Shifting Patterns of Comparative Advantage: Manufactured Exports of Developing Countries

Alexander J. Yeats

Labor-intensive goods are the developing countries’ strongest export items — and the United States is the chief import market for these goods. What’s more, the industrial countries can expect increasing competition in the 1990s in clothing, footwear, leather products, wood manufactures, and some primary metal manufactures.
Labor-intensive goods are the strongest export items for developing countries — and the United States is the developing countries' biggest export market.

In 1965 the National Bureau of Economic Research predicted that developing countries would specialize in the manufacture and export of labor-intensive goods — and prepared a list of those goods.

A study of actual exports for 1965-1986 revealed that with few exceptions, export performance of those labor-intensive goods was superior in developing countries — which increased their market shares for those items despite generally declining shares of world trade.

The United States absorbed nearly 55 percent of labor-intensive products in 1986 ($70.2 billion, compared with only $34.4 billion in the EC). And more than 40 percent of total U.S. imports of labor-intensive goods came from developing countries (compared with only 12 percent in the EC).

Many of the products the National Bureau identified as labor-intensive remain so, and therefore remain suitable for production and export by developing countries.

Clothing, footwear, leather products, wood manufactures, and some primary metal manufactures became relatively more labor-intensive — so producers in industrial countries can expect increased competition from the developing countries in these products in the 1990s.

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Manufactured Exports of Developing Countries 
by 
Alexander J. Yeats

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Developing Countries' Exports of Manufactures: Past and Future

Implications of Shifting Patterns of Comparative Advantage

Alexander J. Yeats*

I. Introduction

Considerations relating to the determinants of comparative advantage for countries or groups of countries have played a major role in the formulation of both national and international economic and trade policies. For example, international organizations like the World Bank and International Monetary Fund have given considerable attention to the need for formulating positive structural adjustment policies under which countries adopt trade, financial, fiscal and other measures to facilitate the transfer of resources from industries where they have lost a comparative advantage in production to those where it has been gained or maintained. 1/ Problems relating to contemporary protectionism are also linked to changing comparative advantage.

* Senior Economist, International Economics Department, World Bank, Washington. The views expressed in this paper need not reflect those of the World Bank or its staff. The author would like to thank Alasdair Sinclair, Paul Meo and Bela Balassa for many helpful comments and suggestions.

1/ See World Bank (1986) (1987) (1988) or OECD (1979) for examples of the types of issues normally addressed in these discussions. A key element often stressed is the need for developed countries to implement measures to facilitate the flow of resources from industries experiencing longer term structural adjustment problems (i.e., agriculture, textiles, clothing, etc.) into sectors like chemicals and machinery where comparative advantage has not shifted to developing countries.
as OECD countries have often utilized nontariff barriers (NTBs) against more competitive imports. 2/ On the positive side, industrial country governments have provided substantial incentives for the development of high technology industries (like aerospace) where a comparative advantage can be maintained or increased.

As might be expected from the importance of such issues, the policy debate has stimulated considerable empirical research on the concept of comparative advantage. A major innovation was Balassa's (1965) development of the "revealed" comparative advantage (RCA) model and subsequent extension of the approach (Balassa (1978)) to account for a "stages" approach to industrialization. 3/ The "revealed" comparative advantage model was employed in studies by UNIDO (1985) (1987) that attempted to identify industries experiencing major shifts in established patterns of production and trade. An alternative empirical approach for measurement of comparative advantage was tested by the United States National Bureau of Economic Research (NBER) that employed relative shares of labor and capital used in the production of

2/ Documentory evidence on the increased use of nontariff barriers in sectors with long-term structural adjustment problems can be found in Yeats (1979) or Laird and Yeats (1988). The latter study examined trends in nontariff barrier use in major OECD countries over the 1966-1986 period and concluded that the value of trade affected by NTBs such as quantitative restrictions, variable import levies and other import charges (excluding tariffs) import licensing and different product standards or regulations more than doubled over this interval (from 25 per cent in 1966 to about 58 per cent in 1986). The increase was even more dramatic in sectors like textiles, clothing and steel.

3/ Country i's "revealed" comparative advantage in product j is defined as the ratio of the share of product j in i's exports to the share of j in world trade. If this index takes a value greater than unity the country is considered to have a "revealed" comparative advantage in the product while a value below unity indicates a comparative disadvantage. See Balassa (1965) or UNIDO (1985) for a discussion of the basic properties of the RCA model.
specific goods. This model was based on the assumption that developing countries should have a comparative advantage in goods that employ relatively large labor inputs. 4/

Given the obvious importance of issues concerning changing comparative advantage, this paper attempts to extend the related empirical analyses in several directions. First, an attempt is made to evaluate the predictive power of comparative advantage indices for future changes in trade by drawing on the NBER study. This will be done by analyzing the 1965-1986 trade changes in products identified as labor intensive in the earlier year. Aside from the ability to identify industries where major changes are likely to occur in trade or production, an attempt will also be made to determine the time frame for which predictions based on comparative advantage indices are valid. 5/ Other issues that will be addressed include: the importance of textiles and clothing in the initial stages of a labor intensive trade expansion; how the product composition of "maturing" developing country

4/ See Lary (1968) for details. According to the United Nations product classification scheme, manufactured products are those items which fall in: SITC 5 (Chemicals); SITC 6 ( Manufactured Goods Classified by Material), less SITC 68 (Non ferrous Metals); SITC 7 (Machinery and Transport equipment); and SITC 8 (Miscellaneous Manufactured Articles). The National Bureau of Economic Research study adopted a somewhat broader definition of manufactures in that it includes some processed foods falling in SITC 0, cigars (in SITC 1), shaped wood (in SITC 2), and fish oil (in SITC 4). See Appendix 1 for a listing of the labor intensive manufactured products identified in the NBER study.

5/ There have been several attempts to develop "early warning" systems for disruptive imports with studies by Watkins and Karlick (1981) and Tuong and Yeats (1975) being representative of the earlier work. Indices of comparative advantage could play a major role in the development of such systems if it were established that these measures are accurate predictors of future trade patterns. This study shows that the NBER labor intensive indices are generally accurate predictors of changes in South-North trade flows and that they may provide a lead time of as much as one or two decades.
exports has changed over time; the extent that differences exist in imports of labor intensive products by OECD countries; and the extent that individual developing countries have been able to capitalize on labor intensive manufactures in their export base. While the initial analysis is largely ex post in that it relates to the 1965-1986 period, the comparative advantage indices are updated to the mid-1980s and their implications for trade patterns in the 1990s and beyond assessed.

II. The Measures of Comparative Advantage

In this study, the measures of comparative advantage are based on labor intensity indices derived by Lary (1968) for the NBER. Lary's analysis employed the criteria of value added per employee, both in the U.S. and other countries, for identification of products which were capital or labor intensive. The general rule followed was to classify labor intensive products as those which met two conditions: (1) value added per employee did not exceed the national average for all United States manufacturing by more than 10 per cent, and (2) imports by developed from developing countries totaled at least $100,000 at the three-digit level of the Standard International Trade Classification (SITC) system in 1965. 6/ According to the NBER reasoning, this approach excluded clearly capital intensive products while applying the test

6/ The factor intensity index for industry j \((L_j)\) is defined as,

\[
L_j = \frac{V_j + N_j}{V_t + N_t} \times 100
\]

where \(V_j\) and \(V_t\) represent value added in industry j and all United States manufacturing respectively, while \(N_j\) and \(N_t\) represent the number of workers in the industry and in all manufacturing activity. With regard to the NBER's condition that imports totalled $100,000 it should be noted that the absolute value of trade is not an appropriate indicator of labor intensity.
of the market (as reflected in imports) to items at or near the overall national average. The import value criteria was therefore added in recognition that value added per employee was not an infallible guide to South-North comparative advantage.

While there is a theoretical basis for postulating a positive relationship between labor intensity and developing countries' exports, there are certain types of products where other factors may be more important determinants of whether manufacturing activity is located in developed or developing countries. Some production processes, for example, are often located near areas of raw material production, particularly if transportation costs for manufacturing inputs greatly exceeds those for higher stage (semi-finished or fabricated) goods. This locational influence might be especially important for manufactured processes that require relatively large inputs of bulky commodities like wood and metal ores. In other cases, transport costs might dictate that manufacturing activity be located closer to centers of consumption. This would be the case where nominal transport costs are relatively low on production inputs, but are more important for the final

7/ The reader should note that there is an inverse relation between the numeric value of the index defined in equation (1) and the labor intensity of a given product. That is, the lower the numeric value of the index the higher the labor intensity of the product. It also follows that products with very high index values are capital intensive in production. The selection of items based on value added per employee in the U.S. was supplemented by detailed examination of manufactures imported by developed from less developed countries to see if additional products needed to be taken into account. On this basis, several items such as batteries, lamps and miscellaneous manufactures were added to the NBER list since relative value added in other countries appeared below the United States average. However, a major conclusion of this portion of the analysis was that products manufactured by labor intensive processes in the United States were also manufactured by relatively labor intensive processes in other countries. Lary used these findings to justify extensive use of United States production statistics as a guide to factor-proportions.
manufactured good (See Yeats (1977) for documentary evidence on this point). Finally, some manufacturing processes require location near abundant sources of relatively-cheap production inputs like energy. The production of some metals from ores (bauxite) are examples of these types of manufacturing processes. 8/

Aside from these locational factors, there are other reasons why factor proportions may not be reflected in actual trade flows. Protectionism is of obvious importance as trade barriers in major markets can be an important constraint to trade. Many empirical studies have documented the restrictive effects of trade barriers developing countries often face in textiles, clothing, foodstuffs, footwear and other products. Production incentives like subsidies, procurement practices and tax concessions for domestic industries may also distort trade flows. Finally, a lack of access to technology, capital markets, marketing and distribution systems, or oligopolistic practices of established firms, may be additional reasons why trade patterns do not follow lines of comparative advantage.

