

AN ANALYSIS OF PERUVIAN TRADE AND EXPORT
PROSPECTS USING INDICATORS OF REVEALED
COMPARATIVE ADVANTAGE

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Index

Introduction

Theoretical Aspects Page 1

Methodological Aspects Page 10

Revealed Comparative Advantage and Indices of Similarity:
Results for Peru Page 22

Conclusions and Policy Recommendations Page 39

References

Appendices

Introduction

The present study is an empirical analysis of Peruvian trade: the identification of those products in which Peru shows comparative advantage and its possibilities to explore new export products and markets. The study uses the framework provided for the Heckscher-Ohlin theorem, in which a country specialises in the production and export of those goods that use intensively its abundant resources. The Peruvian comparative advantage is computed through indicators of revealed comparative advantages (RCA), originally used by Balassa (1965).

Since comparative advantage is not simply a static concept, we pay important attention to the evolution of the patterns of comparative advantage over the period 1971-94; and, look to see if other countries' experience can be used as a tool to derive policies of export promotion.

This paper is divided as follows. In chapter 1 we review the most important aspects of the theory of trade, that is to say, the models explaining how comparative advantage is determined, the differences between countries that cause trade, and how comparative advantage can vary over time. In chapter 2, we go through the methodological aspects present in the surveys of international trade. We consider how to measure comparative advantage through indicators of revealed comparative advantage, their relevance and applicability in the empirical work, and the criticisms of these indicators. We also deal with the construction of an index of similarities in order to identify similar economies and therefore evaluate Peru's own export performance and its potential to develop further products. Problems of data aggregation will be tackled and a more reliable methodology of data classification will be suggested. In chapter 3 we present the results of our calculations of the indicators of revealed comparative advantage and the index of similarity. Finally, in chapter 4 we present the conclusions of the current study and give some policy recommendations.

1. Theoretical Aspects

Peru is a republic situated in west South America, in front of the Pacific Ocean. Its geography consists of a large coastal desert, rising to the Andes. Peru is considered an important producer of minerals and a major fishing nation. Its total population is estimated as 23 millions (1993), with a population density of approximately 18 people per square km. The level of income per capita for the year 1996 was estimated in \$ 1 840¹, and the levels of education are still low, with an illiteracy rate of 15 percent.

The country is well endowed with natural resources and unskilled labour. The trade performance in recent years shows that Peru exports mainly minerals and fishing products and imports manufactured goods.

We now ask how trade theory can explain this pattern of commerce, and if it can shed light about possible policy prescriptions.

In the following paragraphs we go through the models that theorists have chosen to analyse trade phenomena. Firstly, we review those model pertaining to the neo-classical school, and secondly, those that arise from assuming failures in markets. The first group of models makes the following assumptions (Greenaway and Winters, 1994; Leamer, 1984; Evans, 1989):

1. Dimensionality: two countries, n products and m factors of production. Each country is endowed with a fixed stock of each of these factors.
2. Mobility: factors can move without cost among industries within a country, but are completely immobile among countries. Commodities move internationally at zero cost of transport and there are no other impediments to trade.

¹ Preliminary figure. Source: Central Reserve Bank of Peru.

3. Competition: all agents are price-takers in product and factor markets. All the factors are fully employed.
4. Technology: production functions for all products exhibit constant return to scale and decreasing marginal products of factors. Each country has the same production technology for each good. There are no factor intensity reversals².
5. Demand similarity: consumers everywhere have the same homothetic utility function.

Evans (1989) adds no joint production and no externalities.

The first of these models, Ricardo's model, is particularly useful for understanding the differences in countries that lead to trade, and how countries can benefit from it.

The Ricardian view of trade (Schydlosky, 1984) explains that a country produces and exports the good in which it has comparative advantage. In opposition to the idea of Adam Smith (absolute advantage), the concept of comparative advantage indicates that countries should specialise in the production and trade of the good in which they have the least relative cost of production. Ricardo's model is framed in a world of two countries, two goods and one factor of production.

The Ricardian model can be expanded to include more than two countries, more than two goods and even several factors of production; but, it is limited in assuming that technological differences drive trade. Today, technology has become tradable and it is difficult to accept the persistence of technological differences as a reason to trade.

Alternative models return to the assumption of common technology but allow for more than one factor. The Heckscher-Ohlin (HO), also known as the factor proportion model, represents the most worldwide known explanation about how trade arise, as a consequence of

² It means, no change in the factor intensity used in the production of the good relative to other goods when the relative prices of the factors vary.

different endowments of productive factors among countries. This model was originally introduced by Heckscher, E. (1919) and Ohlin, B. (1933).

In its most basic form (2x2x2 model), the model assumes two countries, two goods and two factors of production (labour and capital for instance). The commodities differ in their factor intensity, i.e. how much labour and capital they require. The countries differ in their supply of capital and labour, that is to say, they have different factor abundance (Yoffie and Gomes-Casseres, 1994, p.5).

The argument is simple and apparently logically irrefutable. The countries will export the good that uses intensively its relative abundant factor and will import the commodity that uses intensively its relatively scarce factor (Leamer, 1984, p.8). Thus, countries endowed with abundant capital will have comparative advantage in the production of capital-intensive goods. They will export capital-intensive goods and import labour-intensive goods from labour-abundant countries, since labour is the scarce factor in the former countries. The definition of factor abundance is understood as follows. A country is capital (labour) abundant if its capital-labour (labour-capital) exceeds the world's one.

Four important theorems arise from the HO model. Firstly, the Factor Price Equalisation theorem. Since product trade allows competition between the same factor in different countries, we should expect a tendency to equalisation in their rates of returns (Greenaway and Winters, 1994, p.15). Moreover, we can understand trade as indirect factor arbitrage, transferring services of otherwise immobile factors from location where the factors are abundant to locations where they are scarce. Traded commodities become in this way bundles of factors, and therefore, the indirect arbitrage can completely eliminate factor price differences (Leamer, 1995, P.1).

Secondly, the Stolper-Samuelson theorem. A rise in the relative price of a commodity will raise the return of the factor used more intensive in its production and decrease the return of the factor in which it is less intensive (Evans, 1989).

Thirdly, the Rybczynski theorem. An increase in the supply of a factor raises the output of the good that uses the factor relatively more intensively and lowers the output of the other good (Leamer, 1984).

Fourthly, the Heckscher-Ohlin theorem itself. In its quantity version the theorem states that in free trade each country will export the commodity that uses intensively its relatively abundant factor; while in its price version, the theorem affirms that each country would export the good that makes relatively intensive use of the factor which would be relatively cheap in that country in autarky (Ethier, 1984, p.141).

These theorems are easily demonstrated in the 2x2x2 model (see Annex 1). However, the real world goes beyond the bounds of 'twoness'. Higher efforts have been undertaken to see if the important implications of the HO model remain valid in a multi-commodity, multi-factor and multi-country world.

Leamer (1984) mentions that the factor price equalisation holds in a higher dimension model; but, the HO model loses most of its original sense, for a restatement in terms of the factor services embodied in the goods becomes necessary. Vanek (1988) has pointed out that in situations when more than two factors are involved, we cannot have a unique ordering of technologies according to relative factor intensity. He proposed to restate the HO theorem in terms of the amounts of factor services embodied per good, rather than with reference to products. Thus, 'the country relatively better endowed with one productive factor will be a net

exporter of the services of that factor and a net importer of the services of the other factor', giving origin to the Heckscher-Ohlin-Vanek theorem.

Deardoff (1980) indicated that the law of comparative advantage breaks down when applied to individual commodities, or pairs of commodities in a multi-commodity world. However, the law can remain valid if restated in term of an average across all commodities.

According to this framework we should expect a high flow of trade between industrialised countries (trading capital-intensive goods) and developing countries (trading labour-intensive and natural resource-based commodities). However, much of international trade is carried out within the developed world. Moreover, the restrictive assumptions given above are not actually accomplished. We observe that markets are imperfect and firms and governments act strategically to affect trade flows and national welfare (Yoffie and Gomes-Casseres, 1994).

These facts stimulated the development of new theories of trade, also know as 'theories of strategic trade policy'. Taking elements from the theory of industrial organisation, economists could explain phenomena such as intra-industry trade, i.e. countries importing and exporting the same kind of goods (such as automobiles, ships, machinery etc), the existence of multinational corporations, economies of scale and scope, etc.

Grubel (1977) points out that industries produce differentiated products conditioned by the physical environment, history and culture, quality, market size and brand name. Thus, countries can produce alternative versions of differentiated goods, like automobiles (French cars can be seen different from German cars). This gives the industries market power over the goods they produce, facing a downward-sloping demand curve for their products (instead of the infinitely elastic demand in perfect competition). This pattern is also complemented by the

existence of economies of scale, reducing average costs by increasing production, and economies of scope, producing few specific lines of a product (Greenaway and Winters, 1994, p.44).

Porter (1990) states that, firms and not nations are involved in the competition for success in international markets. In his book 'The Competitive Advantage of Nations' Porter wonders why some nation's firms succeeded in international competition, what the influence of the nation on competition in specific industries and industry segment is, and why a nation's firms select particular strategies.

To achieve competitive success, firms must possess a competitive advantage in the form of either lower costs or differentiated products that command premium prices. To sustain advantages firms must achieve a more sophisticated competitive advantage over time, through providing higher quality products and services or producing more efficiently. That translates systematically into productivity growth.

Porter identifies four determinants of competitive advantage: factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry conditions. They constitute a 'National Diamond', in which the determinants constitute a complex system where the whole is more important than the individual parts.

The factors of production are mostly human resources, physical resources, knowledge resources, capital resources and infrastructure. Only few of them are really inherited and must be developed over time, through investment.

The composition of home demand shapes how firms perceive, interpret and respond to buyer needs, not only domestically, but internationally. According to Krugman (1980), each country will be a net exporter in the industry for whose goods it has a relatively larger demand.

Related and supporting industries mean the presence in the nation of supplier industries or related industries that are internationally competitive. This creates advantages in downstream industries through a more efficient access to the most cost-effective inputs and through a process of innovation and upgrading as a consequence of close working relationships between suppliers and the industry.

Finally, firm strategy, structure and rivalry is the context in which firms are created, organised and managed as well as the nature of domestic rivalry. National advantages result from a good match between the goals, strategies and ways of organising firms and the sources of competitive advantages in a particular industry.

Having reviewed the mainstreams in trade theory, we turn now to the dynamic character of the comparative advantage of a country. The neo-classical theories treat comparative advantage in an static framework; but, comparative advantage will change over time, as long as the country changes its factor endowment through a process of capital accumulation. As it develops a country tends to proceed up a ladder of comparative advantage (Meier, 1995, p.456).

This stages approach expresses that a country moves from exporting commodities (minerals, agricultural products) that are resource-intensive to commodities that are unskilled labour intensive (textiles), to semiskilled and skilled labour intensive (electronic products like watches, radios etc), to capital intensive (machinery) and finally to knowledge intensive (computers, chemical products etc)³.

The movement is from exports embodying basic factors, which are inherited or easily created with modest investment, such as natural resources and unskilled or semiskilled labour

³ However Korea and Malaysia's experiences suggest that it is possible to accelerate this process. In the case of Korea (Kim, 1994) persistent export oriented and industrialization programs since the mid-1960s, delaying any process of import liberalization under the tutelage of the government, were essential. In Malaysia (Lim & Woon, 1994) the exports expansion and diversification of the manufacture sector were supported by strong flows of foreign investment.

respectively, to exports that embody more advanced and specialised factors, which required considerable investment in human and physical capital.

The first pattern of exports is more suitable to be depicted by the Ricardian and the HO models, since trade in resource-intensive commodities resembles more the assumption of the neo-classical model. Roemer (1979, p.171) comments that the general benefits to a country processing its natural resources can be discussed in terms of general propositions about comparative advantage, and despite its well-known inadequacies the HO approach is a useful point of departure. On the other hand, the second pattern of exports is usually subject to imperfect competition, product differentiation and economies of scale, for which the Porter-type or Krugman-type models are more appropriate. In the latter case, the gains from trade derive from the greater diversity of goods that consumers face, offering each individual a wider range of choice (Krugman, 1980). Meier (1995, p.457) points out that in the first group, comparative advantage is 'natural' while in the second it is 'created'⁴.

