 |
| -50.12 | 260.95 | 175.35 | 386.07 |
| -357.35 | -48.02 | 3.55 | -401.97 |
| -7.59 | 3.62 | 0.24 | -3.77 |
| -34.22 | 0.34 | 25.87 | -8.02 |
| -217.51 | -4.80 | 0.21 | -222.19 |
| -26.86 | -0.28 | 0.14 | -27.03 |
| -427.57 | 125.14 | 264.00 | -38.79 |
| -116.10 | 21.92 | 5.59 | -88.66 |
| -298.72 | -67.22 | 9.28 | -356.96 |
| -1,963.69 | 279.19 | 501.42 | -1,184.55 |
| d Effects | | | |
| 7.53 | 30.44 | 49.30 | 87.24 |
| -45.76 | -103.59 | 50.38 | -99.23 |
| 172.90 | 52.13 | 143.37 | 368.29 |
| -331.93 | -33.40 | 3.86 | -361.61 |
| -28.79 | 17.84 | -0.27 | -11.25 |
| -42.81 | 1.61 | 8.74 | -32.47 |
| -222.13 | 2.15 | 0.53 | -219.53 |
| -68.03 | -0.46 | 0.66 | -67.86 |
| -970.77 | 212.33 | 766.52 | 7.72 |
| -112.79 | -39.21 | 7.21 | -144.86 |
| -265.87 | -92.19 | 40.01 | -318.35 |
| -1,908.44 | 47.66 | 1,070.32 | -791.93 |
| | LOP -82.76 -344.88 -50.12 -357.35 -7.59 -34.22 -217.51 -26.86 -427.57 -116.10 -298.72 -1,963.69 d Effects 7.53 -45.76 172.90 -331.93 -28.79 -42.81 -222.13 -68.03 -970.77 -112.79 -265.87 -1,908.44 | LOPDIF -82.76 6.11 -344.88 -18.58 -50.12 260.95 -357.35 -48.02 -7.59 3.62 -34.22 0.34 -217.51 -4.80 -26.86 -0.28 -427.57 125.14 -116.10 21.92 -298.72 -67.22 $-1,963.69$ 279.19 d Effects 7.53 30.44 -45.76 -103.59 172.90 52.13 -331.93 -331.93 -33.40 -28.79 17.84 -42.81 1.61 -222.13 2.15 -68.03 -0.46 -970.77 212.33 -112.79 -39.21 -265.87 -92.19 $-1,908.44$ 47.66 | $(U) \begin{tabular}{ c c c c c } \hline UOP & DIF & HIGH-DIF \\ \hline -82.76 & 6.11 & 5.85 \\ -344.88 & -18.58 & 11.34 \\ -50.12 & 260.95 & 175.35 \\ -357.35 & -48.02 & 3.55 \\ -7.59 & 3.62 & 0.24 \\ -34.22 & 0.34 & 25.87 \\ -217.51 & -4.80 & 0.21 \\ -26.86 & -0.28 & 0.14 \\ -427.57 & 125.14 & 264.00 \\ -116.10 & 21.92 & 5.59 \\ -298.72 & -67.22 & 9.28 \\ -1,963.69 & 279.19 & 501.42 \\ \hline d \ Effects & & & & \\ \hline 7.53 & 30.44 & 49.30 \\ -45.76 & -103.59 & 50.38 \\ 172.90 & 52.13 & 143.37 \\ -331.93 & -33.40 & 3.86 \\ -28.79 & 17.84 & -0.27 \\ -42.81 & 1.61 & 8.74 \\ -222.13 & 2.15 & 0.53 \\ -68.03 & -0.46 & 0.66 \\ -970.77 & 212.33 & 766.52 \\ -112.79 & -39.21 & 7.21 \\ -265.87 & -92.19 & 40.01 \\ -1,908.44 & 47.66 & 1,070.32 \\ \hline \end{tabular}$ |

Source: Based on USITC data.

Note: The analysis includes all countries, although only the results of Latin American countries are shown.

ket share in the United States during the period. However, in the sample, Argentina and Mexico gained, whereas Venezuela lost market share.

Both tables focus on the product composition effects, since I am interested in relating the dynamics of product markets to the characteristics of the export products. The competitiveness effects have to do with changes in each exporting country rather than with the characteristics of each product or the dynamics of the market.²³

The signs of the product composition effects by country are the same for both the

²³ In point of fact, the competitiveness effects are quite different when the results from U.S. imports of resource-based products are compared to the results from the sample. In the former, LA lost competitiveness, whereas in the latter it gained. Competitiveness effects can be easily calculated by subtracting the product composition effects from the export variation less the demand effects.

whole set of resource-based products in Table IV and for the sample in Table V, including the positive sign for Chile. The only exceptions are Mexico and Venezuela that have negative product composition effects in the sample when, in fact, these effects were positive for the whole range of resource-based products exported to the United States.