While the above factors all relate to external barriers, policies pursued by the developing countries themselves also cause trade to be diverted from lines of comparative advantage. Many developing countries in Latin

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8/ If the objective is to forecast the future composition of developing country exports, a factor proportions analysis, by itself, could be inappropriate for dealing with products where transport or related factors have a strong locational influence. For "flagging" these items, the revealed comparative advantage approach may be more appropriate since the results incorporate the "net" effect of different factors influencing the production process. Yeats (1985) provides an RCA framework that is useful for analyzing competitive inroads made by developing countries in specific industries. Lead times, may however, be an important drawback. Since revealed comparative advantage indices are constructed from actual (current) trade flows they may not signal trade changes until after they have in fact occurred.
America and Asia have, for example, followed costly import substitution policies that have severely constrained exports of manufactures. It has also been documented (see Balassa (1971)) that the structure of protection in developing countries may impose important constraints on some manufacturing sectors. Similarly, other domestic tax, labor, political and social policies pursued by developing countries also augment or offset natural lines of comparative advantage.

III. Trends in Imports of Labor Intensive Products

Table 1 examines trends in the trade of the NBER-defined (1965) labor intensive products over 1965-1986. The table shows all developed countries' imports of these goods as well as imports of all other (capital intensive) manufactures and all other non-fuel products. While the top half of Table 1 shows imports measured in value terms, the lower half shows developing countries' trade shares. To assist in evaluating these statistics, similar information is given for seven selected developed country markets; namely, Canada, EC(10), Japan, Norway, Sweden, Switzerland and the United States. Appendix Table 1 provides a listing of the three, four and five-digit SITC products that are included in the labor intensive group. Capital intensive manufactures consist of all other items classified in SITC 5 through 8 less nonferrous metals (SITC 68).

Table 1 shows developed country imports of labor intensive manufactures rose almost sixteen-fold over the 21 year period (a slightly smaller expansion occurred for capital intensive manufactures) and that this increase is considerably higher than the nine-fold growth in other nonfuel products. There is considerable variation in the performance of individual
<table>
<thead>
<tr>
<th>Year</th>
<th>All Developed</th>
<th>Canada</th>
<th>EEC(10)</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Nonfuel</td>
<td>Capital</td>
<td>Labor</td>
<td>Total Nonfuel</td>
</tr>
<tr>
<td>1965</td>
<td>80,315</td>
<td>31,407</td>
<td>38,076</td>
<td>3,964</td>
</tr>
<tr>
<td>1970</td>
<td>133,487</td>
<td>63,858</td>
<td>72,367</td>
<td>6,487</td>
</tr>
<tr>
<td>1975</td>
<td>288,176</td>
<td>148,577</td>
<td>172,919</td>
<td>15,628</td>
</tr>
<tr>
<td>1980</td>
<td>620,339</td>
<td>336,690</td>
<td>406,005</td>
<td>26,698</td>
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<tr>
<td>1985</td>
<td>612,180</td>
<td>375,834</td>
<td>476,362</td>
<td>35,282</td>
</tr>
<tr>
<td>1986</td>
<td>733,593</td>
<td>453,669</td>
<td>603,917</td>
<td>37,827</td>
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(import values expressed in terms of US $ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>All Developed</th>
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<th>EEC(10)</th>
<th>Japan</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(share of developing countries in total imports of the product group)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>21.7</td>
<td>1.7</td>
<td>8.7</td>
<td>8.2</td>
</tr>
<tr>
<td>1970</td>
<td>17.8</td>
<td>2.1</td>
<td>9.4</td>
<td>5.7</td>
</tr>
<tr>
<td>1975</td>
<td>14.9</td>
<td>2.4</td>
<td>12.7</td>
<td>4.4</td>
</tr>
<tr>
<td>1980</td>
<td>15.2</td>
<td>4.0</td>
<td>16.8</td>
<td>5.0</td>
</tr>
<tr>
<td>1984</td>
<td>15.8</td>
<td>6.0</td>
<td>22.4</td>
<td>6.5</td>
</tr>
<tr>
<td>1985</td>
<td>15.1</td>
<td>5.9</td>
<td>21.7</td>
<td>5.5</td>
</tr>
<tr>
<td>1986</td>
<td>14.1</td>
<td>4.7</td>
<td>21.2</td>
<td>6.2</td>
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</tbody>
</table>
Table 1 (Continued)
Comparative Analysis of Selected Developed Countries Imports of Labor Intensive and Other Non-Fuel Products: 1965 to 1986

<table>
<thead>
<tr>
<th>Year</th>
<th>Norway Manufactures</th>
<th>Sweden Manufactures</th>
<th>Switzerland Manufactures</th>
<th>United States Manufactures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>1,404</td>
<td>945</td>
<td>639</td>
<td>2,293</td>
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<tr>
<td>1970</td>
<td>2,248</td>
<td>1,508</td>
<td>1,169</td>
<td>3,477</td>
</tr>
<tr>
<td>1975</td>
<td>5,704</td>
<td>4,260</td>
<td>3,045</td>
<td>8,224</td>
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<tr>
<td>1980</td>
<td>7,825</td>
<td>5,455</td>
<td>6,169</td>
<td>12,954</td>
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<tr>
<td>1984</td>
<td>6,854</td>
<td>5,149</td>
<td>5,609</td>
<td>10,934</td>
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<td>1985</td>
<td>7,067</td>
<td>5,400</td>
<td>6,187</td>
<td>11,726</td>
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<td>1986</td>
<td>9,822</td>
<td>7,654</td>
<td>9,284</td>
<td>14,615</td>
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</table>

(import values expressed in terms of US $ million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Norway</th>
<th>Sweden</th>
<th>Switzerland</th>
<th>United States</th>
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<tr>
<td></td>
<td>Labor</td>
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<tr>
<td>1965</td>
<td>9.1</td>
<td>0.6</td>
<td>10.1</td>
<td>3.0</td>
</tr>
<tr>
<td>1970</td>
<td>9.1</td>
<td>1.2</td>
<td>8.4</td>
<td>3.2</td>
</tr>
<tr>
<td>1975</td>
<td>7.3</td>
<td>0.7</td>
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<td>1.0</td>
<td>10.2</td>
<td>10.0</td>
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<tr>
<td>1985</td>
<td>9.4</td>
<td>1.7</td>
<td>8.8</td>
<td>10.4</td>
</tr>
<tr>
<td>1986</td>
<td>8.1</td>
<td>8.6</td>
<td>5.3</td>
<td>10.2</td>
</tr>
</tbody>
</table>

(source of developing countries in total imports of the product group)

<table>
<thead>
<tr>
<th>Year</th>
<th>Norway</th>
<th>Sweden</th>
<th>Switzerland</th>
<th>United States</th>
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<tbody>
<tr>
<td></td>
<td>Labor</td>
<td>Labor</td>
<td>Labor</td>
<td>Labor</td>
</tr>
<tr>
<td>1965</td>
<td>9.1</td>
<td>0.6</td>
<td>10.1</td>
<td>3.0</td>
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<tr>
<td>1970</td>
<td>9.1</td>
<td>1.2</td>
<td>8.4</td>
<td>3.2</td>
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<tr>
<td>1975</td>
<td>7.3</td>
<td>0.7</td>
<td>7.0</td>
<td>4.8</td>
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<tr>
<td>1980</td>
<td>9.1</td>
<td>1.4</td>
<td>7.9</td>
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<tr>
<td>1984</td>
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<td>1986</td>
<td>8.1</td>
<td>8.6</td>
<td>5.3</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Source: All statistics were compiled from United Nations Series D Commodity Trade Tapes. Appendix Table 1 provides a tabulation of products in the labor intensive group in terms of the SITC classification system. The "other imports" group shown in this table includes all other SITC products with the exception of items falling in SITC 3.
markets, however, as United States and Japanese imports of labor intensive products registered the largest expansion over 1965-1986 (they rose more than 28 times) while imports by Sweden and Canada rose by 9 and 11 times respectively. While these growth rates are affected by factors such as relative price changes or the growth of GDP in the importing country there is considerable evidence that commercial and protectionist practices have also been a major factor.

Aside from the differences between the growth in the value of imports of labor intensive products Table 1 shows that there are sizeable differences in the shares of developing countries in developed country markets. For example, the share of developing countries in United States labor intensive imports rose by 22 points over 1965-1986, while these countries also increased their shares four-fold (to 44 per cent) in the Japanese market. In contrast, developing countries supplied only 12 per cent of the European Community's labor intensive imports in 1986, while their share in Norway and Sweden was between 7 and 8 per cent. 9/ Table 1 also shows developing countries' shares of labor intensive products are higher and have grown faster than those for other non-fuel products, even though there is considerable variation across markets. In total, as well as in each of the selected developed countries, developing countries significantly increased their import shares of labor

9/ A EEC-EFTA trade protocol may be one major reason why the trade performance of developing countries in Europe is poor relative to the United States and Japan (where shares are high). Under the terms of the protocol manufactured goods can be exchanged between member states free of all import duties and some non-tariff barriers. With intra-EEC, intra-EFTA, and EEC-EFTA inter-trade being duty free, European tariffs only apply to outside suppliers like the United States, Canada and Japan, socialist countries of Europe, and developing countries. Yeats and Laird (1987) show that post-Tokyo Round European tariffs on many labor intensive products are still very high and stimulate intra-European trade in these items at the expense of developing countries.
intensive manufactures. In contrast, developing countries experienced declining shares in the aggregate for non-labor intensive products, while their shares for capital intensive manufactures increased but remained low.

Table 2 examines variations in developed countries imports of labor intensive products in more detail. The top third of the table shows the 1986 value of these imports from developing countries, in total and for major product groups. 10/ The middle third shows the share of developing countries, while the lower third reports imports from developing countries on a per capita basis. Similar information is shown for total developed countries' imports.

Table 2 further confirms the superiority of the United States as a market for developing countries' labor intensive products. With $70.2 billion in 1986 imports, the U.S. absorbed approximately 55 per cent of total developing country shipments of these items to developed countries. In 1986, United States per capita imports were more than three times those of the European Communities and about three and one-half times that of Japan. Aside from the overall level of imports, Table 2 shows that the share of U.S. imports of these products from developing countries is almost double that for developed countries as a group.