The existence of this process of evolution indicates that countries are permanently upgrading their pattern of exports, as long as they follow a process of capital accumulation. Balassa (1979, 1987) demonstrates that inter-country differences of exports are in large part explained by differences in physical and human capital endowments. As the early-comer countries climb the ladder they lose their initial comparative advantage in basic intensive factors to move to capital intensive factors, whereas, other countries occupy this place (rung) left by the former countries. For instance, Japan has shifted recently its initial comparative advantage in capital intensive commodities into R&D intensive goods, leaving its former position to countries like

⁴ Greenaway (1991) offers a discussion about how new trade theories fit in LDCs' flows of trade. Since scale economies and product differentiation are common features in the real world, they also affect LDC which are involved in international trade. Thus, there is no reason to neglect their effects in these countries. However, these theories are less relevance in LDCs than in developed countries where they are more widespread.

Korea and Singapore, which gave up their initial advantage in labour intensive goods in behalf of countries like Thailand and Malaysia.

This climbing the ladder of comparative advantages suggests that it is possible to assess the performance of other countries as indicators of the potential performance of any country in question. It means countries with similar endowment of resources, occupying a upper rung in the ladder could indicate a path to follow.

Yeats (1991) carried out an empirical analysis of the potential of China. The author proposes the assessment of other East Asian economies in a higher step of economic development as an indicator of the future performance of China. Since the correlation of the current Chinese exports with those of the comparator countries in previous periods is high, that can be used as evidence that as soon as China widens its industrial base, she would increase her range of exports⁵.

In the next section, we look at the methodological aspects in measuring comparative advantage, their pros and cons. We also discuss how to organise trade data in a more suitable way to study the different stages of development in countries climbing the ladder of comparative advantage.

5 Lo and Chan (1996) point out that China's export growth did not depend entirely on a comparative advantage approach, but in the combination of market and non-market mechanisms. For instance, in the development of the electronics industry, imported technologies, the creation of economies of scale and incentives for good performance were crucial in this development. In contrast, Walder (1995) asks for how long China could sustain this incompatibility of market allocation and state intervention.

2. Methodological Aspects

Comparative advantage is a difficult concept to measure, since the concept is defined in terms of autarkic prices, not observable in a world involved in trade. Moreover, the concept says that comparative advantage determines the trade pattern in a free-trade world, but, most of commerce is subject to barriers and controls. This problem raises the need to use indirect ways to gauge the competitiveness of a country, using post-trade equilibrium information.

Balassa (1965)¹ was the pioneer in analyzing how comparative advantage can be revealed by trade flows. He elaborated an indicator of export performance based on export shares. By using this technique he found that industrialized countries like the United States showed comparative advantage in capital intensive industries such as chemical materials, aircraft, metal working machinery and plastic materials and a disadvantage in the production of labor intensive goods like garments, footwear, simple form of steel etc. In contrast, countries in an earlier stage of industrialization like Japan possessed a relative advantage in cotton materials and other made-up textile fabrics.

Balassa replicated his analysis in 1977 (Balassa, 1977), using again export shares as indicators of comparative advantage. He showed that United States had reinforced its advantage in products embodying advanced techniques² (i.e. computers), while it had lost to European countries like Germany, UK and the Netherlands its advantage in chemical products.

¹ This article as well as other studies from Balassa cited here are included in Balassa (1989).

² Krugman (1979) offers an explanation for how developed countries can keep their advantage in trade by constantly innovating.

How valid is use of this tool in examining comparative advantage? Balance et al (1987) describe the logic behind this procedure. Economic conditions (EC) are which ultimately determine the international pattern of comparative advantage (CA). This pattern governs the pattern of trade, production and consumption (TPC). Thus, indices built from TPC information are used to indicate (reveal) comparative advantage. These indicators are referred as indices of Revealed Comparative Advantage (RCA).

In short, $EC \rightarrow CA \rightarrow TPC \rightarrow RCA$.

Deardoff (1980) demonstrated that the law of comparative advantage remains valid in a multi-commodity world if restated in terms of averages across all commodities. Deardoff relaxed the assumption that the law (of comparative advantage) must be applied for each commodity individually, instead, correlating several vectors of relative autarky prices and net trade. He found that the autarky prices of exports are low compared with those of imports, and thus the country is exporting those goods with relatively low autarky prices as the principle of the comparative advantage suggests.

Examination of several correlations between particular vectors of relative autarky prices³ and net exports show a tendency for those items with high autarky prices items to be imported and low autarky priced items to be exported.

There are commonly two kind of indicators (Balance et al, 1987). Those using data on trade and domestic production and consumption and those using actual trade statistics only.

The first class is subdivided in two categories. Indicators using directly observable data, and indicators using the levels of trade, production and consumption of a

³ Deardoff uses as a proxy of autarky prices, world prices, since there is no single set of foreign autarky prices with respect to which one country's prices can be compared.

hypothetical comparative advantage neutral world. In the first subcategory we find indices such as the ratios of exports to production, imports to consumption, and net trade to production. These indices provide some normalization for country size. In the second subcategory, no country enjoys any comparative advantage. No trade would occur in this world. Then, actual levels of trade, production and consumption are compared with these imaginary values as indicators of comparative advantage.

The second class, indices using only trade data, avoids the drawbacks presented in the first category, such as the fact that trade data and production data are measured using different industrial classification and the high level of aggregation of production data, that does not permit a more detailed analysis. The following indicators are the most common used in the literature: (1) the net export index and (2) the export share index (Balassa, 1987).

$$\frac{X_{jk} - M_{jk}}{X_{jk} + M_{jk}} \quad (1)$$

and

$$\frac{X_{jk}}{X_{wk}} \div \frac{X_j}{X_w} \quad (2)$$

The first index measures the net exports (exports minus imports) of the country j as a ratio of its total trade (exports plus imports) of the commodity k . The index takes a value of 1 when the country exports the commodity but does not import it. In this case, the country reveals comparative advantage in the trade of commodity k . On the other hand, the index takes a value of -1 when the country only imports the commodity and 0 when the imports are equal to the exports of the referred commodity.

It is desirable that any measure of RCA is not influenced by disequilibrium at the macroeconomic level (Webster, 1991, p.938). To deal with presence of disequilibrium in the trade balance, Webster suggests the following adjustment:

$$\frac{X_{jk} - M_{jk}}{X_{jk} + M_{jk}} - \frac{X_j - M_j}{X_j + M_j} \quad (3)$$

Where X_j (M_j) are the total exports (imports) of country j .

Since the net export index recognizes implicitly the presence of intraindustry trade, that is to say, exporting and importing the same category of commodity, a modified version of (1) is presented in Grubel (1977, p.72) as an indicator of this phenomenon:

$$1 - \frac{|X_{jk} - M_{jk}|}{X_{jk} + M_{jk}} \quad (4)$$

The index of intra-industry trade takes a maximum value of 1, when exports equal imports. On the other hand, when the commodity is only exported (or imported) the index takes a value of zero. Grubel used this index to demonstrate that intra-industry trade is stronger in categories 5-8 of the Standard International Trade Classification (SITC), associated basically with manufactured goods, in a group of ten of the most industrialized countries.

The net exports index has been criticized since imports are often subjected to controls, tariffs and other distorting measures of the free trade; nonetheless, it is superior in theoretical grounds to the export share index (Balassa, 1977). The reason is that comparative advantage is a concept measured in term of net exports, and the export share index does not consider imports at all.

The export share index measures the country j 's share of world exports of the commodity k as a ratio of country j 's share of total world exports. If this ratio is greater

than 1, the country is revealing comparative advantage in the trade of k , since the share of country j in the world trade of commodity k is greater than its participation in total world exports.

Even though the critics against the export share index, Hillman (1980) found that this measure is a consistent indicator of comparative advantage. To do so, he had to impose the condition that country's exports of a particular good are simultaneously neither overly prominent in its total exports nor overly prominent in total world trade in that good.

Kunimoto (1977)⁴ provides a theoretical basis for interpreting deviations in this index from the unity. Such deviations measure the extent to which actual trade diverts from the trade expected in a world without factors influencing the direction of trade. Then we can decompose expression (2), in:

$$\frac{X_{jk}}{E(X_{jk})}$$

where

$$E(X_{wk}) = \left(\frac{X_{wk}}{X_w} \right) \times X_j \quad (5)$$

The latter expression indicates that the expected exports of the commodity k in country j should be equal to the participation in the total trade of commodity k in world trade, multiplied by the total exports of country j . Thus, the index is interpreted as the ratio of actual exports of commodity k by country j to its expected value of exports in a world in which world exports of commodity k are distributed among countries in proportion to their share of world exports. Then, deviations from the unity indicate the presence of factors which influence the distribution of a country's trade among countries.

Expected trade represents the trade that would be observed in a world where these factors are absent. Bowen (1983) critically points out that this interpretation is valid only if every commodity is exported by all countries, an assumption that is not economically sensible. Bowen proposes instead two indices. An index of 'net trade intensity' and an index of 'production intensity'. The former is the ratio of net trade to consumption⁵ of the commodity. If the index takes positive (negative) values the country reveals comparative advantage (disadvantage). The latter is the ratio of production to consumption of the commodity. In this case, comparative advantage (disadvantage) is revealed when the index is greater (lesser) than unity.

An important requirement in the RCA indicators is that they provide consistent results. Since these indices are an indirect way to measure comparative advantage, their use should provide similar conclusions. If not, the results turn out to be sensitive to the index chosen (Balance, Forstner and Murray, 1987). These authors analyzed the consistency of several indicators of RCA by comparing correlation coefficients for alternative pairs of these indices. They found that these correlation coefficients did not evince consistency among the indicators. Therefore, the authors propose that the criteria for selecting indices should not be based on statistical considerations, but on theoretical constructs.

In a similar way, Webster (1991) pointed out that the poor performance of these measures is not attributable to problems of measurement itself, but to the need of a more

⁴ Cited in Bowen (1983).

⁵ Bowen measures consumption assuming countries have homothetic preferences. Consumption is proportional to the world's production of the commodity, being the ratio of country's GNP to world's GNP. For further details of this model, see Bowen (1985).

fundamental review of the theoretical aspects of RCA. In order to cope with complications like many commodities traded, barriers to trade and so on.

Perhaps, the most important critic against these kinds of indicators is that they are widely affected by the distortions in trade such as tariffs, controls, subsidies and so on. A more demanding indicator, that takes into account all these distortions, is the domestic resource cost (DRC) ratio. This measure attempts to provide an estimate of the value of domestic resources used in producing a particular product when all intermediate inputs are valued at world prices and all factor inputs are valued at their opportunity cost prices (Greenaway and Milner, 1993, p.99).

Algebraically, the ratio is measured as:

$$DRC_j = \frac{DC_j}{IVA_j} \quad (6)$$

where DC_j is the domestic cost of commodity j with factors valued at this social opportunity cost and IVA_j is the value added to activity j at border prices.

The DRC ratio is actually a measure of comparative advantage, since it compares the opportunity cost of the primary factors used in the production of a commodity with its value added at border prices. A ratio lesser than one identifies an activity where the country has a comparative advantage. It means the country is producing at a lesser cost than abroad, and consequently can obtain foreign exchange by exporting such a commodity.

The technique of DRC ratios will not be used in our study since it is too demanding in terms of data requirements. In calculating DRC ratios it is necessary to

count with an up-to-date and reliable input-output table⁶, conversion factors to derive shadow prices and comparisons between domestic and world prices for the commodities under analysis (Weiss, 1991).

