THE FIRST PROGRESS REPORT FOR THE STUDY RELATED TO THE REGIONAL DEVELOPMENT PLAN OF THE GREAT CARAJAS PROGRAM OF THE FEDERATIVE REPUBLIC OF BRAZIL

Vol. 1
SUMMARY AND CONCLUSION

NOVEMBER 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

It is with great pleasure that I present this report entitled "The First Progress Report for the Study related to the Regional Development Plan of the Great Carajas Program of the Federative Republic of Brazil", which was made in response to the request of the Government of Brazil to the Government of Japan.

This report embodies the results of a study on international competitiveness and long-term prospects of forty-one agricultural and mining commodities, which was conducted by a team dispatched by the Japan International Cooperation Agency (JICA) to U.S.A., Europe, South America and Southeast Asia during the period from October 1982 through March 1983.

JICA dispatched Brasilia a study team headed by Dr. Saburo Okita in July 1983 to have a series of discussions on the Draft First Progress Report with the officials concerned of the Government of Brazil. In September 1983, a Brazilian mission visited Tokyo for further discussion.

JICA, based on these discussions, formulated the First Progress Report.

I hope that this report will be useful for development of the Great Carajas Program.

I wish to express my deep appreciation to the officials concerned of the Government of the Federative Republic of Brazil for their close cooperation extended to the Japanese team.

November 1983

Keisuke Arita

Keisuke Arita
President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

November 15, 1983

His Excellency Mr. Keisuke Arita
President
The Japan International
Cooperation Agency
Shinjuku Mitsui Bldg.
Nishi-Shinjuku 2-1
Shinjuku-ku, Tokyo
Japan

Dear Mr. President:

I have the honor to submit to you the First Progress Report for the Study Related to the Regional Development Plan of the Great Carajas Program of the Federative Republic of Brazil, as provided for in the Scope of Work of February 4, 1982 agreed upon between the Japan International Cooperation Agency (JICA) and the Executive Secretariat of the Great Carajas Program (SE/PGC).

The Report was prepared during the past one year by the Study Team organized by the International Development Center of Japan. It comprises 4 volumes, i.e. Vol.1, Summary and Conclusion; Vol. 2, Agricultural Products (Part I); Vol. 3, Agricultural Products (Part II); and Vol. 4, Mining Products.

Throughout the preparation of the Report, the members of the Study Team benefited a great deal from assistance and cooperation extended to them by various quarters. I wish to put on record our sincere gratitude to all those concerned for their kind cooperation, in particular to the officials and experts of the JICA and other authorities concerned of the Government of Japan, overseas research institutions on commodities which the Study Team visited, as well as the Executive Secretariat of the Great Carajas Program of the Government of the Federative Republic of Brazil.

It is our earnest hope that the Report will serve as a useful basis for planning the development of the Great Carajas Region.

Yours sincerely,

Saburo Kawai
President
International Development
Center of Japan

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MEMBERS OF THE STUDY TEAM

NAME	SPECIALITY
OKITA, Saburo	Team Leader
YAMASHITA, Mitsugi	Deputy Team Leader/Development Planning
SHIRASU, Takashi	Quantitative Analyst: Project Coordinator
MOTOHASHI, Kaoru	Senior Agricultural Economist
KUROKO, Takeo	Senior Mining Development Expert
TAKEBE, Noboru	International Economist
KOHAMA, Hirohisa	International Trade Expert I
NAGAMATSU, Takayoshi	International Trade Expert II
NAMURA, Niro	Wood Product Expert I
SATO, Junichi	Wood Product Expert II
MISAWA, Seihei	Wood Product Expert III
OHTO, Motonaga	Oilseed Expert I
FUKUSHIMA, Takato	Oilseed Expert II
SUZUKI, Yoshihiro	Oilseed Expert III
KUBOTA, Ryoji	Industrial Crops Expert
YAMAMOTO, Kakuya	Feedstuff Expert
YOSHIHARA, Kiyoshi	Beef Expert
YAMAZAKI, Kinichi	Tropical Fruits Expert
NISHIYAMA, Satoru	Ethyl Alcohol Expert
HORI, Tsutomu	Cotton Expert
TAKEOKA, Masayuki	Rubber Expert
MATSUO, Yoshiro	Aluminum Expert

NAME	SPECIALITY
OHMURA, Keigo	Alumina Expert
KAWASHIMA, Kiyohiro	Bauxite Expert
TAKAYAMA, Michio	Nickel Expert
HAGIWARA, Shunji	Cobalt Expert
OTSUKA, Taheiji	Manganese Expert
NOMURA, Hisao	Copper Expert
OKADA, Yuji	Tin Expert
TODA, Hiromoto	Pig Iron and Semi-finished Steel Expert

SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

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SUMMARY AND CONCLUSION

I. INTRODUCTION

The objective of the present study project is to make a contribution toward the formulation of a regional development plan for "the Great Carajas Program" area in Brazil, based on "the Scope of Work for the Study Related to the Regional Development Plan of the Great Carajas Program of the Federative Republic of Brazil" as agreed upon between the Japan International Cooperation Agency (hereinafter called JICA) of the Japanese government and the Executive Secretariat of the Great Carajas Program (hereinafter called SE/PGC) of the Brazilian government on the 4th of February, 1982. The project consists of a series of studies separately or jointly undertaken by JICA and SE/PGC, aiming at identifying agricultural and mining commodities which can be produced in the Study Area for exportation, through the examination of economic, technical and financial feasibilities.

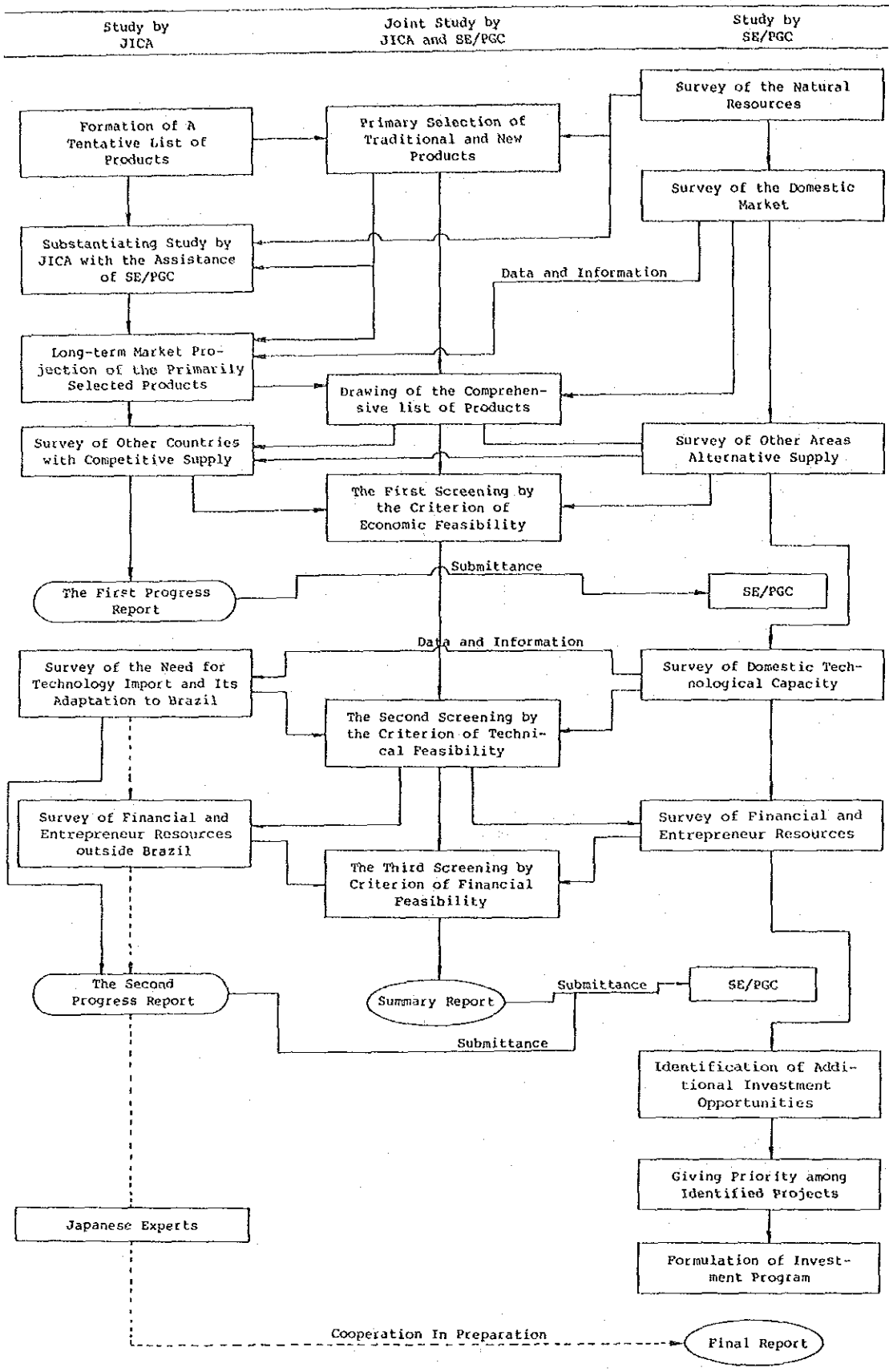
The present report is the result of the first-year study (hereinafter called the Study) undertaken by JICA, which corresponds to the part up to the First Progress Report shown in the flow chart (Fig. I-1).

The objective of the First Progress Report (hereinafter called the Report) is to assess export possibilities of traditional and new products to be produced in the Study Area. Specifically, the Study aims at analyses of external conditions of Brazil such as historical and present conditions of world demand and supply and international trade, supply capacities, technological levels, productivities and other factors in major producing countries, and long term prospects of international demand and supply for the respective products.

Export possibilities of the respective products are assessed in this Study vis-a-vis macro international market conditions and outlooks, and accordingly tentative and general in orientation. Therefore, the findings of the present Study must be considered complementary to a series of studies by the Brazilian side which examine natural resource endowments of the Study Area, domestic market conditions, other areas of alternative supply within the country and other relevant domestic factors to assess export possibilities.

The Report consists of four volumes. Volume 1 presents summary and conclusion, and the methodology used in the Study. Volumes 2 and 3 are devoted to agricultural products, and Volume 4 to mining products.

Fig. I-1 Flow Chart of the Studies to be executed by JICA AND SE/PGC



Source: Minutes of Discussion Dated 30 April, 1982

II. METHODOLOGY OF THE STUDY

II-1 Products to be Studied and Depth of Study

Products under study number forty-one, consisting of twenty-eight agricultural products and thirteen mining products as shown in Table II-1. Twenty-eight agricultural products are classified into eight groups: oilseeds group (nine products), feedstuff group (three products), ethyl alcohol group (two products), industrial crops group (four products), cotton, wood products group (five products), beef, and tropical fruits group (six products).[1)]

There are some cases in which the same product is analyzed separately in more than one group indicated in the list of Table II-1. For instance, soybean and maize (corn) are both included in the oilseeds group as well as in the feedstuff group, while cassava is examined in the feedstuff group (as cassava pellet) and in the ethyl alcohol group. Including these products which belong to more than one group, the cumulative number of agricultural products to be studied becomes thirty-one.

In terms of the depth of study, agricultural products are classified into those for detailed study and others. Products subjected to detailed study are fourteen in number: soybean, babassu palm and oil palm in the oilseeds group; soybean meal, maize and cassava pellet in the feedstuff group; cassava and sugar cane in the ethyl alcohol group; rubber in the industrial crops group; and five products in the wood products group.

Mining products are classified into three categories: bauxite, alumina and aluminium which are subjected to complete study (Level A); nickel, ferro-nickel, cobalt, ferro-manganese and copper concentrate subjected to intermediate level study (Level B); and manganese ore, tin, copper, pig iron and semi-finished steel subjected to indicative study (Level C). In addition to the products listed above, a study of manganese nodules is undertaken and its findings are attached as the Annex to the chapters on nickel and cobalt of Volume 4.

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1) Cashew juice, which is listed as cashew nuts and juice in the tropical fruits group, is omitted in this Study due to the lack of data.

Table II-1 List of Products to be Studied

Agricultural Products

1. OILSEED
   - *Soybean
   - *Babassu-palm
   - *Dende-palm
   - Peanut
   - Cottonseed
   - Sunflowerseed
   - Corn (Maize)
   - Coconuts
   - Castorseed

2. FEEDSTUFF
   - *Soybean
   - *Maize
   - *Cassava-pellet

3. ETHYL ALCOHOL
   - *Cassava
   - *Sugarcane

4. INDUSTRIAL CROPS
   - *Rubber
   - Pepper
   - Guarana
   - Brazil Nuts

5. FIBER
   - Cotton

6. WOOD
   - *Sawnwood
   - *Lumber
   - *Plywood
   - *Charcoal
   - *Chips

7. CATTLE
   - Beef

8. TROPICAL FRUITS
   - Cashew Nuts and juice
   - Banana
   - Papaya
   - Melon
   - Pineapple Juice
   - Passion-fruits Juice

Note: (*) Shows products to be analyzed in detail.

Mining Products

1.	Bauxite	(A)
	Alumina	(A)
	Aluminium	(A)
2.	Nickel	(B)
	Cobalt	(B)
	Ferro-nickel	(B)
	Ferro-managanese	(C)
	Manganese Ore	(C)
3.	Tin	(C)
4.	Copper	(C)
	Copper Concentrate	(B)
5.	Pig Iron	(C)
	Semi-finished Steel	(C)

Note: (A) Complete Study (B) Intermediate Level Study
(C) Indicative Study

Source: Minutes of Discussion Dated 30 April, 1982

II-2 Outline of the Methodology

II-2-1 General

The products to be analyzed in this Study vary widely in their inherent characteristics. As noted in the Summary and Conclusion of Agricultural Products, for instance, some products are highly mature as internationally traded commodities, while others are not. Basic statistics on production, trade and other relevant information are more readily available for the former, while they are nearly absent or extremely inadequate for the latter due to the limited number of producing countries, small volume of trade, transportation constraints, etc.

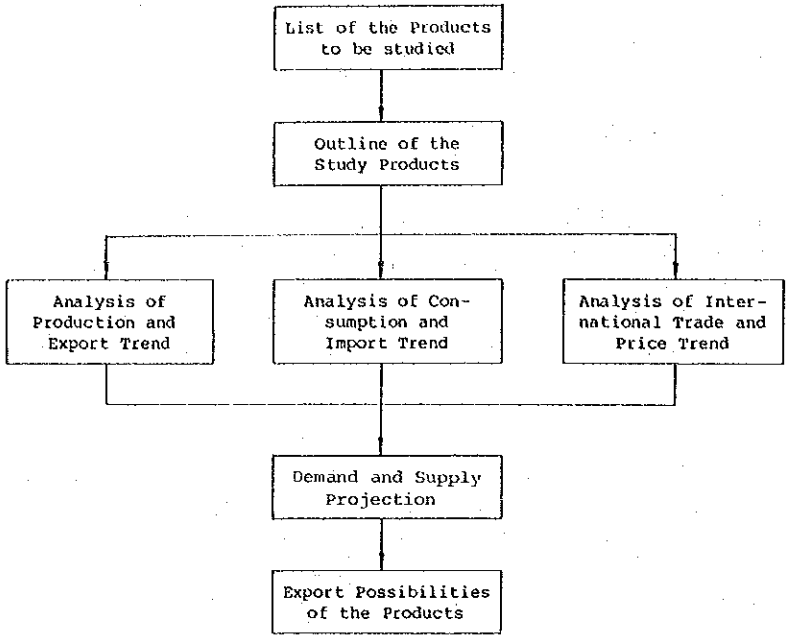
From the analytical point of view, it is needless to say that approaches vary to some extent from one commodity to another. Products such as those in the oilseeds group which are highly interchangeable should be analyzed in relation to their substitutability. In other cases, factors such as consumers' tastes or occurrences of diseases may greatly affect international trade flows.