When products are classified according to their degree of industrial processing (primary, agro-industrial, and manufactures) and technology intensity (low- and high-tech manufactures) in Table IV, it can be seen that primary products tend to have large negative product composition effects, agro-industrial products have negative but small product composition effects and manufactures have large positive product composition effects, contrary to expectations, high-tech manufactures tend to have negative product composition effects, while low-tech manufactures have large and positive product composition effects.²⁴

However, there are important exceptions to this pattern. Chile is an outstanding example, since its pattern is just the opposite of Latin America's as a whole. Chile's exports of primary products have the largest positive product composition effect, while its exports of low-tech manufactures have a negative product composition effect. The product composition effect of agro-industrial exports for the Dominican Republic is negative and much larger than the same effect for primary exports. Exports of low-tech manufactures by the group of countries classified as "others" have a much larger negative product composition effect than their exports of agro-industrial products.

The top part of Table V shows the product composition effects for the sample. It can be observed that they are negative in LOP products for all countries. For Latin America as a group, the negative product effect is solely due to the LOP products, as DIF and HIGH-DIF products contribute positively to the product composition effect. The same pattern occurs for Argentina, Chile, Costa Rica, Dominican Republic, Mexico, and Venezuela. Furthermore, for all countries that have negative DIF product composition effects, the negative contribution of LOP products is always much greater. Finally, the HIGH-DIF product composition effects of all countries are positive. In other words, the dynamism of the markets for HIGH-DIF products contributed positively to the expansion of resource-based exports of all countries examined.

Therefore, the break down of the product composition effects by groups of products classified according to their degree of differentiation seems to capture the different market dynamism effects within the resource-based products. The same is not quite true for the groups of products classified according to their degree of industrial processing (primary, agro-industrial, and manufactures) and technology intensity (low- and high-tech manufactures).

²⁴ However, this may be due to the small number of resource-based-high-tech exports in the sample.

In point of fact, there is a significant number of low-tech-manufactured resourcebased products in the group of LOP products. They account for 48 percent of the total imports of the group. Agro-industrial products account for 28 percent, while primary products account for 24 percent. There is even a high-tech-manufactured product within the LOP group, though it accounts for only 0.2 percent of the total imports of the group.

Therefore, the characteristics of the LOP products in this much enlarged sample reinforce the conclusion drawn in a previous study (Chami Batista and Silveira 2003) that, contrary to the general view that associates the law of one price to primary goods, the sample of products that were here found to follow this law consists of products that go through some basic industrial processing, even when they are classified as agricultural or primary good. In fact, products that are extracted from nature tend to be different according to their location. Therefore, some degree of basic industrial processing is necessary to standardize the products and turn them into homogeneous goods, wherever their production is located.

Products like aluminum ores, unworked diamonds, and a variety of fish and fruits were found to be DIF or HIGH-DIF products. Indeed, products classified as primary commodities account for 16 percent of imports of HIGH-DIF products and 7 percent of DIF products. Agro-industrial products account for over half of imports of HIGH-DIF products and over one-third of DIF products.²⁵ Low-tech manufactures account for over half of DIF products, but less than one-third of HIGH-DIF products. Just one high-tech product appears in the DIF group and another in the HIGH-DIF group, and they account for only 1 and 2 percent of their imports, respectively.

Chile's main exports of primary goods include several types of fish, such as farmed Atlantic salmon, frozen salmoniade, fish fillets, smoked salmon, frozen crabmeat, and a variety of fruits such as grapes and avocados, that are all dynamic and classified either as differentiated or highly differentiated products. Brazil's main exports of primary and manufactured goods, on the other hand, include several LOP products, such as different types of coffee, iron ore, silicon less than 99 percent pure, coniferous wood, unwrought non-alloyed aluminum, unwrought non-alloyed zinc, and unwrought non-alloyed tin. That is why Chile has benefited from large and positive product composition effects, while Brazil and other countries in South America have suffered from negative product composition effects.

F. Limitations of the New Taxonomy

In every classification of traded goods there is some degree of arbitrariness; this one is no exception. The methodology used in this paper to classify traded products

²⁵ The shares of agro-industrial products in DIF and HIGH-DIF imports are likely to be overestimated as they were over represented in the sample. The opposite is true for primary and manufactured goods.

according to their degree of differentiation faces a number of difficulties and limitations. Perhaps the first difficulty is to choose the level of aggregation of products. The best I could do was to start at the greatest possible disaggregated level. In the case of LOP products, the price time series of individual countries would typically be nonstationary, as one would expect, though in some cases a few outliers had to be withdrawn for the series to be nonstationary. Furthermore, relative prices would have to be stationary for the product to be classified as LOP.²⁶ In most cases, including those in which the weaker version of the law of one price applied, it was possible to see graphically that individual prices moved together over time.

When at the highest level of disaggregation there was not enough data to apply the tests, or when some changes in the definition of products occurred during the period at this level, I have moved down to the next level of disaggregation. But although a product found to be LOP at a lower level of disaggregation could include products that were not LOP at a higher level of disaggregation, I was happy to ignore these non-LOP products as they were clearly dominated by those following the law of one price.