Another important application of the indicator of RCA found in the literature is the measuring of the changing pattern of comparative advantage (Balassa, 1979). Balassa used a sample of 36 countries, 18 developed and 18 developing. He regressed ratios of RCA (index of export shares) from a wide sample of manufactured commodities on variables representing countries' relative capital intensity (capital-labor ratios which are higher in developed countries). By doing so he showed that inter-country differences in the structure of exports were largely explained by differences in human and physical capital endowments. This conclusion gives support to the 'stages approach' of RCA. The pattern of comparative advantage in manufactured goods varies as a consequence of the process of human and physical capital accumulation.

In a latter study, Balassa (1987) reiterated the use of the index of export share to depict how Japan had changed its comparative advantage from unskilled labour intensive commodities (textiles, rubber and plastic products, leather products, glass products etc.) in 1967 to human capital intensive products in 1983, after having crossed the intermediate rungs in the ladder of comparative advantage.

A formalised technique on how to evaluate export potential by analysing similar economies is presented in Greenaway and Milner (1993, p.198). The argument is that comparative advantage may change systematically over time (by climbing the ladder of comparative advantage). It might be possible therefore to employ trade performance

⁶ Peru has not renewed its input-output table since 1979. However, it has gone through 2 major structural changes: 1980 (transition to democracy) and 1990 (program of stabilization and structural change).

information from appropriate comparator countries in order to identify products with export potentials or potential export markets.

The first step is the identification of the comparator countries. *A priori* the selection can be made in terms of similar local resource endowments, the stage of industrial development or revealed export performance. These countries are highly likely to be exporting similar but not identical products, therefore, these dissimilarities can become a source of information for the country concerned on export potential.

The similar performance in exports can be assessed by the index of export similarities introduced by Finger and Kreinin (1979)⁷.

The proposed index is defined by the formula:

$$S(ab, c) = \left(\sum \min [X_i(ac), X_i(bc)] \right) \times 100 \quad (7)$$

Which measures the similarity of the export patterns of countries (or country groups) 'a' and 'b' to the target market 'c'. $X_i(ac)$ ($X_i(bc)$) is the share of commodity i in a's (b's) exports to 'c'. If the commodity distribution of a's and b's exports are identical ($X_i(ac) = X_i(bc)$ for each i), the index will take a value of 100. The authors point out that we can observe changes over time in the similarity of exports and thereby assess the degree to which their economic structures become more similar or more divergent.

In regard to the stability of the index of similarity, Kellman and Schroder (1983) analysed how steady the index is through the time and at different levels of commodity aggregation. The authors found a fairly high degree of inter-temporal stability, though the

⁷ Finger and Kreinin originally applied the index to study the similarities of exports between semi-industrialized LDCs, middle LDCs and least developed LDCs to the markets of the United States, Japan, the old EEC and the rest of Western Europe. They found that the economic structure of the semi-

index was quite sensitive to the SITC aggregation level chosen (considering from one-digit to four-digit level of aggregation).

Since it is impossible to analyse each commodity in the world in order to calculate comparative advantage, a methodology of aggregation must be used. The Standard International Trade Classification (SITC), published in the International Trade Standard Yearbook, United Nations, gives us statistics of commodities grouped according to their similarities. This classification is divided in 10 sections (1-digit level of aggregation), 56 divisions (2-digit level of aggregation), 177 groups (3-digit level of aggregation) and 1312 items (4-digit level of aggregation). This nomenclature was introduced by the United Nations in the 50s and was subject to 2 revisions (revision 1 in 1960 and revision 2 in 1974). The 1-digit level of aggregation groups the commodities in the following categories:

Table 2.1
SITC 1-digit level of aggregation

0 food and live animals	5 chemical, related products, nes
1 beverages and tobacco	6 basic manufactures
2 crude material, excluding fuels	7 machines, transport equipment
3 mineral fuels etc	8 miscellaneous manufactured goods
4 animal, vegetable oil, fat	9 goods not classified by kind

Source: International Trade Standard Yearbook, Vol. I, United Nations, 1994

Where, sections 1-4 represents basically natural resources, while sections 5-8 manufactured goods, either intensive in labour or in capital factors. In emprirical works, the most common level of aggregation chosen in the empirical works is at the 3-digit level. This level of aggregation does represent the single good that theory assumes

industrialized LDCs were becoming more similar to those of the industrialized countries, as a consequence that the former countries are getting more involved in international competition.

(Webster, 1991). Yeats (1991) also proposes to compute RCA indices for manufactured goods only, since trade in primary commodities (mostly agriculture) is so distorted by export incentives and trade barriers.

Leamer (1984) criticises this methodology of aggregation and proposes a new categorisation. Some of the classifications are misleading and would fit better in other place. Based on the technique of cluster aggregation, he found that many of the current SITC categories show a high level of correlation with groups located in other sections. Thus, he comes up with a new array of the 2-digit level⁸ of aggregation (see Annex 2) divided in 10 basic groups: (1) Petroleum (PETRO), (2) Raw materials (MAT), (3) Forest products (FOR), (4) Tropical products (TROP), (5) Animal products (ANL), (6) Cereals, etc (CER), (7) Labour intensive (LAB), (8) Capital intensive (CAP), (9) Machinery (MACH) and (10) Chemical (CHEM).

Leamer states that this classification is successful given the high correlation shown in the new aggregates. For instance, SITC 64 (paper, paperboard) suits better under the forest products group than under its former location (manufactured goods), given the low level of processing involved, or SITC 68 (non-ferrous metals) that comes better under the Raw material group than under the headline of basic manufactures associated with labour intensive activities. Moreover, this latter category comprises activities such as SITC 65 (textile, yarn, fabrics etc) which are actually capital intensive.

The Leamer classification was also preferred over the official Peruvian classification⁹ of exports and imports and the Homogeneous System (HS) classification.

⁸ Leamer actually proposed a 3-digit level new array; but, since this level of aggregation is more demanding in statistical work and shows a high similarity with the simpler 2-digit level, the latter is enough.

⁹ Official figures are provided by the Central Reserve Bank of Peru as part of the Balance of Payments statistics.

The official classification divides exports in traditional and non-traditional products. The traditional products are Mining, Oil and derivatives, Agricultural and Fishing products, while the non-traditional are Agriculture, Textile, Fishing, Basic metal industry, Chemical, Steel and metallurgical, Non-metallic and Others products. On the other hand, imports are divided in Consumer goods (Durable and Non-durable), Inputs (Fuel, Oil and derivatives, Raw material for agriculture and for industry), Capital goods (Construction material, Capital goods for agriculture and for manufactures, and Transport equipment) and Others. As a result both categories of exports and imports are incompatible in order to calculate indicators of RCA. The HS classification¹⁰ was also a sensible approach; but is displaced by the Leamer classification, since this one classifies products according to the factor content (namely raw materials, labour intensive, capital intensive etc), which is our main point of interest.

In the next section, we present the result of the calculations of the index of RCA (net export, net export adjusted, intra-industry trade and export share indices), identifying those categories in which Peru shows comparative advantage, and how they evolve over time. We also apply the index of similarities in order to find out those countries that resemble the Peruvian pattern of export. Having done this we can identify potential export products and markets, since these countries could trace a potential path to be followed.

¹⁰ The HS division classifies products in thirteen categories according to the inputs used in their production. Thus we have categories such as vegetable products, mineral products, products of the chemical and allied industries, plastics, textiles and textile articles etc.

3. Revealed Comparative Advantage and Indices of Similarity: Results for Peru

In this section we present the results of the calculations of the indicators of revealed comparative advantage (net exports, adjusted net exports and export share indices) for the period 1971-94¹. The results are presented using the SITC (revision 1 for the sub-period 1971-76 and revision 2 for the sub-period 1977-94). Evidence of intra-industry trade is also given by showing the computation of the index appearing in Grubel (1977). The categories chosen are: at 1-digit level of aggregation the official SITC, and at 2 and 3-digit level the array proposed by Leamer (1984).

The identification of similar economies is also presented according to the results of the index of similarities. A further analysis of the pattern of exports of the comparator countries is useful in identifying potential export products and potential markets as well.

Net export index

According to the index of net exports, the products in which Peru reveals comparative advantage (in accordance to the Leamer classification) are basically those found in the categories of raw materials, tropical agriculture and animal products. Peru also revealed comparative advantage in a few lines of the cereals, labor and capital intensive, and chemicals categories. No products in the categories of petroleum, forest products and machinery showed revealed comparative advantage.

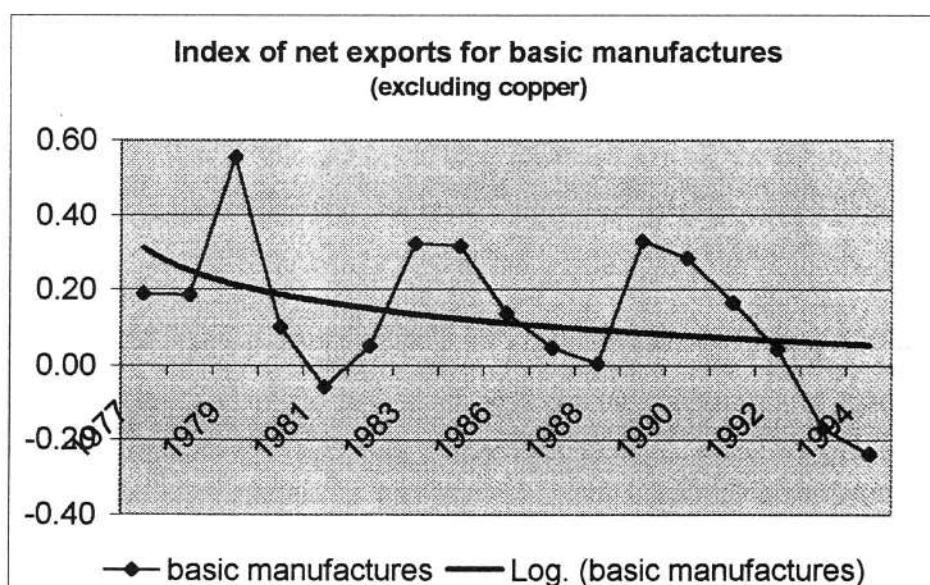
The most important category was raw materials. The index gave a value of 1 for all the 3-digit level of aggregation groups considered: 281 (iron ore and concentrates),

¹ Excluding 1985 due to unavailability of statistics for that year.

287 (base metal ores, conc. nes), 289 (precious metal ores and waste nes) 681 (silver, platinum), 682 (copper, excluding cement copper), 685 (lead) and 686 (zinc). These findings reveal the well endowed Peru is in term of mineral resources.

Copper as well as the other non-ferrous metals (SITC 68) were originally located in the SITC category of basic manufactures (category 6 at 1-digit level of aggregation), driving this category to reveal a comparative advantage as a whole, since copper accounts for 60 per cent of the value of exports in this class. If we exclude copper, this category tends to reveal a comparative disadvantage. For example, the original value of the index of 0,22 for 1994 turns out to be -0,24 when copper is excluded. This is an indicator of how misleading the original classification can be. Moreover, this category excluding copper shows a negative trend (measured by the variable log) in the value of the index (Picture 3.1).

Picture 3.1



As a whole, this category has remained stable over time. It means the same products explaining the comparative advantage in this class.

The second most important category was tropical agriculture, where the groups: 056 (vegetable etc prsvd prepd), 058 (fruit preserved, prepd), 071 (coffee and substitutes) and 072 (cocoa) revealed comparative advantage. Coffee is the most important product representing almost 5 per cent of the total exports (in 1994). Again, the groups in this category registered only exports and no imports giving a value of 1 for the net export index.

The category of animal products was accounted for the groups: 034 (fish fresh chilled frozen), 036 (shell fish fresh frozen) and 037 (fish etc prepd, prsvd nes). Another group related to fishing but located, mistakenly in the category of cereals is 081 (animal feeding stuff), which is actually fishmeal.

The category of cereals was explained by 263 (cotton)², 266 (synthetic fibers to spin), 268 (wool) and 411 (animal oils and fats).