Therefore, the approach outlined below should be regarded as only indicative of the general methodology. A certain amount of variation will be observed among individual commodities due to the differences in study depth, inherent characteristics of the commodities, availability of statistical data, maturity as internationally traded commodities, etc.

The general framework of the study for each product or product group is as follows: 1) an outline of the properties of the product; 2) analysis of the historical trend in production and export; 3) analysis of the historical trend in consumption and import; 4) analysis of the historical trend in international trade and prices; 5) projections of international demand and supply; and 6) a tentative conclusion on export potentials. Interrelationships of these study components will be given in Fig. II-1.

It should be noted that the emphasis of this Study is placed on the comprehensive evaluation, to the extent possible, of export potentials through the analysis of these study components.

Fig. II-1 Major Study Components in the First Progress Report



II-2-2 Outline of Products to be Studied

A brief introductory note on product characteristics is given at the outset of the analysis of each product or product group, and the statistical criteria are also indicated for product classification as used in the analysis.[1)]

As for agricultural products, reference will be made to their inherent characteristics, similarity or difference in chemical composition of processed products as typically shown in the oilseeds group, major uses defined by these characteristics, interdependence or interchangeability among major uses, etc.

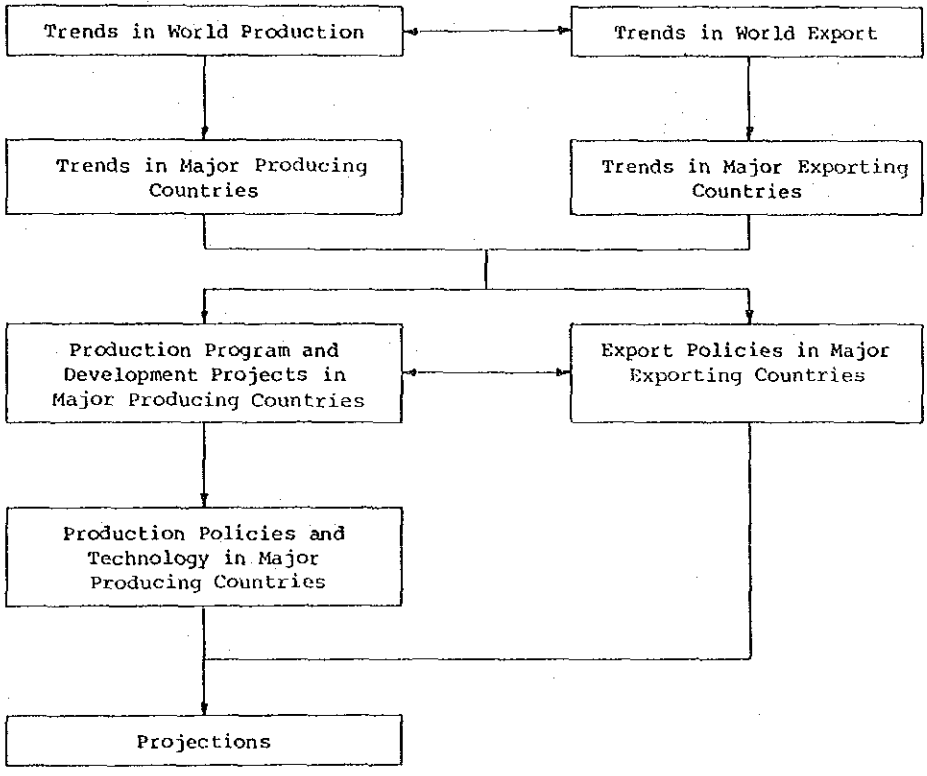
Mining products will be referred to the following factors: namely, properties of the product, kinds of ore, geographical distribution of mineral deposits, outline of production technologies with regard to mining and refining, major uses and forms of utilization, etc.

1) Special care is needed in terms of statistical classification for the wood products group and for pig iron and semi-finished steel.

II-2-3 Analysis of Production and Export Trends

Major study items and the approach employed for the analysis of production and export trends are shown in Fig. II-2. In this part of the Study, the emphasis is placed on the analysis of historical trends such as world total production, production in major producing countries and/or regional blocs, levels of productivity, total volume of world exports, export volumes of major exporting countries from 1965 to the most recent year for which statistics are available.

Fig. II-2 Major Study Items in the Analysis of Production and Export



In order to derive future outlooks of supply, it is important to note whether world production has a tendency to concentrate in a limited number of major producing countries or to disperse over many countries. Factors which have been influencing changes in relative positions among major producing countries are analyzed.

In quite a number of products under study, major producing countries are at the same time major exporters. In such cases, a change in the relative position of major producing countries in the world production is quite often related to a change in the relative position of major exporting countries in the world export. In this regard, attention is given to the identification of newly emerging exporting countries which have increased their exports at a relatively high rate in recent years. Two different forms of exports are distinguished: namely, agricultural or mining products traded as raw materials and commodities traded after processing in producing countries. The ratio of raw materials export to processed export varies widely by product and by exporting country. The Study also focuses to the extent possible on structural features of the forms of exports and factors which influence these structural features.

With regard to major producing countries, an attempt is made to collect the newest information on factors such as production programs, major development projects, incentive and/or adjustment policies.

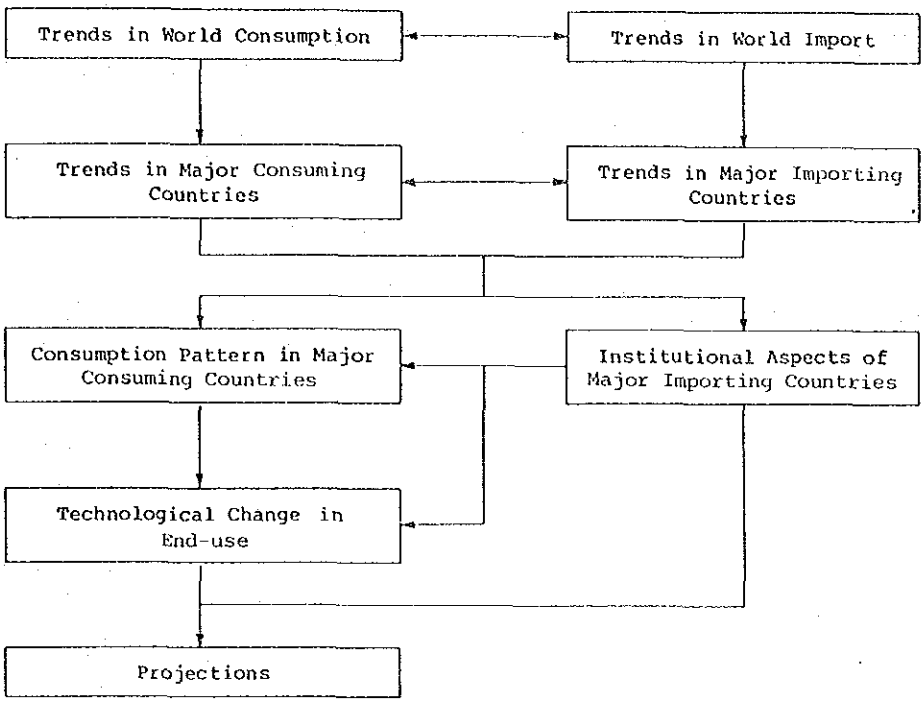
In the case of agricultural products, particular attention is given to inherent characteristics of each product. For mining products, studies are conducted on recent technological innovations and their impacts on production. Comparison of production costs is made by assuming some appropriate cost models. Also, with regard to several leading producers of some mining products, transition of roles and functions of such "majors" is also studied to the extent possible.

II-2-4 Analysis of Consumption and Import Trends

The approach and major study items employed for the analysis of consumption and import trends are indicated in Fig. II-3. In principle, as in the case of production and export trend analysis, studies in this part are carried out by using time series data on consumption and imports from 1965 to the most recent year. Efforts are made to discern trends and characteristics of world total consumption, and consumption in major consuming/importing countries and/or major regional blocs. Efforts are also made to ascertain whether the consumption pattern of each product has a tendency to concentrate in a small number of consuming countries or to disperse over many countries. Statistical data on consumption is, however, not available for many of the agricultural products under study. Therefore, consumption figures are estimated by adding import to domestic production and subtracting export.

With regard to the analysis of import trends, attention is given to changes in the relative positions of major importing

Fig. II-3 Major Study Items in the Analysis of Consumption and Import



countries, or their shares in the total world imports. Historical trends are also examined for major importing countries. The distinction between raw materials import and processed import is hard to generalize, because commodities under study have different properties for processing and merchandising. However, efforts are made to discern characteristic changes in the patterns of trade by analyzing time series data on each importing country.

With regard to major consuming countries, relationships between the levels of consumption and some basic socio-economic indicators such as population and gross domestic product (GDP) are examined. In this connection, it should be noted that effects of the first and second oil crises in 1973 and 1979 and subsequent world economic recession on international commodity trade, especially effects of the sluggish demand for capital goods in slowing down the demand for mining products, are examined in detail as far as possible. For agricultural products, reference is also made, when considered relevant, to the unusually tight international market situations as observed around the first oil crisis and to the slump in demand influenced by the world recession.

Since many of the agricultural products under study are final consumption goods, changes in consumer preferences and consumption patterns are carefully examined. In the case of mining products, because they are mostly used as intermediate goods in the production process of capital goods or final consumption goods, changes in the pattern of major end uses is carefully studied for each major consuming country. In this connection, analysis is also directed to such factors as changes in utilization technology, changes in sectoral demands due to substitution by other metals or materials, and effects of recycling.

From the institutional point of view, reference is made, to the extent possible, to such factors as import duties and taxes, import quotas, protection measures from import competition, and price supports.

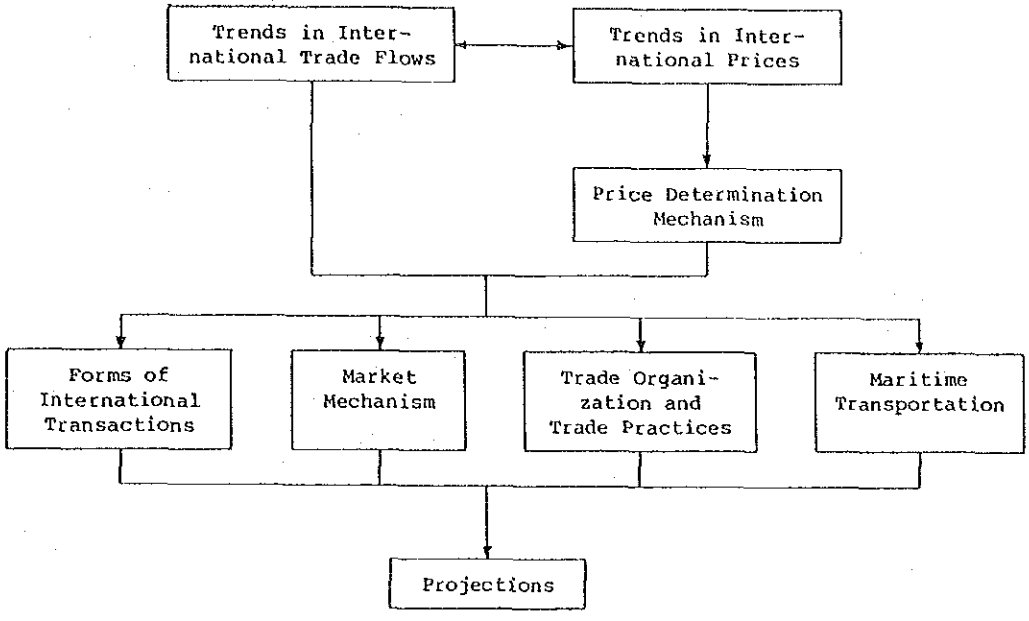
II-2-5 Analysis of International Trade and Price Trends

In the analysis of international trade, an attempt is made to quantitatively delineate historical trends of trade between major exporting and importing countries. Although matrices of international trade flows over a long period are necessary to analyze historical trends, time series statistics are inadequate or unavailable for many products under study. Therefore, it is attempted to delineate changes in trade structure between two points of time based on statistics of import and export between major exporting and importing countries.

Tendencies toward concentration or diversification among producers or consumers may be discernible in international trade patterns among developed countries, developing countries and centrally planned economy countries. An attempt is made to examine factors which have been influencing trade patterns for major products, as schematically shown in Fig. II-4.

International market prices are examined as indicators of international market situations, and the mechanism of international price formation is studied to the extent possible for major products. For instance, the study touches on functions of the Chicago Board of Trade in the case of agricultural products and producers' prices and international market prices at LME and COMEX in the case of mining products. Institutional factors play an important role in determining market prices: for instance, the International Tin Agreement, CIPEC in the case of copper, also international study groups between consuming and producing countries, and other bilateral and multilateral trade agreements. In the case of manganese for which there are no international market quotations, prices are estimated from the transactions between producers and consumers.

Fig. II-4 Major Study Items in Analysis of Trade and Prices



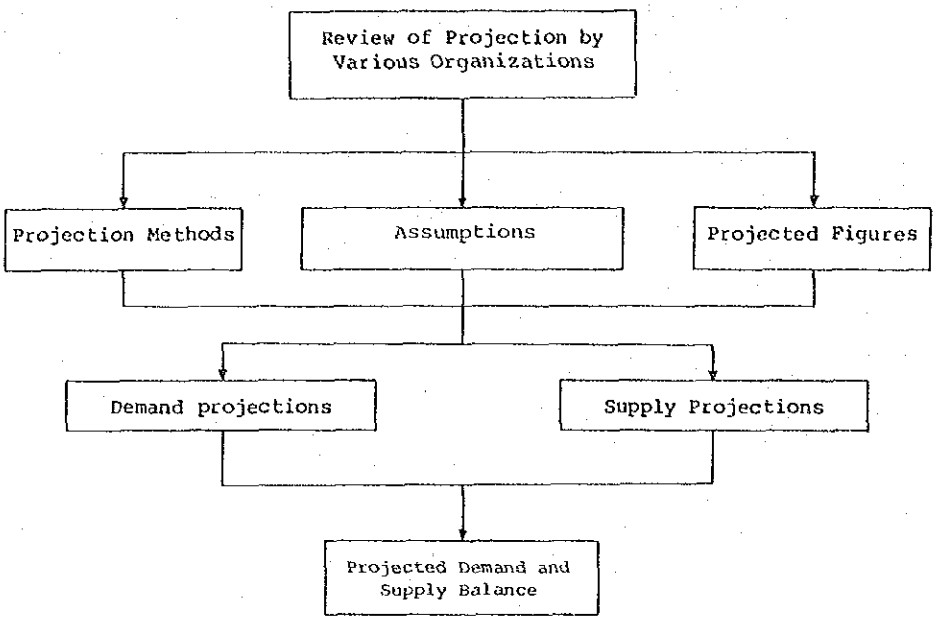
Besides the international commodity agreements and contracts, reference is made to organizations which practice international trade: e.g., multinational corporations, trading companies, producers' associations, exporters' associations, and governmental agencies in charge of trade.

Some agricultural and mining products require bulk transportation due to their inherent characteristics. Some products are transported by special vessels like cold storage ships or by container ships. Accordingly, reference is made to maritime transportation concerning methods of transportation, freight, innovations in transportation technology, etc.

