Just How Big Is Global Production Sharing?

Alexander J. Yeats*

Principal Economist, Development Research Group
The World Bank, Washington, D.C. 20433

*The views expressed in this paper are those of the author and need not reflect those of the World Bank, its staff or its member countries.

Abstract

The sharing of different stages of manufacturing processes between countries is of major and growing importance. However, due to previous deficiencies in the Standard International Trade Classification (SITC) Revision 1 system it was not possible to differentiate between two key elements of this process - that involving international trade in components and parts as opposed to the exchange of fully fabricated manufactured goods. Such a distinction was needed in order to empirically estimate the size of global production sharing.

Changes in the SITC classification system (Revision 2) now allow one to approximate how much production sharing occurs within the key machinery and transportation equipment (SITC 7) group which includes approximately 50 percent of world trade in all manufactures. In 1995, OECD exports of parts and components in this group totalled $440 billion which was about 30 percent of all shipments (components plus assembled goods) of machinery and transportation equipment. The data also show that developing countries produced and exported an additional $100 billion of these products - which indicates global exports were in excess of one-half trillion dollars. However, the extent of product sharing is clearly larger than these figures indicate since the SITC Revision 2 system does not allow one to distinguish between components and parts in chemicals or other manufactured goods. Finally, the data also shows that over the last decade trade in machinery and transport equipment components has grown at a considerably faster pace than that for final stage products in this group.

A different form of production sharing involves the use of special tariff provisions for the re-import of domestically produced components that have been assembled abroad. A second data source on this activity indicates that trade in these goods totals about $100 billion annually with most of the activity involving the European Union and the United States. However, there again are important reasons for believing that the available data understate the importance of this exchange. Even so, these supplemental statistics illustrate the overall importance of this activity to some developing countries as over 40 percent of the total manufactures exports of Mexico, Jamaica, Haiti, Dominican Republic and El Salvador involve assembly operations using components manufactured abroad.

Just how big is global production sharing? The figures analyzed in this report suggest it involves more than $800 billion in manufactures trade annually, or at least 30 percent of the total world trade in these products. Another important finding is that trade in components and parts has been growing at a considerably faster pace than that for other (finished) products - a point that clearly documents the growing interdependence of countries in international trade and production operations.

Just How Big is Global Production Sharing?

Alexander J. Yeats

I. Introduction: Basic Issues

Historically, the development of international production sharing activities has been a major and evolving process.[1] In one of its earliest forms this process involved the production of primary commodities in developing countries, shipment of these goods to industrial nations for further processing, and then the re-exportation (in part) of the processed product back to the primary commodity producing country. As an example, iron ore might be mined in Mauritania, shipped to Europe for processing into iron and steel products - some of which were then re-exported to Mauritania. In part these "production sharing" trade flows were based on comparative advantage (some commodity processing like the fabrication of metals from ores or petroleum refining are highly capital intensive), but other factors such as "escalation" in industrial countries' trade barriers also contributed to this exchange pattern.

In the mid-1960s a different form of production sharing between developing and industrial countries began to emerge. This involved the development of specialized labor-intensive production activities within vertically integrated *international* manufacturing industries. As an example, semi-conductors, valves, tuners and other components began to be assembled for international electronic firms in Hong Kong, Thailand, Malaysia and Singapore. Wearing apparel and leather goods were also assembled in the Dominican Republic, Jamaica and the Philippines for transnational firms. Among the many other industries where parts of a

[1]Production sharing is defined as the internationalization of a manufacturing process in which several countries participat erent stages of the manufacture of a specific good. The process is of considerable economic importance since it allows stage duction to be located where they can be undertaken most efficiently and at the lowest cost. Furthermore, if production sharin easing in relative importance this implies that countries are becoming more interdependent on each other.

production process were transferred to developing countries included television and radio receivers, sewing machines, calculators and other office equipment, electrical machinery, power tools, machine tools and parts, typewriters, cameras, optical equipment, watches, brass valves, aircraft parts, telecommunications equipment, chemicals and synthetic fibers, and musical equipment.

How important in the aggregate have these overseas production arrangements now become? What are their characteristics, and is co-production a universal phenomenon spread evenly over countries and products? Second, what caused the growth in this exchange and can particular characteristics of products and policies that were instrumental in promoting these opportunities be identified. Third, what have the effects of overseas production on home and host economies been? In particular, have these operations resulted in sizeable employment losses in high wage countries, or have they actually been a source of net job creation in the industries manufacturing and exporting production inputs. These are among the crucial questions relating to international production sharing operations. The present paper will focus almost entirely on the first - just how big is current global production sharing and has its relative importance been growing or declining?[2]

A major difficulty one previously faced in attempting to assess the magnitude and nature of global production sharing is that international trade data generally have not differentiated between components and assembled products. Identification of the former is

[2]A trend towards an international "slicing up of the value" chain in manufacturing would be important for the development pro several reasons. First, by increasing the set of internationally traded goods it increases opportunities for developing countrie efit from the gains from trade by allowing them greater room for specialization in the labor intensive stages of manufactu cesses (which as a whole might be technology or capital intensive). Also, by broadening the scope for gains from trade it wo ler protectionist, import substitution or anti-foreign investment policies even less sensible or attractive than before. In addit n that this kind of production and trade tends to occur within tightly knit "just in time" global networks, it attaches ad ortance to improving the efficiency of transportation and communications infrastructure and a generally low cost, hassle-free dictable business environment.

crucial since these items are being shipped from one country to another for further processing. With this the case it was not possible to determine the actual location where components and parts were being produced, the direction and composition of their exchange, or the magnitude of this trade. However, revisions to the Standard International Trade Classification system (SITC - both Revision 2 and 3) now make it somewhat easier to tabulate intra-industry trade in components within several broad industry groups. A second source is data compiled in connection with the use of special OECD tariff provisions that provide for preferential access for the re-entry of domestically produced components assembled abroad. Using these data sources jointly one can provide some estimates of the importance of global production sharing in international trade.

II. **The Evidence from Trade in Components**

In its original form the SITC classification system did a very inadequate job of distinguishing between trade in final goods and trade in components. At the lower (five-digit) level the SITC Revision 1 identified about 800 individual products - 10 of which consisted only of "parts" or components. However, in the late 1970s and early 1980s many countries shifted to the SITC Revision 2 system which greatly expanded the number of product groups composed solely of components. The coverage of these items was most complete within the machinery and transport equipment group (SITC 7) where about 50 individual three, four, and five-digit groups consist solely of components of other manufactured equipment.[3] Outside this sector the SITC still fails to differentiate sufficiently between assembled goods and components so

[3]The tabulations in this study are based solely on these SITC groups which are identified as consisting solely of components clearly causes the estimates of the level of international production sharing to be downward biased. Specifically, some other SIT duct group exports (like television picture tubes) may be used for further assembly operations in the importing countries. Howe n the nature and limitations of the available trade data it is not possible to determine whether, and to what extent, these items d for further assembly or are traded as finished goods for final consumption.

meaningful tabulations of the magnitude of trade in parts can not be made. Furthermore, many developing countries did not shift to the SITC Revision 2 trade classification system until the early or mid-1980s so it was not possible to fully monitor non-OECD exports of components outside the recent period.

Table 1 utilizes this new data source to show the composition and relative importance of individual SITC 7 product groups which consist solely of parts and components.

Insert Table 1

The table identifies each product group by SITC (Revision 2) number, it provides a description of each item, and also indicates the 1995 value of OECD imports. To help assess the relative importance of each product, its share in all parts and component imports is also shown. Appendix Table 1 provides similar statistics for OECD exports of these goods. Finally, the table also provides a measure of the net OECD trade balance for each individual item. The latter has been computed as the difference between OECD exports and imports of each good expressed as a percentage of OECD exports.[4]

Perhaps a key feature of this trade is that imports (and exports - see Appendix Table 1) are concentrated in a relatively few product groups. Specifically, Table 1 shows that 4 of the 44 SITC product groups account jointly for over 70 percent of total trade in components with parts of motor vehicles alone (SITC 784) accounting for over $91 billion, or about one-quarter of the total exchange in these goods. Outside this one group, parts of office machinery (SITC 759) and of telecommunications equipment (SITC 764) jointly account for about 35 percent of total trade with parts of switch gear (SITC 773) adding a further 10 percent. Outside these four groups the largest remaining products generally account for no more than one to five percent of the total (parts of aircraft, parts of internal combustion engines, etc.) with a few items, like parts of internal combustion engines, parts of wire making machinery, or parts of grain milling machinery represent less than one-tenth of a percent of total trade in these goods. Table 5 (which follows) provides more information on the relative importance of trade in more aggregate two-digit SITC product groups.