In the category of labor intensive products we found that only a few categories associated with clothing: 842 (men outerwear not knit), 845 (outerwear knit elastic) and 846 (under garments knitted) as well as 896 (works of art) and 897 (gold, silver ware jewelry) revealed comparative advantage. Similarly, only did two groups 651 (textile yarn) and 652 (cotton fabric woven) reveal comparative advantage in the category of capital intensive products.

In the category of chemical products, the unique categories revealing comparative advantage, 532 (dyes nes, tanning products) and 554 (soaps, cleaning etc prepd) represent less than 1 per cent of the total exports.

No product revealing comparative advantage was registered in the categories of petroleum, forest products and machinery. As a whole, the country turned out to be a net

importer of pulp and paper in the category of forest products; rice, wheat, maize in cereals; footwear, articles of plastic, glass in labor intensive; iron sheets and pipes, tools, rubber articles in capital intensive; and in almost all the groups of machinery and chemicals. This result gives undeniable evidence of the low stage of the ladder of comparative advantage in which the country is located.

Adjusted net exports index

Even though the trade balance is not in equilibrium, the results given for the adjusted index does not differ from those bestowed by the net export index, since the factor of adjustment was not extremely high.

Intra-industry trade index

This index was calculated only for those categories reflecting trade in manufactures, namely, labor intensive, capital intensive, machinery and chemical products.

Only four groups at the 3-digit level of aggregation showed evidence of intra-industry trade: 651 (textile yarn), 699 (base metal mfrs nes) in the capital intensive category; 793 (ships and boats)³ and 522 (inorganic elements, oxides etc) in chemicals. However, in the period 1971-76 the index handed over evidence of intra-industry trade in a larger list of commodities. 662 (clay refractory), 665 (glassware), 894 (toys, sporting goods), 895 (office supplies nes) in the labor intensive category. 651 (textile yarn and thread), 652 (cotton fabrics, woven), 656 (textile products), 675 (iron, steel hoop, strip),

² Even though the drop in the exports in the last 2 years.

691 (structures and parts), 692 (metal tanks, boxes etc) and 693 (wire products non electric) in the category of capital intensive. 733 (road vehicles non motor), 735 (ships and boats) and 864 (watch and clocks) in the category of machinery and 551 (essential oil, perfume, etc) in chemicals. This dynamism reflected the attempts of industrialization undertaken by the military government in the early seventies.

Export share index

The export share index was computed for the last five years (1990-94), a period in which the participation of the Peruvian exports remained around 0,1 per cent of world exports (one thousandth of total world trade). The categories in which Peru showed comparative advantage were quite similar to those given by the net export index. There were a few exemptions such as 334 (petroleum products, refin) in the category of petroleum, since the country keeps a balanced trade in oils.

The category of raw materials was again the most important. The index in this category took in most cases values over thirty (it means the participation in the world trade of the commodity was as great as thirty times the participation in the world exports). The groups revealing comparative advantage in this category were 281 (iron ore, concentrates), 287 (base metal ores, conc nes), 289 (prec metal ores, waste nes), 681 (silver, platinum), 682 (copper, excl. cement copper), 685 (lead) and 686 (zinc).

The category of tropical agriculture did show comparative advantage in the groups of 054 (veg etc fresh simply prsvd), 056 (very etc prsvd, prepd) and 071 (coffee and substitutes).

³ The construction of ships and boats was carried out by the 'Servicio Industrial de la Marina de Guerra del Peru' (SIMA) Peruvian Navy Industrial Service.

In animal products the jutting groups were 034 (fish fresh), 036 (shell fish, fresh frozen), 037 (fish etc, prepd, prsvd nes), 081 (feeding stuff for animal) and 411 (animal oils and fats).

In the category of cereals, again, comparative advantage was revealed in the groups of 263 (cotton), 266 (synthetic fibers to spin) and 268 (wool).

In the category of labor intensive as well as in the category of capital intensive there were few outstanding commodities. 845 (outerwear knit non elastic), 846 (undergarment, knitted) and 897 (gold, silver ware, jewelry) in the former and 651 (textile yarn), 652 (cotton, fabric, woven) and 654 (other woven textile fabric) in the latter.

Finally, group 532 (dyes nes , tanning product) was the only important commodity in the group of chemical, whereas the value of the index for the group 522 (inorganic elements, oxides etc) was slightly greater than one.

Again, neither the category of forest products nor the category of machinery registered any product revealing comparative advantage, as was pointed out using the net export index.

Consistency of the results

The resulting calculations of the indices of revealed comparative advantage were highly consistent, since both indices did tend to show the same commodities revealing comparative advantage. In the following table we indicate the commodities revealing comparative advantage according to either the net export index or the export share index.

In the third column those commodities in which the indices did not produce a consistent result are highlighted.

Table 3.1
Revealed comparative advantage by type of index

Category	Net export index	Export share index	Differences
1. Petroleum	--	334	334
2. Raw materials	281, 287, 289, 681, 682, 685, 686	281, 287, 289, 681, 682, 685, 686	--
3. Forest products	--	--	--
4. Tropical products	056, 058, 071, 072	054, 056, 061, 071, 072	054, 061
5. Animal products	034, 036, 037, 081, 292	034, 036, 037, 081	292
6. Cereals	263, 266, 268, 411	263, 266, 268, 411	--
7. Labor intensive	842, 845, 846, 896, 897	845, 846, 897	842, 896
8. Capital intensive	651, 652	651, 652, 654	654
9. Machinery	--	--	--
10. Chemical	532, 554	522, 532	552, 554

We observe that the results are basically the same. Both indices identified the same group of commodities revealing comparative advantage and those categories in which the country does not show comparative advantage. The main differences were in the categories of topical products, labor intensive and chemical products, where the index of export share failed to identify the good computed by the net export index. The explanation is that even though the country keeps a positive balance in the trade of these commodities, their export volumes are still low. In the case of petroleum (SITC 334) the

explanation is that the country keeps a balanced oil trade, even though Peru exports important volumes of combustibles (around 4 per cent of the total exports).

Index of similarities

An *a priori* selection of comparator countries was made considering the relative stage of development of the countries and their natural resources endowment. Since Peru is a well endowed country in terms of natural resources (mainly non-ferrous minerals and sea resources) and has an incipient industry, its export pattern reflects this condition, but it is not as concentrated as other developing countries, especially from Latin America. Thus, the criterion used was to look for a developing country well endowed with non-ferrous minerals as well as a small scale industry.

General information about the countries was obtained from the Microsoft Encyclopedia Encarta 97, while the data for exports were taken from the International Trade Standard Yearbook.

The countries selected were:

Bolivia, Chile and Colombia from Latin America. These countries base their economies in the production of minerals. Bolivia is well endowed with mineral resources (tin, bismuth, antimony, lead, silver, copper, etc) and half of its labor force is employed in agriculture. Chile is the world leading exporter of copper, which is the main export product in Peru. Colombia has an incipient industry, but still bases its export revenues in the sale of coffee.

Morocco, in Africa, is well endowed with agriculture and mineral resources, and has a small scale enterprise-based manufacturing.

India, Indonesia, Malaysia, Philippines and Thailand from Asia. Even though these countries differ in term of population and natural resources, the criteria were relaxed in order to see the similarity in terms of manufacturing activities. These countries undergo a process of rapid industrialization, departing from the manufacturing of textiles and clothing to machinery and chemicals. Special attention was paid to the inter-temporal comparison.

The second stage was the application of the index of similarities for the years: 1994, 1984 and 1974 and at the 1, 2 and 3-digit level of aggregation. However, only the results at the 3-digit level of aggregation were used as the criterion for selecting the comparator economy (see Annex 4).

Among the Latin American economies used in the comparison, Chile had the most similar pattern of exports to Peru. The index of similarities at the 3-digit level of aggregation reached a value of 41 per cent for the year 1994 (22 per cent to Bolivia and 15 per cent to Colombia). In the comparison with Chile, 18 points of the value of the index (approximately 44 per cent) was accounted for the SITC 682 (copper, excluding cement copper), since both countries are important producers and exporters of this mineral. No other product seemed to play such important role in the comparison as copper. However, if we look at the 2-digit level of aggregation we see that the similarity is explained basically by: SITC 68 (non-ferrous metals) and 28 (metalliferous ores scrap) and to a lesser extent by 04 (fish and preparations) and 05 (fruit and vegetables). The value of the index was 13 per cent in 1984 and 36 per cent in 1974. It is important to point out the increasing value of the index and that a lower percentage of the index was

explained only by copper in 1994 than in the other years, meaning that both countries tend to show a closer performance in their export patterns.

In the comparison with Bolivia, the SITC 287 (base metal ores, concentrates nes) explained more than half of the value of the index. Whereas with Colombia, the relatively small value of the index was accounted for by SITC 071 (coffee and substitutes) and 334 (petroleum products, refined).

With Morocco the index of similarity gave a modest value of 19 per cent for 1994, slightly higher than the value in 1984 (15 per cent), but considerably greater than in 1974 (8 per cent). It is interesting to point out that almost 50 per cent of the similarity was due to the production of textiles and fishing activities.

The comparison with the Asian economies was not successful. No country seemed to be a useful comparator to Peru. The value of the index was 19 per cent in the comparison to India, 17 per cent to Indonesia, 13 per cent to Philippines, 5 per cent with Malaysia and 14 per cent with Thailand in 1994. However, it is important to note that the similarity in the previous years seemed to be higher, specially in the comparison with India (22 per cent in 1974 and 1984) and Philippines (31 per cent in 1974 and 13 per cent in 1984). In the case of India the similarity in 1984 was accounted for by the exports of 333 (crude petroleum, etc) and of less significance by 281 (iron ore concentrates), 036 (shell fish, fresh frozen), 071 (coffee and substitutes) and 652 (cotton fabric woven); whereas in 1994 the participation of petroleum in Indian exports dropped and consequently the value of the index of similarity. However, for that year there was a relative increase in the percentage accounted by textile products, namely, 651 (textile yarn), 845 (outerwear knit non-elastic) and 846 (under garments knitted).

In the case of Philippines, the value of the index (13 per cent in 1994) dropped to less than half the value in 1974 (31 per cent). In that year, the similarity was explained by 283 (non ferrous metal ore concentrates) and 061 (sugar and honey), which represented 27 per cent of Peruvian total exports and 43 per cent of Philippine total exports. Those percentages dropped to 13 per cent for Peru and to just 2 per cent for the Philippines in 1994⁴.

Table 3.2
Index of similarity

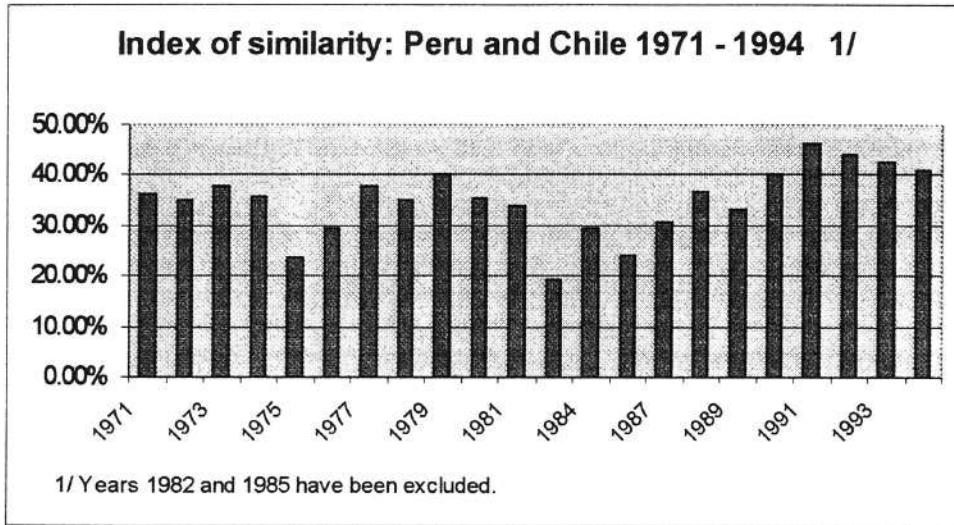
Country	1994	1984	1974
Chile	41.0 %	29.4 %	35.8 %
Bolivia	22.3 %	20.8 %	23.7 %
Colombia	15.3 %	23.9 %	14.0 %
Morocco	18.9 %	15.4 %	8.4 %
India	19.1 %	22.1 %	22.3 %
Indonesia	17.3 %	19.0 %	6.8 %
Philippines	13.2 %	13.4 %	30.7 %
Malaysia	4.7 %	13.9 %	3.3 %
Thailand	13.8 %	9.8 %	13.4 %

The only country that revealed itself as a good comparator is Chile. Besides, being an important copper producer, Chile also exports an important number of commodities in which Peru reveals comparative advantage. The calculation of the index of similarity for the whole period 1971-94⁵ (see Annex 5) revealed that the similarity between the patterns of exports of both countries has increased in the last years (see picture 3.2). A further analysis explains that the value of the index was sensitive to the drop of copper exports for both countries in the early 80s (See picture 3.3).