II-2-6 Demand and Supply Projections

The approach used in the demand and supply projection is indicated in Fig. II-5. An attempt is made to review projections undertaken by various international organizations, government agencies of developed countries, private research institutions, etc. The review examines methods used in projection, assumptions and projected figures. Subsequently, demand and/or supply projections by the Study Team are undertaken by taking note of properties of the

Fig. II-5 Major Study Items in the Projection



respective products.[1] Demand and supply balances are also projected.

For agricultural products, the projections which are selected for review are, for example: Agriculture: Toward 2000,[2] by Food and Agricultural Organization of the United Nations (FAO); World Forest Products: Demand And Supply; 1990 and 2000, by FAO; a series of projection models for oil crops and grains (cereals) by the U.S. Department of Agriculture (USDA); and a series of projections for oil crops and other agricultural commodities by the World Bank. In

1) Projections are not undertaken for some products due to the lack of data.
2) The FAO projections are made basicaliy according to three scenarios for 90 developing countries: the trend scenario is based on an extrapolation of past trends in production and consumption of agricultural products; the optimistic scenario is based on the hypothesis that the developing countries will achieve the overall economic growth objective of the new UN International Development Strategy (IDS) and substantially improve their agricultural performance; and the medium growth scenario is based on more modest growth rates of agriculture and overall economy.

the case of mining products, projections are usually made by producers' association and/or private research organizations. An exception is the U.S. Bureau of Mines (USBM) which undertakes projections for selected mineral resources. An example of the long-term projections by producers' associations is that of pig-iron by the International Iron and Steel Institute (IISI). Besides, projections by the World Bank are also reviewed.

Besides reviewing various projections listed above, the Study Team interviewed experts in charge of projection in various international organizations concerning recent trends and future outlooks of international markets for the products under study. The Study Team uses the obtained information to make qualitative adjustments on the quantitative projections which more or less tend to reflect historical trends. In making demand and supply projections, efforts are made to utilize most appropriate methods by taking into full account the characteristics of products and the availability of data. For some products, only demands are projected in this manner. In the case of mining products, supply projections are undertaken by noting the newest information on present operations, expansion plans and new development projects of the world's major mines and refineries. There are several agricultural commodities such as oil palm and rubber for which future outlooks of supply are derived from experts' judgments based on the newest informations concerning development programs and projects in major producing countries.

Projected growth rates of population and/or gross domestic product (GDP) are applied in the case of some products. As for population growth, projections by the World Bank for 125 countries [1] are employed in this Study as shown in Annex Table 1. As for GDP growth, three sets of projections are used, i.e., high growth, medium growth, and low growth up to the year 2000. Because major consuming countries or regional blocs vary by product, it is necessary to project GDP growth rates for as many countries as possible. The present Study employs the GDP growth rates projected in The Global 2000 by the United States Government. However, the base year for The Global 2000 was 1975, and the actual GDP growth rates between 1976 and 1980 were found to deviate from the projected figures. Therefore, it was decided to use 1980 as the base year for projection in the present Study, employing the growth rates projected by The Global 2000 for the 1980s and 1990s.[2] In addition, the medium growth projections by The Global 2000 are adopted for developing countries and centrally planned economy countries during the period of 1980 ~ 1985, by taking into account the current world economic environment after the second oil crisis (See Annex Table 2). Annual GDP growth rates for developed countries in the first half of the 1980s are adjusted

1) World Bank, World Development Report 1982.
2) Actual GDP figures in 1980 for planned economy countries are not known.

in some cases, by noting the actual figures for 1981, estimates for 1982 and projections for the rest of the years in the 1982 December issue of Economic Outlook by OECD.

The projected figures of demand and supply in this Study in the manner mentioned above should not be considered definitive. Rather, they should be regarded as one of the pointers with which to make comprehensive evaluation of production and export possibilities.

II-2-7 Export Possibilities of Products under Study

Based on the examination of various relevant factors, export potentials are evaluated for the respective products. Because the evaluation in this Report is mainly based on macro level conditions external to Brazil such as trends and outlooks in world markets, it is tentative and general in orientation. Therefore, the findings should be complemented by the studies of Brazilian domestic conditions such as natural resource endowments in "the Great Carajas Program" area and relative advantages of the area against other regions of Brazil in producing the respective products under study. The Study also suggests some measures necessary for effective merchandizing of the products in international markets.

III SUMMARY AND CONCLUSION OF AGRICULTURAL PRODUCTS

A total of 28 agricultural products are the object of this Study. Due to such factors as the trend of the world economy in recent years, the demand and supply for most of these products will be either balanced or moderately soft. Because the number of products is large, the trends for individual products is described separately for each. Although it is necessary, needless to say, to consider the outlook for the world's demand and supply balance when analyzing external factors influencing the export potential of Brazilian products, this alone is not sufficient. In order to be able to realize export potential, study of a number of other factors is necessary. For details on what is required, reference should be made to the chapter devoted to each product, but here special attention is given to several aspects of commercial characteristics common to two or more products. These common characteristics are derived from the analyses of individual products, and give some points of considerations in assessing the export potential of these products.

First of all, there is the matter of the stage of maturity of the individual products as commodities in international trade. Soybean (including its products), palm oil, and rubber are typical products which are extremely mature as international commodities as shown in their high export ratios (ratio of world export volume to production). For products such as these, price competitiveness is the decisive factor determining success in export markets.

As examples of products which are not mature, mention may be made of (1) products such as guarana and Brazil nuts, which at present are produced in specific, limited regions, and (2) products such as melons, papayas and other fresh fruit, and charcoal, which in general may not sustain relatively high transport costs as compared to their unit value.

For these products, high productivity is of fundamental importance, but at the same time with regard to such products as belong to the first of these two categories, it is also necessary to make efforts to have the products accepted in world markets as well as to attain stable supply capability, on behalf of buyers of the product. And in the case of products in the second category, what is necessary is development of new uses which makes it possible for the products to bear the high cost of transportation, or technical innovation and other changes in the methods of transportation used.

The second point is that of competition and substitution. First, among the products which were included in the scope of this study, there are many for which there are competitive products and potential for substitution by products which belong to the non-agricultural category (especially petroleum products). Examples of these are rubber, cotton,

alcohol made from sugar cane and cassava, as well as castorseed oil, and some wood products. Second, there is considerable competition and substitution even among agricultural and forestry products. Technological advances have increased the interchangeability in use of oil seeds of various kinds, and different kinds of feed may be readily substituted for one another.

For products such as these it is essential not only to have price competitiveness but it is also highly important to develop specific uses inherent in the products. Moreover it should be recognized that further advance in technology will increase the competitiveness and substitutability of products of this type.

Further, there are some cases where large quantities of two distinctly different products ("joint products") may be obtained from one product used as the raw material. Examples are soybean meal and soybean oil obtained from the soybean, cotton and cottonseed oil from the seed cotton, and corn starch and corn oil from the corn. There are several matters to be given attention to in regard to products such as these, and their related products. Production of cottonseed oil is greatly dependent on conditions influencing cotton production, to give an example, or, if demand for soybean meal is strong, the price competitiveness of soybean oil to other oils will be influenced due to the increased production of soybean oil which is a joint product of soybean meal, to give another example. Also, depending on conditions of supply of a product for other than the main use of the product, the price competitiveness of the product is subject to change. Specifically, in the case of babassu, at present only the kernel of the nut is being commercially used, as a source of oil, but if other parts of the nut can be commercialized, the price competitiveness of babassu oil can be greatly increased.

The third point is one of preferences. Demand for agricultural products is greatly dependent on traditional dietary and other preferences. Strong preference for peanut oil in India or that for sunflowerseed oil in the USSR and the like are created by long-standing traditions of domestic production. There is also a high level of domestic consumption, largely supported by imports, as in the case of a strong preference for peanut oil in France or a strong preference for cottonseed oil in Egypt. When consideration is made of exporting products to countries such as those, to substitute for traditionally preferred products, special care must be taken in the evaluation of price competitiveness.

Fourth, there is the matter of protection against harmful pests and diseases. One of the examples is the structure of beef trade; import and export flows of fresh beef show the distinction between countries where foot-and-mouth disease exists and those where it does not. In the case of fruit as well, due attention must be paid to improve measures for preventing pests and diseases in promoting export of such products.

Fifth, there is the matter of attaining certain quantitative levels of export volume and stable supply to the world markets. This is important regarding unit transportation cost, and maintaining continuity in sales. As in the case of cashew nut, unless a stable supply of a certain volume to the world market is assured, it will be replaced by other commodities, leading to the danger of loss of international marketability.

Sixth, there is a question regarding the interaction with domestic demand. There are times when overseas demand changes irrespective of the wishes of the exporting country. It is thought to be desirable to develop export products with a certain level of domestic demand, in order to cushion the effects of fluctuations in external demand on the domestic economy, as well as to better stabilize and expand exports.

Finally, there are some specific problems which exist with regard to forestry and wood products. Apart from the current demand and supply it is also necessary to consider the implications of the long-term outlook for the natural resource endowments. It is also important to give attention to the question of protection of the environment.

These points all deserve attention when studying export potential of agricultural and forestry products, in addition to the usual subjects relating to the demand and supply of the products. Needless to mention, it is necessary in connection with any export product to collect and analyze information relating to import policies, production policies, etc., in other countries.

In the following sections, main points of the individual products will be summarized.

III-1 Oilseeds

III-1-1 Palm Oil

World production of palm oil has grown at a high rate, and reached the level of 5.05 million tons in 1980. Because most of this is exported (about 3.8 million tons in 1980), palm oil occupies an important position, as in the case of soybean oil, as a vegetable oil in world trade.

Increase in Malaysia's production has been particularly rapid since the start of the 1970s. Production in Africa, conversely, has been steady or has tended to decline. In the future it is expected that Southeast Asian production, primarily that in Malaysia, will continue to increase.

Consumption also has expanded, and it is thought that future increase in palm oil demand will be primarily in the developing countries. Per capita consumption of vegetable oil in developed countries has already approached the saturation point. Also, because demand for soybean meal is high and supply of soybean oil seems to increase consequently, growth of demand for palm oil will be restrained accordingly in developed countries.

According to the long-term projections made as part of this Study, the demand-supply balance will become tight after 1990. This is to a large measure due to the method of projection in which new plantings that had been effected by the end of the 1970s or new plantings and varietal improvement plans that started after 1980, are not fully taken into acoount, and consequently, supply projection becomes underestimated.

Regarding the world demand and supply outlook, much depends on the trend of demand as influenced by income in developing countries, price competitiveness with soybean oil, and development of new uses, but on the whole the chances that a supply shortfall will occur seem to be small.

When considering under these circumstances an increase in the production of Brazilian palm oil for exportation, since great advances have already been made in establishing palm oil as an international oommodity, it should be remembered that success in exporting palm oil will be mainly determined by price competitiveness. It is of course necessary to invest in road construction, improvement of infrastructure, land clearing and preparation, planting, and construction of processing facilities as well as to relocate a work force when necessary, in order to develop oil palm resources. In the Carajas region, vast areas favorable for cultivation of the oil palm are said to exist, but in order to obtain adequate competitiveness in international markets for palm oil produced there, it is important to perform adequate studies on identification of the land which, due to social and economic factors, in addition to its appropriate agronomic oonditions, will yield the highest return on investment, and on the method of production management. It will be desirable to favor concentration of production in a limited number of locations rather than to adopt decentralized production at a larger number of locations. If price competitiveness can be attained, it will be possible to take advantage of being relatively close geographically to Africa and developing countries elsewhere which have experienced an rapid increase in demand in recent years.

III-1-2 Coconut (Copra and Coconut Oil), Palm Kernel (Oil) and Babassu Kernel (Oil)

Coconut oil, palm kernel oil and babassu oil are classified as

lauric oils and because their characteristics are very similar, they have almost the same uses and there is a high degree of substitutability among them. World production in 1980 was 2.78 million tons of coconut oil, 630,000 tons of palm kernel oil, and 150,000 tons of babassu oil. Coconut oil thus has by far the largest share in this group.

Copra, as a raw material for coconut oil, and coconut oil have been traded in world markets but in recent years performance of oil extraction in producer countries has increased, thereby decreasing the volume of copra in world trade. Coconut cultivation is widely practiced throughout the tropics, but the Philippines has a dominant position as supplier to world markets.

There is some exportation of palm kernel as well as palm kernel oil.

Interchangeability in use of coconut oil and palm kernel oil is high and prices for the two oils have been approximately equal during the past 10 years, the average price of coconut oil has been $584/ton and that of palm kernel oil has been $599/ton).

It is expected that in the future both production and consumption of coconut oil will moderately increase. Because production of palm kernel is expected to increase as a consequence of increased production of palm oil, the price of palm kernel oil will tend to decline, and will influence the price of coconut oil.

Regarding consumption of coconut oil and palm kernel oil in the future, it is expected that there will not be any appreciable increase in use for cooking but if the price declines, by becoming competitive with certain petrochemicals, it is possible for industrial demand to increase.

Babassu kernel oil is obtained from the fruit of the babassu palm, which grows wild throughout much of the Carajas area. Because its properties resemble those of coconut oil and its uses are almost the same as those of coconut oil, its export potential depends on competitiveness with coconut oil and palm kernel oil.

Production of babassu kernel oil at present is done by primitive and labor intensive methods as in the case of collection of the fruit, opening of the fruit, and crushing.

It is important in assessing the export potential of babassu kernel oil and other babassu products to see to what extent improvements will be made in the efficiency of collection system and the expansion of collection areas through road improvement and other transportation related measures, mechanization of the opening of nuts, and obtaining other products such as activated charcoal from

the nuts so to make unit production cost of babassu palm products lower.

Production of coconuts in major producing regions is greatly influenced by typhoons, which imparts an element of unstability to the supply of coconut oil to world markets. In this respect success in establishing stability in the supply of babassu kernel oil would be an advantage in developing the market.

III-1-3 Soybean

The soybean accounts for about half of total world production of oil seeds. About 30% of total production is exported and this is the most important oil-bearing seed in world trade.

World production grew at the high rate of 7% per annum during the 1970s, and reached 80.90 million tons in 1980. The United States is the largest producer and accounts for about 60% of world production. Countries where production has grown at a rapid rate are Brazil and Argentina.

World demand for soybean shows a pattern of steady growth which has been supported by increased consumption of soybean meal as feedstuff in Japan, Western Europe and the United States, and of fats and oils in connection with dietary improvements in developing countries as well as, in recent years, increased demand for soybean meal for use as feedstuff in the centrally planned economies.

Regarding soybean oil, world production has increased at a high rate up to the present time, and reached the level of 13.4 million tons in 1980. The volume of world trade in soybean oil in 1980 was 3.3 million tons, which was one-third of total vegetable oil trade.

Major exporters are Brazil, the United States and the European Community. Among them, growth of Brazilian exports has been notable. Major importers are some developing countries such as India, Iran, Pakistan, etc., as well as the European Community.

Soybean production is expected to increase in line with increase in demand for soybean meal and other soybean products, and there will be no change in the position of the United States and South America as the major sources of supply.

Hereafter, in keeping with increases in crushing, production of both meal and oil will increase; because demand for meal will continue to be high, and supply will be short, a slight surplus of supply of oil is projected. As a result of this situation, the price of soybean oil may tend to fall, enabling it to substitute for

other oils, and thus leading to increases in its consumption. In any event, the future trend for soybean oil is certain to have great influence on production and consumption of other oils.

If Brazil attempts to increase exports of soybean products, since the soybean and its products (most of Brazil's exports are as soybean products) are mature international commodities, it is essential to possess price competitiveness. Furthermore, it would be necessary to study the transportation modes to be used because of the bulky nature of the product, and to make a comparative study of the advantages of the Carajas area over other regions in Brazil.