Differentiated (DIF) products require a more complicated analysis. For a product to be classified as DIF, the first condition is that the time series of relative prices between each pair of countries has to be nonstationary. Between the same pair of countries, the time series of relative quantities has also to be nonstationary. Finally, the time series of relative quantities must cointegrate with the time series of relative prices having a negative coefficient for at least one pair of major exporters.

When no cointegration with a negative coefficient was found, products were categorized as HIGH-DIF.²⁷ Typically, however, the time series of prices of HIGH-DIF products were stationary for individual countries. Although, rigorously, the ADF test requires that each time series be nonstationary, relative prices would often be stationary as well.²⁸ In this case, when individual and relative prices were stationary and relative quantities were either stationary or nonstationary, products were classified as HIGH-DIF.²⁹ The same would happen if relative prices were nonstationary and relative quantities were stationary, since it was assumed that there

- ²⁸ An even more complicated econometric problem would arise when the time series of prices or quantities seemed to be seasonal. In these cases, as long as relative prices and quantities did not seem to be seasonal, tests were carried out normally. When relative prices or quantities seemed to be seasonal, the product was not classified.
- ²⁹ In a few instances negative relationships between stationary relative quantities and prices were found through OLS regressions. However, these relationships were regarded as short term and, therefore, do not characterize a DIF product.

²⁶ Given the low power of the test, critical values at the 5 percent level were applied throughout the classification process to determine that a time series was stationary.

²⁷ In the case of products classified as HIGH-DIF, it is very often possible to see graphically that exporters tend to gain market share, though with rising relative prices, or at least without having to lower their relative prices.

could be no long-run relationship between them. In some cases, individual and relative prices and quantities were all nonstationary, but no cointegration with the right sign was found.

Given that the classification depends on the analysis of pairs of countries, it is possible that the same product has different classification for different pairs of countries. Especially when a product is classified as DIF, which in our criterion requires that one right sign cointegration is found at least for one pair of major exporters, it is possible that for all other pairs of countries the product would behave as a HIGH-DIF product.³⁰ A more rare event, but also possible, is a product that behaves as LOP for some pairs of countries in the market to decide how to classify the product. These sorts of hybrid products can be found in the real world, given that what I am calling a traded product here is determined by the existing harmonized (HS) and standard international trade (SITC) systems for classifying traded goods. The methodology applied in this work is, therefore, able to capture the complexity of this reality.

By choosing very high levels of disaggregation, one has to sacrifice the coverage of one's classification. The sample here examined covers more than one-third of U.S. imports, but less than one-fourth of world imports of resource-based products, excluding energy-related goods.

One fundamental limitation of the data is that they refer to imports by countries rather than by firms. Intra-firm trade may cause prices to behave in a manner that would not occur otherwise. Hence, products may be classified differently in different markets because of the presence of intra-firm trade³² in one market but not in another. The same can happen if domestic suppliers (U.S. suppliers in our case) offer a product that has very different elasticities of substitution with regard to the different exporters to the domestic market. Finally, time may change the character-

³⁰ This was the case, for example, of unworked diamonds, spirits, baker's wares, and diamonds weighing less than 0.5 carat each. It should be recognized that the distinction between DIF and HIGH-DIF products can be very difficult in some cases.

³¹ This was the case, for example, of frozen shrimp and coffee [not elsewhere specified or included (nesoi), not roasted, not decaffeinated]. The prices of shrimp from Thailand, Ecuador, and Indonesia follow the law of one price, but Chinese shrimp does not. Likewise, prices of coffee from Colombia, Guatemala, and Indonesia follow the law of one price; but Brazil's prices are a determining factor in changes in Brazil's market share as compared to Colombia and Indonesia. In the case of nickel powder and flakes, Canada is the main supplier to the United States, and its price is not related to the prices of the other smaller suppliers: Australia, Finland, and Russia. However, the prices of these three smaller suppliers seem to follow the law of one price, though there are insufficient data for a proper ADF test.

³² Long-term contracts between importers and exporters may have similar effects on prices as intrafirm trade. Products such as aluminum ores, for example, are known to be traded within firms or under long-term contracts. The stability of Canadian prices of unrefined copper, as opposed to Chile and Mexico prices, suggests either the presence of intra-firm trade or long-term contracts.

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istics of a product. Because this methodology does not consider a point in time, but a period of time, it is quite possible that the product being analyzed is in the process of moving from one classification to another, blurring the result somewhat.

The new taxonomy makes no distinction between products that are actually different and those that are perceived as different, perhaps due to marketing or advertising. Although products perceived as different means a greater variety of goods, and hence, high rates of growth and superior utility for consumers, according to endogenous growth models, innovation of the kind that requires research and development may be quite low for such products.³³

V. CONCLUSIONS

If trade integration induces relative specialization in stagnant industries, diminishing R&D activities and monopoly profits in the economy of a country, it is very tempting to propose government policies to relocate resources favoring high-technology industries, products and R&D activities. But what are these stagnant/noninnovative industries? What are the reasons behind the reduction in R&D activities? Is it simply because of economic integration? Is it related to the pattern of specialization?