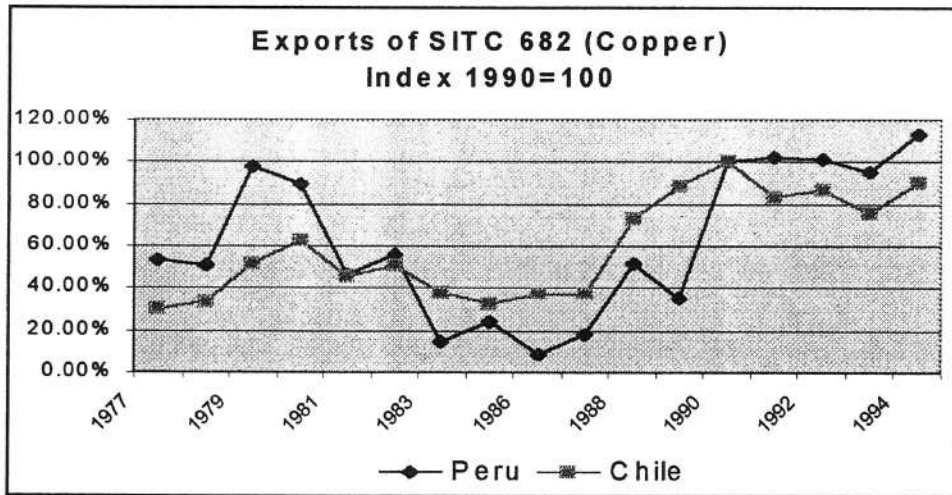
⁴ Philippines, formerly a producer of agriculture products has increased its manufactured exports quickly under the benefit of its membership to the Association of South-Asian Nations (ASEAN) and the Asian-Pacific Economic Cooperation (APEC).

⁵ Excluding the years 1982 and 1985, due to the unavailability of statistics for Chile and Peru, respectively.

Picture 3.2



Picture 3.3



In 1994 Chilean exports were as great as 2,6 times the Peruvian exports and its GDP was in a similar proportion bigger as well. Nonetheless, Chile has an smaller population than Peru (14 millions against 23 millions of inhabitants).

Chilean exports are accounted for mainly by natural resources (over 90 per cent if we group the first six categories of the Leamer classification). Its most important export

product is SITC 682 (copper), which represents 28 per cent of the total exports. SITC 251 (pulp and waste paper), SITC 287 (base metal ore), SITC 057 (fruits, nuts, fresh, dried) and 411 (feeding stuff for animal) are important as well. Overall, Chile maintains a sound balance in its trade balance (See picture 3.4).

Picture 3.4



Calculations of the indices of comparative advantage were made only for the year 1994 (see annex 6). They showed that Chile reveals comparative advantage in precisely the first six categories of commodities (excluding petroleum which is negligible in its trade) as well as chemical products. No revealed comparative advantage was found in the categories of labor intensive, capital intensive and machinery.

When comparing both countries, Chile reveals comparative advantage in a broad category of raw materials and animal products as Peru does. However, Chile reveals comparative advantage in a large category of forest products in which Peru has no presence in the international trade. Forests cover about 12 per cent of Chile's land area. Some 16.5 million cu m (about 583 million cu ft) of timber was cut annually in the late 1980s. Output consists of both hardwoods (such as laurel) and softwoods (such as pine).

Lumber, pulp, and paper are made from the annual timber cut. Targeted for investment since the mid-1970s, the forestry industry accounted for more than 10 per cent of annual exports by the end of the 1980s. On the other hand, the forests covering 54 per cent of Peru's land area have not been significantly exploited⁶. Here we find an useful example of what Chile can teach to Peru. Nonetheless, within the categories of forest products that contain a higher value added (641, paper and paperboard, and 642, paper etc, precuts) Chile revealed no comparative advantage.

Another useful example is found in the category of tropical agriculture products, in which exports of the SITC 05 (fruit and vegetables) in Chile are at least 8 times those in Peru. Chile exports a wide variety of apples, grapes, pears etc as preserved fruit, fresh, juice, dried fruit as well as fresh, preserved and frozen vegetables which represent 10 per cent of its total exports (3 per cent in Peru, mainly vegetable products).

The category of animal products is accounted in both countries by fishing. Both Chile and Peru enjoy the benefits of the Humboldt current that makes the sea life thrive in the west coast of South America. Chile catches important volumes of sardine, mackerel, hake and anchovies, while in Peru the catch of anchovy represents 60 per cent of the total amount, and is used in the processing of fishmeal, in which the country is a world leading exporter (SITC 081, feeding stuff for animal).

It must be pointed out that those few group of commodities in which Chile exports in the categories of labor intensive, capital intensive and machinery revealed no comparative advantage. Moreover, their weight in Chilean trade is minimal, and overall,

⁶ Microsoft® Encarta® 97 Encyclopedia. © 1993-1996 Microsoft Corporation.

the participation of manufactures in Chile's GDP had decreased from 25 per cent to 20 per cent between 1974 and 1990⁷.

In summary we see that Chile has a revealed comparative advantage while Peru does not in forest products and has exploited further its advantage in fruits. The categories to be analyzed are SITC 057, 058, 246, 247, 248, 251 and 635. We analyze the potential markets for those commodities by observing the fastest growing importers for the period 1990-94. Nonetheless, the global demand (world imports) for these goods did not show the same upward trend in all these cases (see Annex 7).

In the SITC 057 (fruits, nuts, fresh, dried) the first 3 biggest growing importers are USA, Japan and Netherlands. However the biggest increments were reported in Mexico and Argentina that have increased their imports by 462 and 277 per cent, respectively, in the period under analysis. Other important importers are India, Hong Kong and Singapore with increments of 140, 50 and 40 per cent respectively.

In this category Chile has succeeded in exporting mainly grapes, apples and pears. The exports of grapes represent almost half of the exports in this category and over 3 per cent of the total exports. The production of wine for the external market is also important and accounted for 1,3 per cent of the total exports in 1994.

In the SITC 058 (fruit preserved, prepared) the first 3 biggest growing importers are Japan, Netherlands and the Republic of Korea. The Russian Federation is also an important target having increased its imports 4 times between 1992 and 1994. Other important destinations are Brazil and Mexico which increased their imports in 246 and 222 per cent respectively.

⁷ Meller (1994) called this the process of de-industrialization that followed the program of liberalization in the 70s.

In spite of this market is 2,5 times smaller than the market for fresh fruit Chile has expanded more its external sales in preserved and prepared fruit than in fresh fruit (28 per cent against 14 per cent in the last five years). Particularly in the way of juice and frozen fruit without sugar.

The SITC 246 (pulpwood, chips, wood waste) is a niche market. The principal importer is Japan (which increased its imports by 25 per cent between 1990 and 1994). Other important growing markets are France, Republic of Korea, Austria and Canada. Korea was the most striking importer increasing its imports in 7 times in the period under analysis.

In the SITC 247 (other wood rough, squared) the first 3 biggest growing importers are Canada, Turkey and United Kingdom. An interesting case is Malaysia, which increased its imports by 1 086 per cent in the period under analysis. Mexico is as well appealing with a growth of 207 per cent in its imports

In the SITC 248 (wood shaped, sleepers) USA and Japan are the two biggest importers. Their imports have increased by 112 per cent and 61 per cent between 1990 and 1994. The biggest growth was reported by China (351 per cent), however other East Asian countries have turned out to be important as well, such as Hong Kong (with an increase of 247 per cent) and Korea (with an increment of 154 per cent). Other potential markets are Saudi Arabia and Argentina.

In this category Chile exports firstly lumber swan and in a lesser extent lumber planed.

In the SITC 251 (pulp and waste paper), imports have been declining as a whole. However, countries such as Indonesia and Argentina have shown an important increase in

4. Conclusions and Policy Recommendations

The results of the present study have confirmed the initial impression that Peru does well in exporting natural resources, since it is well endowed with these resources, whereas, the incipient exports of manufactured goods, mainly garments, are consistent with the endowment of low skilled labor. In both cases a revealed comparative advantage was shown by both the net export and the export share indices.

The framework provided by the Heckscher-Ohlin theorem turned out to be a useful starting point, as was pointed out by Meier (1995, p.457) and Roemer (1979, p.171).

The pattern of exports has not changed significantly since the 70s. Other countries in a similar stage of development have superceded Peru. For example, the once similar Philippines now exports over 40 per cent of its total exports in the categories of basic manufactures, excluding non-ferrous metals, machinery and miscellaneous manufactures, while this ratio in 1974 represented only 9 per cent. In Peru this ratio is currently 12 per cent. We can imply that Philippines climbed the ladder of comparative advantage while Peru remained unfortunately on the same rung.

The most similar economy in a sample of 9 less developed countries turned out to be Chile¹. This country resembles Peru in exporting natural resources, mainly copper, base metal ores and feeding stuff for animal, in which both countries reveal comparative advantage. However, Chile has expanded further its advantage in fruits and forest products, and is looking to give them higher value added. It is in these categories where Chile offers a lesson to be learnt by Peru. This success is explained in a major extent by

¹ A successful exporter of primary commodities (World Bank, 1994, p.33).

the structural transformation of the agriculture sector². Today, agriculture embodies modernity, progress and capitalist entrepreneurship translated into production to the external market (Kay, 1991). There has also been an important change of attitude of the Chilean entrepreneurial class, from rent-seeking and inefficiency in the 60s to risk-taking and outward-looking since the 80s. The ability of the Chilean entrepreneurs to coordinate and manage all the distinct and complex features of modern enterprises is recognized as the main factor contributing to export expansion (Meller, 1994, pp.124-125). A crucial role has also been played by transnational corporations that account for almost half of Chile's fruit exports, as well as for the presence of a multitude of microclimates that make possible the production of counter-season fruits to be exported to the Northern Hemisphere (World Bank, 1994).

With a similar endowment of national resources (forest areas and multitude of microclimates), Peru has the potential to follow the Chilean experience. Despite the unwavering global demand for the commodities depicted above, it was possible to find out emerging markets (in the way of countries increasing their imports) for these products.

For instance we see that in the categories of fresh fruit East Asian markets (Hong Kong, Singapore, Korea) are playing an important role in the total demand, while in the case of fruit preserved and prepared, Brazil and Mexico (2 Latin American countries) are potential markets to expand activities.

² Structural changes in the agriculture sector (initiated in the Alessandri Administration 1958-64 and enhanced in the Pinochet era) were accounted for by the market reforms. The recognition of comparative advantage in agriculture and forestry gave incentives to the use of modern inputs and mechanized farm activities, as well as technical support and minimum support prices from the government. Today, agriculture generates 15 per cent of foreign exchange (Kay, 1991). However, despite this success the Chilean government still has to deal with the pervasive poverty in the rural area (Kay, 1996).