III-1-4 Other Oilseeds

The other vegetable oils included in the scope of this study are: peanut oil, sunflowerseed oil, cottonseed oil, corn oil and castor oil.

Sunflower seed oil production was about the same as that of palm oil in 1980/81 (4.90 million tons), making it one of the three most important vegetable oils. During the same period production of cottonseed oil was 3.00 million tons, while that of peanut oil was 2.3 million tons. Corn oil and castor oil production, in comparison to these, was low, at 500,000 and 380,000 tons respectively.

Cultivation of the plants from which these oils are obtained is possible throughout the tropic and sub-tropic as well as temperate zones, and main production areas are relatively widely dispersed.

All of these, with the exception of castor oil, are edible oils and because each has a distinctive flavor, some nations and regions prefer them as salad and cooking oils. Their prices are higher than that of soybean oil; they are "premium oils". (For example, there are strong preferences for use of peanut oil for salad oil in France, sunflowerseed oil for frying potato chips in the United States, and cottonseed oil for cooking use in Egypt.)

Consumption of these edible oils in the countries where they are produced is high, and the volumes sold in international markets therefore are small. For sunflowerseed oil, which is next to soybean oil in terms of production volume, the volume of exports is about 1.10 million tons, which is low in comparison to the volume of 3.30 million tons for soybean oil and 3.80 million tons for palm oil, and exports of cottonseed oil and peanut oil are only 480,000 tons and 320,000 tons respectively.

Among these oils, cottonseed oil is a byproduct of cotton production, and corn oil is one of the byproducts of corn starch

production, so that the volumes of production of these are influenced by the production of the main product.

Regarding the outlook for production of these oils in the future, production of cottonseed oil and corn oil have increased in accordance with increase in the production of the corresponding main products, and it is expected that production of them will increase at a moderate rate in the future.

Peanut oil production during the past ten years has increased slightly in terms of the world total and only in Brazil has it declined. Hereafter it is likely that production in the three major countries, India, China and the United States, will continue to gradually increase. India is promoting increased planting of peanut in order to cope with the problem of a shortfall of domestic supply capability, but since any increase in production achieved thereby will be absorbed by the domestic market, there is little possibility that exports will be increased.

Regarding sunflowerseed oil, because there has been a trend of decreasing production in the world's leading producer country, the USSR, it is thought that if this trend continues it could easily lead to insufficient supply in planned economy countries.

In connection with demand for these edible oils, while it is expected that due to consumption patterns cited above demand will increase for sunflowerseed oil and corn oil in which cholesterol content is relatively low. On the other hand, growth of their consumption in such uses as raw material for margarine and shortening will be somewhat restrained due to substitution by soybean oil and palm oil.

Thus, there are distinct commercial characteristics of the products under study and analyzed above; it would be essential to take these characteristics into account when thinking of expanding their exports from Brazil.

III-2 Feedstuffs

III-2-1 Maize

World production of maize has increased more rapidly than that of other feed grains in recent years because of (1) increased demand for livestock products, (2) advantage of relative price, and (3) diffusion of hybrid corn.

The United States accounts for about 45% of total world production of maize (in 1980, about 392 million tons). Other major producers are China, the USSR and East European countries, Argentina and Brazil in South American countries, developed countries in Western Europe, and South Africa. Among these, other than the United States, it is noteworthy that production in China has increased rapidly.

About 60% of world maize consumption is for use as feed, and the ratio of use for feed is especially high in the United States, West European countries, Japan, the USSR and East European countries, Brazil and Argentina.

The volume of world trade (80 million tons in 1980) has increased largely due to increased demand for maize for use as feed, in connection with increased consumption of livestock products. Principal exporter countries are the United States, the European Community countries, Argentina, South Africa and Thailand, and about 80% of exports are supplied by the United States. Most European Community trade is intra-regional. Traditional importer countries are Japan and West European countries. Since the poor harvest in the USSR in 1972, that country as well as East European countries have been large-scale importers, but their import quantities fluctuate according to the scale of domestic harvests and availability of foreign exchanges, causing wide fluctuations in world trade in maize. Also, in recent years China, due to domestic stability and other factors, has become a large-scale importer, and Brazil, due to increase in domestic demand, has become an importer.

Regarding the future demand and supply balance for maize, under normal circumstances, it is expected that there will be a tendency toward a softening of conditions.

Regarding production and exports, despite an increase in supply capacity in developing countries, the United States and other developed countries will continue to supply the largest share of the total. This is be cause collection and shipping facilities for maize in these countries have been highly established, and it is expected that there will continue to be investment in production and technical improvements there. On the other hand, demand in developing countries and planned economy countries will exceed production, requiring importation from outside those regions. For these reasons it is expected that the structure of trade in maize will become more diversified and complicated than before.

In considering the increase of production in Brazil, in view of the fact that the country has become a maize importer since a few years ago, it is thought that for the time being it will be advisable to seek increased yields for land presently under cultivation.

III-2-2 Soybean Meal

The scale of demand and supply for soybean meal is the highest of all protein feeds, and demand has been high in developed countries in which intensive livestock and poultry production has been developed. At present, about 65% of total world consumption takes place in developed countries (the United States, Western Europe and Japan). Also, the consumptlon of soybean meal is increasing rapidly in the centrally planned economies (the USSR and Eastern Europe) where the low level of feed protein of the domestic supply has been an impediment to increasing meat production, and in developing countries where demand for livestock products is increasing in keeping with progress in industrial development. It is estimated that in the future the growth rate of consumption in these regions will come to exceed that of developed countries where protein feed consumption has already reached a high level.

Supply of soybean meal is primarily from the major soybean-producing countries, including the United States and Brazil which together account for 60% of world production (in 1980/81, 57 million tons), while the major consumers including the European Community countries, Japan and others produce another 20%, so that most of the world production is concentrated in a few countries.

Further, trade in soybean meal shows a pattern of the soybean producers exporting 76% of the total (the United States, 39%; Brazil, 37%). Export of soybean meal from the European Community countries, which are importers of soybean, accounts for another 18% of the world total, so that most of the world export is also concentrated in a few countries.

On the other hand, the European Community countries which are the major importers account for somewhat more than half of world import quantity, and the Eastern and Western Europe together import 82% of the total. It is noteworthy regarding the import market in recent years that in addition to traditional importers such as West European countries, both East European countries and Asian countries have become importers due to the demand conditions noted above.

The international balance of demand and supply of soybean meal in the year 2000 is expected to attain equilibrium if soybean crushing is increased in keeping with growth of demand for soybean meal, while a considerable shortfall would develop in the event that the crushing is strongly influenced by the demand for soybean oil.

In such an event, since export capability is expected to increase in developing regions, mainly South American countries, the position of Brazil in the export market will improve provided that her product has the advantage of price competitiveness.

III-2-3 Cassava pellets

Because cassava is a product grown primarily for subsistence consumption, the ratio of exports to total production is very low. The major cassava product, which is now a commodity in world trade, is cassava pellets (export quantity in 1980, 4.80 million tons). Both imports and exports are carried on by a limited number of countries; Thailand is the major exporter and the European Community countries are the major importers. Exports by Thailand to the European Community have increased rapidly since 1970, leading to competition by cassava pellets with feed grains produced within the European Community, and to an agreement between Thailand and the European Community for gradual reduction of Thai exports to the European Community starting in 1978.

The outlook for the world market for cassava pellets, other than the decline in the European Community's imports, is such that, since it is not clear to what extent new markets will be formed in the Far East or Middle East's oil-producing countries, fundamentally there is no reason to warrant optimism.

If there is a great increase in yields, and if productivity is improved by such means as shortening the required duration of the growing season, however, it would be possible to markedly reduce the price of cassava pellets, and the potential for exports would be enhanced thereby. Because export demand is easily influenced by foreign market conditions and change in policy in importer countries, it is deemed advisable to study measures for guaranteeing a certain level of domestic demand as a buffer against the overseas market fluctuations.

III-3 Ethyl Alcohol

Production of ethyl alcohol, according to the United Nations' statistics for 1980, comprised 8.35 million kl for industrial use and 3.25 million kl for fuel use (a total of 11.6 million kl) produced in a total of 43 countries. There are two production processes: the fermentation process using a variety of agricultural products, and the synthesis process based on ethylene.

Regarding consumption, there is almost no international trade in ethyl alcohol and it is thought that there is very little change in its stocks. This means alcohol is a self-supplied commodity. Thus, production volume may be taken to be roughly equal to consumption volume. There are three major categories of use, each having different market characteristics and substitutes. These categories are:

1. General industrial use, including use in the chemical, the food and beverage industries, and in medicine and health care (as a disinfectant).

2. As a basic raw material for the chemical industry, similar to ethylene.

3. Fuel alcohol.

Only about 4% of the total amount of ethyl alcohol produced in 1977-1979 was traded internationally.

The outlook for demand and supply is as follows.

1. General Industrial Use

World demand is expected to increase from 8.35 million kl in 1980 to 9.98 million kl in the year 2000 with an annual average growth of about 80,000 kl. If the synthesis process based on naphtha and natural gas loses cost competitiveness and the operation rate of synthesis process production goes down to 30-50% of capacity in the year 2000, the additional 480,000 to 800,000 kl demand will have to be met by either the fermentation process or imports. If this is the case, total demand will increase by 2.11 to 2.43 million kl.

Regarding supply, it is expected that there will be supply achieved using the fermentation process from countries producing low-cost agricultural products such as Brazil, and by synthesis from associated gases such as Saudi Arabia.

2. Basic Chemical Use

The cost of producing ethylene from alcohol may turn out to be cheaper compared to the cost of producing it from naphtha or natural gas. Therefore, in countries such as Brazil and India, where alcohol is produced from domestic agricultural product, considerable amounts of alcohol will be used for basic chemical use.

On the other hand, the ethylene production cost from associated gas in oil-producing countries is very low, and it is notable that Europe, Japan and the United States are trying to obtain ethylene from the oil-producing countries.

Further, in the industrial countries, the petrochemical process using naphtha produces large amounts of useful by-products such as propylene and aromatic, in addition to ethylene, so that operation of these petrochemical processes using naphatha is expected to continue in the future.

3. Fuel Use

Assuming that the price of crude oil increases at an average annual rate of 5%, the cost of producing alcohol in countries where agricultural raw materials are cheap, such as Brazil, would be about the same as the cost of producing gasoline, so that rapid progress in the substitution of alcohol for gasoline is likely to be seen in such countries.

On the other hand, it is also necessary for the purposes of export to keep in mind the additional cost of freight as well as problems in the petroleum and auto industries of the prospective importing countries.

From the above, it seems that Brazil has the potentiality of exporting alcohol for the following reasons.

Firstly, for general industrial use, the increase of world demand is expected to be over 2 million kl (corresponding to 30 million tons of sugar cane, that is, 600,000 ha of additional cultivating area) in the year 2000.

Regarding these increases in demand, Brazil will be one of the most likely exporters, and the possible competitors will be oil-producing countries like Saudi Arabia.

Secondly, for basic chemical use and for fuel use, domestic consumption will rapidly increase in countries like Brazil which can produce alcohol by the fermentation process using low-cost agricultural raw materials.

Moreover, if uncertain supply and/or more rapid increases in the price of crude oil should occur in the future, or if oil-importing countries should initiate policies to resort to alternative energy sources for national security, considerable amounts of alcohol might be released for exportation rather than consumed domestically.

III-4 Industrial Crops

III-4-1 Natural Rubber

Regarding the supply situation of natural rubber, it is necessary first to note that natural rubber accounts for about 30% of the

total supply of new rubber (12.16 million tons of natural rubber and synthetic rubber combined). Further, the three largest producers —— Malaysia, Indonesia and Thailand —— produce about 80% of the world's total production of natural rubber (3.67 million tons in 1981), and when estimating future production scale, special attention must be given to conditions and plans in these countries.

Moreover, world consumption of new rubber (12.14 million tons in 1981) is declining slightly since 1980 due to lower levels of motor vehicle production and increasing share of longer-life radial tires. Major consumers are the United States, Japan and other developed countries, but in the United States the new rubber consumption has fallen substatially to 2.57 to 2.66 million tons in the 1980s from over 3 million tons at the end of the 1970s. While developed countries including Japan will continue to be major consumers in terms of absolute quantity consumed, higher rates of growth in consumption are expected in regions other than these. The share of natural rubber (3.70 million tons in 1981) in total consumption of new rubber has ceased to decline, and because of the expected increase in radial tire production and other factors, some forecast that it will increase somewhat.

What should be particularly noted in regard to international trade in natural rubber is that the producing and the consuming countries are separate groups. Most of the consuming oountries produce no natural rubber and entirely depend on imports. Natural rubber exports have been over 3 million tons in recent years accounting for 80% of total production, making this a classic example of an export commodity. At present, three major producing countries of Malaysia, Indonesia and Thailand export about 80% of the world total. Major importers are the United States, Japan and the Federal Republic of Germany.

Regarding the future supply and demand, under normal circumstances, the outlook is a slight surplus of supply for 1990 and 2000.

Although Brazil produces rubber, it is a net importer. It is therefore thought desirable that the country first try to attain self-sufficiency with introduction of new technology and accumulation of know-how. Cultivation of rubber in new regions like Carajas should come afterwards.

With specific regard to the Carajas area because rubber is already a mature international commodity, as long as Brazil's FOB cost stays competitive in international market, the country's geographical proximity to the United States will ensure its export advantage. For that to be attained, it would be necessary (1) to develop clones of varieties suitable to the soil and meterological conditions in the cultivation areas, (2) to train and increase the number of skilled workers (especially in tapping), and (3) to

develop TSR (Technically Specified Rubber) suitable for the United States market.

III-4-2 Other Industrial Crops

(1) Pepper

Production of pepper is concentrated in four countries, i.e., Brazil, Malaysia, Indonesia and India; they produce about 90% of the world total.

The major pepper consumption areas are the United States and Europe, but consumption is widely dispersed among the rest of the world. Pepper is a classic example of an export commodity. As measured by per capita consumption, the level is high in traditional consumer countries, in Europe and North America, but it is also noteworthy that it is high in Saudi Arabia and Kuwait. Moreover, there has been a rapid increase in consumption in Japan since the 1960s and more recently in the Republic of Korea as well. This suggests that pepper consumption is related to the increase in meat consumption, particularly in production of processed meats (ham, sausage, etc.), which has been induced by the increase in income level.

As mentioned above, while consumption has been stable for a long time in the traditional consumer countries, it is expected to increase in developing countries in keeping with improvement of income there.

Production of pepper, however, fluctuates considerably and there is a repetition of the cycle of several years of overproduction and several years of shortfalls in production.

The reason that Brazil's production of pepper increased rapidly in the 1970s is that it improved in price competitiveness, but hereafter it will probably be necessary to strive to improve quality in addition to maintaining price competitiveness. Furthermore, in order to maintain its position as the leading exporter it is thought that Brazil will have to carry out measures to combat the disease which has threatened production through destroying the plant's roots.

(2) Guarana

While production of guarana in Brazil has increased steadily in recent years (since 1975), most of the product is consumed

domestically and there has been large fluctuation in its export volume; in a year when exports are strong about 10% of annual production is exported, while in another year as little as 1.5% of the annual production is exported.

Export destinations are primarily Japan, the United States and Federal Republic of Germany, which together take 90% of Brazil's guarana exports, but these countries' imports fluctuate greatly and it is difficult to say that they are stable export markets. Most of the demand in Japan is for use as a beverage flavor, especially for carbonated "health" drinks.