G&H have argued that "when technological spillovers are local, by strengthening the incentives for private research, the government of a technologically lagging country can 'level the playing field,' then a nation that would otherwise specialize in traditional manufacturing can be transformed into an exporter of hightechnology goods" (Grossman and Helpman 1991, p. 339). However, when technological spillovers are global, they argue that R&D incentives may turn an exporter of high-tech goods into an importer, as more human capital goes to R&D.

Faced with highly uneven industrial development, in which a few developing countries have shown spectacular and sustained successes and a large number of other countries have experienced dismal and prolonged failures, it is only natural to ask if these disparities will correct themselves over time. It has been argued that they will not. "Structural drivers of industrial development are slow, difficult and expensive to change, and the new global setting only raises their importance. Some of the drivers can improve only through greater reliance on market forces. But most need strong policy support" (UNIDO 2002, p. 28). This may be correct, but which policies should be implemented?

³³ A few products that may be intensive in advertising are among the resource-based products included in the sample. None was classified as LOP. Cigarettes, new pneumatic radial tires, wine and spirits were classified as DIF products. Beer, sugar confectionary, cheese and coffee in retail containers were classified as HIGH-DIF products. Though possibly intensive in advertising, these products may also be subject to innovation of the kind that makes each firm's product actually distinctive.

Market forces do not operate in a vacuum. They require rules, regulations, institutions as well as good policies. It may well be that slow growth in some countries is the result of a lack of institutions conducive to physical and human capital accumulation and to providing rewards for innovative effort. These institutions "include the rule of law in general (as opposed to bureaucratic whim), security of private property, business contract law, a functional mechanism for domestic payments (i.e., a working banking system), intellectual property rights, and a minimization of government corruption" (USITC 1997, pp. 2–13). Bad policy management leading to inflation or political instability may also be at the root of slow growth. There is no reason to blame trade, as the cause of stagnation, nor, a priori, consider industrial policies as an essential part of the strategy to promote growth.

Theoretical models yield ambiguous predictions about the welfare effects of economic integration as well as policies such as R&D subsidies or strengthening intellectual property protection. "At the heart of this ambiguity is the tradeoff between competition in pricing (which increases social welfare by cheapening old goods, but reduces the incentive to invent new ones) and temporary monopoly in new innovations (which promotes incentives by insuring the rewards of invention to the monopolist, but also prevents useful dissemination of the innovation)" (USITC 1997, pp. 2–10).

Mexico and the countries of East Asia, including China, that have raised their ranks and become top exporters in the world in the past fifteen years, have all benefited enormously from market share gains in the very dynamic groups of nonresource-based manufactured goods, especially in high-tech products. On the other hand, countries that have gained market share in resource-based goods, particularly in primary commodities or even agro-industrial products, have generally suffered from the slow expansion of world imports.

Generally speaking, countries with a low share of resource-based products in total exports tended to perform better in the last decade than those with high shares. Within Latin America, Mexico and Costa Rica with low shares of resource-based exports performed relatively well, while Brazil, Colombia, and Venezuela, with high shares of resource-based exports, did not do very well. Resource-based products as a group contributed negatively to Latin America's market share gains in the U.S. market in 2002 compared to 1996.

Most Latin American countries benefited from large and positive product composition effects in non-resource-based manufactures, especially in low-tech products. But some did not. This proves that being an exporter of non-resource-based manufactures, or even of non-resource-based-high-tech manufactures, generally dynamic groups of products, provides no guarantee that the country's specific export specialization in a subset of these groups of products is dynamic.

In sharp contrast with Latin America in general, Brazil and Chile have recently gained market share in resource-based products in the U.S. market. Chile's gains in

this group of products resulted from positive competitiveness as well as product composition effects. Of particular note, Chile's product composition effect was positive for its exports of primary commodities. This proves, again, that even within a generally non-dynamic group of commodities, a country may specialize in a subset of dynamic products.

In point of fact, the new taxonomy presented in this paper, that classifies resource-based products (excluding energy-related goods) according to their degree of differentiation, has shown that exports of differentiated and highly differentiated products tend to be much more dynamic than those of homogeneous products.

Moreover, the new taxonomy, despite the relatively small size of the sample of products actually classified, seems able to explain why countries like Chile, for example, have exports of primary goods that benefit from positive product composition effects, the reason being that most of Chile's exports of primary and agroindustrial products are classified as differentiated or highly differentiated products. On the other hand, Brazil's exports of primary and agroindustrial products are classified as homogeneous goods; hence, the product composition effects in these products for Brazil tend to be negative.