The statistics in Table 2 can be used to determine whether the overall differences between the United States imports of labor intensive

10/ Appendix Table 1 provides the SITC numbers and a description of the products comprising each of these aggregate groups. It also gives detailed statistics on trade changes and trends in labor intensity ratios for these items over the period 1965-1982.
## Table 2

### Analysis of Variations in Developed Countries Imports of Labor intensive Products from Developing Countries in 1986

<table>
<thead>
<tr>
<th>Major Product Group 1/</th>
<th>All Developed</th>
<th>Canada</th>
<th>EEC(10)</th>
<th>Japan</th>
<th>Norway</th>
<th>Sweden</th>
<th>Switzerland</th>
<th>U.S.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1986 value of imports from developing countries in $ million)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing and Accessories</td>
<td>27,906.9</td>
<td>1,007.3</td>
<td>8,617.7</td>
<td>2,039.7</td>
<td>129.9</td>
<td>394.6</td>
<td>354.2</td>
<td>14,743.7</td>
</tr>
<tr>
<td>Textile Small Wares</td>
<td>2,167.5</td>
<td>102.2</td>
<td>626.9</td>
<td>201.4</td>
<td>14.0</td>
<td>30.6</td>
<td>19.0</td>
<td>996.6</td>
</tr>
<tr>
<td>Other Woven Fabrics</td>
<td>1,744.5</td>
<td>132.6</td>
<td>669.6</td>
<td>304.3</td>
<td>0.8</td>
<td>9.5</td>
<td>13.4</td>
<td>450.3</td>
</tr>
<tr>
<td>Leather and Manufactures</td>
<td>15,107.9</td>
<td>485.6</td>
<td>3,530.9</td>
<td>904.3</td>
<td>91.0</td>
<td>175.5</td>
<td>154.3</td>
<td>9,230.0</td>
</tr>
<tr>
<td>Toys and Sporting Goods</td>
<td>8,905.6</td>
<td>323.6</td>
<td>1,004.2</td>
<td>461.6</td>
<td>40.4</td>
<td>68.3</td>
<td>51.1</td>
<td>5,750.0</td>
</tr>
<tr>
<td>Jewelry and Silverware</td>
<td>5,947.5</td>
<td>64.2</td>
<td>1,744.3</td>
<td>815.4</td>
<td>2.6</td>
<td>3.7</td>
<td>389.9</td>
<td>2,856.6</td>
</tr>
<tr>
<td>Tools and Hardware</td>
<td>4,036.7</td>
<td>102.6</td>
<td>1,744.3</td>
<td>815.4</td>
<td>2.6</td>
<td>3.7</td>
<td>389.9</td>
<td>2,856.6</td>
</tr>
<tr>
<td>Electrical Apparatus</td>
<td>22,414.8</td>
<td>908.9</td>
<td>1,744.3</td>
<td>815.4</td>
<td>2.6</td>
<td>3.7</td>
<td>389.9</td>
<td>2,856.6</td>
</tr>
<tr>
<td>Non-electrical Machinery</td>
<td>11,003.2</td>
<td>489.7</td>
<td>332.7</td>
<td>12.4</td>
<td>33.4</td>
<td>70.7</td>
<td>55.4</td>
<td>7,075.2</td>
</tr>
<tr>
<td>Lumber, Plywood and Veneers</td>
<td>4,106.6</td>
<td>76.9</td>
<td>1,744.3</td>
<td>815.4</td>
<td>2.6</td>
<td>3.7</td>
<td>389.9</td>
<td>2,856.6</td>
</tr>
<tr>
<td>Building Materials</td>
<td>818.7</td>
<td>13.3</td>
<td>166.4</td>
<td>241.4</td>
<td>1.5</td>
<td>3.5</td>
<td>3.7</td>
<td>353.7</td>
</tr>
<tr>
<td>All Labor Intensive Manufactures</td>
<td>127,732.9</td>
<td>4,257.4</td>
<td>34,433.5</td>
<td>10,219.4</td>
<td>502.1</td>
<td>1,230.4</td>
<td>70,165.3</td>
<td></td>
</tr>
</tbody>
</table>

|                        | (1986 share of total imports from developing countries in percent) |        |         |       |        |        |             |        |
| Clothing and Accessories | 54.6          | 70.9    | 36.8    | 85.3  | 12.7   | 27.9   | 18.6        | 85.8   |
| Textile Small Wares     | 23.5          | 18.1    | 15.0    | 51.9  | 7.9    | 10.5   | 7.4         | 56.3   |
| Other Woven Fabrics     | 15.5          | 22.0    | 10.0    | 49.6  | 1.6    | 5.9    | 4.3         | 29.1   |
| Leather and Manufactures| 30.6          | 35.6    | 20.9    | 60.8  | 14.4   | 19.3   | 11.3        | 69.3   |
| Toys and Sporting Goods | 23.7          | 23.7    | 12.8    | 44.3  | 10.2   | 11.4   | 5.1         | 35.2   |
| Jewelry and Silverware  | 30.9          | 26.9    | 20.9    | 54.7  | 4.7    | 5.8    | 15.5        | 45.8   |
| Tools and Hardware      | 15.9          | 9.9     | 6.9     | 25.5  | 3.0    | 4.4    | 2.0         | 39.9   |
| Electrical Apparatus    | 20.7          | 10.4    | 10.0    | 31.3  | 4.2    | 6.3    | 3.5         | 39.1   |
| Non-electrical Machinery| 6.9           | 2.6     | 3.2     | 11.5  | 1.4    | 1.6    | 1.4         | 17.8   |
| Lumber, Plywood and Veneers | 21.1      | 13.4    | 19.0    | 30.7  | 3.6    | 11.0   | 3.9         | 25.2   |
| Building Materials      | 0.3           | 2.3     | 2.4     | 47.9  | 0.6    | 1.0    | 0.8         | 15.8   |
| All Labor Intensive Manufactures | 21.2      | 11.2    | 12.3    | 45.7  | 5.4    | 8.6    | 7.8         | 40.5   |

|                        | (Imports per capita expressed in terms of U.S. dollars) |        |         |       |        |        |             |        |
| Clothing and Accessories | 35.65         | 40.46   | 24.52   | 17.12 | 31.55  | 47.34  | 55.73       | 63.03  |
| Textile Small Wares     | 2.76          | 4.10    | 1.79    | 1.69  | 3.40   | 3.67   | 2.99        | 4.26   |
| Other Woven Fabrics     | 2.22          | 5.32    | 1.91    | 2.55  | 0.19   | 1.14   | 2.11        | 1.93   |
| Leather and Manufactures| 19.30         | 1.95    | 10.04   | 7.59  | 22.08  | 21.06  | 2.43        | 39.46  |
| Toys and Sporting Goods | 11.38         | 1.23    | 5.13    | 3.07  | 16.0   | 8.22   | 8.04        | 24.58  |
| Jewelry and Silverware  | 7.58          | 2.50    | 4.96    | 6.84  | 0.63   | 0.44   | 6.14        | 12.21  |
| Tools and Hardware      | 5.16          | 6.62    | 2.30    | 1.27  | 4.17   | 4.38   | 2.83        | 11.23  |
| Electrical Apparatus    | 28.66         | 23.66   | 12.60   | 9.45  | 15.39  | 20.16  | 1.53        | 64.98  |
| Non-electrical Machinery| 14.06         | 19.67   | 6.64    | 3.63  | 6.11   | 8.48   | 8.72        | 30.25  |
| Lumber, Plywood and Veneers | 5.24     | 3.09    | 4.97    | 5.42  | 3.84   | 3.44   | 3.25        | 5.65   |
| Building Materials      | 1.05          | 0.53    | 0.48    | 2.02  | 0.36   | 0.42   | 0.58        | 1.51   |
| All Labor Intensive Manufactures | 163.16    | 171.04  | 90.00   | 85.76 | 121.86 | 147.62 | 246.14       | 299.98 |

1/ For the SITC numbers and description of components of each major product group see the appendix table 1.
products and those of other developed countries are due to one or two abnormal sectors or result from a general disparity. Relatively higher levels of US imports are evident for all products, as both developing countries' market shares and imports per capita exceed those of other developed countries. For example, at $63 per capita U.S. clothing imports are more than 70 per cent above the developed country average, while imports of nonelectrical machinery and electrical apparatus are more than twice as high. 11/ Two additional observations should be made with regard to Table 2. First, informal ("negotiated") trade restraints may be a factor causing Japanese imports per capita to be the lowest in the table. In contrast, relatively open trade policies by Switzerland (which does not participate in the MFA) appear to be a major reason why this country's imports per capita are relatively high.

In contrast to the United States, the developing country import shares in Norway, Sweden, Switzerland and Canada are markedly lower. Norway imports only about 5 per cent of its labor intensive products from developing countries, with the corresponding shares for Sweden and Switzerland ranging

11/ Protectionism is a likely explanatory factor for some of the national variations, and trade barriers could be especially important in the textile and clothing sector where nontariff barriers discriminate against developing countries. Under the terms of the Multifibre Arrangement (MFA) imports of textiles and clothing from developing countries are subject to strict quota limits while similar goods originating in developed countries are traded freely. The previously cited EFTA-EEC protocol is undoubtedly a factor accounting for the relatively low import per capita figures for Europe since Laird and Yeats (1987, p. 95) report that post-Tokyo EEC and EFTA tariffs average approximately 10 to 20 per cent for textile and clothing products. These figures represent the margins of tariff preferences intra-European trade enjoys over outside suppliers.
between 8 and 9 per cent. 12/ The Scandanavian countries shares are well below those of the U.S. for clothing, with Norway only receiving 13 per cent of its imports from developing countries (as opposed to 86 per cent for the United States).

An important question concerning variations in imports of individual products is the extent to which the differences can be explained by variations in labor intensity among products. To investigate this question correlations were run between both the level and change in developing countries import shares against the index of value added per employee (equation (1)). The Pearson correlation between levels of the index and developing countries shares in the United States ($r = -0.539$) was significant at the 95 per cent level, as was the correlation between the index and developing countries' shares in other industrial countries ($r = -0.435$). The negative sign was anticipated since the more labor intensive items (i.e., those with a lower value added per employee index) should have higher developing country import shares. Labor intensity also has considerable explanatory power in accounting for changes in the developing countries' United States market shares, as this

12/ The import per capita figures for these countries are closer to (or exceed) the developed country average, but there is a problem with such comparisons in that they do not involve any adjustment for country size. That is, smaller countries are often more open to imports since they do not have the resources and other physical endowments required to produce the range and variety of goods manufactured in larger countries. Given this size-import relation, one would expect the imports per capita of (say) Norway and Sweden to be greater than those of the United States. Spatial factors within Europe may also be a factor accounting for some countries relatively poor performance as import markets for developing countries. That is, location close to low cost labor countries like Greece, Italy, Spain and Portugal may provide the Mediterranean countries with a transport cost advantage in Europe that offsets developing countries' natural comparative advantage. Table 3 compares the export profiles of the latter with those of selected developed countries.
correlation is also significant (r = -0.400). Appendix Table 1 provides details on changes in developing country shares for labor intensive products over 1965 to 1985.