Overall, Table 1 shows that OECD countries generally record a positive trade balance

[4]That is, if Oxj and Oij represent total OECD exports and imports of SITC product j, respectively, than the trade balance measure is derived from;

$$Bj = ((Oxj - Oij) \div Oxj) \cdot 100$$

for almost all of the individual product groups with total OECD exports of components ($442 billion) exceeding imports ($365 billion) by about 17 percent. This pattern is not unexpected since most assembly operations are labor intensive in nature and non-OECD (developing) countries generally have a comparative advantage in this type of activity. In only 6 of the 44 product groups is this trade pattern reversed with the most noteworthy exception occurring for office and adding machine parts (SITC 759) where OECD imports ($69 billion) exceed imports by about 13 percent.

A key question relating to these data is how great is the relative importance of trade in parts and components within several broader product groups. Table 2 provides some evidence on the importance of trade in components within the entire machinery and transport (SITC 7) sector. The top half of the table shows the global export value of parts and components of machinery and transport equipment for selected years from 1978 to 1995. The lower half shows the share of these items in all SITC 7 exports for each year. Both sets of figures testify as to the global importance of this exchange. In 1995 OECD exports of transport and machinery components and parts surpassed $440 billion, which was about 30 percent of all traded SITC 7 products.[5] Although US exports of these goods ($102 billion) were about one-half those of the EU, their share (about 40 percent) was considerably higher than in either the EU or Japan. Japan, however, had the most rapid growth in the relative importance of these exports with their share increasing from about 15 to 26 percent over the 17 year period.[6]

---

[5]A recent estimate placed world trade in all manufactures at about $2.7 trillion. As such, the component trade reported in Tab ıe would constitute about 16 percent of this total exchange. However, as noted, two deficiencies in the SITC system may cause tl ı to seriously under-report the true importance of this exchange. First, some products in the machinery and transport group ɔrted, at least in part, for further assembly abroad. Since their actual end-use could not be determined from the SITC data they v uded from the tabulations. Second, it was not possible to identify SITC groups that consisted solely of components in o ıufactures groups - yarns and textile fabrics were almost certainly employed in this manner - so these had to be excluded from ılations.

[6]The rapid expansion of Japanese components exports is largely concentrated in trade with the U.S. which received $27.6 billion

What role did regional economic groupings like the European Union or EFTA play in the growth of this exchange? The preferential reduction of trade barriers in regional arrangements may have caused

:ent) of all such shipments in 1995. Motor vehicle components dominated this exchange accounting for about three-quarters o
orts. Aside from the U.S., Japanese exports of components were largely directed at Asian markets as Taiwan (China), Thaila
gapore, Hong Kong and Korea each received about 5 percent of total Japanese exports of these goods.

Insert Table 2

trade in components to rise faster than in trade with third countries. Also, because of the formal regional arrangements trade with other member countries might be viewed as being somehow more "secure" or less likely to encounter disruptions or new restrictions than trade with nonmembers. If "risk" considerations are a major factor in the decision as to where to "source" basic industry components this could have favored intra-block trade in these goods. However, if this exchange is primarily motivated by considerations like wage differentials rising costs (particularly in Europe) could be a factor working against increased intra-block production sharing.

The data in Table 2 (see the memo item) shows that in 1995 intra-block trade of the three regional groups accounted for 69 percent ($302.5 billion) of the total OECD exports of components to all destinations - up from about 66 percent in the late 1970s. However, the data do not indicate that there are important differences in the share of components in trade within or outside the regional blocks. For example, in 1995 27.9 percent of EC global exports of transport and machinery products consisted of components and parts as opposed to these products' 26.8 percent share in intra-EU trade.

Overall, Table 2 shows that the share of components in total OECD SITC 7 exports has steadily increased over 1978-95 and, at 30 percent, now stands about 4 percentage points above its earlier levels. Although the available data do not allow one to accurately track trends in developing countries' exports of these products over the 1980s, the available information indicates they were growing rapidly and were of major importance by the beginning of this decade. In 1995 shipments of components from developing countries exceeded $100 billion (this was about one-quarter the total value of exports of these goods from the OECD), with Singapore having exports of $22 billion and Taiwan (China), Republic of Korea, Malaysia and Mexico all having shipments in excess of $10 billion. These trends clearly signal the increasing

interdependence of production sharing operations in the whole machinery and transport sectors as industries in one country become increasingly reliant on suppliers in another for essential manufacturing inputs.

Table 3 offers a different perspective on the OECD trade in components by identifying the 30 largest destinations for this exchange in 1995. For comparison, similar statistics on these countries imports also reported for 1978.[7] Germany and the United States were by far the largest markets for these goods in the earlier period when they received about 40 percent of all shipments, although their combined share fell to about 23 percent in 1995. However, the trend for the US differed from that of Germany - US imports of components rose about six-fold over 1978-95 while those going to Germany expanded at a far slower pace. The appreciation of the German Mark, along with rapidly rising labor costs, were undoubtedly factors slowing the assembly of components in Germany.

A further important point evident in Table 3 is how international trade in components has become to some developing countries. Developing countries constitute 11 of the 30 largest markets for these goods with 1995 combined imports of Mexico and China being approximating $25 billion. The growth of this exchange in China's trade is the fastest of that for any of the major countries (that is, Chinese imports of components rose from just under $200 million in 1978 to $10.7 billion in 1995 - a compound annual growth rate in excess of 26 percent).

Table 4 provides a different perspective on the relative importance of individual

[7]The fact that Table 3 shows the seven largest markets for components are developed countries may come as something
prise. A detailed analysis of the underlying trade data (see also Table 4) show that differences in factor intensities do not appear t
ring a major role in the direction of this exchange - rather the trade flows appear to often consist of high-tech products where
ors may play a major role in the location of production facilities across countries. No doubt, discriminatory trade barriers like th
lied in EFTA, the European Union, or in the Canadian-American FTA, were also a factor contributing to the high share of in
CD trade in this exchange.

countries' imports of SITC 7 parts and components in: (i) imports of all goods (that is, SITC 0 through 9); (ii) all manufactured goods (SITC 5 through 8 less 68); and (iii) all transport and machinery products (SITC 7). The table shows the value of each country's imports of each group as well as the share of parts and components within each total. The reader should again recall that the SITC does not do an adequate job

Insert Table 3

of identifying "parts" outside of SITC 7 so the comparisons with total imports, and with imports of all manufactures, clearly understate the true importance of this exchange.

For each of the 35 countries listed in Table 4 components accounted for at least 27 percent of total SITC 7 exports which, with the exception of Israel, represents 10 percent or more of total imports of all goods. Imports of components account for 30 percent or more of total transport and machinery imports for about one-half of the countries in the table and reach a high of 46 percent for French Guinea. Appendix Table 2 provides similar statistics for individual OECD countries' exports.

What major individual product groups are of primary importance in trade in components? Table 5 provides some additional aggregated information by tabulating the 1978 and 1995 value of component product exports within each of the two-digit SITC sub-groups which constitute all machinery and transport equipment (SITC 7) - see Table 1 for underlying data for individual products. Road motor vehicles parts account for over one-quarter ($115 billion) of the total exchange followed by telecommunications and office machinery ($61 billion) whose share is 18 percent.[8] With an annual growth rate of 16 percent component exports of the latter sub-group expanded at an annual rate that was 6 percent higher than that for all component and parts, and 7 percent higher than that for the total SITC 7 group.