When thinking of guarana as an export product, while it is necessary to make efforts to publicize the characteristics of the product in overseas markets, it is also necessary to stabilize the price at which it is supplied. It is reported that high prices due to the strong demand in the domestic market are the reason why exports to the United States and Federal Republic of Germany were zero in 1981, and there have been some cases of Japanese beverage makers converting to other products.

(3) Brazil nuts

Brazil is the major producer of the nut which bears its name, and while Peru and Bolivia also export the nut Brazil accounted for about 80% of total world exports in 1981 (23,000 tons). Exports were made primarily to the United States, the United Kingdom and the Federal Republic of Germany.

It seems that there is a strong preference for Brazil nuts in the United Kingdom, but in the United States and the Federal Republic of Germany this nut has a small share compared to other nuts (almonds, cashews, etc.).

In order to expand the export market for Brazil nuts, it would be necessary to modernize the harvesting and collecting mechanism, to stabilize supply and price, and to create stronger consumer demand abroad.

III-5 Cotton

World cotton production for 1980-1981 averaged 14.85 million tons, to which developed countries contributed 22%, developing countries 38%, and planned economy countries 40%. Major producers are the USSR, China, the United States, and India, which together produce more than 60% of the world total. It is thought unlikely that the area under

cotton will expand from the present world total of 3.3 million hectares, and most of the increase in production will come from the improved yield per hectare.

Cotton consumption by the entire world in 1980-1981 averaged 14.35 million tons and the major consumers were China, the USSR, the United States, and India. Together these countries consumed about half of the world total. Regarding the consumption pattern by region, the consumption has been declining in developed countries, while it is increasing in developing countries and planned economy countries at the annual rate of about 4% and 2% (1965-1979), respectively.

World cotton exports averaged about 4.3 million tons in 1980-81, corresponding to about 29% of the total production. Imports accounted for 31% of the total consumption. Both of these ratios are declining. The United States and the USSR are the world's leading exporters, together making up for more than half of the total exports. With regard to imports, reflecting the pattern of consumption they are declining in developed countries, while on the increase in developing countries and planned economy countries.

Regarding the future supply and demand, as long as yields continue to increase at the same rate as in recent years, they are expected approximately to balance.

Exports of cotton by Brazil show a declining trend, due to the growth of domestic demand by the development of the spinning industry. In considering the future export potential of cotton by Brazil, therefore, it is necessary to assess the future development prospects of the Brazilian spinning industry, and thereby to estimate domestic demand and exportable surplus.

Keeping the foregoing in view, the main problems of cotton production in Brazil are competition with other crops for land, and low land productivity. With specific reference to the Carajas area, moreover, the limiting factors are the construction costs of irrigation works and other infrastructure and availability of labor.

III-6 Forest Products

Reflecting recent conditions of the world economy, demand for those forest products which are internationally traded has been soft. In the light of the characteristics of forestry, however, it is important also to look at the industry from longer term viewpoints.

(1) Hardwood Logs (Non-conifer Sawlogs and Veneer Logs)

World production of logs, the raw material from which forest products are made, has increased considerably during the past 20 years. However, production has become stagnant after the first oil crisis, particularly in the Southeast Asian and North American regions. As for the outlook for future demand, an increase in the tropical developing countries and a slight increase in developed countries are expected.

World trade in hardwood logs in 1980 (42 million cubic meters) consists primarily of two major flows, namely one in the Far East, from Southeast Asian producer countries to Japan, and the other from West Africa to Western Europe. There has been a tendency in recent years, however, for exports from Southeast Asia to be made to Western Europe and the Middle East.

(2) Hardwood Lumber (Non-conifer Sawn Wood)

The trend of world production of hardwood lumber parallels that of the hardwood logs as cited above. There has been a tendency toward stagnation of production in developed countries in recent years, and globally speaking growth rates for both past production and expected future demand are low compared to those of other forest products. Regarding international trade (in 1980, 12.7 million cubic meters), exports from Southeast Asia to developed oountries, especially to Western Europe, occupy a dominant position. Regarding specific countries outside this region, Brazil among the South American oountries and the Ivory Coast among African nations, export large quantities. Importers are primarily Italy, the United Kingdom, and the Federal Republic of Germany. In recent years the trends have been for a shift in the source of supply to Europe, from Africa to Southeast Asia, as well as for exportation of more highly processed products.

As regards the export potential of the Carajas area, tree species there have disadvantage compared to those of Southeast Asia from the viewpoint of the present demand structue of tropical hardwood products and their utilization technology. But in view of factors such as valuable tree species grown there, Brazil's proximity to markets of the United States and West European countries, and the existence of some domestic demand as well, it would be possible to expand the export potential by means of improving processing techniques and improving the efficiency of plant management.

(3) Plywood and Particle Board

Production trends of plywood and particle board show higher

rates of growth than the above-mentioned forest products. Even though demand in Western Europe and other developed countries dropped after the first oil crisis, it reoovered thereafter and demand for both plywood and particle board is expected to grow at a high rate in the future.

World trade (6.9 million cubic meters of exports in 1980) has grown rapidly. The United States is the largest import market for plywood, followed by the United Kingdom and other European Community countries. In recent years the petroleum-producing nations of Middle East and China have received increased attention. Major exporters of plywood are Republic of Korea, Taiwan, the Philippines, Malaysia and Singapore.

Regarding the potential for exporting plywood from Brazil, the situation is basically the same as that for the lumber mentioned in the previous item. To improve the export competitiveness of these products, it is necessary to a greater extent than for the above-mentioned lumber to improve production technology (improvement of product quality), to improve infrastructure (especially transport), and further to develop the related industries (machinery and chemicals).

(4) Pulp Wood and Particles

Production Of pulp wood and particles was greatly affected by the consequences of the first oil crisis but it is expected that future demand will reach a considerably high level. The present world trade of nonconifer pulpwood is almost entirely limited to exportation from Southeast Asia and Oceania to Japan. Given these circumstances, for the time being greater importance may have to be attached to the domestic market for Brazilian non-conifer pulp wood and particles, rather than seek to export them.

(5) Firewood and Charcoal

Production of firewood and charcoal has been increasing, primarily in developing countries. It is expected that demand in those countries will continue to increase while demand in developed countries, which has been low, will further decrease.

Only very small quantities of these products enter into world trade. In view of the fact that it is almost impossible to pass on the relatively high costs of transportation to importers of these products, and that their prices have kept rising without being influenced by the oil crisis or general economic conditions as they are a familiar part of the daily life of many people, for the time being the domestic market should be considered as most important, similar to the case of the pulp wood as mentioned above.

Information on recent research findings on new uses for charcoal is attached elsewhere for referenoe.

(6) Evaluation of Forest Resources and the Forest Products Industry in the Carajas Area

In view of the special characteristics of the forestry, in addition to the considerations presented above, it is important to evaluate the relevant forest resources from a long-term standpoint.

To evaluate tropical forest resources of the world at present, the resources of Southeast Asian tropical rain forests mainly comprising the dipterocarpaceae have high commercial value, and are followed by rain forests in West Africa, while the forest resources of South America, from the viewpoint both of tree species and accessibility, are difficult to develop given present conditions. Starting in the 21st century, however, since the depletion of resources in other regions would be anticipated, the forest resources of the Carajas area would come to be highly evaluated.

In this context, since the forests of the Amazon Basin comprise resources which should be reserved for exploitation after the year 2000, it is desirable that care be given to their future development and utilization, and to preservation of the environment with proper forest management system, while balance should be maintained between development of these resources and development of other economic and social sectors.

For the time being, the following points would have to be included in measures which are desirable to be adopted.

a. Regional development studies including drawing up of a model plan on the basis of a comprehensive view which encompasses forestry, agriculture, and livestock industry.

b. Research and studies on the utilization of less known tree species.

c. Research and studies on development of reforestation techniques.

d. Research and studies on a rational system which includes all aspects from logging to exportation of forest products.

III-7 Beef

Demand and supply of beef had been increasing steadily until the first oil crisis, but with stagnation of the world economy since then, demand has turned weak after the peak year of 1976. Because of this, there is a slight over-supply today. Regarding the outlook for the future, however, it is expected that demand will grow in keeping with economic recovery, and in the year 2000 there will be either equilibrium of demand and supply or, perhaps, a slight shortfall of supply.

Beef production is largely concentrated in North America, which provides 24% of the total world production (in 1980, 45 million tons of carcass equivalent). That region is followed by countries with planned economy (19%) and the European Community countries (16%).

Regarding beef consumption, there are considerable inter-regional differences. Per capita annual consumption exceeds 60 kg in Argentina, New Zealand and Australia, while consumption is from 20 to 60 kg in North America, the European Community countries and the USSR. The average for the world is 10 kg, but the average for most developing countries is below that.

Because most beef production is for domestic consumption, only a few countries have an exportable surplus, and exports (3.4 million tons in 1980) were even less than 10% of total productions. Major exporters are Australia, New Zealand, Argentina and the European Community oountries; exports from these regions amount to 77% of total world exports. The United States is the world's largest producer but is also an importer.

It is characteristic of world trade in beef that there are two separate trade flows: one among countries with foot-and-mouth disease and the other among those without the disease.

In connection with beef production in Brazil, if the grazing land available is more effectively utilized and its productivity increased, thereby contributing to a stable supply of low-cost beef, Brazil could occupy a significant position in the world beef market. In such a case, however, since importing countries having no foot-and-mouth disease will only import boiled beef from countries having the disease, there would be a restraint on expansion of exports as exports could only be increased to the extent that demand for boiled beef increases. In the long term, therefore, it is essential to make utmost efforts to control the foot-and-mouth disease so that there are no restraints on exports to countries free from that disease.

III-8 Tropical Fruits

III-8-1 Banana

World production of bananas since 1970 has been stable or slightly increased in the range between 30 million and 40 million tons.

On the other hand, demand is not expanding strongly and in developed countries in particular has ceased to grow. Countries where demand can be expected to grow comprise the newly industrialized countries, the USSR, and the East European and Middle East countries, but there is some uncertainty on this point due to unstability of the foreign exchange positions of these oountries. In view of these circumstances, world demand and supply outlook for bananas will continue to be moderately soft.

Although the balance of world demand and supply tends to be somewhat soft, it would not affect the entry of new producers, if they satisfy certain production conditions. Those required conditions are natural conditions —— climate and soil —— suitable to cultivation of banana, location of production regions close to export ports which can also serve as collection points, as well as price competitiveness after allowing for the cost of developing new plantation areas, the cost of labor, and the cost of improving infrastructure. The behavior of the multi-national oorporations active in banana cultivation and trade is also one of factors deserving study.

III-8-2 Other Tropical Fruits

Because of lack of adequate information on which to assess the future demand and supply outlook for other tropical fruits, only brief comments of general nature will be offered below.

Regarding melons, as may be seen from the examples of some developed countries such as the United Kingdom, Canada, and the United States, since domestic production sometimes is not sufficient to satisfy domestic demand, if it is possible to reduce transportation cost, improve transportation methods in order to preserve freshness and quality, and produce melons of acceptable taste in the target markets, it is thought that exportation is possible. Also, developing melons of higher quality and price will mean that the transportation cost factor is so much reduced in importance.

For papaya, the same problems exist as are facing melons, but in view of the tendency for demand for papaya in the world's largest consumer country, the United States, to remain stagnant, it seems difficult to anticipate a rapid expansion of the world market.

World demand for cashew nuts, when considered from price trend, is expected to stay on the order of 650,000 tons. While Brazil has been steadily increasing the quantity she supplies, it will be necessary to establish a system for assuring stable supply, and to stabilize the price at which the nut is offered in world markets, if exports are to be increased.

Concerning pineapple juice, judging from the past trend of the volume of trade, it may be said that there is potential for further growth. There are, however, a number of competing products, and in order to overcome such competition, further research is needed regarding taste and quality, etc.

Regarding passion fruit juice, this drink is still not well known among consumers in developed countries, but the product has growth potential which may be realized depending on successful efforts for publicity among consumers. Moreover, greater stabilization of production would be needed.

IV SUMMARY AND CONCLUSION OF MINING PRODUCTS

The demand for the thirteen mining products under study, continued to make a steady growth along with the expansion of the world economy, up to the 1973 oil crisis although it was accompanied by fluctuations due to economic cycles.

Since 1974, there has been a stagnation of demand under the influence of slow growth of the world economy, and especially under the influence of the worldwide recession since 1980. During this period, demand for mining products declined or remained unchanged.

In examining demand in regional blocks, although demand in developing countries has increased during the period under review, it has not been sufficient to compensate for the decline in demand in developed countries which collectively account for the largest portion of total world demand. The demand in countries with planned economy has been stagnant, or else showed a slight increase.

By product, there has been a decline in demand for tin and cobalt because of rapid progress of substitution of these by other products, since 1974. Demand for the other mining products increased at about the same pace as the world economy, and although substitution of these products is also in progress its influence on the overall demand has been small.

The characteristics of mining production which can be cited are, first, because production capacity had been increased in keeping with the steady growth of demand prior to the first oil crisis in 1973, the structure of production that was formed is such that it was not easy to adjust itself to the stagnation of demand which began in 1974 or to the more recent decline in demand. As a result, on a global basis there has been a tendency of over-supply which has resulted in recent declines in world market prices.

Second, despite the above-mentioned over-supply in the world market there has been a sharp increase in production capacity of refined products in the developing countries and movements from production of traditional primary commodities to that of more highly processed goods in developing countries are clearly observed. This may be said to be the case particulary with the newly industrialized countries, and is in sharp contrast to the tendency of stagnant construction of new production facilities in developed counties.

Third, as a result of the increase in the price of oil since 1973 a shift has taken place whereby intensive energy-using industry has been relocated to those regions of the world where energy costs are low.

Fourth, the domination of the markets by the major producers has become weaker, and their supply capability has declined.

Finally, despite the rigorous competition caused by the over-supply, countries which have succeeded in increasing their shares in the world total production - other than Brazil - are primarily Australia in regard to aluminum, Chile and Peru in regard to copper, Indonesia and Thailand in regard to tin, South Africa and Norway in regard to manganese, Australia in regard to nickel, and South Korea in regard to steel.

To summarize the supply and demand prospects for the products under study, in case the world economy is recovered and continues to be so after 1983, demands for almost all products in 1985 will be restored to the levels of 1978-1980, but the condition of a surplus of supply capacity will not be eliminated.

According to the projections of demand based mainly on GDP elasticities and of supply based on plans for increase in production capacity, it is expected that by 1990 demand and supply of copper, nickel and aluminum will be balanced but for the other products the estimated volume of demand will be considerably lower than the effective production capacity.

In order to introduce mining products from the Carajas region into the world markets, a worldwide shortfall of supply of those products is desirable, but besides that, it is essential to possess cost competitiveness relative to products from major exporting countries.

The composition of the production cost of mining products differs greatly from product to product. In the cases of copper, tin and cobalt, the cost of extracting the ore accounts for a large proportion of the total cost, and the ore cost depends on such factors as the scale of the ore deposit being worked, the ore grade, the presence or absence of by-product metals, and other attributes. Some examples of the most advantageous mines in this regard are: copper mines in Chile, Peru, the Philippines, Papua New Guinea, etc. which by working the large-scale porphyry deposit produce molybdenum and gold as by-products; off-shore deposits of tin in Indonesia and Thailand which are recovered by dredging; nickel mines in Canada which produce platinum as a by-product; and the cobalt mines in Zaire and Zambia that produce copper as a by-product.