IV. Developing Countries' Exports of Labor Intensive Products

While there is considerable variation in developed countries' imports of the NBER (1965) labor intensive manufactures, Table 3 examines the importance of individual developing countries as sources of supply for these goods. The table identifies the 20 most important developing country exporters of NBER labor intensive manufactures in terms of 1986 exports and also provides statistics on the value of this exchange for selected years back to 1965. To indicate the evolving importance of these products in total trade, the table shows their share in all nonfuel exports of each country over 1965-1986. In addition, the share of textiles and clothing products within the labor intensive group is given to illustrate how the importance of these products changed during the period.

Table 3 shows that labor intensive products have been growing rapidly in importance for practically all of the 20 developing countries listed, yet the 1986 trade in these products (measured in value terms) remains concentrated in a relatively small number of exporters. Taiwan alone accounted for over 22 per cent of the value of shipments to developed countries in 1986 while five exporters (Rep. of Korea, Singapore, China, Hong Kong, and Taiwan, China) originated about 62 per cent of this trade. For each of these five countries, labor intensive manufactures rose in importance over 1965-1986 and now account for between 62 (China) to 94 per cent (Hong Kong) of

13/ The correlation between the value added index and changes in developing countries' shares in other industrial countries (r = -0.369) is weaker, but takes the appropriate negative sign and is statistically significant.
### Table 3

**Trends in the Trade of Major Exporters of Labor-Intensive Manufactures to Developed Countries**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiwan, China</td>
<td>45.5</td>
<td>78.9</td>
<td>85.6</td>
</tr>
<tr>
<td>Korea, Rep. of</td>
<td>51.1</td>
<td>79.2</td>
<td>78.7</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>89.9</td>
<td>94.2</td>
<td>94.1</td>
</tr>
<tr>
<td>China</td>
<td>19.2</td>
<td>41.4</td>
<td>57.7</td>
</tr>
<tr>
<td>Singapore</td>
<td>31.5</td>
<td>74.8</td>
<td>74.5</td>
</tr>
<tr>
<td>Brazil</td>
<td>6.2</td>
<td>16.7</td>
<td>26.7</td>
</tr>
<tr>
<td>India</td>
<td>44.3</td>
<td>65.2</td>
<td>62.3</td>
</tr>
<tr>
<td>Malaysia</td>
<td>12.5</td>
<td>32.2</td>
<td>77.1</td>
</tr>
<tr>
<td>Israel</td>
<td>48.5</td>
<td>48.3</td>
<td>58.6</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>35.7</td>
<td>53.0</td>
<td>54.1</td>
</tr>
<tr>
<td>Thailand</td>
<td>8.7</td>
<td>19.8</td>
<td>49.1</td>
</tr>
<tr>
<td>Philippines</td>
<td>10.9</td>
<td>5.8</td>
<td>54.4</td>
</tr>
<tr>
<td>Turkey</td>
<td>8.7</td>
<td>26.8</td>
<td>51.5</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.9</td>
<td>4.5</td>
<td>30.0</td>
</tr>
<tr>
<td>Pakistan</td>
<td>30.4</td>
<td>63.5</td>
<td>71.3</td>
</tr>
<tr>
<td>Morocco</td>
<td>10.6</td>
<td>16.3</td>
<td>31.8</td>
</tr>
<tr>
<td>Tunisia</td>
<td>6.6</td>
<td>30.8</td>
<td>60.1</td>
</tr>
<tr>
<td>Argentina</td>
<td>1.5</td>
<td>9.4</td>
<td>15.2</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>1.7</td>
<td>3.8</td>
<td>38.9</td>
</tr>
<tr>
<td>Chile</td>
<td>2.6</td>
<td>3.4</td>
<td>11.0</td>
</tr>
<tr>
<td><strong>All Developing Countries</strong></td>
<td><strong>16.0</strong></td>
<td><strong>33.7</strong></td>
<td><strong>52.8</strong></td>
</tr>
</tbody>
</table>

**MEMO ITEM**

| Greece          | 29.0 | 47.2 | 52.9 | 55.6 | 5.6  | 26.7 | 35.4 | 39.1 | 76.3 | 773.8 | 1,735.6 | 2,484.4 |
| Italy           | 48.7 | 55.4 | 63.9 | 64.3 | 27.0 | 21.4 | 21.2 | 21.7 | 2,516.6 | 12,874.3 | 34,781.2 | 47,179.5 |
| Portugal        | 66.1 | 63.1 | 66.7 | 69.0 | 16.5 | 35.6 | 43.9 | 44.6 | 145.4 | 650.5 | 1,826.1 | 2,205.7 |
| Spain           | 23.4 | 41.9 | 38.7 | 39.2 | 8.5  | 7.9  | 6.2  | 6.5  | 229.4 | 2,360.9 | 6,438.8 | 8,318.3 |

Source: All statistics were compiled from United Nations Series D Commodity Trade Tapes. Appendix Table 1 provides a tabulation of products in the labor-intensive group in terms of the SITC system. Appendix 2 analyzes changes in Taiwan, Korea, Hong Kong and Singapore's exports of labor-intensive products over 1965-1986.
total nonfuel exports. In total, the 20 countries listed in Table 3 accounted for $113 billion or approximately 89 per cent of all labor intensive exports from developing countries. 14/

For many of the largest exporters of labor intensive manufactures textiles and clothing were dominant early in the expansion and then declined in importance as countries shifted to other items. For example, from 1965 to 1975 labor intensive manufactures rose from 46 to 79 per cent of Taiwan's total nonfuel exports and the share of textiles and clothing within these items rose from 3 to 28 percent. From 1975 to 1986 the share of all labor intensive products in Taiwan's exports continued to rise (to 85 per cent), yet the share of textiles and clothing in the labor intensive group fell by about 12 percentage points. This same general pattern is evident in many of the developing countries' export profiles. 15/ In the initial stages, textiles and clothing appear to have been a major element or catalyst for the initial export expansion and then were replaced by other labor intensive products.

The question of which labor intensive products replace textiles and clothing as "dynamic" elements in developing country exports is addressed in

14/ The subject is not explored in this paper, but there is considerable evidence that the export performance statistics reported in Table 3 are linked to domestic policy measures in developing countries. For example, the rapid 40 point increase in labor intensive products share in total Dominican Republic exports over 1975-1986 can be tied directly to internal measures, such as the establishment of export processing zones, aimed at trade expansion. See World Bank (1988b) for an evaluation of how domestic policies influenced the export performance of the Caribbean Group for Cooperation in Economic Development (CGCED) countries.

15/ Among the five largest exporters of manufactures China is an exception as the share of textiles and clothing in the labor intensive group rose throughout 1965-1986 and reached 47 per cent in 1986. This may be explained by a difference in timing as China began its major export expansion to developed countries later than Taiwan, Korea, Hong Kong and Singapore. That is, the current Chinese export profile appears to be similar to that of the "newly industrialized" countries in the mid-1970s. See Appendix 2 for related information on this point.
Table 4. The table lists the major three and four-digit SITC labor intensive products exported by developing countries (ranked in terms of their 1986 export values) to developed countries and also shows the share of each item in total trade of the group. This information is given for selected years from 1965 to 1986 to identify items of increasing and declining importance 16/

Table 4 suggests that the dynamic elements in developing country labor intensive manufactures are not confined to a few items, but have a fairly broad base. Footwear and transistors each increased their share by more than four percentage points, while the share of toys and sporting goods more than doubled. Several electronic equipment products (i.e., statistical machines, telecommunications equipment, electronic power machinery, office machines and radio broadcast receivers) had their share of labor intensive products increase by one to two percentage points, while leather clothing, motor vehicle parts, other electrical machinery also recorded a similar increase.

V. Trends in Labor Intensive Production

The key point that emerged from the preceding analysis is that labor intensity was a useful predictor of developing country exports, although there was variation in national supply of, and demand for, these goods. Items identified as labor intensive in 1965 registered a superior developing country

16/ Pearls and precious stones (SITC 667) experience the steepest decline in Table 4 as the share of these items in labor intensive exports went from 10.2 per cent in 1965 to 3.6 per cent in 1986. Protectionism in developed countries has not played a role in this decline as tariffs are generally low on these items and there are few reported nontariff barriers. Other items whose share declined by two percentage points or more include: preserved fruit (SITC 053); woven cotton fabrics (SITC 652); shaped wood (SITC 243); textile products nes (SITC 656); floor covers (SITC 657); leather (SITC 611); plywood (SITC 631.2); and preserved vegetables (SITC 055).
## Table 4