III. **Tariff Provisions for Offshore Assembly**

A second source of information on international production sharing is statistics on tariff induced "offshore assembly processing" (OAP) activity in internationally trade. Specifically,

[8]The available data do not allow one to distinguish between trade in automotive components that are intended for further assen pposed to those that are intended for repair or replacement purposes. In any case, the growth in this exchange signals a grow rdependence in international operations - either on the part of assembly operations or on the part of service industries which hai ıir or replacement services.

most industrial countries' tariff schedules provide special favorable treatment for domestically produced components that are shipped abroad for further processing and then re-imported into the home country (see Box 1). Data

Insert Table 4

Insert Table 5

compiled by the US International Trade Commission indicate that the value of these goods ($74 billion) accounted for about 16 percent of all United States imports in 1989, but there are various reasons why the recent available data understate the importance of this exchange.[9] Specifically, a considerable volume of US imports are already exempt from customs duties under special programs like the Generalized System of Preferences (GSP) or Caribbean Basin Initiative (CBI). In these cases, foreign suppliers have no incentive to apply for the special tariff treatment so any production sharing in goods receiving these preferences would go unreported. Similarly, the United States recently negotiated a free trade arrangement with Mexico and Canada (NAFTA) that allows imports from these countries to enter the US free of tariffs. Again, in this case, Mexican and Canadian suppliers would have no incentive to apply for this special OAP treatment. As such, there is reason to believe that the available data considerably under-state the magnitude and importance of production sharing that occurs under these special tariff provisions.[10]

Table 6 employs the available US data sources on this OAP activity to examine the composition of 1993 and 1994 imports of assembled goods in terms of major product categories. About 40 percent of this exchange consists of road motor vehicle parts assembled

---

[9]Commission staff have routinely monitored the effect of production sharing on US industry and maintain regular contact with panies that use foreign assembly as part of their competitive strategy. The effects of these production sharing tariff provisions use of assembly in Mexico's maquiladora industry on the US economy were the subject of a USITC (1988) investigation. In ly, the Commission surveyed over 300 companies in industries making use of foreign assembly. According to these responses, us ign assembly and the production sharing tariff provisions has: (l) improved the overall competitiveness of US firms; (2) redu d costs and improved profitability; and (3) increased US employment. Most of the respondents indicated that were it not for duction sharing tariff provisions, the firms would have lost market share to foreign producers that do not use US made compone Grunwald and Flamm (1985), Drucker (1987), and Echeverri-Carroll (1988)(1995) for other analyses of the impact of foreign assen he competitiveness of US industry.

[10]European Union statistics on this type of activity almost certainly suffer from the same type of bias. In addition to the GSP, the vides many developing countries' manufactured exports preferences under the Lome Convention. Recipient countries would hav ntive to apply for OAP tariff concessions if the processed goods are already duty free under these programs. Similarly, the EU otiated free trade arrangements with EFTA, Turkey, Israel and a number of North African countries. OAP exports from these sou uld likely go unreported if they are not subject to import duties.

abroad ($23 billion in 1994) followed by

Insert Box 1

Insert Table 6

microelectronic components (such as assembled circuit board - $8 billion) and apparel ($6 billion).[11] The fact that reported assembled road motor vehicle imports declined by about $2.2 billion is likely due to a loss of accuracy in the underlying statistics. The decline seems largely attributable to the fact that Canadian assemblers had no incentive to report this trade under the special US OAP tariff provisions when these goods became duty free under the US-Canadian FTA.

Table 6 also illustrates the overall importance of production sharing by comparing the value of OAP imports of selected product groups with the total value of all imports of these same goods (see the memo item). For example, in 1993 OAP imports of automobiles and trucks ($25.3 billion) accounted for 40 percent of the total US imports ($63.9 billion) of these goods while 14 percent of all US clothing imports were from domestically produced components assembled abroad. However, OAP activity is actually involved $2.6 billion in 1994 imports of television receivers which represents over 70 percent of the total imports of this one product group.

Table 7 provides a different view on the importance of this special tariff induced OAP trade - this time from the perspective of individual exporting countries that utilize these tariff provisions. Specifically, the second and third columns of the table show the value and share of components in all United States imports of foreign assembled goods from individual developed and developing countries. This share ranges from a high of 80 percent for Jamaica down to about 2 percent for Sweden, Germany or Belgium.[12] Quite obviously, tariff savings

[11]The European Union has a production sharing tariff provision comparable to that of the US (see Box 1) but it appears to be far nsively used. The principle imports of the EU under the European OAP tariff provision were apparel and other textile artic ch accounted for 43 percent ($6 billion) of the total. Germany accounted for over two-thirds of the EU production sharing import arel in 1994. Textile and apparel producers in Germany ship fabric mostly to Central Europe where it is cut and sewn into garme

[12]The OAP trade between the US and other industrial countries may be due, in part, to the fact that companies "rational duction by consolidating the manufacture of a particular product or component to a limited number of locations. Plants that r

are not the key factor motivating trade with the latter three

Insert Table 7

e diversified products become specialized in the production of fewer goods. This can lead to greater efficiency and economie
e, and to interdependency between plants requiring coordination of production planning.

OECD countries - nontariff related cost saving or other technical aspects of production certainly at work, as well as the necessity of establishing a physical presence in foreign markets in order to properly service domestic customers.[13] Finally, the three right-most columns are designed to indicate the importance of this trade to the exporting countries. Specifically, these columns show: (i) the total US import value of OAP goods, (ii) the total value of all United States imports from each country, and (iii) the share of OAP products in total imports.

The major point evident in Table 7 concerns the importance of assembly operations in the total exports of some of the (primarily developing) countries. Over 50 percent of Haitian, Dominican Republic, and El Salvador's exports to the United States consist of assembled products - the share is over 40 percent in the case of Jamaica and Mexico. Perhaps the most surprising point emerging from Table 5, however, is the importance of OAP activity in the total exports from some of the industrial countries. Specifically, between 16 to 18 percent of all US imports from Sweden and Germany involve the return of domestically produced components which have been assembled in these countries. As previously noted, this is likely associated with the need for TNCs to establish a presence in the major markets they serve. In doing so there may be advantages in utilizing components produced in the country where sales of the final good are made.

IV. **Some Perspectives on South-North Production Sharing**

What factors contributed to the development of North-South production sharing (OAP)

[13]Department of Commerce data show that US multinationals tend to sell most of what they make abroad to customers in ign markets where their subsidiaries are locates. Even in developing countries more than 60 percent of the production by fore iates of US multinational manufacturers is sold locally. A portion of the intra-OECD countries' trade reflected in Table 5 is ment of resident firms domestically produced components and parts to supply their foreign subsidiaries. These shipments may important to the economy of the country where the parent corporation is located since the job creating effects of the production orts of components may be sizeable.

activity reflected in the previous tables. This exchange has been especially important for many developing countries in that it provided a far easier means for implementing "outward oriented" growth strategies since an associated firm, located in an industrial country, handles marketing and distribution functions. Evidence compiled by the US International Trade Corporation suggests four factors contributed to this production sharing.

A. The Influence of OECD Trade Barriers

In the 1960s there was general pessimism concerning the ability of many developing countries to expand foreign exchange earnings due to poor prospects for traditional commodity exports and by OECD trade barriers against exports of labor intensive manufactures. For example, in the late 1960s industrial countries' tariffs on exports from countries like the Republic of Korea, Hong Kong, Singapore and Taiwan (China) averaged about 17 percent, reaching a high of 19.5 percent in the United Kingdom (see Table 8). OECD tariffs also discriminated against developing countries, as reflected in the higher than average tariffs on their exports. In addition, GSP schemes had not yet been adopted, so the Asian NICs, Mexico, and the Caribbean countries - where production sharing made its earliest appearance - had to compete with other suppliers on an equal MFN basis.

Table 8. Average Levels of OECD Countries' Tariffs in the mid-1960s.

Import market	Mid-1960 Tariff Averages on Total Imports of Manufactures	Mid-1960 Tariff Averages on Imports of Manufactures from Developing Countries
United States	11.5	17.9
United Kingdom	15.2	19.5
European Community	11.0	14.3
Sweden	6.6	9.8
Japan	16.1	18.0

All Industrial Countries	10.9	17.1

Source: UNCTAD, The Kennedy Round Estimated Effects on Tariff Barriers, (TD/6/Rev. 1), (New York: United Nations, 1968).

In this environment developing counties had major incentives to adopt measures favoring labor-intensive activities. Furthermore, many developing countries realized OECD firms which stood to benefit from such production sharing would have a major incentive to help resist demands for new protection against goods manufactured in such a production sharing arrangement.[14] This lead to the active involvement by developing countries' governments in efforts to attract this type of activity (see section D) and involvement on the part of TNC firms to promote tariff induced OAP development.

B. Labor Costs

One major factor that facilitated the early development of OAP production sharing was marked differences in wage rates between developed and developing countries. In the 1970s wages in most of the Caribbean countries, Mexico and Latin America ranged between 60 to 80 percent below those in the United States. By drawing on these foreign labor sources US corporations could both enhance their own profitability from domestic sales and also increase their ability to compete in third markets due to lower overall production costs.

Recent production sharing in Europe appears to have been driven by similar economic incentives - often involving wage differentials - and considerations such as those motivating earlier production sharing in North America. To remain competitive in international markets,

[14]Aside from wage differences other cost considerations helped promote the development of North-South production shar
le many new TNC production processes are often quite costly, this was not the case for OAP activity. All that normally was requ
the allocation of some research on the *identification* (within their existing operations) of labor intensive activities which v
ntially transferable to low-wage countries. That is, new technologies were not needed as it was generally a matter of identify
e existing (fixed coefficient) activities which might be located abroad.

manufacturers in high labor cost regions of Europe moved some of their more labor intensive production and assembly operations to neighboring countries with lower labor costs (see Table 9). In addition to low labor costs, factors such as labor skills and education, adequate transportation and financial infrastructure, and technical training were important in determining the magnitude and direction of this OAP activity in Europe. Moreover, EU firms have used offshore processing to gain access to new markets, particularly in Central Europe. In addition to geographic proximity, Table 9 suggests that the combined effect of low wages and high literacy rates may have helped the former socialist countries in Europe attract most of the European Unions new OAP processing contracts during 1991-94.