The greater dynamism of differentiated and highly differentiated products, as in the case of products classified by technology intensity, does not imply that governments ought to be implementing policies designed to promote exports of these products in particular. However, there may be a case for both the public and private sectors to try to identify the causes why exporters in some countries have failed to increase the shares of differentiated and highly differentiated products in their total exports.

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| (1) | Primary goods | SITC 0, 1, 2, and 4, excluding those products classified as agro-industrial |
|------|---|--|
| (2) | Agro-industrial goods | SITC 01 (excl. 011), 023, 024, 025, 035, 037, 046, 047, 048, 056, 058, 06, 073, 098, 1 (excl. 121), 232 (or 233 rev. 2), 247, 248, 25, 264, 265, 269 and 4 |
| (3) | Energy-related goods | SITC 3 |
| (4) | Resource-based manufactures | SITC 51 (excl. 512 and 513), 52 (excl. 525 or 524, rev. 2), 53 (excl. 533), 551, 592, 62, 63, 641, 66 (excl. 665 and 666) and 68 |
| (5) | Resource-based-high-tech manufactures | SITC 52222, 52223, 52229, 53111, 53112, 53113, 53114, 53115, 53116, 53117, 53119, 53121, 53122 |
| (6) | Resource-based-low-tech manufactures | Resource-based manufactures excluding resource-based-high-tech manufactures |
| (7) | Non-resource-based manufactures | SITC 5, 6, 7, 8 excluding resource-based manufactures |
| (8) | Non-resource-based-high-tech manufactures | See Hatzichronoglou (1997). |
| (9) | Non-resource-based-low-tech manufactures | Non-resource-based manufactures excluding non-resource-based-high-tech manufactures |
| (10) | Unallocated | SITC 9 |

APPENDIX TABLE I

SITC PRODUCTS CLASSIFIED BY THE DEGREE OF MANUFACTURING AND TECHNOLOGY INTENSITY

| 1996–2002 |
|-----------|
| STATES, |
| UNITED |
| 0 THE |
| EXPORTS T |
| AMERICAN |
| ATIN |
| OF] |
| ANALYSIS |
| SHARE / |
| Market |

APPENDIX TABLE II

A. Export Variation

| | | | | | | | | | | | (U.S.\$ | million) |
|---------------------------|------------------|-----------|----------|-----------|---|----------|---|---------------|----------|-----------------------|-----------|--------------------|
| | Latin America | Mexico | Brazil | Guatemala | Argentina | Chile | Honduras | Costa Rica | Colombia | Dominican Republic | Venezuela | Other Countries |
| Resource-based | 14,865.13 | 6,330.41 | 2,191.85 | 124.60 | 724.55 | 1,269.89 | 2.56 | 237.36 | 701.00 | -16.23 | 1,598.34 | 14,865.13 |
| Primary Agro- | 753.80 | 177.73 | -71.45 | 86.82 | -85.07 | 694.35 | -27.17 | 208.22 | -164.13 | -19.00 | 75.64 | 753.80 |
| industrial | 2,429.58 | 1,572.03 | 385.86 | -56.79 | 32.84 | 279.80 | 29.63 | -20.21 | 42.76 | 14.00 | -1.69 | 2,429.58 |
| Energy | 8,068.34 | 3,502.83 | 984.58 | 95.68 | 541.26 | 54.87 | 0.00 | 8.68 | 618.95 | -1.00 | 955.88 | 8,068.34 |
| Manufactures | 3,613.42 | 1,077.82 | 892.86 | -1.11 | 235.53 | 240.87 | 0.11 | 40.67 | 203.42 | -11.00 | 568.52 | 3,613.42 |
| Low-tech | 3,555.48 | 1,056.73 | 856.45 | -1.11 | 227.37 | 240.42 | 0.11 | 40.67 | 203.42 | -11.00 | 571.70 | 3,555.48 |
| High-tech | 57.95 | 21.09 | 36.41 | 0.00 | 8.15 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 | -3.18 | 57.95 |
| Non-resource- | | | - | | - - - - - - - - - - - - - - - - - - - | - | - - - - - - - - - - - - - - - - - - - | | | | | |
| based Low-tech | 61,373.53 | 50,677.42 | 4,489.17 | 1,101.88 | 314.45 | 207.99 | 1,348.41 | 881.87 | 237.39 | 497.00 | 116.67 | 61,373.53 |
| manufactures | 45,149.30 | 37,760.98 | 1,713.59 | 1,087.72 | 302.81 | 206.24 | 1,347.63 | 332.88 | 239.72 | 508.00 | 115.30 | 45,149.30 |
| High-tech manufactures | 16,224.23 | 12,916.44 | 2,775.57 | 14.16 | 11.64 | 1.75 | 0.77 | 548.99 | -2.33 | -11.00 | 1.37 | 16,224.23 |
| Unallocated | 4,033.32 | 2,856.06 | 413.43 | 27.45 | 40.78 | 41.01 | 129.84 | 87.73 | 110.79 | 8.00 | 87.56 | 4,033.32 |
| Total | 80,271.99 | 59,863.90 | 7,094.45 | 1,253.94 | 1,079.77 | 1,518.89 | 1,480.81 | 1,206.96 | 1,049.18 | 489.00 | 1,802.58 | 80,271.99 |
| Source: Based | on USITC d | ata | | | | | | | | | | |