In the cases of pig iron and semi-steel, and alumina and aluminum, the cost of capital investment in the production facilities and related infrastructure facilities as well as the cost of energy such as electric power and fuel comprise by far the more important part of the total production cost compared with the cost of extracting the ore. Therefore it is necessary to examine the comparative advantages vis-a-vis major exporting countries in terms of production scale, cost of acquisition of production facilities, share of infrastructure cost borne by the project, cost of financing, location of the production facilities, cost of energy,

and so on. In the case of new production facilities in developing countries, to a very great extent cost advantages can be secured by policy considerations by the government, through such measures as the sharing by the government of infrastructure cost, tax relief for imported production equipment and machinery, support for reducing the financing cost, setting special low prices of energy for the industry in question, and so on.

Regarding ferro-manganese, the three factors of the cost composition, i.e., the cost of ore extraction, capital cost of production facilities, and energy (electric power) cost are each about equal in terms of shares in the total cost. The production cost of manganese ore varies according to the natural conditions such as scale of the deposits, the grade, and the form of the ore as well as the cost of transporting the ore to the refinery.

Regarding, the factor next to cost competitiveness in exportation of mining products is assurance of long-term and stable supply of products to consumers. In this connection, it is important to proceed with long-term, planned investment and to establish appropriate government policy in which the dual objectives of satisfying domestic demand and securing export markets have to be pursued.

IV-1 Bauxite, Alumina and Aluminum

Bauxite production in 1980 totalled 92.62 million tons, 2.5 times the production in 1965, meaning an annual growth rate of 6.3% for the period in question. Alumina production in 1980 was 35.05 million tons, 2.4 times the level in 1966, and corresponding to 6.3% annual growth rate. Aluminum production (primary aluminum) in 1980 totalled 16.06 million tons, 2.4 times the 1965 level and corresponding to 6.3% annual growth rate.

As for the structure of production during this period, there was almost no change in the share accounted for by major producer countries,[1] but it is noteworthy that Australia, while recording no production in 1965 has become No. 1 or No. 2 producer of bauxite and alumina since 1970, and supplied 30% of the world's bauxite produced

1) Regarding bauxite, the five major producer countries' share rose from 62% to 69%, and the ten major producer countries' share rose from 83% to 87%, showing a tendency toward higher concentration of production. In the case of alumina, the corresponding changes were from 71% to 63%, and from 88% to 83%, and for primary aluminum, the changes were from 77% to 62%, and from 90% to 76% respectively, showing a tendency toward wider dispersion.

in 1980, which was more than double the share of Guinea, the second-ranked producer. Similarly, with regard to alumina, Australia's production is 21% of the world total, making it the leader and putting the United States in the second place. For primary aluminum, there has been no change in the United States' position as No. 1, but its share has declined from 38% in 1965 to 29% in 1980.

Among other major producing countries, Jamaica, the USSR and Surinam have experienced a reduction in their share of bauxite production by one-half since 1965, while Guinea and Brazil have gained in importance. (Brazil was sixth in 1980, with a 4.5% share.) The shares of alumina production of the United States, Canada and the USSR have declined to about half of what it was in 1965, while the shares of Japan and Jamaica slightly increased. Regarding primary aluminum, the United States and Canada combined produced about half of world output in 1965, but their combined share decreased to about 30% in 1980. The USSR remained in the next position, but experienced a modest decline in share (from 18% to 15%). Slight increases were recorded for Japan and Federal Republic of Germany, there was no change for Norway, and France experienced a decline (from 5% to 2.7%). The increased production by Japan and Europe was not enough to offset the declines in the United States and Canada, so there was an increased dispersion of world production.

For the study of consumption, it is sufficient to give attention only to primary aluminum, as consumption of bauxite and alumina is determined by the demand for aluminum. In 1980 consumption was 15.30 million tons (of which 12 million tons were consumed in the free world); this was 2.3 times the level of 1965, corresponding to an annual increase of 6.1%. By region there was no change in the consumption shares of the free world and the countries with planned economy (78% and 22% respectively) but within the free world's share there was a decline in the share of developed countries (75% to 66%) and a corresponding increase in the share of developing countries (3% to 12%).

Analysis of the structure of demand of Japan, the United States, and Europe which account for 55% of world aluminum demand (USA., 28.5%; four European countries, 15.8%; Japan, 10.8%) indicates that at present the transport, construction and packing material sectors account for 55%, and in comparison to 1965 the increase in demand in the packing materials sector in particular has been strong.[1)]

1) There has been no change in the position of the transport and construction sectors (Nos. 1 and 2) but in 1965 packing materials was No. 6 (7.6% share) after electricity and communications, steel, other alloys, office equipment and housewares, but now packing materials has a share of about 16%.

Materials which compete with aluminum include iron and steel, copper, plastic and wood, but aluminum has made gains in certain areas and opened up new areas of applications where its characteristics give it advantages, while its relatively stable price has facilitated such gains. For such growth to be maintained in the future, in addition to overcoming the handicap of requiring a great amount of energy to produce, it will be necessary to develop more new areas of use.

The demand projections for the free world in 1985, 1990 and 2000 with 1980 as the base year came up with 14 million, 16 to 17 million, and 20 to 25 million tons for those three years respectively. On the other hand, regarding supply capacity, if all of the planned additional capacity announced to date is constructed, and further progress is made by the advanced countries in mothballing or scrapping existing facilities, supply in 1990 will be 17 million tons (compared to 14 million tons in 1982), suggesting that market equilibrium will be attained around 1990.

When studying new projects, therefore, decisions would be best made on the basis of projections of demand and supply in and about 1990. In the case of aluminum, a huge investment is required for all phases from infrastructure to processing facilities. The critical factors for the success of a new project may include seeking economy of scale, minimizing risk by effective measures such as forming a consortium, and a timely decision on the implementation of the project.

IV-2 Nickel and Ferro-nickel

The structure of the nickel market is such that two-thirds of demand is for capital goods industries and one-third is for consumer goods industries. From the end of World War II to the time of the second oil crisis, world demand for nickel grew at about the same rate as that of world industrial production. Free world demand, after reaching a peak of 587,000 tons in 1979, has shown a drastic decline for three consecutive years in keeping with the recession afflicting the world eoonomy. This is the first major decline in nickel demand during the entire postwar era. In 1982 demand fell to 450,000 tons, the same level as in 1970.

Regarding supply, on the other hand, worldwide investment was made so as to increase capacity to meet the growing demand up to 1979, and in particular, besides capacity added by the major producers (INCO, Falconbridge and SLN), there were some new entries to the industry, making the 1982 effective production capacity estimated to be 705,000 tons.

This swift increase in production capacity led to a loss of flexibility in coping with the sharp drop in demand from 1980 on, in

addition to which it is estimated that there is an annual supply of 30-40,000 tons from planned economy countries, so that the free world market at the present time has an extraordinary high surplus of supply and the burden of high inventory levels is depressing the market price.

As for the outlook for nickel in the future, it is noted that in the short term recovery will be strongly influenced by the conditions of the world economy, but in the long term demand will be influenced most strongly by recovery of demand for stainless steel, which accounts for about half of total nickel consumption. In contrast to the stagnation of consumption growth in industrial countries, it is expected that demand in developing countries will increase.

Regarding short-term demand and supply in the nickel market, due to delay in economic recovery, free world demand in 1985 is projected to be 570,000 tons, and pessimistic outlook regarding the extraodinary high surplus of supply will continue to exist. Over the medium term, demand is expected to grow to 650,000 tons in 1990 and 797,000 tons in 2000, in view of expectations regarding the recovery of world economy, increase in consumption of stainless steel and alloys, and growth of the market in developing counties.

As for the supply capacity, although the published capacity at present is said to be about 800,000 tons, effective capacity at the end of 1985 is estimated to be 697,000 tons after an allowance made for scrapping of some facilities and construction of others.

Therefore, in terms of the demand and supply balance, the projected levels of demand for 1985 and 1990 - 570,000 and 650,000 tons respectively - can be met by the effective capacity in place at the end of 1985. Effective capacity, in response to the growth of demand, will approach the published capacity cited above and is expected to be sufficient to meet the projected demand of 797,000 tons in the year 2000. During the 1990s, however, it is thought that utilization of capacity will reach the level of 90%, and that there will be some construction of new and additional capacity. In such a case, expansion of production capacity by existing producers possessing adequate quantities of confirmed ore reserves is expected to have a distinct advantage in terms of initial investment cost and average production cost. In addition, it should be noted that the production potential for nickel in the countries with planned economy is large, and that it is possible for those countries to export 100,000 tons a year or more to the free world by the year 2000.

IV-3 Cobalt

From the latter half of the 1960s to the present the annual consumption of cobalt in the free world fluctuated between 16,000 and

24,000 tons, sensitively reacting to the influence of fluctuations due to business cycles, but fundamentally consumption has shown a trend of increase. This trend, however, has lost tempo recently. That is, because of political conditions in Zaire and Zambia which together account for about 65% of the world's cobalt production capacity, instability of supply has easily led to high prices, which have promoted substitutution of other materials for cobalt in many applications. Moreover, the countries with planned economy are not self-sufficient with regard to the supply of cobalt, and are highly dependent on imports from the free world. Therefore, it is assumed that substitution has been promoted and consumption has not grown very much in these countries.

On the demand side, demand for super-alloys used in jet engines and for use as catalysts in the chemical industry, where substition for cobalt is difficult, is expected to grow. However, substitutes for cobalt have come to be widely accepted in such fields as high strength alloys, magnets, and special steel, so there will be no contribution to growth of demand from these areas of use.

On the basis of the assumption that substitution will stop as the price continues to stay at about the same level as the present $4.5/pound, the free world demand is projected to be 16,000 - 18,500 tons in 1985, 18,800 - 21,700 tons in 1990, and 25,700 - 29,600 tons in the year 2000.

On the other hand, production capacity in the free world, including the capacity added by Zambia in 1982 and additional capacity to be added by Canada by 1983, at least will be 34,000 tons at the end of 1985. In 1990 it is projected that there would be a moderate increase to 35,300 tons and that capacity would remain at that level through 2000.

Because cobalt is a byproduct of copper and nickel production, the production of cobalt is linked to the production of those metals, and assuming that copper production does not diminish, but that there is a reduction in cobalt supply due to lower nickel production, effective production capacity is estimated to be 28,300 tons in 1985, and 29,600 tons in 1990 and 2000.

Comparison of these demand projections and the outlook for production capacity indicates that demand will not exceed supply through 2000, and even in the case of the most optimistic demand projection with assumed reduction in nickel production, it will not be until the year 2000 that market equilibrium can be attained. Even if there is an increase in the quantity held by the United States in its GSA (General Services Administration) stockpile, and there is an increase in European stockpiling for strategic reasons, it is believed that there still will be a surplus of supply capacity.

IV-4 Manganese Ore and Ferro-manganese

Demand for manganese has increased in proportion to growth of the steel industry, which is the source of more than 90% of demand for manganese ore and 100% of that for ferro-manganese.[1)]

The volume of production of manganese ore reached the level of 27 million tons in 1980. The seven largest producer countries —— the USSR South Africa, Gabon, Brazil, Indonesia, Australia and China —— acounted for 95% of the world total production.

Ferro-manganese production in 1979 was 6.9 million tons, and the ten largest producer countries had a share of more than 90%, which remains unchanged throughout the study period, but among the producer countries, shares of South Africa, Japan, and Norway have increased, and those of the United States, United Kingdom and the Federal Republic of Germany have declined, while Brazil, China, Czechoslovakia and Canada have joined the top ten group, and the USSR and France have continued to have constant shares. This reflects a shift of production centre from the erstwhile producing -consuming countries to those countries where natural resources are richly endowed like South Africa and Brazil or where the energy cost is low like Norway and Canada.

As a result of estimating the demand of manganese ore, from the outlook for production of crude steel and unit consumption of manganese ore in crude steel production, it is estimated that free world's consumption in 1985, 1990 and 2000 would be 15.5 million, 16.6 million and 19.1 million tons respectively. Corresponding figures for the countries with planned economy are 11.7 million, 12.4 million and 13.4 million tons respectively. From this it is possible to conclude that in both the free world and the countries with planned economy, existing supply capacity would be about equal demand until 1990.[2)]

In the year 2000, if capacity expansion plans are carried out as scheduled by such countries as Brazil, Gabon and Australia,[3)] demand and supply will be balanced in the free world.

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1) The annual growth rate of demand for manganese ore averaged 2.6% from 1965 to 1980, and that for ferro-manganese was 2.4%. During this period, crude steel production grew at 3% per annum.
2) Supply capacity of the free world is estimated to be 18.2 million tons in 1983 while that of the countries with planned eoonomy 12 million tons. It will be 21.3 million tons in the free world in 1990 while estimated supply capacity in countries with planned economy will be 12 million tons (their long-term plans have not been announced).
3) Brazil's project (Rio-Doce, Azul) is the only new project, but Gabon and Australia have expansion plans up to 1990.

In the case of ferro-manganese, the result of projections indicates that in 1985 free worlds demand will be 4.1 million tons, and will rise to 4.5 million tons in 1990, and 5.1 million tons in the year 2000. Corresponding figures for the countries with planned economy are 1.55 million, 1.63 million, and 1.77 million tons respectively. In all cases balance can be readily obtained with the present capacity level (6.8 million tons in the free world and 2 million tons in the countries with planned economy).

When considering the future of Brazilian manganese ore, which already has secured a niche in the world market, in view of the fact that the free world relies on politically unstable South Africa for about 40% of their demand, and that Brazil, Gabon, Australia and India each have a share of 12-14%, it must be stated that the significance of Brazil's expansion of its position is great indeed.

With regard to ferro-manganese, the quantity produced by Brazil as of 1979 was the equivalent of about 3% of the total world production (and 4.5% of the free world's production), and a shift is evident in production, toward the resources-holding countries.

IV-5 Copper Concentrate and Copper

World copper consumption increased at the annual rate of 2.7% from 1965 to 1981, and in 1981 was at the level of 9.48 million tons. Since 1980, however, the production has been declining due to the recession of the world economy.

Production of refined copper increased in response to growth of demand, from 6.18 million tons in 1965 to 9.66 million tons in 1981, and during that period the volume produced by Japan, Chile, Peru and Australia increased, that produced by the United States, Canada and the European Community was virtually unchanged, and production by Zaire and Zambia declined. The countries with planned economy showed a growth of production exceeding that of the free world and have increased their share of total world production.

Copper concentrate production increased at about the same rate as refined copper: from 5.07 million tons in 1965 to 8.32 million tons in 1981. The difference in quantities of production of copper and copper concentrate produced is the quantity of recycled copper from scrap and from 1965 to 1981 the ratio of scrap used for copper production was almost constant. The production of copper concentrates by leading countries shows a stagnation of output by the United States, Canada, and Zambia, and an increase in output by Chile, Peru, the USSR and Poland.

During the period 1965-1981, the world copper market prices, despite some fluctuations, tended to be relatively stable at lower level in comparison to earlier historical prices, and in the London Metal Exchange the price showed a tendency to decline in terms of constant price. In particular, due to the stagnation of demand and build-up of inventory since 1980, the market price has been weak at 70-80 cents a pound, but it is expected that the price will recover in keeping with recovery of the world economy.

Taking 1981 demand as the base, and using GDP elasticity of copper consumption, it is estimated that the world demand will be 10.08 million tons in 1985, 10.97 million tons in 1990, and 13.10 million tons in the year 2000.

The supply outlook is formulated on the basis of capacity of copper mines to produce concentrates, and capacity of refining facilities. Aggregating the effects of mine closings in the United States and Canada in 1982, as well as new and additional capacity scheduled to be available in 1985 and 1990, and postulating a mine operation ratio of 87%, total mine production capacity is estimated. And further assuming that expansion plans for refineries will be implemented by 1985 but thereafter no capacity would be added, the following results were obtained.