C. Transport and Distance

Products which have high value relative to their bulk, and therefore have transport costs which make up a very small proportion of their total value, are the most suitable for assembly abroad. Although international freight and insurance charges average about 5 to 6 percent of the value of all US imports (Yeats 1989), the rates ranged from about 2 percent on watches and jewelry to 20-40 percent for furniture and some wood manufactures. Other studies also found that major differences often exist in nominal freight rates for similar goods shipped from different countries have a major impact on the competitive position of exporters. As an example, Yeats (1981) determined that transport costs for apparel exports from Indonesia to the United States were about 25 percent higher, on average, than those on similar products shipped from Malaysia. This point is important since even small variations in international transport costs can have an important influence on the location of global production and export volumes.[15]

[15]In a Nobel symposium on the location of international economic activity Assar Lindbeck argued that "given other costs, fi

Adverse transport costs appear to be one reason why Sub-Saharan Africa has generally failed to participate in OAP activity - in spite of the very low prevailing wages. For example, Table 10 reports

se between alternative international locations in order to minimize transport costs. These costs, therefore, may become low preci
ıuse they have been highly important for location - high transport cost locations are avoided if other costs are equal." Simila
lish Bhagwati observed that "even if transport costs for any alternative location were a small proportion of total product price, t
d still affect location if they varied geographically more than other costs of production" (Ohlin, Hesselborn and Mijkman. 197
.

Insert Table 9

international transport charges for all 1993 Sub-Saharan African exports to the United States. Individual product freight rates for all export items were ranked in ascending order and their quartile values computed. In addition, freight costs for shipments of the same goods from other suppliers were computed in order to determine how much extra Africa pays above other exporters. Specifically, the table shows that half the nominal vessel freight rates for middle-income West Africa (10 percent) are about 2 percentage points higher than those paid by other exporters of the same goods.[16] To put this in perspective, the Uruguay Round achieved an average 2.4 percentage point reduction in industrial country tariffs. Moreover, in every instance there is a larger adverse margin for air freight than for vessel shipments. African air transport, at first glance, appears to be relatively less cost efficient than vessel freight. Finally, the third-quartile values indicate that some African exports encounter very high transport costs. About 25 percent of Africa's air exports have freight rates exceeding 26 percent and a quarter of low-income West Africa's vessel shipments have nominal rates of more than 19 percent. These comparisons clearly show that international transport costs have a significant adverse impact on the region to participate in international production sharing.[17]

---

[16]These statistics exclude port and inland transport costs which may be very high for some African countries. The importance of
:r in Africa should not be underestimated. For example, World Bank data compiled by Tyler Biggs show port charges for cleari
nty foot container in Abidjan and Dakar are $1,100 and $910 respectively. In contrast, the ocean freight cost for shipping
:ainer to Hamburg or Le Havre range between $1,350 to $1,430.

[17]This raises two key questions. What factors account for the adverse African transport costs and what corrective policy meas
available? Evidence suggests that the anticompetitive cargo reservation policies adopted by most African governments have h
or adverse influence on freight costs. The OECD provides an assessment of these anticompetitive practices and the current situa
ırding shipping in West and Central Africa: "In 1992, West and Central African states showed no indication of liberalizing t
:ectionist shipping policies based largely on the unilateral interpretation of certain provisions of the UN Liner Code Convention.
contrary there were various moves towards enacting existing, but not yet implemented restrictive policies. These attempts met
osition by OECD member countries and their shipping lines which considered this as both protectionist and discriminat
vever, the operation of some 50 shipping lines offering regular services to West Africa from most ports of the world was not
ıpered by protectionism. Civil unrest, economic depression, a sharp increase in criminal activities towards vessels together with p
: management and severe and often discriminatory customs regulations were factors shipping lines had to struggle with." OE
2, p. 43. So, the answer is clearly deregulation. World Bank studies show deregulating and stimulating competition for shipp
ices may reduce liner freight rates by as much as 50 percent (Bennathan, Escobar, and Panagakes 1989).

Insert Table 10

D. Governmental Influences

As previously noted, governmental policies have a major impact on the location and extent that production sharing occurs between developed and developing countries. Specifically, special OECD tariffs for foreign assembled goods played a major role in stimulating this exchange (see Box 1).[18] However, developing countries own governmental policies are almost certainly more important. Special incentives are frequently offered to industrial exporters by the governments of the less developed countries which have taken the form of tax holidays, credits and rebates; subsidized credit, rent and other infrastructure; direct and indirect export subsidies of various types; freedom from import duties or exchange controls. Indirect governmental policies that improved literacy rates and the quality of the work-force, or which promoted the development of adequate transport and communications systems may be equally important (Box 2 and 3 provides an assessment of the role these measures played in promoting OAP activity in the Caribbean).

Risk is a further factor contributing to decisions as to where production sharing activity will be located. Risks include all of the usual dangers for foreign investors - exchange risk, nationalization without adequate compensation, political disruptions and so forth. To these must be added risks resulting from the decision to separate production process from one another in those circumstances where this has not previously been the practice. The international vertical integration of industry increases the risk associated with supply disruption in a single overseas location, for it can bring the entire international production to a

[18]These tariff provisions are available not only to US manufacturing firms but also to jobbers and to non-US producing firms. T
, like all others, do not affect the extent of protection offered to US-owned firms but only that offered to US-located ones. It
30 and 807.00 encourage the location of particular types of activity outside the United States; or, more appropriately, the repea
e thoroughly rational provisions would discourage non-US locations. At the same time, however, these provisions increase
petitiveness in the American market of many US-based (and presumably US-owned) firms. They can also be viewed, then,
ice to encourage the use of US raw materials and early stage processing in US based metal finishing operations and in all fore
ed assembly which caters to the US market.

halt. Such disruptions could be the product of shipping delays, political disturbances,

Insert Box 2

strikes or take the form of loss of quality control. Disruption of component supplies is apparently perceived by potential investors of this type as the primary risk.[19] Box 3 examines the extent to which these factors have influenced the location of production sharing and manufacturing activity within the Caribbean region. This information is intended to show why some countries participated while others did not and how important the overall extent of this activity has been.

V. **How Big is Global Production Sharing?**

If, at this point, one returns to the question of how big is global production sharing the answer clearly is "very big"! The available data on trade in machinery and transport equipment components showed these items comprised about 30 percent of the total exchange and that trade in these goods was growing at a faster pace than the overall SITC 7 total. Various "yardsticks" are available for measuring the importance of international production sharing. For example, the 1994 UNCTAD Handbook of International Trade and Development Statistics estimates that North American (United States plus Canada)

apparent consumption (defined as production less exports plus imports) of machinery and transportation came to $1,175,636 million. Data produced in this report showed that Canadian and US imports of parts and components totalled $124,788 or about 10.6 percent of apparent consumption. Using the UNCTAD estimate one can derive North American production of these goods (defined as consumption less imports plus exports) which totalled $1,064,806

[19]These risks can be lowered through geographic diversification of the portfolio of component investments. In considering the olved in any particular overseas investment what is relevant is the marginal change in the riskiness of the entire overseas estic investment portfolio and not merely the riskiness of that particular investment itself. There is survey evidence rnational firms prefer not to place more than one plant in one country, but rather to spread the risks somewhat, even if it invo n in more transport and management costs.

million. Imports of parts and components stood at

Insert Box 3

Table 11. 1995 Imports of Parts and Components as a Share of Production and Apparent Consumption of Machinery and Transport Equipment in the EU, Japan and USA.

		Components Imports as a Share of (%)	
Market	Sector	Apparent Consumption	Production
European Union	Transport and Machinery	15.6	14.1
Japan	Transport and Machinery	8.4	6.7
North America	Transport and Machinery	10.6	11.6

about 11.6 percent of this production base. As the above table indicates imports of parts and components accounted for almost 16 percent of apparent consumption of transport and machinery products in the European Union and a slightly smaller share of total production of these goods.