| B. Demand Effect | | | | | | | | | | | \$ S I D | (noillim) |
|-------------------------------------|-----------------------|----------------------|--------------------|------------------|------------------|--------------------|--------------------|--------------------|--------------------|-----------------------|----------------------|------------------------|
| | Latin America | Mexico | Brazil | Guatemala | Argentina | Chile | Honduras | Costa Rica | Colombia | Dominican Republic | Venezuela | Other Countries |
| Resource-based Primary A sro- | 22,466.99 6,228.37 | 7,417.90 1,903.18 | 1,558.00 675.85 | 403.12 290.70 | 828.35 251.31 | 1,032.00 588.25 | -231.73 -225.06 | -172.48 -145.80 | -969.41 -711.41 | -274.19 -108.70 | -4,019.23 -153.28 | -1,336.76 -1,223.41 |
| industrial | 1,825.46 | 619.63 3 758 17 | 349.61 80.57 | 68.80 32.04 | 134.63 | 162.89 7 06 | 0.63 | -54.95 8.68 | 1.26 -386 20 | -140.55 | -16.14 | -64.30 13.84 |
| Manufactures | 2.794.16 | 1.136.93 | 452.01 | 11.58 | 40.12 | 272.90 | -7.30 | 19.59 | 126.94 | -23.97 | 234.46 | -62.89 |
| Low-tech High-tech | 2,769.47 24.69 | 1,129.51 7.42 | 440.14 11.87 | $11.58 \\ 0.00$ | 39.82 0.30 | 272.81 0.09 | $-7.30 \\ 0.00$ | $19.59 \\ 0.00$ | 126.94 0.00 | -23.99 0.02 | 239.11 -4.66 | -54.35 -8.54 |
| Non-resource- based | 33,542.05 | 25,521.31 | 2,665.54 | 449.60 | 243.11 | 79.36 | 692.02 | 346.35 | -63.23 | -920.47 | -201.57 | 146.38 |
| manufactures | 29,477.20 | 21,739.69 | 2,486.39 | 448.80 | 234.90 | 75.04 | 691.31 | -178.06 | -55.89 | -889.83 | -202.19 | 220.23 |
| пиgn-tecn manufactures | 4,064.85 | 3,781.62 | 179.15 | 0.80 | 8.21 | 4.33 | 0.71 | 524.41 | -7.34 | -30.63 | 0.61 | -73.85 |
| Unallocated | 2,168.38 | 1,341.77 | 166.39 | 7.47 | 28.24 | 69.71 | 117.51 | 58.67 | -53.35 | -45.42 | 33.02 | -10.64 |
| Total | 58,177.43 | 34,280.98 | 4,389.93 | 860.18 | 1,099.70 | 1,181.08 | 577.80 | 232.54 | -1,085.99 | -1,240.07 | -4,187.78 | -1,201.02 |
| ۲ د | | | | | | | | | | | | |

Source: Based on USITC data.

APPENDIX TABLE II (Continued)

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THE DEVELOPING ECONOMIES

| (Continued) | |
|-------------|--|
| Π | |
| X TABLE | |
| APPENDI | |

C. Competitiveness Effect

| | | | | | | | | | | | (U.S.\$ | million) |
|---------------------------|------------------------|------------------|--------------------|------------------|------------------|------------------|--------------------|------------------|------------------|-----------------------|---------------------|--------------------|
| | Latin America | Mexico | Brazil | Guatemala | Argentina | Chile | Honduras | Costa Rica | Colombia | Dominican Republic | Venezuela | Other Countries |
| Resource-based Primary | -1,422.74 -1,158.08 | 50.95 -841.64 | 1,595.87 186.48 | 231.19 168.76 | 432.54 -26.65 | 184.95 -16.72 | -137.28 -131.08 | -48.99 -41.19 | -219.02 20.09 | -31.95 -12.53 | -3,242.30 -21.63 | -238.71 -441.97 |
| industrial | 894.94 | 508.57 | 279.39 | -11.27 | -17.99 | 100.76 | 6.92 | -22.76 | 27.86 | -0.21 | -33.30 | 56.97 |
| Energy | -1,408.19 | 1,153.61 | 855.44 | 82.73 | 283.21 | 43.49 | 0.00 | 8.68 2.20 | -343.70 | -1.32 | -3,343.49 | -146.84 |
| Manuactures Low-tech | 240.39 182.30 | -793.27 | 237.21 | -0.0- -0.03 | 185.60 | 57.21 | -13.12 | 0.20 6.28 | 76.73 | -17.91 | 158.90 | 293.14 |
| High-tech | 66.29 | 23.68 | 37.36 | 0.00 | 8.37 | 0.21 | 0.00 | 00.0 | 0.00 | 0.02 | -2.78 | -0.58 |
| Non-resource- based | 18,267.34 | 16,108.02 | 2,486.79 | 711.96 | 210.82 | 85.93 | 288.02 | 109.17 | -112.63 | -1,144.81 | -166.24 | -309.69 |
| manufactures | 8,064.76 | 8,713.32 | 20.52 | 697.87 | 210.14 | 84.26 | 287.33 | -402.24 | -104.20 | -1,125.09 | -166.20 | -150.95 |
| nign-tecn manufactures | 10,202.58 | 7,394.70 | 2,466.27 | 14.09 | 0.68 | 1.66 | 0.69 | 511.41 | -8.43 | -19.72 | -0.03 | -158.74 |
| Unallocated | 900.77 | 469.67 | 324.04 | 10.42 | -8.05 | 25.94 | 107.81 | 46.50 | -68.88 | -32.85 | 4.46 | 21.71 |
| Total | 17,745.37 | 16,628.63 | 4,406.69 | 953.57 | 635.31 | 296.82 | 258.56 | 106.69 | -400.53 | -1,209.61 | -3,404.07 | -526.68 |
| Source: Bace | of on USITC | ' data | | | | | | | | | | |