1985 : Effective mine production capacity: 8.6 million tons
Refining capacity: 12.0 million tons

1990 : Effective mine production capacity: 9.15 million tons
Refining capacity: 12.0 million tons

Given the projected demand for refined copper in 1985, i.e., 10.08 million tons and the refining capacity, i.e., 12 million tons, the demand and supply balance in 1985 will turn out to be supply surplus. From the standpoint of input materials for refining, if scrap is used for 15% of the input, the quantity of copper concentrates required will be 8.57 million tons. Against this, the capacity of the mines is 8.6 million tons, so that demand and supply will be approximately balanced.

Regarding the demand and supply balance in 1990, while refining capacity would be ample for the projected demand quantity of 10.97 million tons, the mine production capacity of 9.15 million tons is insufficient to meet the demand of 9.3 million tons of copper concentrates.

Demand in the year 2000 is expected to be approximately 13 million tons, but the outlook for supply is difficult to estimate because it is largely conditioned by the extent to which new investment is made after 1986. As a basic trend, however, it is judged that there will be a shortfall of supply.

Turning to the price of copper, while it will rise as demand grows in the future, from 1986 onward, it is thought that it will rise to the level of $1.10-1.30 per pound (in 1981 prices) which is supposed to be the breakeven price for large copper mine developement projects now being planned.

As is shown above, in view of the supply shortfall of copper concentrates expected for 1986 onward, with specific regard to a mine development project in the Carajas area, it is to be noted that first of all it is necessary to immediately conduct a feasibility study for stably satisfying domestic demand in Brazil, which is dependent at present on imports to a considerable extent. In the medium-to-long term, if promising deposits are discovered and confirmed after detailed exploration in the Carajas area as well as in other promising regions in Brazil, they could be developed so as to provide Brazil with an export commodity.

IV-6 Tin

World tin consumption reached a peak in 1973, 250,000 tons, and has declined since then, to the level of 210,000 tons in 1980. The annual rate of decline from 1970 to 1980 was 0.4%. The consumption in developing countries and planned economy countries showed firm increases of 1.7% and 1.6% p.a. respectively, but consumption in the industrial nations which account for 60% of the total world consumption, declined by 1.5% p.a. during this period. This long-term decline is partly due to the economic situation of stagnation of the world economy, but, more immediately, it is because of structural factors: efforts to reduce tin requirements and progress in substituting other materials for tin.

Tin is the only metal which for 30 years has consistently shown a rise in real market price no matter what temporary fluctuations of demand took place, thanks to an international agreement for adjusting supply and demand of tin. Because of this, the differential between the price of this metal and other metals has increased, while from the demand side it has lost price competitiveness against similar materials, which has in turn promoted efforts to use less tin and to substitute other materials for it. This has been particularly true in the case of tinplate, which accounts for about 40% of total consumption.

Despite the decline in consumption, world production of tin-in-concentrate during the period 1970-1980 rose, at the low rate of 0.2% p.a., and production of primary tin metal also increased modestly, so that in 1980 the level of 230,000 tons was maintained. The production level of tin-in-concentrate in Malaysia, the worlds' largest producing

country, declined, and there have been large declines in production in Nigeria and Zaire, but the production has risen in Thailand and Indonesia as well as Australia and Brazil.

Regarding the production of primary tin metal, there has been an increase in production in Indonesia and Bolivia in keeping with the trend of increases in processing in countries of origin, in sharp contrast to the reduced production in Europe which is dependent on imports of tin-in-concentrate. This has been made manifest in a decline in trading volume of tin-in-concentrate in world markets, and an increase in trading in tin metal.

Future demand for tin will vary greatly depending on the extent that other materials substitute for it in major user markets such as plating, solder and alloys, but considering the change occurring in the structure of demand, world consumption is expected to be 228,000 tons in 1985, 226,000 tons in 1990 and 247,000 tons in the year 2000, which means a high growth rate is not expected. In comparison to this, effective production capacity in 1980 was as high as 248,000 tons, and it is believed that this could easily increase to 290,000 tons, so there is a strong likelihood that in the short term as well as the medium and long term there will continue to be a surplus of supply.

Because there is adjustment of demand and supply in accordance with an international commodity agreement, there is a price rigidity to resist decline and the market also has the characteristics of getting the majority of its supply from high-cost, marginal producers. Since the tin deposits in the region are large enough, of good grade, and have good properties, it is possible that such tin could have cost competitiveness in world markets.

IV-7 Pig Iron and Semi-Steel

During the past ten years world steel production, in terms of crude steel, has increased at the annual rate of 0.6%, from 630 million tons in 1972 to 706.9 million tons in 1981. By region, there has been a decline in production in the United States and Europe (-10% for the European Community, and -7% for the United States) while production by the newly industrialized countries, in sharp contrast, has increased (Brazil, two fold; Republic of Korea, 18.4 times; Taiwan, 5.8 times; Mexico, 1.7 times). Further, growth in the countries with planned economy during the same period was 1.2 times, but in recent years it has not maintained that pace.

Regarding consumption, it is worth noting that despite the most

severe recession since the Great Depression of the 1930s, developing countries have increased their consumption, although by a small margin.

The volume of world trade was 132.3 million tons in 1981 and the export shares by countries have not shown any major change during the period in question (ten European Community countries, 46.2%, of which 24.3% is trade outside the Community; Japan's share is 21.5%).

The volume of trade during the decade grew by about 40%, but within that there was growth of 29 times attained by the Republic of Korea, 7 times attained by Brazil, 5.5 times attained by Spain, and 3.5 times attained by Taiwan. In particular, the share in world trade accounted for by Republic of Korea and Spain (about 4% each) has risen even to the point that it is greater than the share of the United States (over 2%).

To review the effective production capacity for steel, for the world, in terms of crude steel, it is projected that from 867 million tons in 1980 it will increase to 1,062 million tons in 1990. On the other hand, apparent consumption in 1980, 1985, and 1990 is, respectively, 717 million, 749 million, and 800 million tons. With regard to utilization of capacity, in both 1985 and 1990 the rate is projected as being under 80%, at levels lower than those of 1980, so it is not expected that there will be a shortfall in supply capacity.

In forecasting the quantity of crude steel consumption in the year 2000, assuming that there is no appreciable change in consumption by the industrial countries and countries with planned economy, and that the developing countries continue to show an increase of 3.7% p.a. through and after 1990, a projection of 900 million tons is obtained, which would be lower than the production capacity in 1990.

In projecting consumption of pig iron, however, technical development of direct reduction process, increased installation of electric furnaces, and change in the trend of usage of pig iron in steelmaking process must be taken into consideration, making estimation a difficult task. But if these factors are taken into account along with the above projection of the volume of apparent consumption of crude steel, it is estimated that pig iron consumption will be 561 million tons in 1985, and 591 million tons in 1990. Regarding the composition of that consumption quantity, whereas industrialized countries and countries with planned economy are expected to have the same level of consumption as before, it is projected that developing countries will experience an increase of substantial proportions, to 85 million tons in 1985 and 109 million tons in 1990. Thus, it is possible to say that if the production by blast furnace in the United States and Europe tends to decline, and reduced production of pig iron in the USSR continues to be sluggish, even though Japan may have a surplus of supply capacity for pig iron, there will be ample room for new entry in the export market by developing countries.

When examination is made of the export potential of pig iron and semisteel, there is an element of uncertainty due to a possible change (and changeability) in the strategy regarding the sources of supply on the part of user steel company who is a buyer of pig iron as well as in demand and supply balance between various stages of processing. Moreover, the price of pig iron is determined under the influence of the price of scrap, which is a substitute for pig iron,[1] and the prices of semi-steel are calculated backwards from international market prices of the final products. Therefore, these uncertainties create a problem for management and planning of a project. We may think that the buyer of pig iron is more likely to be an open hearth or electric furnace steel producer or a foundry than a producer of a integrated steel mills, who would use pig iron as a buffer. If the buyer is an open hearth or electric furnace steel producer, pig iron would encounter competition with scrap,[2] and if it is a foundry the diversification of uses is tied in with low unit volume of demand and the resultant difficulty in planning large-scale production. These factors must not be overlooked when thinking about establishing a large-scale production facility. In this sense, a small-scale charcoal steel mill would be fitting for promotion.

1) Recently, it has become necessary to consider the comparison of cost of sponge iron made by direct reduction.
2) Especially in the case of the United States, there are large quantites of scrap available.

V. CONCLUDING REMARKS ON MINING PRODUCTS

The present international market situation of mining products brought up in this Study, by itself, does not necessarily constitute a definite restrictive factor for developing projects in the Great Carajas Program area. The favorable conditions of the region should give competitiveness for its production at world level.

The availability of adequate amount of hydroelectric energy at low cost; the strategic geographical location in relation to the large markets (North America and Europe); the planned establishment of regional infrastructure; the advantages of availability of local labor; the initiative of private and government sector, are some of the factors that should give viability to new projects for the Great Carajas Program.

Significant steps for the viability of these enterprises may result from the continuous decrease of the production share in the mineral-metallurgical sector, specially of developed countries as a group, due to its obsolescence or by lack of competitiveness of the products, due to high cost of inputs. As a result of this situation the production of these products of the metallurgical sector will be increasingly undertaken by the developing countries, as also evidenced by the policy of these countries in recent years. To the mining products mentioned in this Study are given the following specific observations:

V-1 Aluminum

The high quality of the Brazilian bauxite (aluminum ore), the 3rd largest world reserve, the recent entry of the country in the international market and private ventures in projects of the production of alumina and aluminum within the framework of the Great Carajas Program are evidence of promising potentialities for the realization of such projects in the region.

V-2 Nickel and Ferro-Nickel

The restrained consumption of the stainless steel in Brazil and knowledge of production technology using charcoal should be important factors to sustain projects aiming at an eventual regular share of foreign markets.

V-3 Manganese and Ferro-Manganese

The existence of a positive policy by the Brazilian Government for encouraging projects in the area of the Great Carajas Program related to the production of ferro-alloys, should induce initiatives for the production of these products. The exploitation of the manganese ore, together with the domestic technology in the manufacturing equipments and the use of charcoal as reductant will bring comparative advantages to the investors in the sector.

V-4 Copper

The country's deficit of copper and copper concentrate justifies the priority for the strengthening of exploration and exploitation in the area of the Great Carajas.

V-5 Tin

The cassiterite mines of high grade ores and low cost of production give the region an advantageous situation for the metal production and export.

V-6 Pig Iron

Brazil is a traditional producer and exporter of pig iron using charcoal blast furnace based on national know-how (technology). The exploitation of the iron ore of high quality found in Carajas should be a factor for promoting regional industrialization extending to the steel industry, inducing investments in the region particularly aiming at the export market.

Appendix MAJOR CHARACTERISTICS OF PRIMARY COMMODITY TRADE

1. Behaviors of Primary Commodity Markets

This appendix overviews major behavioral characteristics of commodity markets from the issue-oriented point of view and thereby provides a common ground for more detailed discussions and analyses by commodity in other Chapters.

The term "primary commodities" signifies all those goods that are naturally produced or depend largely on natural conditions for production, and it would exclude, if taken literally, products which are processed in any way in factories. However, the practical classification employs a somewhat broader definition.

One of the central issues in the commodity trade has generally been related to the export performance of developing countries. As seen in Table A-1, primary commodities account for a considerable part of the total exports by the developing world, although their share has been declining in the last two decades mostly due to the expansion of petroleum export. When the composition of exporting counties in the world commodity markets is examined, however, developing countries are found to be not necessarily major suppliers. Table A-2 shows the world total exports of major commodities (1977-79 average) and the percentage contribution by developing countries. The shares of the developing world vary from over 90% for banana, copra and natural rubber to less than 20% for maize.

Table A-3 shows the total world exports in 1979 and 1980 of those commodities in the present Study which have SITC five-digit listings in the UN Yearbook of International Trade Statistics. The export values vary greatly from US$13.5 billion of copper ingots, US$12.7 billion of aluminum and US$10.9 billion of maize down to US$0.2 billion of cotton seed oil. Given the total world exports of US$1,998 billion in 1980, the export of copper ingots, the largest among the commodities in the table, accounts for a mere 0.68%.

As discussed in the summary and conclusion of agricultural products of this volume, commodities vary considerably in the maturity of their marketabilities and in their freight-payable capacities. Because there is no established indicator to measure the maturity of the respective commodities' marketabilities, the degree of maturity must be distinguished by informed judgement over various factors. The presence of a specialized market, such as the London Metal Exchange (LME) for copper and other metals and the Chicago Board of Trade for cereals, might be understood, above all, as an indicator of the advanced state of maturity. The availability of market quotations, or the easy access to price

Table A-1 Composition of Exports by Developing Countries (1960, 1970 and 1979)

(US$1,000 million; %[a])

	1960	1970	1979
Primary commodities[b]	18.3 (62.3)	29.3 (46.7)	105.3 (22.9)
Petroleum[c]	7.7 (25.7)	18.2 (29.0)	237.4 (51.5)
Manufactures[d]	3.5 (11.7)	13.9 (22.2)	113.6 (24.6)
Others[e]	0.1 (0.3)	1.3 (2.1)	4.6 (1.0)
Total exports	30.0 (100.0)	62.7 (100.0)	460.9 (100.0)
Total exports except petroleum	22.3	44.5	223.5
Percentage of primary commodities in total exports except petroleum	(82.1)	(65.8)	(47.1)

a) Figures in parentheses are percentages in total exports.
b) SITC 0, 1, 2, 4, 68.
c) SITC 3.
d) SITC 5, 6, 7, 8 (except 68).
e) SITC 9.

Source: World Bank, Commodity Trade and Price Trends, 1981, Table 1.

Table A-2 Contribution of Developing Countries in World Commodity Trade (1977-79 average)

Commodity (SITC)	Total World Exports (US$ million)	Contribution by Developing Countries (%)
Maize (D44)	8,109.5	15.0
Sugar (061.1 + 061.2)	7,775.8	37.9
Banana (057.3)	1,056.5	92.5
Copra (223.1)	258.1	95.0
Coconut oil (424.3)	833.2	85.5
Palm oil (424.2)	1,258.8	81.7
Cotton (263.1)	6,289.5	47.8
Natural rubber (232)	3,234.1	98.3
Timber (245 + 246 + 247 + 248)	15,514.8	27.3
Bauxite (287.31)	714.7	86.1
Copper (287.1 + 682.1)	7,255.5	62.8
Tin (287.6 + 687.1)	2,407.1	84.2
Iron ores (281)	5,651.6	42.3
Manganese ores (287.7)	426.0	75.9

Source: World Bank, Commodity Trade and Price Trends, 1981, Table 9, 10.

Table A-3 Total World Exports of Commodities under Study

(US$ million)

Commodities	SITC Codes	1979	1980
Soybeans	222.2	6,868	7,054
Soybean oil	423.2	2,010	1,518
Palm oil	424.2	1,135	1,109
Palm kernel oil	424.4	298	n.a.
Ground nuts	222.1	514	410
Ground nut oil	423.4	459	n.a.
Cotton seeds	222.3	n.a.	n.a.
Cotton seed oil	423.3	234	228
Sunflower	222.4	517	563
Sunflower oil	423.6	334	336
Maize	044	9,735	10,857
Coconut	057.71	n.a.	n.a.
Copra	223.1	282	n.a.
Coconut oil	424.3	1,080	n.a.
Natural rubber	232	5,077	n.a.
Pepper	075.1	n.a.	n.a.
Brazil nuts	057.72	n.a.	n.a.
Cotton lint	263	5,586	5,726
Timber (unprocessed)	247	6,301	6,042
Beef	011.1	3,452	4,125
Cashew nuts	057.73	n.a.	69
Pineapple juice	058.54	n.a.	n.a.
Bauxite	287.31	1,079*	1,314*
Alumina	287.32	1,998*	2,529*
Aluminum	684	9,803	12,742
Nickel ore	287.2	794	1,207
Nickel	683	1,874	2,433
Manganese ore	287.7	499	n.a.
Tin ore	287.6	n.a.	n.a.
Tin	687	2,637	n.a.
Copper	682	11,157	13,502
Copper ore	287.1	1,960	n.a.
Pig iron	671	4,426	4,285
Steel blooms, billets and slabs	672.5	2,206	2,357

* Figures indicate total world imports.