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Annex 1

The Heckscher-Ohlin Theorem¹

A country with balanced trade will export the commodity that uses intensively its relatively abundant factor and will import the commodity that uses intensively its relatively scarce factor

Proof Denoting the output levels by X_1 and X_2 , we may set factor supply equal to factor demand to obtain

$$K = a_{k1}X_1 + a_{k2}X_2$$

$$L = a_{l1}X_1 + a_{l2}X_2$$

Which is a system that can be solved for outputs as a function of the endowments. If V represents the vector of endowments (K, L) and X the vector of outputs (X_1, X_2) , then these equations may be written in matrix form as $V = AX$, or inverted as

$$X = A^{-1}V$$

where the inverse exists provided the relative input intensities are unequal: $a_{k1}/a_{l1} \neq a_{k2}/a_{l2}$. Because of the linearity of these equations (and the consequent unresponsiveness of total world outputs to factor migration), we can also write total world outputs X_w as a function of total world endowments V_w :

$$X_w = A^{-1}V_w$$

Since the relative prices of goods are given in world markets and hence are the same for all countries, due to the assumption of demand similarity each country consumes commodities in the same proportion, that is,

$$C = sX_w$$

where s is the country's consumption share of world output and C is its consumption vector.

Trade balance requires that the value of production equal the value of consumption, that is, $p'X = p'C = sp'X_w$, where p is the price vector (p_1, p_2) . Thus if trade is balanced, the consumption share is the ratio of own GNP to world GNP:

$$s = \frac{p'X}{p'X_w}$$

the vector of net exports is the difference between production and consumption

$$T = X - C$$

$$T = A^{-1} - sA^{-1}V_w$$

$$T = A^{-1}(V - sV_w)$$

which is A^{-1} times the vector of excess factor supplies:

¹ From Leamer (1984), pp. 8-10

$$V - sV_w = \begin{bmatrix} K - sK_w \\ L - sL_w \end{bmatrix}$$

$$V - sV_w = \begin{bmatrix} K_w \left(\frac{K}{K_w} - s \right) \\ L_w \left(\frac{L}{L_w} - s \right) \end{bmatrix}$$

It will be now demonstrated that if the country in question is relatively capital abundant, $K/K_w > L/L_w$, then this excess factor supply vector has signs (+,-). This follows from the fact that the consumption share is a weighted average of the capital share and the labor share

$$s = \frac{p'X}{p'X_w} = \frac{p'A^{-1}V}{p'A^{-1}V_w} = \frac{w'V}{w'V_w} = \frac{[w_k K_w (K/K_w) + w_l L_w (L/L_w)]}{w_k K_w + w_l L_w}$$

where w is the factor reward vector: $w = (A')^{-1}p$. Thus s must fall between K/K_w and L/L_w , and consequently $K/K_w > s$ is equivalent to $K/K_w > L/L_w$.

To determine the sign of the net export vector of a capital abundant country, we need to determine the effect of premultiplying a vector with signs (+,-) by the inverse of the matrix A :

$$A^{-1} = \begin{bmatrix} a_{k1} & a_{k2} \\ a_{l1} & a_{l2} \end{bmatrix}^{-1} = \begin{bmatrix} a_{l2} & -a_{k2} \\ -a_{l1} & a_{k1} \end{bmatrix} / |A|$$

where the determinant is

$$|A| = (a_{k1}a_{l2} - a_{l1}a_{k2}) = a_{l1}a_{l2} \left(\frac{a_{k1}}{a_{l1}} - \frac{a_{k2}}{a_{l2}} \right)$$

If X_1 is the capital intensive industry, the $|A| > 0$, and A^{-1} has the sign pattern

$$A^{-1} = \begin{bmatrix} + & - \\ - & + \end{bmatrix}$$

If the country is abundant in capital, the vector of excess factor supplies has sign pattern (+,-), and trade therefore has sign pattern

$$T = \begin{bmatrix} + & - \\ - & + \end{bmatrix} \begin{bmatrix} + \\ - \end{bmatrix} = \begin{bmatrix} + \\ - \end{bmatrix}$$

Meaning the capital abundant country exports the capital intensive commodity X_1 and imports the labour intensive commodity X_2 .

Annex 2

Aggregation of the SITC divisions proposed by Leamer on the basis of the cluster aggregation

SITC	Description	SITC	Description
	1 Petroleum (PETRO)		7 Labor intensive (LAB)
33	Petroleum, petroleum products	66	nonmetallic mineral manufactures
	2 Raw material	82	furniture
27	crude fertilizers, crude material	83	travel goods, handbags etc
28	metaliferous ores, metal scrap	84	clothing
32	coal, coke, briquettes	85	footwear
34	gas, natural and manufactured	89	miscellaneous manufactured articles n.e.s.
35	electrical energy	91	postal pack not classified according to kind
68	nonferrous metals	93	special trans. not classified according to kind
	3 Forest products (FOR)	96	coins nongold, noncurrent
24	wood, lumber, cork		8 Capital intensive (CAP)
25	pulp, waste paper	61	leather, dressed furskins
63	wood, cork manufactures	62	rubber manufactures n.e.s.
64	paper, paperboard	65	textile, yarn, fabrics, etc.
	4 Topical agriculture (TROP)	67	iron and steel
5	fruit, vegetables	69	manufactures of metal
6	sugar, sugar preparations, honey	81	sanitary, fixtures, fittings
7	coffee, tea, cocoa, spices, etc		9 Machinery (MACH)
11	beverages	71	machinery, other than electrical
23	crude rubber	72	electrical machinery
	5 Animal products (ANL)	73	transport equipment
0	live animals	86	professional goods, watches, instruments
1	meat, meat preparations	95	firearms, ammunition
2	dairy products, eggs		10 Chemicals (CHEM)
3	fish, fish preparations	51	chemical elements, compounds
21	hides, skins, furskins, undressed	52	mineral tar and crude chemicals from coal, petroleum, natural gas
29	crude animal, vegetable minerals		dyeing, tanning, coloring matter
43	animal, vegetable oils, fats, processed	53	medicinal, pharmaceutical products
94	animals, n.e.s.	54	essential oils, perfume matter
	6 Cereals, etc. (CER)	55	fertilizers, manufactured
4	cereals, cereal preparations	56	explosives, pyrotechnic products
8	feeding stuff for animals	57	plastic materials, cellulose, etc.
9	miscellaneous food preparations	58	chemical materials, n.e.s.
12	tobacco, tobacco manufactures	59	
22	oil seeds, oil nuts, oil kernels		
26	textile fibers		
41	animal oils, fats		
42	fixed vegetable oils		

Source: Leamer, 1984, pp.67-68

Annex 3
Index of Net Exports and Adjusted Net exports
1971 - 1976

Net Export Index	1971	1972	1973	1974	1975	1976	Adjusted Net Export Index	1971	1972	1973	1974	1975	1976
1 Petroleum							1 Petroleum						
2 Raw materials							2 Raw materials						
281 iron ore, concentrates	1.00	1.00	1.00	1.00	1.00	1.00	281 iron ore, concentrates	0.91	0.91	0.99	1.00	1.33	1.23
283 nonfer base mtl ore conc	1.00	1.00	1.00	1.00	1.00	1.00	283 nonfer base mtl ore conc	0.91	0.91	0.99	1.00	1.33	1.23
681 silver, platinum, etc	1.00	1.00	1.00	1.00	1.00	1.00	681 silver, platinum, etc	0.91	0.91	0.99	1.00	1.33	1.23
682 copper	0.98	0.98	0.98	0.96	0.94	0.97	682 copper	0.89	0.89	0.97	0.96	1.27	1.19
685 lead	1.00	1.00	1.00	1.00	1.00	1.00	685 lead	0.91	0.91	0.99	1.00	1.33	1.23
686 zinc	1.00	1.00	1.00	1.00	1.00	1.00	686 zinc	0.91	0.91	0.99	1.00	1.33	1.23
689 non fer base metals nes	1.00	1.00	1.00	1.00	1.00	1.00	689 non fer base metals nes	0.91	0.91	0.99	1.00	1.33	1.23
3 Forest products							3 Forest products						
4 Tropical agriculture							4 Tropical agriculture						
061 sugar and honey	1.00	1.00	1.00	1.00	1.00	1.00	061 sugar and honey	0.91	0.91	0.99	1.00	1.33	1.23
071 coffee	1.00	1.00	1.00	1.00	1.00	1.00	071 coffee	0.91	0.91	0.99	1.00	1.33	1.23
072 cocoa	(1.00)	(1.00)	(1.00)	n.a.	1.00	1.00	072 cocoa	(1.09)	(1.09)	(1.01)	n.a.	1.33	1.23
5 Animal products							5 Animal products						
031 fish fresh, simply preserved	1.00	1.00	1.00	1.00	1.00	1.00	031 fish fresh, simply preserved	0.91	0.91	0.99	1.00	1.33	1.23
032 fish etc, tinned prepared	1.00	1.00	1.00	1.00	1.00	1.00	032 fish etc, tinned prepared	0.91	0.91	0.99	1.00	1.33	1.23
6 Cereals, etc.							6 Cereals, etc.						
081 animal feeding stuff	0.98	0.97	0.98	1.00	1.00	1.00	081 animal feeding stuff	0.89	0.89	0.97	1.00	1.33	1.23
262 wool and animal hair	1.00	1.00	1.00	1.00	1.00	1.00	262 wool and animal hair	0.91	0.91	0.99	1.00	1.33	1.23
263 cotton	1.00	1.00	1.00	1.00	1.00	1.00	263 cotton	0.91	0.91	0.99	1.00	1.33	1.23
411 animal oils and fats	1.00	1.00	1.00	1.00	1.00	1.00	411 animal oils and fats	0.91	0.91	0.99	1.00	1.33	1.23
7 Labour intensive							7 Labour intensive						
8 Capital intensive							8 Capital intensive						
651 textile yarn and thread	(1.00)	(1.00)	(1.00)	(0.31)	(0.65)	0.57	651 textile yarn and thread	(1.09)	(1.09)	(1.01)	(0.31)	(0.32)	0.79
652 cotton fabrics, woven	n.a.	n.a.	n.a.	1.00	1.00	1.00	652 cotton fabrics, woven	(0.09)	(0.09)	(0.01)	1.00	1.33	1.23
9 Machinery							9 Machinery						
10 Chemicals							10 Chemicals						
Memo:							Memo:						
							Adjustement factor	0.09	0.09	0.01	0.00	(0.33)	(0.23)

n.a. : not applicable

Annex 3
Index of Net Exports
1977 - 1994

	1977	1978	1979	1980	1981	1982	1983	1984	1986	1987	1988	1989	1990	1991	1992	1993	1994
1 Petroleum																	
2 Raw material																	
281 iron ore, concentrates	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
287 base metal ores, conc. res	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
289 prec. mtal ores, waste res	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
681 silver, platinum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	0.99	0.85	1.00	1.00	1.00	1.00	1.00
682 copper conc. cement copper	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
685 lead	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
686 zinc	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3 Forest products																	
4 Tropical agriculture																	
056 veg etc. prod., prepd	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
058 fruit preserved, prepared	1.00	1.00	1.00	1.00	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
071 coffee and substitutes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
072 cocoa	1.00	1.00	1.00	1.00	0.12	0.15	0.93	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5 Animal products																	
034 fish fresh, chilled/frozen	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
036 small fish fresh/frozen	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
037 fish etc. prod., prepd res	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
292 crude veg. material res	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	0.13	(0.06)	0.03	0.48	1.00	1.00	1.00	1.00	1.00
6 cereals, etc.																	
081 animal feeding stuff	1.00	1.00	1.00	0.84	0.71	0.79	0.55	0.87	0.65	0.72	0.70	0.92	0.81	0.86	0.78	0.85	0.88
263 cotton	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.34	(0.67)	(0.71)
266 synthetic fibres to spin	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
268 wool (excl. tops) animal hair	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
411 animal oils and fats	1.00	n.a.	1.00	1.00	(0.72)	0.84	(1.00)	0.52	1.00	1.00	n.a.	1.00	1.00	1.00	1.00	1.00	1.00
7 labour intensive																	
661 lime, cement, bldg. prod.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
842 mens. outerwear, not kit	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
845 outerwear, kit nonelastic	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
846 undergarments knitted	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
847 textile clothing accessories	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
848 headgear, non textile clothing	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
896 works of art etc.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
897 golds, silver ware jewelry	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8 Capital intensive																	
651 textile yarn	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.70	0.72	0.77	0.78	0.91	0.75	0.62	0.28	0.46
652 cotton fabric, woven	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9 Machinery																	
10 Chemicals																	
532 dyes res, tanning product	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
554 soaps, cleaning etc. preps	(0.58)	(0.38)	0.37	0.15	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	1.00	1.00	1.00	1.00	1.00