How important is production sharing outside the machinery and transport equipment group? Data collected in connection with the use of special OECD tariff provisions for the re-import of components assembled abroad suggest production sharing is a key factor in the manufacture of textiles and clothing, leather goods, footwear and other labor intensive manufactures. However, again it is recognized that these data likely incorporate a downward bias as to the extent to which this type of production sharing occurs. Special tariff treatment for goods exchanged within FTAs and schemes like the generalized system of preferences, as well as the low average level of MFN tariffs in OECD countries, all reduce the incentive for countries to utilize these tariff provisions so much of this OAP trade goes unreported. Even so, the reported data show this exchange still accounts for 40 percent or more of the total manufactures exports of some developing countries.

Given the available statistics, and their limitations, it appears the 30 percent share of parts and components in total SITC 7 exports also constitutes a reasonable estimate for the production sharing component of all manufactured goods trade. One reason is that transport

and machinery product group by itself accounts for more than one-half of all trade in manufactures and marked differences would have to exist in the composition of trade of other manufactured products for the overall share to deviate significantly from the 30 percent average. The available data relating to OECD tariff provisions for re-imported components suggest this is not the case - production sharing frequently occurs and is of major importance in other sectors. The implications are that at least $800 billion of world trade in manufactures - which totalled approximately $2.7 trillion in the early 1990s - consisted of some form of global production sharing operation.

References

Echeverri-Carroll, Elsie (1988). "Maquilas: Creating Jobs in Texas and in Mexico," **Texas Business Review**, February.

Echeverri-Carroll, Elsie (1995). "Flexible Production and the North American Free Trade Agreement: The Impact on US and Japanese Maquiladoras," in **NAFTA and Trade Liberalization in the Americas**, Bureau of Business Research, University of Texas at Austin, 1995.

Drucker, Peter (1987). "The Changed World Economy," **Journal of the Flagstaff Institute**, February.

Grunwald, Joseph and Kenneth Flamm (1985). **The Global Factory: Foreign Assembly in International Trade**, (Washington: The Brookings Institution).

OECD (1992). **Maritime Transport Review**, 1992, (Paris: OECD).

Ohlin, Bertil et. al. (1977). **The International Allocation of Economic Activity**, (London: Macmillan Press).

United States International Trade Commission (1988). **The Use and Economic Impact of TSUS Items 806.30 and 807.00**, (Washington: USITC Publication 2953, January).

Yeats, Alexander (1981). **Shipping and Development Policy: An Integrated Assessment**, (New York: Praeger Press).

Box 1. Tariff Provisions for International Production Sharing

From 1963 through 1988 statistics on the value of products assembled abroad from US manufactured components and then returned under tariff items 806.30 and 807.00 were compiled by the US International Trade Commission. After 1988 this tariff treatment was continued with some modification in US tariff schedule provisions 9802.00.60 and 9802.00.80.

US imports qualifying for this special treatment enter almost entirely under tariff provision 9802.00.80. Such products are subject to duty at the full imported value of the good less the value of the US produced components. To qualify for this treatment imports must require no further processing in the United States and only "operations incidental to the assembly process" (but not manufacturing) may occur abroad. Tariff provision 9802.00.60 provides similar treatment for metals that are manufactured in the United States, exported for further processing, and then returned.

European Community tariff schedules contain provisions similar to those of the United States. These provisions, known as "outward processing relief arrangements," allow EC components to be exported for further processing or assembly. Upon re-import, products may be exempted totally or partially from duties. The types of activities that may qualify for this special EC tariff treatment include fitting, assembling, processing, or repairing goods.

EC production sharing provisions apply equally to goods exported by one member country and returned as well as to triangular trade in which goods are exported from one EC country and returned to another member after foreign processing. Authorization to engage in outward processing is allowed on either a special or general basis, but only when customs officials can clearly determine that EC produced components have been incorporated in imported products. An application to engage in outward processing may be denied if evidence indicates it could damage EC processors.

Despite general similarities, differences in the EC and US provisions exist with the most important being the method used for calculating the tariff on assembled goods returned. Under US provisions, the applicable duty is applied to the full value of the article as imported, less the value of the US components. However, the method used by the EC is a "differential taxation" method based not only the value added outside the EC but also changes in applicable rates of duty on the foreign processing and assembly. That is, the duties are applied to both the value of the component products originally *exported from* the EC as well as the final good. The EC provisions also differ from those of the US in that such transactions must have the prior approval of the member country into which the final goods are imported. US regulations have no such provisions.

Source: United States International Trade Commission

Box 2. Production Sharing in the Caribbean

Most US apparel imports from the Caribbean come from the Dominican Republic, Costa Rica, Haiti, and Jamaica and are the result of offshore assembly operations. The USITC indicates the growth of US imports of Caribbean apparel is due largely to increased foreign investment. Because of US MFA quotas on Hong Kong, Korea and Taiwan (China), producers in those countries, as well as the United States, have invested in the Caribbean as a site for export-oriented production aimed primarily at the US market. Although US investment has been dominant, Asian investment has also been strong. US investment has been concentrated mainly in activities that use US components while Asian investment has focused on cut, make and trim (CMT) production utilizing Asian fabrics. Jamaica has been particularly attractive to Asian investors because its exports receive preferential access to EC markets under the Lomè Convention.

One principle attraction for foreign investors in the Caribbean is the relatively low labor costs. In 1989, hourly wages in the Dominican Republic and Haiti were $0.61 and $0.58 respectively. Average productivity in the four leading Caribbean countries ranges between 80 to 90 percent of that in the US, with Haiti the lowest and Costa Rica the highest. Extended social benefits and a better educated work force account for Costa Rica's relatively higher wages of $1.07 per hour. However, these higher wages are offset by the ability of Costa Rican firms to handle a full range of production and style changes.

Political stability and a healthy business environment have played major roles in attracting foreign investment. Costa Rica, in particular, has been a leader in production of offshore assembly goods due to its history of political stability and its well developed infra-structure and communications network. Haiti, although the fourth largest producer of these goods, has comparably low foreign investments a result of political instability, unreliable energy sources, and health concerns. In fact, much of the OAP activity is by locally owned producers rather than with foreign owned manufacturing activities.

The Caribbean countries have established programs to attract potential investors through various government incentives such as tax breaks and free zones. All the major Caribbean suppliers established free zones, which provide investors with production sites and substantial tax and duty exemptions. The Dominican Republic has 18 free zones from which the majority of its apparel exports originate. The Caribbean also indirectly benefits from other US programs. Section 936 of the Internal Revenue Code provides a tax break to US companies that operate "twin" or complementary plants in Puerto Rico and Caribbean Basin Initiative beneficiary countries. This program has further increased the attraction of investment in sewing operations in the region.

The Caribbean Basin countries not only offer low-cost labor, but their proximity to the United States also allows US firms greater control over production and delivery times than do Asian nations. The competitive position of US producers increasingly depends on their ability to react quickly to changes in consumer requirements. Reduced duties resulting from trade agreements as well as unilateral market reforms in Caribbean countries have enabled US apparel and other firms producing labor intensive products to improve their ability to compete against low-cost imports from Asia, while maintaining US production of components that are used in these assembly operations and retaining US production of components that are used in these operations and retaining US production that would otherwise be lost to foreign producers.

Box 3. OAP and the Caribbean's Expanding Manufactures Trade: Who Participated, Who Did Not?

While all Caribbean exports of manufactures to the OECD more than doubled over the 1986-1992 period, different trends are evident in some of the individual country's statistics. As indicated below, the rapid growth was largely confined to six countries: Antigua and Barbuda, the Bahamas, Dominican Republic, Grenada, St Lucia, and St. Vincent and the Grenadines. After declining by more than 25 percent from 1980 to 1986, exports of manufactures from Jamaica more than doubled over the next six years. In contrast, manufactures exports from the rest of the Caribbean were stagnant or even declined (Barbados, Dominica, Guyana, and Haiti).

Exporting Country	OECD Imports of Manufactures (US$ 000)			1980-92 Growth Rate (%)
	1980	1986	1992	
ALL CARIBBEAN	1,678.456	2,185,972	4,483,058	8.5
Antigua & Barbuda	47	229	6,320	50.4
The Bahamas	166,428	276,348	707,548	12.8
Barbados	67,077	118,068	41,956	-3.8
Belize	16,895	21,840	20,837	1.8
Dominica	14,819	3,743	5,595	-7.8
Dominican Republic	294,893	594,529	2,155,229	18.0
Grenada	151	503	6,320	36.5
Guyana	34,089	15,624	21,289	-3.8
Haiti	230,744	374,684	122,538	-5.1
Jamaica	479,481	352,817	779,819	4.1
St. Kitts & Nevis	17,708	61,456	19,859	1.0
St. Lucia	345	534	36,926	47.3
St. Vincent & Grenadines	650	1,509	18,201	32.0
Surinam	238,337	148,491	260,600	0.7
Trinidad & Tobago	116,792	215,598	280,021	7.6

What caused this markedly different performance of the Caribbean countries? Clearly, one factor accounting for the superior performers' success was the incentives to attract OAP activity. These include speed and simplicity in processing investment applications, the relative absence of foreign exchange restrictions on OAP investors, factors influencing the general industrial relations climate, differences in the productivity of domestic labor, relatively low international transport costs and the absence of policies that impede transport operations, and the absence of major supply bottlenecks. Similarly, several specific negative factors contributed to the other Caribbean countries poor export performance, i.e., political instability (Haiti), foreign exchange restrictions (Guyana - until 1989, Dominica in the 1990s, Barbados since 1989, etc.), an "unfriendly" business environment (Guyana), or lack of adequate air transport (Dominica).