### Analysis of the Changing Composition of Labor Intensive Exports from Developing to Developed Countries: 1965-1986

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>841.1 Textile Clothing, not knit</td>
<td>220.3</td>
<td>2,769.9</td>
<td>12,952.5</td>
<td>15,795.5</td>
<td>6.6</td>
<td>12.7</td>
<td>12.6</td>
<td>12.4</td>
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<tr>
<td>841.4 Clothing Accessories, knit</td>
<td>169.3</td>
<td>2,235.1</td>
<td>7,946.7</td>
<td>11,136.8</td>
<td>5.1</td>
<td>10.2</td>
<td>7.7</td>
<td>8.7</td>
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<td>851 Footwear</td>
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<td>5,891.3</td>
<td>11,136.8</td>
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<td>4.1</td>
<td>5.7</td>
<td>5.6</td>
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<tr>
<td>729.3 Transistors, Valves, etc.</td>
<td>10.1</td>
<td>937.3</td>
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<td>5,900.0</td>
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<td>894 Toys and Sporting Goods</td>
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<td>612.2</td>
<td>4,658.7</td>
<td>5,807.6</td>
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<td>2.8</td>
<td>4.5</td>
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<td>667* Pearls and Precious Stones</td>
<td>337.2</td>
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<td>4,553.6</td>
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<td>4.2</td>
<td>3.4</td>
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<td>724.9 Telecommunications Equipment</td>
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<td>2.2</td>
<td>3.4</td>
<td>3.3</td>
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<td>714.3 Statistical Machines</td>
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<td>89.8</td>
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<td>3,372.2</td>
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<td>0.4</td>
<td>2.1</td>
<td>2.6</td>
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<td>714.9 Office Machines, nes</td>
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<td>0.7</td>
<td>2.5</td>
<td>2.5</td>
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<td>724.2 Radio Broadcast Receivers</td>
<td>26.3</td>
<td>574.1</td>
<td>2,815.7</td>
<td>3,067.0</td>
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<td>2.7</td>
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<td>821 Furniture</td>
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<td>2.0</td>
<td>2.1</td>
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<td>891 Sound Recorders</td>
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<td>1,507.8</td>
<td>2,525.2</td>
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<td>1.1</td>
<td>1.5</td>
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<td>831 Travel Goods and Handbags</td>
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<td>1.5</td>
<td>1.9</td>
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<tr>
<td>303* Preserved Fruit</td>
<td>142.9</td>
<td>492.4</td>
<td>2,186.2</td>
<td>2,205.3</td>
<td>4.3</td>
<td>2.3</td>
<td>2.1</td>
<td>1.7</td>
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<tr>
<td>651 Textile Yarn and Thread</td>
<td>64.2</td>
<td>518.0</td>
<td>1,933.2</td>
<td>2,166.3</td>
<td>1.9</td>
<td>2.4</td>
<td>1.9</td>
<td>1.7</td>
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<tr>
<td>652* Cotton Fabrics, Woven</td>
<td>232.4</td>
<td>763.0</td>
<td>1,476.6</td>
<td>2,131.0</td>
<td>7.0</td>
<td>5.5</td>
<td>1.9</td>
<td>1.7</td>
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<tr>
<td>841.3 Leather Clothing</td>
<td>13.2</td>
<td>466.8</td>
<td>1,476.6</td>
<td>1,887.6</td>
<td>0.4</td>
<td>2.1</td>
<td>1.4</td>
<td>1.5</td>
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<td>895 Articles of Plastic</td>
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<td>313.4</td>
<td>1,358.2</td>
<td>2,131.0</td>
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<td>1.4</td>
<td>1.3</td>
<td>1.4</td>
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<tr>
<td>243* Shaped Wood</td>
<td>232.2</td>
<td>648.9</td>
<td>1,517.8</td>
<td>1,697.0</td>
<td>7.0</td>
<td>3.0</td>
<td>1.5</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>656* Textile Products, nes</td>
<td>105.3</td>
<td>318.4</td>
<td>1,349.9</td>
<td>1,696.0</td>
<td>3.2</td>
<td>1.5</td>
<td>1.3</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>732.8 Motor Vehicle Parts</td>
<td>3.9</td>
<td>182.3</td>
<td>1,281.7</td>
<td>1,598.1</td>
<td>0.1</td>
<td>0.8</td>
<td>1.2</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>657* Floor Covers and Tapestry</td>
<td>64.2</td>
<td>518.0</td>
<td>1,933.2</td>
<td>2,166.3</td>
<td>1.9</td>
<td>2.4</td>
<td>1.9</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>729.9 Other Electrical Machinery</td>
<td>144.9</td>
<td>569.8</td>
<td>1,533.9</td>
<td>1,569.7</td>
<td>4.4</td>
<td>2.6</td>
<td>1.1</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>032* Prepared Fish*</td>
<td>61.1</td>
<td>255.3</td>
<td>1,045.2</td>
<td>1,395.3</td>
<td>1.8</td>
<td>1.2</td>
<td>1.0</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>897.1 Real Gold and Jewelry</td>
<td>6.0</td>
<td>94.7</td>
<td>976.4</td>
<td>1,387.8</td>
<td>0.2</td>
<td>0.4</td>
<td>0.9</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>864.1 Watches and Watch Movements</td>
<td>1.8</td>
<td>190.3</td>
<td>1,001.5</td>
<td>1,248.3</td>
<td>0.1</td>
<td>0.9</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>611* Leather</td>
<td>99.4</td>
<td>378.1</td>
<td>1,074.7</td>
<td>1,172.8</td>
<td>3.0</td>
<td>1.7</td>
<td>1.0</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>725.05 Electric Space Heaters</td>
<td>0.3</td>
<td>75.3</td>
<td>965.0</td>
<td>1,136.3</td>
<td>--</td>
<td>0.3</td>
<td>0.9</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>631.2* Plywood</td>
<td>86.2</td>
<td>423.7</td>
<td>832.4</td>
<td>1,118.6</td>
<td>2.6</td>
<td>1.9</td>
<td>0.8</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>655.5 Woven Synthetic Fabrics</td>
<td>2.9</td>
<td>184.7</td>
<td>781.2</td>
<td>1,019.2</td>
<td>0.1</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>055* Preserved Vegetables</td>
<td>80.9</td>
<td>397.0</td>
<td>832.4</td>
<td>924.8</td>
<td>2.4</td>
<td>1.8</td>
<td>0.8</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>719.2 Pumps and Centrifuges</td>
<td>2.6</td>
<td>50.6</td>
<td>859.8</td>
<td>911.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.8</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>632 Wood Manufactures, nes</td>
<td>19.6</td>
<td>208.6</td>
<td>760.0</td>
<td>876.2</td>
<td>0.6</td>
<td>1.0</td>
<td>0.7</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>697 Base Metal Household Equipment</td>
<td>9.7</td>
<td>131.1</td>
<td>719.8</td>
<td>830.6</td>
<td>0.3</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td></td>
</tr>
</tbody>
</table>

Other Labor Intensive Products* | 1,015.5 | 4,227.9 | 18,182.7 | 22,588.5 | 30.6 | 19.4 | 17.8 | 17.5 |

* The item registered a declining share in total exports of products identified by NBER as produced by labor intensive processes in 1965.
export performance in terms of market shares over the next two decades (1965-1986) and also accounted for a steadily increasing share of nonfuel exports. As such, updating the NBER indices of labor intensity into the 1980s could provide insights concerning likely changes in developing countries exports in the 1990s and beyond.

Drawing on U.S. Census Bureau data, Table 5 provides details on trends in labor intensity ratios for broad two-digit U.S. Standard Classification (SIC) industry groups over 1963-1982 for years in which census data were available, and also gives similar information for selected three and four-digit textile and apparel products. To assist in evaluating the relative importance of each industry in total U.S. manufacturing, statistics on the 1982 value of shipments are shown along with industry employment information for 1963, 1972 and 1982.

For most industries listed in Table 5 the 1963-1982 labor intensity ratios fluctuated in a narrow range, but there are important exceptions. Petroleum and coal products (SIC 29) experienced more than a 50 per cent rise in factor intensity ratios (from 215 to 337) while the ratios for tobacco products (SIC 21) rose from 192 to 359 points. These developments indicate both sectors were becoming relatively highly capital intensive. A similar increase in capital intensity is evident in the ratios for both food products and paper although the magnitude of change is smaller. Since these industries' ratios exceeded the United States average throughout the 1963-1982 period the rising trend implies they were becoming even less suitable for export by developing countries. However, the ratios for primary metals (SIC 33) fell from about 15 points above the United States average to 10 points below average during 1963-1982, a development which suggests an increase in developing countries' comparative advantage.
## Factor Intensity Ratios and Employment Statistics for Selected Industries: 1963 to 1982

### Total Employees (000)

<table>
<thead>
<tr>
<th>SIC</th>
<th>Description</th>
<th>1963</th>
<th>1972</th>
<th>1982</th>
<th>Value of shipments (Mill)</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>ALL MANUFACTURING</td>
<td>16,910.1</td>
<td>19,026.8</td>
<td>19,094.1</td>
<td>1,960,205.8</td>
</tr>
<tr>
<td>20</td>
<td>Food Products</td>
<td>1,643.1</td>
<td>1,569.3</td>
<td>1,487.7</td>
<td>280,529.3</td>
</tr>
<tr>
<td>21</td>
<td>Tobacco Products</td>
<td>77.3</td>
<td>66.3</td>
<td>57.9</td>
<td>16,061.4</td>
</tr>
<tr>
<td>22</td>
<td>Textiles Mill Products</td>
<td>863.2</td>
<td>952.6</td>
<td>717.4</td>
<td>47,515.4</td>
</tr>
<tr>
<td>221</td>
<td>Cotton Mills</td>
<td>208.9</td>
<td>121.3</td>
<td>76.9</td>
<td>3,972.0</td>
</tr>
<tr>
<td>222</td>
<td>Artificial Fiber Mills</td>
<td>88.2</td>
<td>149.7</td>
<td>140.8</td>
<td>8,191.2</td>
</tr>
<tr>
<td>225</td>
<td>Knitting Mills</td>
<td>220.5</td>
<td>276.5</td>
<td>204.8</td>
<td>10,986.1</td>
</tr>
<tr>
<td>226</td>
<td>Nonwool Textile Finishing</td>
<td>70.8</td>
<td>79.5</td>
<td>58.1</td>
<td>4,971.9</td>
</tr>
<tr>
<td>228</td>
<td>Yarn and Thread Mills</td>
<td>102.6</td>
<td>147.5</td>
<td>108.6</td>
<td>7,036.4</td>
</tr>
<tr>
<td>23</td>
<td>Apparel and Textiles</td>
<td>1,279.5</td>
<td>1,368.3</td>
<td>1,189.0</td>
<td>53,387.9</td>
</tr>
<tr>
<td>231</td>
<td>Mens Suits</td>
<td>122.7</td>
<td>124.8</td>
<td>75.2</td>
<td>3,061.5</td>
</tr>
<tr>
<td>232</td>
<td>Mens Clothing</td>
<td>305.6</td>
<td>363.7</td>
<td>290.9</td>
<td>12,727.1</td>
</tr>
<tr>
<td>233</td>
<td>Womens Outerwear</td>
<td>405.4</td>
<td>377.7</td>
<td>418.9</td>
<td>18,224.5</td>
</tr>
<tr>
<td>234</td>
<td>Womens Undergarments</td>
<td>113.9</td>
<td>105.4</td>
<td>81.6</td>
<td>3,322.7</td>
</tr>
<tr>
<td>236</td>
<td>Childrens Outerwear</td>
<td>81.9</td>
<td>74.8</td>
<td>71.3</td>
<td>2,711.4</td>
</tr>
<tr>
<td>24</td>
<td>Wood Products</td>
<td>563.1</td>
<td>691.0</td>
<td>576.4</td>
<td>42,934.9</td>
</tr>
<tr>
<td>25</td>
<td>Furniture and Fixtures</td>
<td>376.5</td>
<td>462.0</td>
<td>436.0</td>
<td>24,128.6</td>
</tr>
<tr>
<td>26</td>
<td>Paper and Products</td>
<td>588.0</td>
<td>633.4</td>
<td>605.6</td>
<td>79,895.4</td>
</tr>
<tr>
<td>27</td>
<td>Printing and Publishing</td>
<td>913.2</td>
<td>1,056.5</td>
<td>1,291.8</td>
<td>85,796.9</td>
</tr>
<tr>
<td>28</td>
<td>Chemicals</td>
<td>737.4</td>
<td>836.5</td>
<td>872.6</td>
<td>170,736.9</td>
</tr>
<tr>
<td>29</td>
<td>Petroleum and Coal Products</td>
<td>153.4</td>
<td>139.5</td>
<td>151.6</td>
<td>208,918.6</td>
</tr>
<tr>
<td>30</td>
<td>Rubber and Plastic Products</td>
<td>415.0</td>
<td>617.7</td>
<td>681.7</td>
<td>55,415.8</td>
</tr>
<tr>
<td>31</td>
<td>Leather and Products</td>
<td>327.5</td>
<td>273.4</td>
<td>199.8</td>
<td>9,719.2</td>
</tr>
<tr>
<td>32</td>
<td>Stone, Clay and Glass</td>
<td>573.9</td>
<td>623.2</td>
<td>531.5</td>
<td>45,180.6</td>
</tr>
<tr>
<td>33</td>
<td>Primary Metal Industries</td>
<td>1,166.5</td>
<td>1,142.8</td>
<td>854.1</td>
<td>104,666.8</td>
</tr>
<tr>
<td>34</td>
<td>Fabricated Metal Products</td>
<td>1,493.3</td>
<td>1,459.7</td>
<td>1,459.7</td>
<td>119,440.0</td>
</tr>
<tr>
<td>35</td>
<td>Nonmetallic Machinery</td>
<td>1,459.4</td>
<td>1,827.7</td>
<td>2,188.7</td>
<td>187,895.7</td>
</tr>
<tr>
<td>36</td>
<td>Electrical Equipment</td>
<td>1,511.6</td>
<td>1,661.3</td>
<td>1,914.5</td>
<td>147,943.6</td>
</tr>
<tr>
<td>37</td>
<td>Transport Equipment</td>
<td>1,601.2</td>
<td>1,719.0</td>
<td>1,595.9</td>
<td>201,346.1</td>
</tr>
<tr>
<td>38</td>
<td>Instruments</td>
<td>305.5</td>
<td>452.3</td>
<td>623.6</td>
<td>51,797.6</td>
</tr>
<tr>
<td>39</td>
<td>Misc. Manufactures</td>
<td>390.8</td>
<td>445.6</td>
<td>386.2</td>
<td>26,891.4</td>
</tr>
</tbody>
</table>