n.a.: not applicable

Annex 3
Index of Adjusted Net Exports
1977-1994

	1977	1978	1979	1980	1981	1982	1983	1984	1986	1987	1988	1989	1990	1991	1992	1993	1994
1 Petroleum																	
334 petroleum products, refin	(0.32)	(0.23)	0.08	0.49	0.85	0.81	0.70	0.66	0.73	0.66	0.33	0.26	0.20	0.21	0.18	0.22	0.09
2 Raw material																	
281 iron ore, concentrates	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
287 base metal ores, conc nes	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
289 prec metal ores, waste nes	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
681 silver, platinum	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
682 copper exc cement copper	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
685 lead	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
686 zinc	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
688 non ferr base metals nes	0.98	0.85	0.61	0.87	n.a.	n.a.	n.a.	n.a.	1.13	1.15	1.11	0.88	n.a.	n.a.	n.a.	n.a.	n.a.
3 Forest products																	
4 Tropical agriculture																	
056 veg etc prsrd, prepd	n.a.	n.a.	n.a.	n.a.	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
058 nut preserved, prepd	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
071 coffee and substitutes	0.98	0.85	0.61	0.87	0.26	0.18	0.96	0.76	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
072 cocoa	0.98	0.85	0.61	0.87	n.a.	n.a.	n.a.	n.a.	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
5 Animal products																	
034 fish fresh, chilled frozen	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
036 shell fish fresh frozen	n.a.	n.a.	n.a.	n.a.	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
037 fish etc prsrd, prsrd nes	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
292 crude veg material nes	n.a.	n.a.	n.a.	n.a.	1.14	1.02	1.04	0.85	0.26	0.09	0.14	0.36	0.89	0.95	1.03	1.12	1.12
6 Cereals, etc.																	
081 animal feeding stuff	0.98	0.85	0.60	0.71	0.85	0.81	0.59	0.72	0.79	0.88	0.81	0.80	0.69	0.61	0.81	0.97	1.00
263 cotton	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	0.36	(0.55)	1.12
266 synthetic fibres to spin	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
268 wool (exc tops) animal hair	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
7 Labour intensive																	
842 mens outerwear not kit	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
843 womens outerwear non-lett	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
844 under garments non-lett	n.a.	n.a.	n.a.	n.a.	1.14	1.02	1.04	0.85	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
845 outerwear non-lett	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
846 under garments knitted	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
847 knitted clothing access nes	0.98	0.85	0.61	0.87	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
848 headgear, non-lett clothing	n.a.	n.a.	n.a.	n.a.	1.14	1.02	1.04	0.85	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
849 mens wear kit etc	n.a.	n.a.	n.a.	n.a.	1.14	1.02	1.04	0.85	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
897 pots, silver ware jewelry	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
8 Capital intensive																	
651 textile yarn	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	0.83	0.87	0.87	0.66	0.80	0.71	0.65	0.40	0.68
652 cotton fabric, woven	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
654 other woven textile fabric	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
658 textile articles nes	0.98	0.85	0.61	0.87	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
9 Machinery																	
10 Chemicals																	
532 dyes nes, tarring product	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.13	1.15	1.11	0.88	0.89	0.95	1.03	1.12	1.12
554 soaps, cleaning etc preps	(0.60)	(0.53)	(0.02)	0.03	(0.86)	(0.98)	(0.96)	(1.15)	(0.87)	(0.85)	(0.89)	(1.12)	0.89	0.95	1.03	1.12	1.12
572 explosives, pyrotecnic pro	0.98	0.85	0.61	0.87	1.14	1.02	1.04	0.85	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Memo:	0.02	0.15	0.39	0.13	(0.14)	(0.02)	(0.04)	0.15	(0.13)	(0.15)	(0.11)	0.12	0.11	0.05	(0.03)	(0.12)	(0.12)
adjustment factor																	

n.a.: not applicable

**Annex 3
Exports (thousands of US dollars) and Indices of Export Share
1990 - 1994**

	WORLD										Index of export share				
	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994	1990	1991	1992	1993	1994
1															
334	313558	164274	199066	199468	177010	87496689	85484801	76174525	75894632	74776873	3.70	2.14	2.87	2.90	1.99
2															
281	47522	43922	17354	81175	108812	7652768	8515726	7231998	6814150	6885069	6.40	5.72	2.63	13.15	13.29
287	589841	427182	470538	379246	540296	14897139	13225502	12878725	12690738	11866425	40.56	35.91	40.08	32.98	38.28
289	44786	35531	28047	7767	13234	1274844	1133263	1306500	1024146	1050074	36.24	34.86	21.87	8.37	10.60
681	590	790	76284	74801	100154	5262565	6182032	4477485	4137613	5064184	0.12	0.14	18.68	19.95	16.63
682	684042	697003	689171	649881	771675	21568862	21476167	21491238	20892411	22960792	32.71	36.08	35.18	34.33	28.25
685	48303	33309	37487	30139	40487	1276067	1074873	1077358	913393	1110939	39.04	34.45	38.17	36.42	30.64
686	129981	149384	145516	130451	141247	4240954	3226478	3830655	3454414	3567748	31.61	51.48	41.67	41.68	33.28
3															
4															
054	16701	19272	57442	35284	48467	17645064	18717104	18856709	18086433	2041243	0.98	1.14	3.34	2.15	19.96
056	31448	52229	24004	66784	70753	4636242	4977453	5228228	5003574	5674875	7.00	11.67	5.04	14.73	10.48
061	41237	33031	18448	14476	31005	12181502	10430495	10670851	10468796	10142535	3.49	3.52	1.90	1.53	2.57
071	98577	113019	70724	60075	206791	8958559	8413770	7622320	7907308	13954046	11.74	14.93	10.18	8.38	12.55
072	13048	13754	10511	11233	14050	4186423	3931052	3953332	3955319	4808642	3.21	3.89	2.92	3.13	2.46
5															
034	27511	27577	14988	43884	51834	13589280	15232724	14965019	14229297	15911625	2.09	2.01	1.10	3.40	2.74
036	32239	35643	43133	48031	83622	11291805	12174496	12581225	13098372	15975305	2.94	3.25	3.76	4.05	4.40
037	26624	19522	18910	24043	31177	5748947	6152139	6188474	6463973	7367842	4.78	3.53	3.35	4.10	3.56
081	372521	457963	347004	582754	766211	15602786	16428945	18219190	17981515	18497015	24.62	30.99	20.89	35.77	34.82
6															
263	44495	55328	18583	4577	5040	9008879	8270439	8020587	6611236	7689538	5.09	7.44	2.54	0.76	0.55
266	35842	37089	34786	32194	36778	3556826	3583796	3797097	3595649	4618029	10.39	11.51	10.05	9.88	6.70
268	12527	10207	12688	16459	24565	5722193	5256889	4994065	4047325	5290974	2.26	2.16	2.79	4.49	3.90
411	7022	12022	4656	35509	67490	1106511	1089650	1244977	1220042	1450425	6.54	12.15	4.10	32.12	39.12
7															
845	43384	52296	53658	73769	79120	25278671	28136750	30876365	29483719	31470193	1.77	2.07	1.91	2.76	2.11
846	53912	52417	57461	71303	94945	12536478	15058668	17405102	18410205	20728296	4.44	3.87	3.62	4.27	3.85
897	69071	54528	62585	67540	59456	13469249	13715626	16191629	17164851	19805480	5.29	4.42	4.24	4.34	2.52
8															
651	129555	119827	88240	65639	88907	23087523	23748031	25294256	23067215	27699385	5.79	5.61	3.83	3.14	2.70
652	39182	25765	18131	22581	26872	15559059	15992708	16633588	16350561	18424077	2.60	1.79	1.19	1.52	1.23
654	31099	44220	24933	15808	20522	8466374	8492708	8976355	8618262	9822794	3.79	5.79	3.05	2.02	1.76
9															
10															
522	19685	21310	13003	14381	19049	12708119	12515709	11920767	10309398	12240149	1.60	1.89	1.20	1.54	1.31
532	9978	9296	10340	9952	16657	579427	642290	703976	688059	727861	17.76	16.09	16.11	15.96	19.24

Annex 4

Comparator countries and index of similarities: 1974

SITC	Peru	Chile	Bolivia	Colombia	Morocco	India	Indonesia	Philippines	Malaysia	Thailand
031 fish fresh, simply preserved	0.011	0.002	0.000	0.009	0.006	0.011	0.011	0.006	0.011	0.011
032 fish etc, tinned prepared	0.003	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003
061 sugar and honey	0.103	0.000	0.021	0.052	0.003	0.063	0.000	0.103	0.002	0.086
071 coffee	0.023	0.000	0.015	0.023	0.000	0.016	0.013	0.000	0.000	0.000
081 animal feeding stuff	0.132	0.014	0.000	0.004	0.006	0.040	0.004	0.011	0.002	0.005
262 wool and animal hair	0.005	0.002	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
263 cotton	0.062	0.000	0.021	0.034	0.003	0.010	0.000	0.000	0.000	0.000
266 synthetic, regenerated fibre	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
276 other crude mineral	0.002	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.002
281 iron ore, concentrates	0.040	0.040	0.000	0.000	0.006	0.040	0.000	0.004	0.000	0.000
283 nonfer base mtl ore conc	0.167	0.053	0.167	0.000	0.043	0.009	0.012	0.155	0.004	0.014
332 petroleum products	0.012	0.005	0.000	0.012	0.006	0.005	0.012	0.006	0.012	0.008
411 animal oils and fats	0.025	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
651 textile yarn and thread	0.002	0.000	0.000	0.002	0.002	0.002	0.000	0.000	0.000	0.002
652 cotton fabrics, woven	0.003	0.000	0.000	0.003	0.003	0.003	0.000	0.000	0.003	0.003
681 silver, platinum, etc	0.054	0.004	0.000	0.000	0.000	0.019	0.000	0.020	0.000	0.000
682 copper	0.228	0.228	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.000
685 lead	0.027	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
686 zinc	0.043	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000
689 non ferr base metals nes	0.009	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
735 ships and boats	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Index of similarity	35.85%	23.68%	13.95%	8.40%	22.25%	6.77%	30.71%	3.30%	13.41%	