What emerges from this assessment? The key point is that Caribbean countries' success or failure as exporters has in large part been determined by these nations' own domestic policies. Those that adopted "outward oriented" trade policies generally have succeeded while those that pursued more restrictive "inward looking" trade regimes have generally failed.

Table 6. United States 1993 and 1994 Imports Under HTS Provision 9802.00.80 by Major Industry Groups.

	Value ($million)			Share of total
Industry Group	1993	1994	1993-94 Change	
Auto, trucks and buses	25,315.5	23,095.4	-2,220.1	39.3
Microelectronic components	6,555.4	8,226.4	1,671.0	14.0
Apparel	5,034.1	6,029.9	995.8	10.3
Auto parts including engines	3,290.6	3,066.7	-223.9	5.2
Wiring harnesses for vehicles	1,973.9	2,861.3	887.4	4.9
Television receivers	2,254.5	2,607.1	352.6	4.4
Radio-TV and phone equipment	1,415.6	1,807.4	391.8	3.1
Medical and scientific instruments	1,302.2	1,425.9	123.7	2.4
All other manufactures	1,526.9	1,349.1	-177.8	2.3
Computers	1,692.9	1,306.9	-386.0	2.2
Footwear	1,134.5	1,142.7	8.2	1.9
Other transport equipment	1,388.4	1,141.3	-247.1	1.9
Heating and air conditioners	877.3	1,047.4	170.1	1.8
Other machinery	855.4	800.8	-54.6	1.4
Electrical motors	585.9	717.0	131.1	1.2
Filtering equipment	362.9	705.9	343.0	1.2
Motor vehicle seats	120.5	640.1	519.6	1.1
Transformers	551.9	486.9	-65.0	0.8
Other textile articles	276.6	292.8	16.2	0.5
TOTAL	56,515.1	58,750.9	2,235.8	100.0
MEMO ITEM				
Total US imports of Selected Products				
Auto, trucks and busses	63,948	72,968	9,021	
Apparel	35,822	38,861	3,040	
Television receivers	2,800	3,632	832	
Footwear	11,183	11,697	514	
Medical and scientific instruments	14,161	16,556	2,395	

Source: Compiled from official statistics of the Department of Commerce and UN Comtrade Database.

Table 7. The Importance of OAP Activity in US Imports and Trading Partner Exports in 1994.

	US content of foreign assembled goods		Imports from trading partner		
Exporter	Value ($million)	Share of assembled goods (%)	Value of assembled goods ($million)	Imports of all products ($million)	Share of assembled goods in all imports (%)
Haiti	25	71.4	35	62	56.5
Dominican Rep.	1,109	65.0	1,707	3,166	53.9
El Salvador	175	54.3	322	635	50.7
Jamaica	306	80.5	380	790	48.1
Mexico	11,508	50.2	22,944	50,280	45.6
Honduras	326	72.1	452	1,175	38.5
Costa Rica	411	66.0	623	1,767	35.3
Guatemala	219	48.6	451	1,386	32.5
Philippines	640	46.5	1,377	6,025	22.9
Germany	121	2.1	5,857	32,685	17.9
Sweden	17	2.0	859	5,243	16.4
Belgium	16	1.6	1,018	6,861	14.8
Malaysia	968	49.9	1,940	14,415	13.5
Japan	472	4.5	10,481	122,466	8.6
Korea	479	27.8	1,723	20,374	8.5
Singapore	335	27.3	1,229	15,651	7.9
Colombia	147	58.3	252	3,386	7.4
Thailand	353	59.4	594	10,799	5.5
U.K.	109	9.0	1,211	25,811	4.7
Taiwan (China)	372	32.0	1,161	27,940	4.2
France	78	11.0	708	17,316	4.1
Austria	24	40.0	60	1,811	3.3
Hong Kong	135	41.0	329	10,141	3.2
Spain	18	15.5	116	3,810	3.0
Indonesia	47	22.9	205	7,020	2.9
Netherlands	38	23.9	159	6,358	2.5
Ireland	17	25.8	66	2,953	2.2
Brazil	17	11.6	147	9,265	1.6
China	73	12.1	601	41,364	1.5
Australia	3	7.3	41	3,423	1.2
Canada	456	35.3	1,292	130,405	1.0
India	4	8.0	50	5,663	0.9
Italy	12	17.4	69	15,440	0.4
Other Developing	93	47.4	196	na	na
Other Developed	14	14.6	96	na	na
Total	19,137	32.6	58,751		

Table 2. The Direction of Trade for OECD Countries' Exports of Parts and Components.

		Year			
Exporter	Partner	1978	1985	1990	1995
		(Values in US$millions)			
OECD	World	84,418	142,704	293,499	441,531
	OECD	54,327	100,219	221,111	298,829
	Non-OECD	30,091	42,485	72,387	142,701
EEC12	World	43,554	60,891	139,656	199,941
	OECD	28,915	43,889	112,928	147,502
	Non-OECD	14,640	17,002	26,729	52,439
Japan	World	8,850	21,617	49,104	81,442
	OECD	3,970	13,464	32,329	44,982
	Non-OECD	4,880	8,152	16,775	36,459
USA	World	21,705	40,992	68,187	102,009
	OECD	13,204	26,552	45,228	61,140
	Non-OECD	8,501	14,440	22,959	40,869
MEMO ITEM: Intra-RTA					
EEC12	EEC12	20,483	28,817	81,390	102,525
NAFTA	NAFTA	31,634	64,915	103,753	188,667
EFTA	EFTA	3,642	4,713	9,773	11,332
		Percent of total SITC 7			
OECD	World	26.1	28.9	28.9	30.0
	OECD	26.5	28.2	28.7	29.8
	Non-OECD	25.4	30.6	29.2	30.6
EEC12	World	26.2	28.7	27.0	27.9
	OECD	25.8	27.3	26.9	27.2
	Non-OECD	27.0	33.2	27.4	29.9
Japan	World	15.2	18.1	24.2	26.2
	OECD	13.2	17.4	24.8	27.6
	Non-OECD	17.3	19.5	23.3	24.7
USA	World	36.6	43.5	39.5	39.8
	OECD	40.0	44.5	39.9	41.4
	Non-OECD	32.3	41.6	38.9	37.6
MEMO ITEM: Intra-RTA					
EEC12	EEC12	26.3	28.1	27.1	26.8
NAFTA	NAFTA	38.5	37.9	37.1	32.6
EFTA	EFTA	26.0	26.3	28.6	34.6

Source: Computed from United Nations COMTRADE Database.

Table 3. The Major Destinations of OECD Countries' Exports of Parts and Components.

	1978		1995	
Importing Country	Value ($million)	Share	Value ($million)	Share
United States	9,753.3	11.55	66,046.7	14.96
Germany	22,820.4	27.03	37,460.6	8.48
United Kingdom	4,135.7	4.90	29,616.1	6.71
Canada	7,203.9	8.53	27,029.6	6.12
France	5,282.0	6.26	24,558.1	5.56
Netherlands	3,074.9	3.64	15,648.3	3.54
Belgium	4,033.7	4.78	14,747.8	3.34
Mexico	1,851.7	2.19	13,377.6	3.03
Spain	1,342.1	1.59	12,195.7	2.76
Italy	2,533.6	3.00	11,947.9	2.71
Japan	1,099.5	1.30	11,717.4	2.65
China	193.3	0.23	10,668.0	2.42
Singapore	863.1	1.02	9,735.9	2.21
Korea	1,362.6	1.61	9,463.3	2.14
Hong Kong	553.9	0.66	8,553.6	1.94
Sweden	1,706.7	2.02	8,018.3	1.82
Taiwan (China)	927.3	1.10	7,734.4	1.75
Thailand	395.7	0.47	7,196.6	1.63
Switzerland	1,242.7	1.47	6,514.5	1.48
Australia	1,478.4	1.75	6,211.1	1.41
Austria	1,160.4	1.37	5,943.2	1.35
Malaysia	324.7	0.38	5,917.2	1.34
Brazil	1,398.7	1.66	5,150.1	1.17
Indonesia	463.7	0.55	4,617.5	1.05
South Africa	1,351.2	1.60	4,007.1	0.91
Ireland	495.4	0.59	3,718.9	0.84
Denmark	861.3	1.02	3,352.8	0.76
Norway	812.5	0.96	3,084.4	0.70
Saudi Arabia	1,893.3	2.24	3,037.8	0.69
Finland	549.0	0.65	2,879.8	0.65

Source: Computed from United Nations COMTRADE Database.