1/ Value added per worker in the industry expressed as a ratio to value added per worker for all United States manufacturing.

Source: All data compiled from United States Department of Commerce, Census of Manufactures, vol. 1, Summary and Subject Statistics, (Washington: Department of Commerce, various years).
Table 5 suggests that most of the 1963 labor intensive product sectors were also relatively labor intensive in 1982. This implies that most items which were identified as suitable for developing country exports in the 1960s would also be selected in the 1980s. However, there are some lower level four-digit SIC products that shifted from relatively labor intensive to capital intensive production techniques and would now be deleted from the original 1965 NBER product list (see Appendix Table 1).

Given the key role that textiles and clothing played in the initial export expansion of some developing countries, Table 5 examines changes in employment and factor intensity ratios for these products in more detail. The data show that considerable labor shedding occurred in these sectors since approximately 230,000 jobs were lost over 1963-1982 (146,000 in textiles), and that the labor intensity of both sectors has changed relatively little. On average, the labor intensity of apparel and clothing (SIC 23) is approximately 50 per cent higher than for all United States industry, while textile mill products (SIC 22) appear to be only slightly less labor intensive. The implication is that the very strong comparative advantage developing countries have in the production of textiles and clothing has changed little and that these countries will continue to exert strong pressures on developed country suppliers in the 1990s.

Table 6 addresses the question of where labor intensive products are concentrated (i.e., in which industry sectors do they generally originate) in the 1980s. The table tabulates the number of four-digit SIC labor intensive products in each industry sector and also indicates the extent that these
<table>
<thead>
<tr>
<th>SIC Description</th>
<th>Number of Four-Digit SIC Products</th>
<th>Percent All Labor Intensive Products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very High</td>
<td>High</td>
</tr>
<tr>
<td><strong>ALL MANUFACTURING</strong></td>
<td>71</td>
<td>64</td>
</tr>
<tr>
<td><strong>Food Products</strong></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Tobacco Products</strong></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Textile Mill Products</strong></td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td><strong>Cotton Mills</strong></td>
<td>1(1)</td>
<td>0(0)</td>
</tr>
<tr>
<td><strong>Artificial Fiber Mills</strong></td>
<td>0(1)</td>
<td>0(0)</td>
</tr>
<tr>
<td><strong>Knitting Mills</strong></td>
<td>0(5)</td>
<td>0(2)</td>
</tr>
<tr>
<td><strong>Nonwool Textile Finishing</strong></td>
<td>0(1)</td>
<td>0(2)</td>
</tr>
<tr>
<td><strong>Yarn and Thread Mills</strong></td>
<td>0(4)</td>
<td>0(0)</td>
</tr>
<tr>
<td><strong>Apparel and Textiles</strong></td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td><strong>Men's Suits</strong></td>
<td>0(1)</td>
<td>0(0)</td>
</tr>
<tr>
<td><strong>Men's Clothing</strong></td>
<td>0(4)</td>
<td>0(2)</td>
</tr>
<tr>
<td><strong>Women's Outerwear</strong></td>
<td>0(3)</td>
<td>0(1)</td>
</tr>
<tr>
<td><strong>Womens' Undergarments</strong></td>
<td>0(1)</td>
<td>0(1)</td>
</tr>
<tr>
<td><strong>Childrens Outerwear</strong></td>
<td>0(2)</td>
<td>0(0)</td>
</tr>
<tr>
<td><strong>Wood Products</strong></td>
<td>8</td>
<td>6</td>
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<tr>
<td><strong>Furniture and Fixtures</strong></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Paper and Products</strong></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Printing and Publishing</strong></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Chemicals</strong></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Petroleum and Coal Products</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Rubber and Plastic Products</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Leather and Products</strong></td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td><strong>Stone, Clay and Glass</strong></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Primary Metal Industries</strong></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Fabricated Metal Products</strong></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>Non Electrical Machinery</strong></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Electrical Equipment</strong></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Transport Equipment</strong></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>Instruments</strong></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Misc. Manufactures</strong></td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

1/ Products with "very high" labor intensities are those where the factor proportions ratio is at least 40 points below the average for all United States manufacturing. Products with "high" labor intensities are those whose factor proportions ratios fall between 0.60 and 0.74, while the "moderately" labor intensive products have factor proportions ratios between 0.75 and 0.90. Appendix Table 6 lists the four-digit SIC products that fall in these categories.
products' labor intensity ratio differ from the United States average. The table shows the number and per cent of labor intensive products falling in each broad industry group and also classifies these items in a range of "very high" to "moderately" labor intensive. 17/

Among the 19 industry groups listed, the highest concentration of labor intensive products is now in textile mill products (25 products or 13 per cent of all four-digit SIC items) and apparel and textiles (31 products or 17 per cent of all labor intensive items). Furthermore, the table shows that these products are entirely concentrated in the "very high" labor intensity group (cotton mills, artificial fiber mills, men's suits and children's outerwear), or are distributed between the "very high" and "high" groups. Appendix Table 1 shows that these products (identified in terms of their corresponding SITC group) were also among the most highly labor intensive goods in the mid-1960s.

Aside from textiles and clothing, wood products (SIC 24) have the third highest concentration of labor intensive goods (17 items or 9 per cent of the total) while 7 per cent of the labor intensive products fall in SIC 34 (fabricated metals) and SIC 39 (miscellaneous manufactures). Analysis of the underlying product data (see Appendix Table 6) show various furniture products

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17/ In Table 6, a four-digit SIC product is classified labor intensive if its factor proportions index is 10 points or more below the United States average. This "cut-off" point is lower than that used by the NBER due to the mixed export results developing countries had for products closer to the United States average. Furthermore, products are considered to be "very highly" labor intensive if their ratios are 40 points or more below the U.S. average, while items with a "high" labor intensity are those with ratios between 0.60 and 0.74. "Moderate" labor intensive products are those with factor proportions ratios between 0.75 and 0.90. Appendix Table 6 lists the four-digit SIC labor intensive products selected using these criteria and also provides related shipment and employment statistics.
account for about half of the labor intensive items in the wood group while products like hand saws, metal barrels, structural metal products, wire springs, or sheet metal work in the fabricated metal sector are produced by labor intensive methods. However, Table 6 suggests that the labor intensive products, in which developing countries have a comparative advantage, are distributed throughout the industry sectors with a few exceptions like petroleum refining and chemicals.

Given the previous (1965-1986) developing country export expansion of products identified as labor intensive in 1965, Table 7 examines the implications of the updated 1980s product list using U.S. employment and shipment information. Specifically, the table shows the 1982 value and share of industry employment and shipments that originates in labor intensive products. The latter is further disaggregated into three component product groups (very high, high or moderate labor intensity).