**Annex 4
Comparator countries and Index of similarities: 1984**

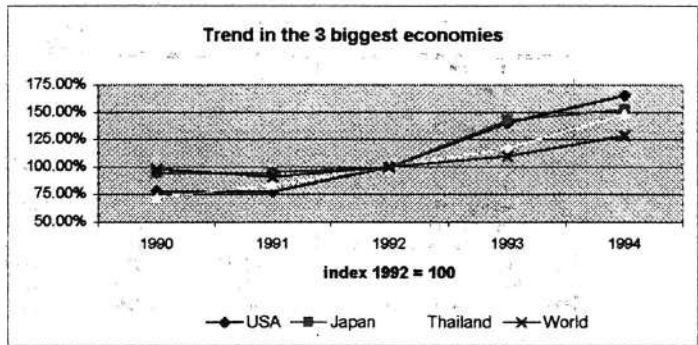
SITC	Peru	Chile	Bolivia	Colombia	Morocco	India	Indonesia	Philippines	Malaysia	Thailand
034 fish fresh, chilled frozen	0.013	0.010	0.000	0.000	0.013	0.002	0.89%	0.004	0.000	0.006
036 shell fish fresh frozen	0.013	0.010	0.000	0.008	0.013	0.013	5.75%	0.008	0.003	0.013
037 fish etc prepd, presd nes	0.009	0.009	0.000	0.000	0.009	0.000	0.00%	0.009	0.003	0.009
056 veg etc prepd, prepd	0.004	0.000	0.000	0.000	0.004	0.000	0.00%	0.000	0.000	0.004
061 sugar and honey	0.007	0.000	0.007	0.007	0.000	0.003	1.36%	0.007	0.000	0.007
071 coffee and substitutes	0.051	0.000	0.008	0.051	0.000	0.018	8.09%	0.014	0.000	0.003
072 cocoa	0.010	0.000	0.000	0.005	0.000	0.000	0.00%	0.002	0.010	0.000
081 feeding stuff for animal	0.045	0.045	0.002	0.000	0.000	0.015	6.61%	0.003	0.003	0.011
263 cotton	0.006	0.000	0.000	0.006	0.000	0.005	2.43%	0.000	0.000	0.000
266 synthetic fibres to spin	0.018	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
268 wool (excl tops) animal hair	0.002	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
278 other crude minerals	0.001	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
281 iron ore, concentrates	0.021	0.021	0.000	0.000	0.001	0.000	0.84%	0.000	0.000	0.001
287 base metal ores, conc nes	0.166	0.086	0.166	0.000	0.000	0.021	9.41%	0.000	0.000	0.000
288 nonfer metal scrap nes	0.001	0.001	0.000	0.000	0.000	0.006	2.65%	0.012	0.005	0.000
292 crude veg material nes	0.003	0.003	0.000	0.003	0.003	0.003	1.44%	0.003	0.000	0.003
333 crude petroleum, etc	0.074	0.000	0.011	0.000	0.000	0.074	33.38%	0.074	0.074	0.000
334 petroleum products, refin	0.184	0.012	0.398%	0.138	0.036	0.022	9.82%	0.050	0.026	0.005
411 animal oils and fats	0.010	0.008	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
572 explosives, pyrotechic prod	0.001	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
592 starch, inulin, gluten, etc	0.000	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
651 textile yarn	0.033	0.000	0.000	0.005	0.013	0.007	3.00%	0.001	0.002	0.011
652 cotton fabric, woven	0.017	0.000	0.000	0.009	0.003	0.017	7.74%	0.002	0.003	0.009
651 lime, cement, bldg, prods	0.000	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
681 silver, platinum	0.078	0.025	0.012	0.003	0.007	0.000	0.00%	0.000	0.000	0.000
682 copper exc cement copper	0.064	0.064	0.000	0.000	0.000	0.000	0.00%	0.022	0.000	0.000
685 lead	0.009	0.000	0.000	0.000	0.009	0.000	0.00%	0.000	0.000	0.000
686 zinc	0.045	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
697 base mt household equip	0.000	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.000	0.000
793 ships and boats	0.005	0.000	0.000	0.000	0.000	0.000	0.00%	0.000	0.005	0.000
842 mens outerwear not kit	0.003	0.000	0.000	0.003	0.003	0.003	1.57%	0.003	0.000	0.003
843 womens outerwear nonkit	0.001	0.000	0.000	0.001	0.001	0.001	0.40%	0.001	0.001	0.001
844 under garments non kit	0.002	0.000	0.000	0.000	0.002	0.002	0.95%	0.002	0.002	0.002
845 outerwear kit nonelastic	0.001	0.000	0.000	0.000	0.001	0.001	0.65%	0.001	0.001	0.001
848 headgear, nonleath clothing	0.001	0.000	0.000	0.000	0.001	0.001	0.58%	0.000	0.001	0.001
897 golds, silver ware jewelry	0.014	0.000	0.000	0.000	0.000	0.007	3.23%	0.000	0.000	0.008
Index of similarity	29.40%	20.83%	23.90%	15.39%	22.12%	18.99%	13.40%	13.94%	9.84%	

Annex 7

**Imports of SITC 248: Wood shaped, sleepers
in the 10 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
USA	3239944	3223613	4156329	5824373	6878594
Japan	2845185	2860395	2999227	4279951	4573938
Thailand	318105	362836	435836	509479	647864
Australia	353887	338788	378468	441507	441452
Rep. of Korea	182092	252305	287861	515020	462631
Singapore	169327	179697	169402	177467	190645
Saudi Arabia	89403	130879	152349	203107	206403
Hong Kong	52811	71795	104846	138303	183151
China	35467	32540	106214	167033	159898
Argentina	18230	33828	50177	56429	63898
World 1/	98.09%	91.05%	100.00%	109.86%	128.70%

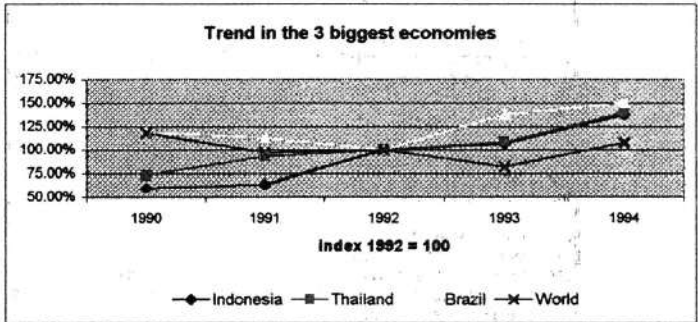
1/ Index 1992=100



**Imports of SITC 251: Pulp and waste paper
in the 5 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
Indonesia	267455	286078	446383	479007	614179
Thailand	153898	195181	208336	225879	290381
Brazil	66287	62556	55495	76404	83164
Poland	36413	42601	45372	37486	58320
Argentina	10790	40392	31170	29601	54075
World 1/	117.64%	97.33%	100.00%	82.59%	107.72%

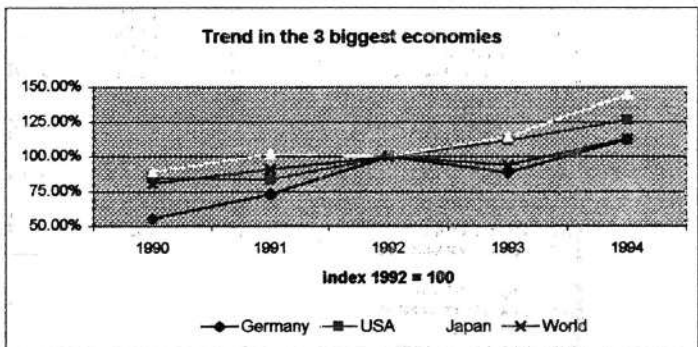
1/ Index 1992=100



**Imports of SITC 635: Wood manufactures nes
in the 10 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
Germany	1192072	1560977	2141689	1897129	2408140
USA	1125321	1107555	1324884	1477329	1670760
Japan	523436	599393	589097	672573	851880
Netherlands	320388	342763	399104	378416	449092
Austria	257424	274408	305281	310280	371425
Canada	224691	220707	251175	271944	296038
Hong Kong	135488	151318	198345	213202	263104
Denmark	76192	76987	104557	91486	119984
Rep. of Korea	36140	64079	80045	97765	134522
China	25677	34733	60811	78737	99204
World 1/	80.60%	90.82%	100.00%	93.89%	113.07%

1/ Index 1992=100

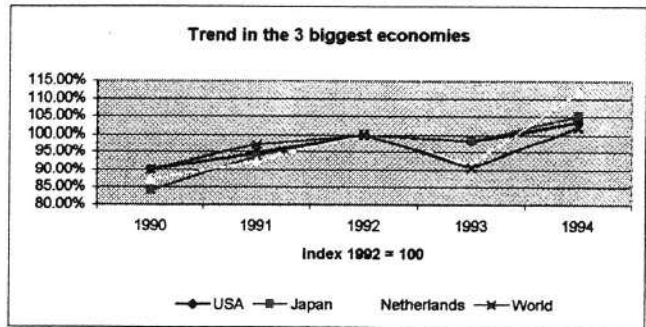


Annex 7

**Imports of SITC 057: Fruit, nuts, fresh, dried
in the 10 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
USA	2650740	2781206	2940602	2887575	3043961
Japan	1477117	1646113	1754384	1727377	1844164
Netherlands	1177736	1248295	1350568	1239994	1511270
Hong Kong	544276	644779	700908	745210	812296
Singapore	275436	324963	345936	358980	358447
India	132292	149536	218096	223338	319936
Mexico	59002	84548	144502	207466	331481
Malaysia	80545	80251	99312	118952	135163
Argentina	32097	62441	77735	111529	121075
Pakistan	27680	26353	30445	31875	39550
World 1/	90.18%	97.20%	100.00%	90.68%	102.25%

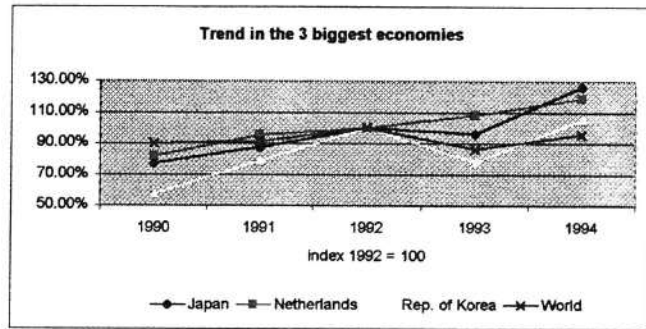
1/ Index 1992=100



**Imports of SITC 058: Fruit preserved, prepared
in the 10 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
Japan	747785	848379	969992	931900	1223696
Netherlands	552146	643624	675262	729375	802066
Rep. of Korea	95155	130706	166157	129732	174591
Singapore	117512	132461	136592	140614	151621
Finland	89351	93335	99917	90273	125879
Russian Fed.			50721	120337	218082
Mexico	32340	36924	64484	66206	104096
Malaysia	17672	19893	27361	23192	30740
Brazil	12312	13030	10576	17673	42655
Philippines	7160	6850	9926	13626	19684
World 1/	90.01%	91.25%	100.00%	86.23%	95.71%

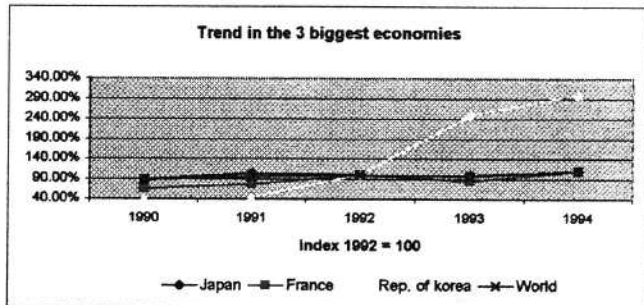
1/ Index 1992=100



**Imports of SITC 246: Pulpwood, chips, woodwaste
in the 6 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
Japan	1433802	1700411	1638198	1629802	1795580
France	28331	33221	43124	36192	47430
Rep. of Korea	11796	12173	27181	67915	81577
Austria	19075	21677	28080	26156	43220
Canada	12262	15589	23329	21922	38572
Singapore	120	226	299	362	552
World 1/	86.93%	96.26%	100.00%	97.14%	109.70%

1/ Index 1992=100



**Imports of SITC 247: Other wood rough, squared
in the 10 fastest growing demanding countries
(Thousand US Dollars)**

	1990	1991	1992	1993	1994
Canada	186271	200878	185979	202778	258183
Turkey	123912	131445	142038	304864	148095
United Kingdom	60842	56830	56222	91680	104197
USA	47874	40334	58153	89550	116075
Israel	42665	40895	39991	41465	51686
Mexico	6936	15543	21847	16408	21270
Egypt	13873	14230	18048	17879	30467
Ireland	4806	8448	7001	10896	14454
Malaysia	1723	4707	8729	12453	20442
Pakistan	3775	4107	6242	7890	8127
World 1/	102.27%	96.69%	100.00%	108.24%	108.52%

1/ Index 1992=100