Table 5. The Composition of OECD Countries' Exports of Parts and Components

	1978		1995		Compound Growth Rate (%)
Parts and Components Group	Value ($million)	Share (%)	Value ($million)	Share (%)	
Power Generating Equipment	9,906	11.7	38,496	8.7	8.3
Machines for Special Industries	9,830	11.6	30,480	6.9	6.8
Metalworking Machinery	1,219	1.4	4,832	1.1	8.4
General Industrial Machinery	5,080	6.0	27,797	6.3	10.5
Office Machinery	4,943	5.9	61,172	13.9	15.9
Telecommunications Equipment	12,364	14.6	79,101	17.9	11.5
Electrical Machinery	9,428	11.2	57,753	13.1	11.3
Road Vehicles	26,694	31.6	115,449	26.1	9.0
Other Transport Equipment	4,954	5.9	26,450	6.0	10.3
All Above Components Groups	84,418	100.0	441,531	100.0	10.2
MEMO ITEM					
All Transport and Machinery (SITC 7)	323,925		1,470,292		9.3
Components share of total	26.1		30.0		

Source: Computed from United Nations COMTRADE Database.

Table 9. Hourly Compensation, GDP Per Capita and Literacy Rates in European and Central European Countries.

Country	Hourly Wage Costs (US dollars)	GDP Per Capita (US dollars)	Literacy Rate (Percent)
	Top Five EU OAP Importers		
Germany	25.70	16,500	99
France	16.23	18,200	99
Italy	16.00	16,700	97
Netherlands	19.95	17,200	99
United Kingdom	12.76	16,900	98
Average	18.13	17,100	98
	Leading Five Non-OECD Sources		
Poland	1.10	4,680	98
Hungary	1.48	5,500	99
Czech Republic	1.23	7,200	97
Romania	n.a.	2,700	98
Slovinia	n.a.	7,600	98
Average	1.27	5,5365	98

Source: USITC Publication 2966. **Production Sharing: Use of U.S. Components and Materials in Foreign Assembly Operations, 1991-94**. (Washington: USITC, May 1996)

Table 10. Level, Distribution, and Range of African Freight Costs for Exports to the United Sta

Region[a]	Transport mode	Nominal Freight Rates for African Exports (%)				
		Quartile values			Range	
		First	Median	Third		
All Sub-Saharan Africa	Air	5.3	14.1	26.5	0.5 - 87.4	
	Vessel	4.6	7.5	13.8	0.2 - 56.1	
Low-income East and Southern Africa	Air	3.7	9.2	23.6	0.7 - 56.9	
	Vessel	4.2	7.1	13.8	0.2 - 55.9	
Low-income West Africa	Air	3.7	20.5	35.6	0.4 - 92.6	
	Vessel	3.5	9.3	19.4	0.2 - 89.7	
Middle-income East and Southern Africa	Air	2.5	8.0	16.4	0.9 - 29.7	
	Vessel	3.8	6.2	8.9	0.7 - 17.5	
Middle-income West Africa	Air	7.3	13.3	24.2	0.4 - 43.1	
	Vessel	4.9	10.0	12.8	2.3 - 50.6	

Note: Trade flows or less than $50,000 have been excluded from these comparisons. See World Bank (1995) for a list included in each region while Amjadi and Yeats (1995) describe the procedures used in estimating these freight costs.

[a]Median transport costs are the difference between African freight rates and those on competitors' products. Pos African transport costs.

Source: U.S. Department of the Census data.

Table 1

The 1995 Value and Share of OECD Imports of Parts and Components Identified in the SITC Rev. 2 System

SITC (Rev. 2) - Description	Trade Balance (%)*	1995 Value of Imports ($ million)	Share of Total (%)
711.9 Parts of steam boilers and auxiliary plants	66.5	464.2	0.13
	21.4	281.5	0.08
713.19 Parts of aircraft internal combustion	27.2	13,142.2	3.59
engines 713.9 Parts of internal combustion	14.8	12,343.5	3.37
engine, nes	39.3	2,315.1	0.63
714.9 Parts of engines and motors, nes	69.4	126.1	0.03
716.9 Parts of rotating electric motors	-16.3	563.8	0.15
718.89 Parts of water turbines and hydraulic	-10.3	1,054.2	0.29
motors	7.1	459.0	0.13
721.19 Parts of cultivating equipment	50.0	14.8	0.00
721.29 Parts of harvesting machinery	26.1	310.6	0.08
721.39 Parts of dairy machinery	75.2	1,440.2	0.39
721.98 Parts of wine making machinery	45.8	921.2	0.25
721.99 Parts of other agricultural machinery, nes	29.0	1,245.7	0.34
723.9 Parts of construction machinery	24.3	576.4	0.16
724.49 Parts of spinning and extruding	34.2	1,917.6	0.52
machinery	-4.0	182.1	0.05
724.69 Parts of looms and knitting machinery	20.8	1,710.2	0.47
724.79 Parts of textile machinery, nes	37.2	117.7	0.03
725.9 Parts of paper making machinery	-300.0	32.2	0.01
726.89 Parts of bookbinding machinery	22.5	695.7	0.19
726.9 Parts of printing and typesetting	48.2	995.2	0.27
machinery	38.1	6,078.9	1.66
727.19 Parts of grain milling machinery	26.2	3,084.8	0.84
727.29 Parts of food processing machinery	39.6	391.8	0.11
728.19 Parts of machine tools for special	19.8	1,425.4	0.39
industries	13.5	3,423.0	0.94
728.39 Parts of mineral working machinery	23.9	4,851.9	1.33
728.49 Parts of machines for special industries,	53.3	70.3	0.02
nes	22.6	9,025.7	2.47
736.9 Parts of machine tools for metal working	-5.3	516.2	0.14
737.19 Parts of foundry equipment	49.9	1,694.4	0.46
741.49 Parts of refrigerating equipment	-12.7	68,964.4	18.85
742.9 Parts of pumps for liquids	19.0	64,874.2	17.73
743.9 Parts of centrifuges and filters	47.1	1,388.1	0.38
744.19 Parts of fork lift trucks	23.0	37,822.1	10.34
744.9 Parts of lifting and loading machines	1.2	641.0	0.18
745.19 Parts of power hand tools	30.9	399.6	0.11
749.99 Parts of nonelectric machinery, nes	24.4	3,624.8	0.99
	16.7	91,611.0	25.04
759 Parts of office and adding machinery	2.3	3,625.7	0.99
764 Parts of telecommunications equipment	-4.8	1,867.3	0.51
771.29 Parts of electric power machinery	16.2	1,860.1	0.51

772 Parts of switchgear 775.79 Parts of domestic electrical equipment 778.29 Parts of electric lamps and bulbs 778.89 Parts of electrical machinery, nes 784 Parts of motor vehicles and accessories 785.39 Parts of carriages and cycles 786.89 Parts of trailers and nonmotor vehicles 791.99 Parts of railroad equipment an vehicles 792.9 Parts of aircraft and helicopters ALL ABOVE ITEMS	27.1 17.2	17,656.3 365,806.0	4.83 100.00

*Exports of the item less imports divided by exports and multiplied by 100.