As was the case with previous analyses, Table 7 demonstrates the "vulnerability" of the textile and clothing sectors to exports from developing countries. Over 80 per cent of textile mill (SIC 22) shipments and employment originate in labor intensive products while the corresponding shares for apparel (SIC 23) exceed 95 per cent. The table also shows that employment and shipments in both sectors are highly concentrated in the "very high" labor intensive group which would appear to be most suitable for developing countries. High "exposure" ratios (i.e., industries where labor intensive products account for at least 50 per cent of total employment or shipments) occur for wood products (100 per cent of shipments and employment), furniture and fixtures, rubber and plastic products, leather products (100 per cent coverage) and miscellaneous manufactures. Overall, 43 per cent of 1982 United
## Table 7

Analysis of the Distribution of Labor Intensive Products Within Major Industry Groups

<table>
<thead>
<tr>
<th>SIC</th>
<th>Description</th>
<th>Share of Industry Employment on Shipments in Four-Digit SIC Labor Intensive Products 1/</th>
<th>1982 Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Employment Shipments</td>
<td>Employment (000)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very High</td>
<td>High</td>
</tr>
<tr>
<td>--</td>
<td>ALL MANUFACTURING</td>
<td>18.7</td>
<td>9.8</td>
</tr>
<tr>
<td>20</td>
<td>Food Products</td>
<td>9.5</td>
<td>1.2</td>
</tr>
<tr>
<td>21</td>
<td>Tobacco Products</td>
<td>0.0</td>
<td>8.8</td>
</tr>
<tr>
<td>22</td>
<td>Textile Mill Products</td>
<td>70.2</td>
<td>17.5</td>
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<td>39</td>
<td>Misc. Manufactures</td>
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<td>34.7</td>
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1/ Products with "very high" labor intensities are those where the factor proportions ratio is at least 40 points below the average for all United States manufacturing. Products with "high" labor intensities are those whose factor proportions ratios fall between 0.60 and 0.74, while the "moderately" labor intensive products have factor proportions ratios between 0.75 and 0.90. Appendix Table 6 lists the four-digit SIC products that fall in these categories.
States manufacturing employment originates in labor intensive products and 24 per cent of industry shipments are composed of these goods. 18/ Such statistics imply broad based competitive pressures from developing country exporters in the 1990s.

Just as Table 7 showed certain industries appear vulnerable to increased exports from developing countries (based on the implications of factor proportions data), several of these industries also appear relatively "safe" as far as labor intensity is concerned. 19/ No labor intensive products occur in petroleum refining and coal (SIC 29), while chemicals (SIC 28) generates less than 2 per cent of total shipments and employment in labor intensive products. Aside from these sectors capital intensive production techniques seemingly prevail in processed food products, paper, printing, electrical equipment, transport equipment and instruments. In a recent extension of the NBER approach, Erzan and Yeats (1989) also determined that most service industries in the United States employ relatively high capital intensive methods as compared to all manufacturing activity.

18/ Employing the 1965 NBER labor intensity indices in connection with the 1963 Census of Manufactures allows one to compute related "exposure" indices for the earlier period. The results suggest that in 1963 approximately 46 per cent of United States manufacturing employment originated in labor intensive products and 23 per cent of all industry shipments were composed of these goods. In computing both the 1963 and 1982 employment and shipment ratios, labor intensive products were defined as items whose factor proportions indices were at least 10 per cent below the U.S. average.

19/ Petroleum refining was identified as one of the most capital intensive of U.S manufacturing industries (see Table 5), yet this industry should not be considered "safe" due to the special situation that exists in some energy exporting developing countries. Saudi Arabia, for example, has been developing an increased export capacity in refined petroleum and petrochemical products and has both the financial reserves and access to international capital markets needed for these ventures.
VI. Summary and Conclusions

For various purposes such as the implementation of structural adjustment programs (or giving related World Bank assistance), efforts to liberalize international trade barriers, or the development of an "early warning" system for disruptive imports, information on changing comparative advantage and the future composition of international trade is often a key input. In recognition of this point, this study tested the use of factor proportions indices as a predictor of developing countries' exports. Four main conclusions followed from this exercise. First, tests conducted for the 1965-1986 period showed that factor proportions data was a useful predictor of developing countries future exports. Developing countries significantly increased their total exports and share of labor intensive products, while their shares for other nonfuel products registered persistent declines. Second, the evidence developed in this study suggests that factor proportions information is useful for longer-term trade projections. The 1965 indices labor intensities identified specific products that developing countries would do well in one and two decades later. In part, this may be due to the fact that most products manufactured by labor intensive methods in the 1960s continued to be produced by such methods in the 1980s (see Table 5 and Appendix Table 1). Third, this study noted that a relation existed between the level of labor intensity of a product and the export performance of developing countries. That is, developing countries generally exhibited a superior export performance in the most labor intensive products.

In view of the past success of factor proportions information for predicting developing countries trade, this study assessed the implications of recent data on labor intensities for the 1990s and beyond. Specifically, a
"core group" of labor intensive products was identified using 1980s production data (see Appendix Table 6) from which four main points can be drawn. First, the position of most textile and clothing products remained virtually unchanged over the last two decades. These products were produced by highly labor intensive production processes in the 1970s and 1980s, a point that indicates future competitive pressures from developing countries will not be reduced. Second, several other sectors like wood, rubber and leather products had a high concentration of very labor intensive production processes in both the 1960s and 1980s, while some items like processed food shifted from relatively labor intensive production techniques to those that were capital intensive. Third, the recent data show that labor intensive products are generally found in the same general sectors in the 1980s and 1960s. Finally, the magnitude of the coverage of labor intensive products suggest they will continue to place broad based competitive pressure on developed countries in the future as over one-quarter of United States industrial employment now originates in relatively labor intensive product sectors.

While the primary objective of this study was to test the predictive power of factor proportions information for future South-North trade, and the utility of this data was established, several points were raised in the investigation that should be subject to further research. Five such issues are as follows:

(i) Why do such major differences exist in imports of labor intensive products by individual developed countries (see Tables 1 and 2)? In particular, why has the United States import demand for these products been so much greater than that of the European countries or Canada in terms of levels and shares and from Japan in terms of levels?

(ii) To what extent do domestic policies of developing countries explain the marked differences in their ability to supply these items? As shown (Table 3) labor intensive exports were concentrated in relatively few countries.
(iii) The data presented in this study on textiles and clothing production (see Tables 6 and 7) indicate more analyses is need on this sector. Specifically, given that the Long Term Textile Arrangement (LTA) and the Multifibre Arrangement were intended to give these industries an opportunity to restructure, why do they remain among the most labor intensive sectors of U.S. industry in the 1980s?

(iv) This investigation identified specific industries (Table 7) that appeared especially "vulnerable" to increased competitive pressures from developing country exporters. As such, it provides a focus for further analyses aimed at establishing how resources may be best transferred from these sectors to industries where a competitive edge has been maintained. These results (Table 7 and Appendix Table 6) also provide a focus for monitoring future developments concerning market penetration and pressures for protection.

(v) This study employed a measure of comparative advantage based on factor proportions data, but noted that Balassa's (1965) "revealed" comparative advantage (RCA) indices could also be used for the analysis. It would be useful to determine how RCA indices relate to those developed in this study (and by the National Bureau of Economic Research). The objective might be to expand the utility of such statistics for anticipating disruptive imports or structural adjustment problems.
Appendix 1

Statistics on Trends in Trade and Factor Proportions Indices for Products Indentified in 1965 as Being Manufactured by Labor Intensive Production Processes

1965 to 1985
Appendix Table 1 updates trade statistics and factor proportions indices for the original list of manufactured products identified by the National Bureau of Economic Research (NBER) as being produced by relatively labor intensive production processes. The table shows the SITC code of each item, gives a brief product description, and also gives the value and share of developed country imports from developing countries in 1965, 1975 and 1985.\(^{20}\)

All trade data were drawn from United Nations, Series D, Commodity Trade Tapes.

The NBER factor intensity indices are updated in the appendix table from 1965 to 1982 using United States Department of Commerce information for the latest years now available. Apart from the usual data defects which may distort intertemporal comparisons of relative factor intensities, the indices of value added per employee presented in Appendix Table 1 may suffer from the 1972 revisions of the United States SIC system. These revisions affected, in some manner, 121 industries out of a total of 422. In the data compilations, an attempt was made to account for these revisions. Lack of detailed statistics, however, sometimes precluded a perfect matching of industries before and after 1972. Thus, the industrial coverage of some groups may vary over time. This defect would, of course, make the use of the data as indicators of absolute levels of activity and employment suspect. However, to the extent that the data correspond to general trends in value added and employment for closely related activities, the calculated ratio of value added per employee should be representative of that industry.

\(^{20}\) These items were originally identified in terms of the United States SIC classification system. See Lary (1968, pp. 189-213) for the concordance used to identify corresponding SITC products. In Appendix Table 1, and elsewhere in this report, standard World Bank definitions of developed and developing countries are employed with one exception. That is Greece, Spain and Portugal are classified in the developed rather than developing country group.
## Appendix Table 1
The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985

<table>
<thead>
<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100)</th>
<th>Total Developed Country Imports</th>
<th>Developing Country Import Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>65100</td>
<td>Yarn and Thread</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Textile Yarn</td>
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<td></td>
<td></td>
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<tr>
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<td>Cotton Fabrics</td>
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<tr>
<td>65300</td>
<td>Other Woven Fabrics</td>
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<td></td>
<td></td>
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<td>65310</td>
<td>Silk Fabrics</td>
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<td>57-67</td>
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<td>57-67</td>
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<td>57-67</td>
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<td>81-87</td>
<td>57-67</td>
<td>18.8</td>
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<tr>
<td>65300</td>
<td>Knitted Fabrics</td>
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<td>57-67</td>
<td>187.1</td>
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### Appendix Table 1 (Continued)
The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985

<table>
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<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100)</th>
<th>Total Developed Country Imports</th>
<th>Developing Country Import Share</th>
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<tr>
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<td>46-54</td>
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### Appendix Table 1 (Continued)

The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985

<table>
<thead>
<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100)</th>
<th>Total Developed Country Imports</th>
<th>Developing Country Import Share</th>
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<td>Essential Oils</td>
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<tr>
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<td>Total</td>
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</table>
### Appendix Table 1 (Continued)

**The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985**

<table>
<thead>
<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100)</th>
<th>Total Developed Country imports</th>
<th>Developing Country import Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>67850</td>
<td>Tube Fittings of Steel</td>
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<td>124.8</td>
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<td>69300</td>
<td>Wire Products</td>
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<td>73</td>
<td>152.8</td>
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<td>72-107</td>
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<tr>
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<td>4,749.7</td>
<td>25,957.9</td>
<td>87,749.8</td>
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### Appendix Table I (Continued)