Source: Based on USITC data.

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APPENDIX TABLE III

RESOURCE-BASED PRODUCTS CLASSIFIED AS LOP PRODUCTS, 1996–2002

| Product Description | Classification | Growth Rate ^a (%) | Share (%) | U.S. Imports ^b (U.S.\$) |
|---|----------------|---------------------------------|-----------|---------------------------------------|
| Boneless meat | HS 0201305000 | 25.2 | 2.1 | 4,070,676,698 |
| Haddock fillets (nesoi, frozen) | HS 0304203062 | 3.9 | 0.2 | 317,572,457 |
| Shrimps (cooked in shell or uncooked, | | | | |
| dried, salted or in brine, frozen) | HS 03061300 | 3.8 | 9.8 | 18,586,178,395 |
| Crab (cooked in shell or uncooked, | | | | |
| dried, salted or in brine, frozen) | HS 03061440 | 25.2 | 1.3 | 2,430,339,030 |
| Coffee (arabica, not roasted, not | | | | |
| decaffeinated) | HS 0901110010 | -11.7 | 4.4 | 8,354,938,447 |
| Coffee (nesoi, not roasted, not | | | | |
| decaffeinated) | HS 0901110090 | -19.4 | 3.5 | 6,614,868,647 |
| Coffee (nesoi, roasted, not | | | | , , , |
| decaffeinated) | HS 0901210060 | 10.0 | 0.1 | 262,722,987 |
| Coffee (nesoi, roasted, | | | | |
| decaffeinated) | HS 0901220060 | -18.8 | 0.0 | 66,662,482 |
| Apple juice | HS 200970 | -6.3 | 1.0 | 1,839,202,404 |
| Iron ore (agglomerated pellets) | HS 2601120030 | -12.2 | 1.1 | 2,184,045,799 |
| Silicon (less than 99 pure) | HS 2804695000 | -11.7 | 0.2 | 368,678,271 |
| Coniferous wood (sawn or chipped lengthwise of a thickness | | | | , , |
| exceeding 6mm) | HS 44071000 | -1.2 | 24.4 | 46,352,336,452 |
| Pine (pinus SPP, standard wood | | | | |
| molding) | HS 4409104000 | 12.3 | 1.3 | 2,443,244,098 |
| Chemical woodpulp, sulfate or soda | | | | |
| (other than dissolving grade, | | | | |
| nonconiferous, bleached) | HS 4703290040 | 7.5 | 2.2 | 4,121,867,053 |
| Diamonds (nonindustrial, cut, faceted, | | | | |
| set or mounted, weighing 0.5 carat | | | | |
| and over each) | HS 7102390050 | 13.7 | 23.6 | 44,892,166,093 |
| Refined copper cathodes and sections | | | | |
| of cathodes | HS 7403110000 | 4.6 | 5.0 | 9,452,870,173 |
| Nickel (unwrought, not alloyed) | HS 7502100000 | -2.7 | 2.8 | 5,322,314,780 |
| Unwrought aluminum (not alloyed, | | | | |
| nesoi) | HS 7601106000 | 1.8 | 6.8 | 12,952,062,189 |
| Zinc (unwrought, not alloyed, | | | | , , , , |
| containing by weight 99.99 or | | | | |
| more zinc) | HS 7901110000 | -7.8 | 2.5 | 4.687.793.356 |
| Tin (unwrought, not alloyed) | HS 8001100000 | -3.2 | 0.8 | 1.496.074.147 |
| Paper and paperboard (uncoated. | | | | , , , |
| nesoi, in rolls or sheets) | SITC 64129 | 5.6 | 7.0 | 13,249,136,998 |
| Total LOP | | 3.5 | 100.0 | 190,065,750,956 |

Note: nesoi = not elsewhere specified or included; nes = not elsewhere specified.