Appendix Table 1
Parts and Components Identified in the SITC Revision 2 Classification System and the 1995 Value of OECD Exports of These Goods

SITC (Rev. 2) - Description	1995 Value of Exports ($ million)	Share of Total (%)
711.9 Parts of steam boilers and auxiliary plants	1,386.9	0.31
713.19 Parts of internal combustion engines for aircraft	358.7	0.08
713.9 Internal combustion engine parts, nes	18,042.8	4.09
714.9 Parts of engines and motors, nes	14,485.4	3.28
716.9 Parts of rotating electric motors	3,811.7	0.86
718.89 Parts of water turbines and hydraulic motors	411.6	0.09
721.19 Parts of cultivating equipment	485.4	0.11
721.29 Parts of harvesting machinery	955.7	0.22
721.39 Parts of dairy machinery	494.3	0.11
721.98 Parts of wine making machinery	29.5	0.01
721.99 Parts of other agricultural machinery, nes	421.2	0.10
723.9 Parts of construction machinery	5,797.1	1.31
724.49 Parts of spinning and extruding machinery	1,698.0	0.38
724.69 Parts of looms and knitting machinery	1,756.3	0.40
724.79 Parts of textile machinery, nes	760.9	0.17
725.9 Parts of paper mill and paper making machinery	2,915.2	0.66
726.89 Parts of bookbinding machinery	175.0	0.04
726.9 Parts of printing and typesetting machinery	2,159.0	0.49
727.19 Parts of grain milling machinery	188.1	0.04
727.29 Parts of food processing machinery	7.6	0.00
728.19 Parts of machine tools for special industries	897.9	0.20
728.39 Parts of mineral working machinery	1,921.4	0.44
728.49 Parts of machines for special industries, nes	9,818.0	2.22
736.9 Parts of machine tools for metal working	4,183.4	0.95
737.19 Parts of foundry equipment	649.2	0.15
741.49 Parts of refrigerating equipment	1,776.6	0.40
742.9 Parts of pumps for liquids	3,957.6	0.90
743.9 Parts of centrifuges and filters	6,376.7	1.44
744.19 Parts of fork lift trucks	149.9	0.03
744.9 Parts of lifting and loading machines	11,667.3	2.64
745.19 Parts of power hand tools	490.4	0.11
749.99 Parts of nonelectric machinery, nes	3,379.1	0.77
759 Parts of office and adding machinery	61,172.3	13.85
764 Parts of telecommunications equipment	79,103.4	17.92
771.29 Parts of electric power machinery	2,621.6	0.59
772 Parts of switchgear	49,113.7	11.12
775.79 Parts of domestic electrical equipment	648.7	0.15
778.29 Parts of electric lamps and bulbs	578.5	0.13
778.89 Parts of electrical machinery, nes	4,792.7	1.09
784 Parts of motor vehicles and accessories	109,966.9	24.90
785.39 Parts of carriages and cycles	3,709.5	0.84
786.89 Parts of trailers and nonmotor vehicles	1,781.8	0.40
791.99 Parts of railroad equipment an vehicles	2,219.8	0.50
792.9 Parts of aircraft and helicopters	24,231.1	5.49

ALL ABOVE ITEMS	441,548.0	100.00

Appendix Table 2. The Relative Importance of Parts and Components in Individual Countries Exports.

Reporter	1995 exports in US$ million				Share of parts and components in		
	Parts and components	Transport & Machinery (SITC 7)	All manufactures	All goods	Total exports	Exports of manufactures	Transport & machinery (SITC 7)
United States	102,009	256,256	417,443	546,442	18.7	24.4	39.8
Japan	81,442	310,708	421,428	442,937	18.4	19.3	26.2
Singapore	21,532	77,568	99,013	118,263	18.2	21.7	27.8
Taiwan, China	19,420	53,493	103,306	111,343	17.4	18.8	36.3
Sweden	13,843	35,972	68,235	79,917	17.3	20.3	38.5
Malaysia	10,521	40,673	55,131	73,778	14.3	19.1	25.9
United Kingdom	33,627	102,470	195,680	239,948	14.0	17.2	32.8
Germany	69,548	251,866	446,023	508,508	13.7	15.6	27.6
Hong Kong	4,070	8,809	28,019	29,946	13.6	14.5	46.2
French Guiana	21	52	79	158	13.5	26.9	40.9
Israel	2,547	5,107	16,978	19,047	13.4	15.0	49.9
Ireland	5,823	15,127	31,116	43,790	13.3	18.7	38.5
Finland	5,301	14,264	33,658	40,409	13.1	15.8	37.2
Mexico	10,367	41,634	61,643	79,489	13.0	16.8	24.9
France	33,093	112,492	218,358	284,046	11.7	15.2	29.4
Thailand	6,193	19,052	41,418	56,655	10.9	15.0	32.5
Barbados	18	30	99	168	10.9	18.5	61.6
Austria	5,724	20,555	46,643	52,807	10.8	12.3	27.8
Canada	20,626	75,081	119,660	192,161	10.7	17.2	27.5
Czech Republic	2,296	6,336	17,703	21,686	10.6	13.0	36.2
Rep. of Korea	12,553	65,625	114,387	125,056	10.0	11.0	19.1
Switzerland	7,760	25,624	76,072	81,641	9.5	10.2	30.3
Italy	21,610	86,706	206,321	231,346	9.3	10.5	24.9
Spain	8,225	37,970	69,780	89,616	9.2	11.8	21.7
Denmark	3,926	12,248	29,152	47,222	8.3	13.5	32.1
Slovenia	640	2,613	7,442	8,316	7.7	8.6	24.5
Netherlands	13,358	47,166	110,697	177,626	7.5	12.1	28.3
Philippines	1,129	3,800	7,054	17,174	6.6	16.0	29.7
Brazil	2,992	8,837	24,679	46,505	6.4	12.1	33.9
China	9,000	31,297	124,871	148,780	6.0	7.2	28.8
Belgium	9,602	45,012	125,887	165,173	5.8	7.6	21.3
Croatia	249	777	3,415	4,633	5.4	7.3	32.1
Nicaragua	25	31	103	509	5.0	24.6	81.6
Guadeloupe	8	59	76	162	4.7	10.1	13.0
Australia	2,326	5,080	12,194	50,357	4.6	19.1	45.8

Note: Countries have been ranked on the basis of the share of "parts and components" in total exports of all goods.

Source: United Nations COMTRADE statistics

Table 4. The Relative Importance of Parts and Components in Individual Countries Imports.

Country	1995 imports in US$ million				Share of parts and components in		
	Parts and components	Transport & Machinery (SITC 7)	All manufactures	All goods	Total imports	Imports of manufactures	Transport & machinery
HIGH INCOME COUNTRIES							
Canada	30,191	84,551	135,703	164,327	18.4	22.2	35.7
Singapore	22,528	71,992	103,285	124,503	18.1	21.8	31.3
Ireland	5,106	13,650	24,483	32,322	15.8	20.9	37.4
Oman	645	1,672	2,896	4,249	15.2	22.3	38.6
United Kingdom	37,317	107,874	209,214	262,572	14.2	17.8	34.6
Sweden	8,250	24,321	50,382	64,446	12.8	16.4	33.9
Australia	7,174	26,939	49,133	57,423	12.5	14.6	26.6
United States	94,597	357,625	607,992	770,822	12.3	15.6	26.5
Spain	13,374	40,284	80,235	113,399	11.8	16.7	33.2
Hong Kong	22,793	71,542	170,630	196,072	11.6	13.4	31.9
Norway	3,754	12,307	25,973	32,706	11.5	14.5	30.5
Finland	3,348	11,415	21,867	29,520	11.3	15.3	29.3
Germany	47,497	152,151	324,068	443,224	10.7	14.7	31.2
Austria	6,356	23,529	51,385	62,009	10.3	12.4	27.0
France	27,768	96,726	208,091	273,387	10.2	13.3	28.7
Netherlands	15,209	51,947	113,405	157,929	9.6	13.4	29.3
Portugal	3,212	11,327	24,169	33,565	9.6	13.3	28.4
Kuwait	745	3,213	6,294	7,790	9.6	11.8	23.2
Denmark	3,974	13,806	31,362	41,626	9.5	12.7	28.8
Israel	2,624	9,611	23,147	28,344	9.3	11.3	27.3
OTHER COUNTRIES							
French Guinea	153	330	575	783	19.6	26.7	46.5
Thailand	11,408	33,730	56,993	71,156	16.0	20.0	33.8
Mexico	11,496	31,693	59,246	73,993	15.5	19.4	36.3
Indonesia	6,037	16,257	29,506	40,629	14.9	20.5	37.1
Malaysia	10,853	46,078	64,382	77,046	14.1	16.9	23.6
South Africa	3,715	12,143	21,081	27,737	13.4	17.6	30.6
Argentina	2,622	8,931	17,186	20,122	13.0	15.3	29.4
China	15,585	52,436	103,652	132.084	11.8	15.0	29.7
Philippines	3,130	9,238	16,462	28,487	11.0	19.0	33.9
Cent. Afr. Rep.	29	112	171	265	11.0	17.1	26.0
Brazil	5,865	21,020	38,160	53,737	10.9	15.4	27.9
Colombia	1,474	5,171	10,768	13,863	10.6	13.7	28.5
Czech Republic	2,591	9,108	19,582	25,303	10.2	13.2	28.4
Honduras	172	503	1,270	1,728	9.9	13.5	34.2
Algeria	954	2,990	6,353	9,831	9.7	15.0	31.9

Note: Countries have been ranked on the basis of the share of "parts and components" in total imports of all goods.

Source: United Nations COMTRADE statistics