The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985

<table>
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<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100) 1/</th>
<th>Total Developed Country Imports</th>
<th>Developing Country Import Share</th>
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<td>122-124</td>
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<td>122-134</td>
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<td>Statistical Machines</td>
<td>89</td>
<td>122-134</td>
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<td>71490</td>
<td>Office Machines</td>
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<td>122-134</td>
<td>400.9</td>
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<td>Machine Tools</td>
<td>97-105</td>
<td>92</td>
<td>812.1</td>
</tr>
<tr>
<td>71520</td>
<td>Metal Working Machines</td>
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<td>92</td>
<td>174.2</td>
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<td>73</td>
<td>122.5</td>
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<td>Paper Mill Machinery</td>
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<td>99</td>
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<td>96</td>
<td>203.6</td>
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<td>71920</td>
<td>Pumps</td>
<td>108</td>
<td>113</td>
<td>218.7</td>
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<td>80-113</td>
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<td>Tapes and Valves</td>
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<td>77-88</td>
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<td>120</td>
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</table>

**Total**

9,193.0 | 45,284.1 | 127,067.8 | 0.3 | 2.0 | 6.5 |

<table>
<thead>
<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100) 1/</th>
<th>Total Developed Country Imports</th>
<th>Developing Country Import Share</th>
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<tr>
<td>03200</td>
<td>Canned Fish</td>
<td>93</td>
<td>102</td>
<td>403.6</td>
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<tr>
<td>08140</td>
<td>Fish or Meat Meal</td>
<td>93-102</td>
<td>120</td>
<td>330.6</td>
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<tr>
<td>41110</td>
<td>Oil of Fish</td>
<td>102</td>
<td>120</td>
<td>140.8</td>
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**Total**

875.0 | 1,639.1 | 3,436.6 | 29.3 | 26.0 | 40.0 |

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<th>SITC</th>
<th>Description</th>
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<th>Developing Country Import Share</th>
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<tr>
<td>05200</td>
<td>Dried Fruit</td>
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<td>134</td>
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<tr>
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<td>Prepared Fruit</td>
<td>90-100</td>
<td>116</td>
<td>560.0</td>
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<tr>
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<td>Prepared Vegetables</td>
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<td></td>
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### Appendix Table 1 (Continued)
The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985

<table>
<thead>
<tr>
<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100)</th>
<th>Total Developed Country Imports</th>
<th>Developing Country Import Share</th>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>06200</td>
<td>Misc. Food Products</td>
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<td>Sugar Confectionary</td>
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<td>140</td>
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<td>65190</td>
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<td>49</td>
<td>39.1</td>
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<td></td>
<td>Woven Jute Fabrics</td>
<td>63</td>
<td>49</td>
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<td>Cordage</td>
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<td>63</td>
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<td>69</td>
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<tr>
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<td>5,202.4</td>
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<tr>
<td>24300</td>
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<td></td>
<td></td>
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<td></td>
<td>Shaped Wood</td>
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<td>70</td>
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## Appendix Table 1 (Continued)
The Export Performance of Developing Countries in Labor Intensive Manufactured Goods: 1965 to 1985

<table>
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<th>SITC</th>
<th>Description</th>
<th>Value Added/Employee (mfg=100)</th>
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<th>Developing Country Import Share</th>
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<td>83-86</td>
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<td>76</td>
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</tr>
<tr>
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<td>Mineral Products, nes</td>
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<td>85</td>
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<tr>
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<td>128</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
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<td>1,040.4</td>
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</table>

1/ Due to the fact that the SIC classification of the United States has undergone a number of major revisions, and the fact that an exact concordance to the SITC system does not exist, it has been necessary to express some of the factor proportions indices as a likely range rather than a specific average for the SITC group. See Lary (1968, pp. 191-212) for a SITC-SIC concordance relating to the 1960s.

2/ This product was included in the original National Bureau of Economic Research list on the basis of valued added per employee data from non-United States sources.

3/ Available concordances between the SITC and SIC place this product in SIC group 2844 "toilet preparations." In 1982, this SIC group had 60,400 employees and produced a value added of $7,130.6 million which accounts for the very high value added per employee ratio.

4/ The corresponding SIC product is 3861 "photographic equipment and supplies" which employed 119,300 workers in 1982 and produced a value added of $14,059.1 million. As such, it moved from about average to very high capital intensity in production over 1965-1982.

5/ Although factor intensity indices could not be computed for this product it was included in the original NBER list on the basis of the import valued criterion and factor proportions data drawn from non-United States sources.
Appendix 2

Analysis of Sectoral Changes in the Exports of Maturing "Newly Industrialized" Developing Countries to the Developed Countries During 1965 to 1986

Hong Kong, Rep. of Korea, Singapore, and Taiwan, Province of China
This report identified products manufactured by labor intensive production processes which, according to factor proportions theory, should be manufactured and exported by developing countries. However, the theory provides a static framework that is vague on certain important "dynamic" questions such as how the export profiles of developing countries will change over time, or which goods will be produced in developing countries at different stages of industrialization. The current "newly industrialized" countries may, for example, gradually shift their exports toward more capital intensive goods (and, in turn, be displaced in their markets for traditional labor intensive products by a "second wave" of industrializing countries). However, little is known or can be implied from theory on the timing and sequence of such changes.

In an attempt to provide relevant empirical information, Appendix Tables 2 through 5 summarize 1965-1986 statistics on the labor intensive exports of four of the most advanced of the industrialized developing countries: Hong Kong, Republic of Korea, Taiwan and Singapore. The table gives the value of individual labor intensive products exported to all developed countries in 1965, 1975, 1985 and 1986 along with its share in the exports of all labor intensive products. This latter information is given to assist in evaluating changes in the relative importance of each item.

Three important points emerge from these data. First, there is a tendency for the four countries to shift to less labor intensive (i.e. more capital intensive goods) in their export profiles as evidenced by the following aggregate indices of labor intensity for all exports:
As indicated by the above figures, the labor intensity indices for Singapore's exports rose by over 38 points during 1966-1986 (which indicates the labor intensity of exports markedly declined). Similarly, Hong Kong's indices of labor intensity for exports rose by approximately 12 points, while the indices for Korea rose by 8 points. Taiwan's indices were largely flat over the 1965-1986 period due to attempts to export some capital intensive processed food products in 1965 (see Appendix Table 5). These items steadily declined in importance from over 20 per cent of total imports to about one per cent in 1986.

Appendix Tables 2 through 5 provide detailed information on the export product mix shifts that produced these overall results. In all four

\[
L_i = \left( \sum \frac{X_{ij}}{X_T} \cdot F_j \right) \cdot 100
\]

where \(X_{ij}\) is the value of the exports of product \(j\) by \(i\), \(X_T\) is the total value of labor intensive exports by \(i\), while \(F_j\) is the labor intensity index for product \(j\) (see Appendix Table 1 for the actual values of these parameters). In the computations, 1965 factor intensities were used for calculation of the 1965 and 1975 indices while 1982 data were used for the 1985 and 1986 calculations. In cases where factor intensity indices were expressed as a range for a given product (see Appendix Table 1) the average value was employed.
countries, the share of clothing products (SITC 841.1 and 841.4) and woven cotton fabrics (SITC 652) experienced some growth over 1965 to 1975 and then rapidly declined in importance. The decline was particularly pronounced in the case of Taiwan where the share of knit clothing (SITC 841.4) fell from 16.8 per cent of total labor intensive exports in 1975 to about 7 per cent ten years later. This change was one major reason why the overall country labor intensity indices rose, e.g., textiles and clothing is one of the most highly labor intensive of the product groups.

Apart from the movement out of textiles, there are some similarities between the product groups of increasing importance. Telecommunications equipment, statistical machines, office machinery, electrical equipment, sound recorders and electric space heaters are among the items that register sizeable share increases among the labor intensive products. These items are generally produced by production processes that are not highly labor intensive (see appendix Table 1 and 6) or, in a few cases, appear to be produced by processes that are somewhat capital intensive.
### Analysis of the Changing Structure of Hong Kong's Exports of Labor Intensive Manufactures to Developed Countries 1965 to 1986

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<th></th>
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<tr>
<td>841.1</td>
<td>Textile Clothing not Knit</td>
<td>152.5</td>
<td>1,151.5</td>
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<td>27.8</td>
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<td>21.4</td>
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<td>15.2</td>
<td>15.9</td>
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<tr>
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<td>6.9</td>
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<td>5.4</td>
<td>2.9</td>
<td>2.6</td>
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<tr>
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<td>Telecommunications Equipment, nes</td>
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**Other Labor Intensive Products**: 160.5 492.9 975.9 1,904.4 21.5 12.0 6.9 11.0

**Total Labor Intensive Products**: 758.1 4,141.7 14,814.0 17,246.6 100.0 100.0 100.0 100.0
## Appendix Table 3

Analysis of the Changing Structure of Republic of Korea's Exports of Labor Intensive Manufactures to Developed Countries

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<th>SITC</th>
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<th>Share in Labor Intensive Exports</th>
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### Appendix Table 4

**Analysis of the Changing Structure of Singapore's Exports of Labor Intensive Manufactures to Developed Countries**

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## Analysis of the Changing Structure of Taiwan's Exports of Labor Intensive Manufactures to Developed Countries

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Appendix 3

The Identification of Manufactured Goods produced by Labor Intensive Production Processes in the 1980s
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### Appendix Table 6 (Continued)
Manufactured Goods Produced by Labor Intensive Processes in the 1980s

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#### II. PRODUCTS WITH HIGH LABOR INTENSITY

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### Manufactured Goods Produced by Labor Intensive Processes in the 1980s

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**Manufactured Goods Produced by Labor-intensive Processes in the 1980s**

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#### MODERATE LABOR INTENSIVE PRODUCTS

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### Appendix Table 6 (Continued)

Manufactured Goods Produced by Labor Intensive Processes in the 1980s

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1/ Products with "very high" labor intensities are those where the factor proportions intensity ratio is at least 40 points below the average for all United States manufacturing. Products with "high" labor intensities are those whose factor proportions ratios fall between 0.60 and 0.64, while the "moderately" labor intensive products have factor proportions ratios between 0.75 and 0.90.

2/ Value added per worker for the four-digit SIC product expressed as a ratio to the value added per worker for all United States manufacturing.
References


Balassa, Bela (1971). The Structure of Protection in Developing Countries, (Baltimore, Johns Hopkins Press).


### PPR Working Paper Series

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<td>Jock R. Anderson</td>
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<td>Martha de Melo</td>
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<td>Alice Galenson</td>
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