^a Growth rates were calculated by regressing import values in logarithmic form on years from 1996 to 2002.

^b Total from 1996 to 2002.

APPENDIX TABLE IV

RESOURCE-BASED PRODUCTS CLASSIFIED AS DIF PRODUCTS

| Product Description | Classification | Growth Rate ^a (%) | Share (%) | U.S. Imports ^b (U.S.\$) |
|--|----------------|---------------------------------|-----------|---------------------------------------|
| Farmed Atlantic salmon | HS 0304104093 | 16.9 | 2.3 | 1,654,867,083 |
| Salmonidae (frozen) | HS 0304206006 | 34.4 | 0.5 | 332,822,778 |
| Fish fillets | HS 0305306080 | 4.8 | 0.3 | 210,097,575 |
| Coffee (not roasted, decaffeinated) | HS 0901120000 | -10.3 | 2.5 | 1,775,742,089 |
| Cigarettes | HS 2402208000 | 33.5 | 1.2 | 832,524,295 |
| Aluminum ores and concentrates | | | | |
| (not calcine bauxite) | HS 2606000090 | -13.2 | 2.0 | 1,403,308,033 |
| Silicon (containing by weight not less | | | | |
| than 99.99 of silicon) | HS 2804610000 | -4.1 | 0.9 | 617,517,786 |
| New pneumatic radial tires of rubber | | | | |
| (used on motor cars) | HS 40111010 | 6.6 | 17.3 | 12,223,581,853 |
| Doors and frames of wood | HS 44182080 | 16.9 | 3.0 | 2,140,306,211 |
| Diamonds (nonindustrial cut, faceted, | | | | |
| not set or mounted, weighing less | | | | |
| than 0.5 carat each) | HS 7102390010 | 0.3 | 25.2 | 17,733,355,246 |
| Unrefined copper | HS 7402000000 | 11.3 | 4.0 | 2,793,875,959 |
| Aluminum plates sheets (a strip | | | | |
| rectangular [including square] alloy, | | | | |
| not clad with a thickness of 6.3mm | | | | |
| or less, nesoi) | HS 7606123090 | 10.2 | 6.9 | 4,849,197,312 |
| Bakers' wares nes., communion wafers, empty cachets for pharmaceutical | | | | |
| use, sealing wafers, rice, paper, etc. | SITC 04849 | 10.5 | 5.8 | 4,077,612,151 |
| Wine of fresh grapes (other than sparkling wine; grape fermentation by the addition | | | | |
| of alcohol) | SITC 11217 | 10.2 | 17.1 | 12,076,710,332 |
| Spirits and distilled alcoholic beverages | SITC 11249 | 12.9 | 11.0 | 7,776,148,996 |
| Total DIF | | 8.9 | 100.0 | 70,497,667,699 |

Note: nesoi = not elsewhere specified or included; nes = not elsewhere specified.

^a Growth rates were calculated by regressing import values in logarithmic form for years from 1996 to 2002.

^b Total from 1996 to 2002.

THE DEVELOPING ECONOMIES

APPENDIX TABLE V

Growth Share U.S. Imports^b Product Description Classification (U.S.\$) Rate^a (%) (%) Beer made from malt (including ale, stout, and porter) (SITC) 11230 11.0 41.3 14,536,278,236 Sugar confectionary (including white chocolate, not containing cocoa, nes) (SITC) 6229 10.3 12.3 4,313,167,246 Smoked salmon 15.5 HS 03054100 0.4 127,920,501 Crabmeat (frozen) HS 03061420 12.2 0.3 114,076,604 6.4 Cheese HS 040690 12.0 4,226,724,132 Avocados 28.5 1.5 514,859,322 HS 08044000 Grapes HS 080610 10.0 10.1 3.538.694.009 Fresh apples HS 08081000 2.3 1.9 667,811,681 Blueberries HS 0810400028 27.6 0.5 168,983,463 Coffee (roasted, not decaffeinated, in retail containers 2kg or less) HS 0901210030 5.4 1.9 667,523,316 Coffee (roasted, decaffeinated, in retail containers 2kg or less) HS 0901220030 -3.70.3 113,534,548 Silicon containing by weight less than 99.99 but not less than 99 of silicon HS 2804691000 7.7 1.9 653,755,604 Diamond except industrial, unworked or simply sawn, cleaved, or bruted HS 7102310000 -3.013.0 4,557,847,367 Unwrought nickel alloys 4.7 0.8 273,719,072 HS 7502200000

RESOURCE-BASED PRODUCTS CLASSIFIED AS HIGH-DIF PRODUCTS

^a Growth rates were calculated by regressing import values in logarithmic form for years from 1996 to 2002.

HS 7504000010

1.9

100.0

-4.8

8.0

682,896,793

35,157,791,894

^b Total from 1996 to 2002.

Nickel powders and flakes

Total high-DIF