Source: UN, Yearbook of International Trade Statistics 1980, Vol.2,
FAO, Trade Yearbook.

series data, in other words, can be used as practical criterion to distinguish commodity markets by their maturity. Price series on primary commodities are available in the World Bank's annual issues of Commodity Trade and Price Trends or in IMF International Financial Statistics, among others. Of the forty-one commodities examined in the present Study, all of the thirteen mining products have some form of price listing in these publications. However, they have no price quotation on such commodities as babassu, cassava, guarana, Brazil nuts, charcoal, cashew nuts, papaya, melon and pineapple. From this somewhat simplistic criterion of the availability of price data alone, it is possible to glean a considerable diversity among the internationally traded primary commodities. It is difficult, it goes without saying, to devise effective policy measures for commodities whose marketabilities are less than mature.

It is difficult, on the other hand, to make quantitative analysis of the respective commodities concerning their freight-payable capacities. The freight factor (the ratio of transportation fare to unit price) is a useful indicator but its availability is so far extremely limited. According to the 1974 figures for selected commodities imported in the United States, the freight factor was calculated to be 27.2% for fresh fruits, 14.7% for groundnuts, 6.2% for copra, 2.7% for coconut oil, 4.9% for palm kernel oil, 9.9% for natural rubber, 17.2% for plywood, 4.3% for raw cotton, 27.7% for iron ore, 7.9% for pig iron, 2.0% for copper ingots, 32.6% for bauxite, 10.6% for alumina, and 2.7% for aluminum ingots.[1] As expected, the freight factor is higher for fruits and metallic ores.

2. Basic Characteristics of Commodity Trade

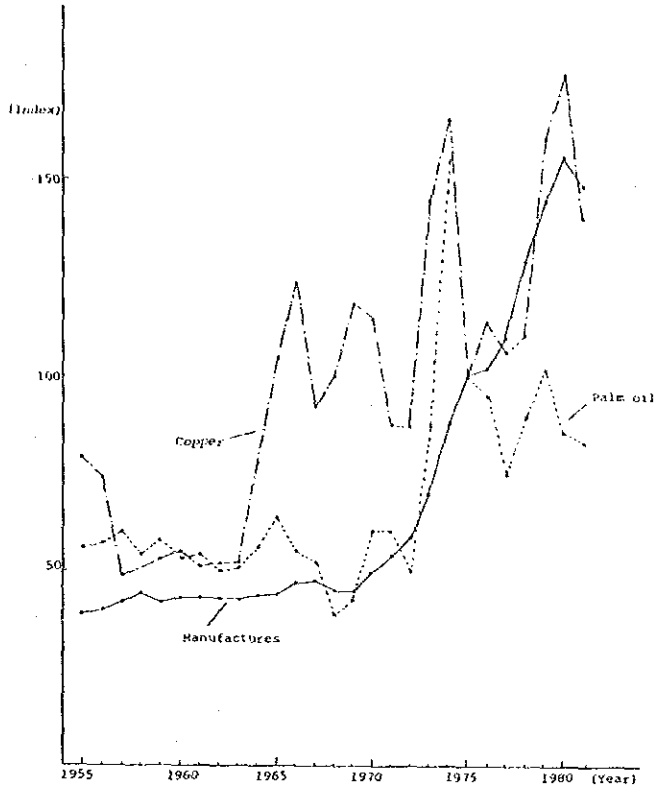
This section mainly discusses the instability of commodity exports and the secular trend in the terms of trade.

2-1 Instability of Commodity Exports

The instability of commodity exports or commodity markets is mainly observed in price fluctuations. Fig. A-1 compares unit price indexes of manufactures [2] calculated by the World Bank and those of copper and palm oil published by IMF during the period of 1955 - 1981. It is evident that price fluctuations are much larger for copper and palm oil than for manufactures.

1) A.J. Yeats, "Do International Transport Costs Increase with Fabrication?", Oxford Economic Papers, Vol. 29, No. 3, Nov. 1977, pp. 462-464.
2) Average export price index of SITC 5-8.

Fig. A-1 Comparison of Price Fluctuations (1975=100)



Sources: World Bank, Commodity Trade and Price Trends, 1981.
IMF, International Financial Statistics Yearbook, 1982.

The same situation is found between the average price idexes of the entire primary commodities and those of the manufactures. The major reason for this widening gap is that the price elasticity of demand and supply of primary commodities is smaller in absolute terms compared to that of manufactures. In fact, the element of speculation in trade is stronger for primary commodities, as typically observed in the copper market, and this leads to greater shifts in the demand curve than is the case with manufactured trade. As will be mentioned later, most of the international policy measures in operation have been aimed to reduce the price fluctuations as far as possible.

In addition to price fluctuations, it must be noted that bilateral commodity trade is often subject to wide fluctuations of traded volume and frequent changes of export destination. The export of maize from Argentina to the USSR, for instance, began from 22,000 tons in 1965 and climbed to 190,000 tons in 1969, only to plummet to nil

next year. The export volume rebounded to 230,000 tons in 1971, again tumbled to 18,000 tons in 1972 and soared next year to 1.74 million. The same applies to wheat. The United States export of wheat to the USSR, for instance, stayed virtually nil for several years after 1.7 million tons in 1964, and suddenly rose to 2.7 million in 1972 and 8.7 million in 1973 but dropped to 1 million next year. Behaviors of commodity markets are affected by the great variation between regions and countries of resource endowments and natural conditions. Bad weather in one country or region could, for instance, adversely affect international trade of agricultural commodities, among others. Commodity markets are not simply governed by market signals like price competitiveness, but more susceptible to exogenous factors than manufactured trade.

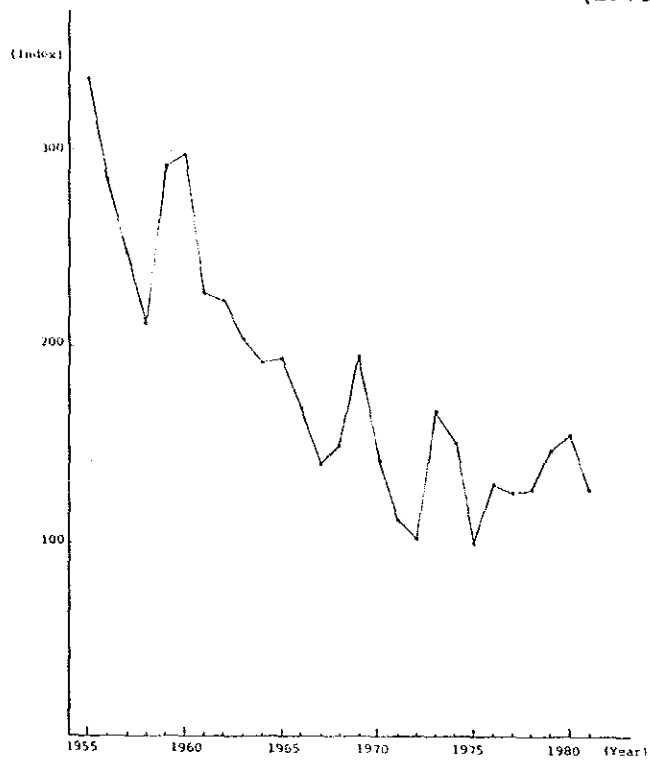
Such vulnerabilities should be borne in mind whenever the export possibilities of primary commodities are being examined.

2-2 Secular Trend in Terms of Trade

That primary commodities' terms of trade deteriorate as a long-term trend vis-a-vis manufactures is well known as so-called Prebisch - Singer Thesis. The thesis is an empirical law and therefore does not apply to all the commodities. However, the case of natural rubber, as shown in Fig. A-2, clearly indicates the worsening terms of trade (price index of natural rubber divided by unit price index of manufactures shown in Fig. A-1). Among the forty-one commodities examined in the present Study, copper, manganese, banana, maize, coconut oil and palm oil show deteriorating terms of trade, as defined above, similar to natural rubber. On the contrary, the terms of trade has been improving for such commodities as tin and bauxite as shown in Fig. A-3. The rest of the commodities do not show any discernible trend.

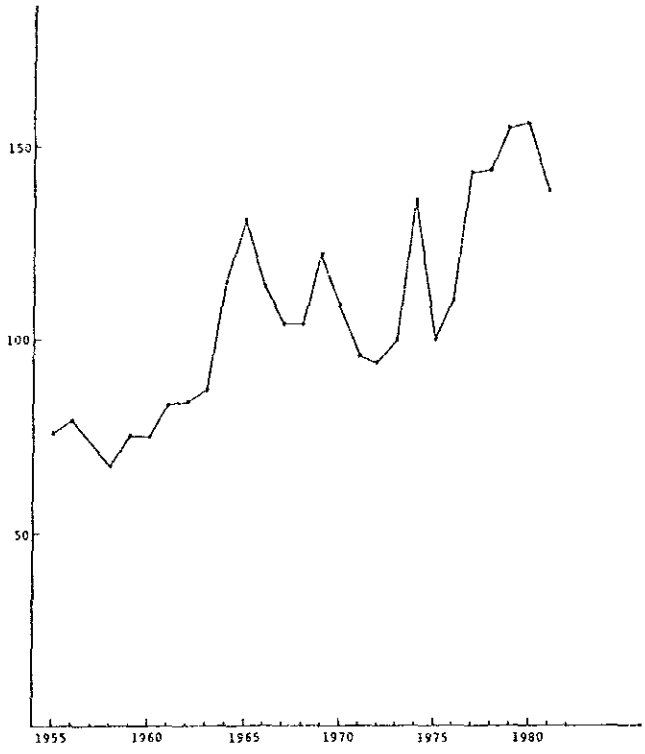
Together with the commodity terms of trade discussed above, it is necessary to examine the trend in income terms of trade (commodity terms of trade multiplied by the increase rate of export volume) and thereby to analyze the changes in the purchasing power of export earnings. Because of the generally lower income elasticity of demand for primary commodities compared with manufactures, countries which depend largely on primary commodities for export earnings are on the whole worse off than those which mostly export manufactures, even though the commodity terms of trade is not deteriorating.

Fig. A-2 Terms of Trade for Natural Rubber (1975=100)



Sources: Ibid.

Fig. A-3 Terms of Trade for Tin (1975=100)



Source: Ibid.

3. Major Policy Measures [1)]

3-1 International Commodity Agreements

Major price stabilizing policy measures adopted in the existing international commodity agreements comprise (i) multilateral long-term contract, (ii) export quota agreement and (iii) buffer stock.

The multilateral long-term contract, as in the International Wheat Agreement, stipulates beforehand the upper and lower limit of export price for a given commodity and the guaranteed volume of trade. When the market price rises above the upper limit, the exporting country is required to sell the guaranteed volume at the ceiling price to its partner of the contract, whereas the importing country must buy the guaranteed volume at the floor price, when the actual price goes down below the lower limit. As long as actual price changes stay within the upper and lower limit of the price band, the stipulated market intervention is not activated.

The export quota agreement aims at price stabilization by adjusting the export volume among the producing member countries in accordance with changes in world demand. The quota is usually determined by the respective countries' previous market shares.

The operation of buffer stock is to stabilize price within a stipulated range by purchasing from the open market when the actual price falls below the floor price and by selling the stock when the market price goes up above the ceiling price. A notable example of the buffer stock operation is the International Tin Agreement.

3-2 Compensatory Financing Schemes

Compensatory financing schemes come into effect when earnings from commodity exports of a given country fall below the base amount determined on the basis of the country's Past performance, and compensate a certain stipulated percentage of the shortfall in earnings. Most notable examples are Compensatory Pinancing Facility of IMF and Stabex (Stabilization of Export Earnings) agreed at Lomé Convention. The characteristic of such schemes as distinct from commodity agreements is that they offer ex post compensation rather than direct market intervention and so have the merit of not disturbing the market mechanism.

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1) Bilateral long-term trade agreements are just as important, although they are not discussed in this section.

3-3 Integrated Program for Commodities

This program was first proposed in 1974 by G. Corea, the Secretary General of UNCTAD. It originally consisted of five policy measures; namely, (i) international buffer stocks for the bulk of primary commodities (chiefly ten major commodities, or so-called core ten),[1] (ii) a Common Fund to finance the international stocking operations and other policy measures, (iii) multinational commitments that cover the operation of internatinal commodity stocks and the compensatory financing of export fluctuation in commodity trade, (iv) improvement of compensatory financing schemes and (v) expansion of processing and diversification of raw materials. The gist of the program was the multi-commodity buffer stocks to be financed by the Common Fund, as it was presumed that the joint operation of multi-commondity buffer stocks would cancel out the price fluctuations of individual commodities and therefore would economize the financing by the Fund.

The amount of the Common Fund was initially stipulated to be more than US$ 10,000 million but later reduced to US$ 6,000 million. At the negotiating table on the Common Fund held in May 1979, it was agreed to set up the first window of US$ 400 million and the second window of US$ 350 million, or a total of only US$ 750 million for the Fund. The first window is the facility to finance the operation of buffer stocks and the second is the account to promote R&D and market development among others. Although the Common Fund was drastically scaled down since its conception, it has not yet been put into effect.

4. Policy Options for Commodity Trade

It is crucial in the long run to devise effective policy measures for counteracting vulnerabilities of commodity markets. A variety of attempts have been made so far through multinational forums, as mentioned already, and through bilateral negotiations as well. Some of the bilateral longterm trade agreements have proved to be reasonably effective in reducing the instability of commodity trade.

The buffer stock operation included in the International Tin Agreement is, as already explained, to reduce the price swings by setting the upper and the lower limit of the price band for the commodity. The exact level of the price band has been, however, adjusted regularly, as seen in Fig. D-2 in the chapter of tin. In effect, the buffer stock operation has been functioning as a device not only to reduce price swings but to raise the price level itself.

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1) Core ten comprises cocoa, coffee, tea, sugar, cotton, natural rubber, jute, coarse fibers, copper and tin.

The effectiveness of the Agreement is evident in the improving terms of trade for tin, as already shown in Fig. A-3. As long as other conditions remain constant, the improvement in commodity terms of trade is beneficial to the producing countries, but in the long run, the price mechanism will function to enable the subsitution with another metal. The same applies to bauxite. In this sense, it is important to evaluate the relative long-term advantages of terms of trade improvements, on the one hand, and the declines of demand due to substitution, on the other, and thereby to judge a better policy option.

Commodity exporting countries will have to make policy decisions from the long-term perspective, by carefully evaluating the structures and behaviors of particular commodity markets they are interested in, and the trend and composition of the importing countries.

Annex Table 1 Projected Average Annual Growth of Population, 1980 - 2000

Countries	Average Annual Growth of Population (%)			Population (millions)	Projected Population (millions)		
	1960-70	1970-80	1980-2000 (Projected)	1980	1985	1990	2000
Low-Income Countries	2.1	2.1	1.8	2,160.9	2,359	2,607	3,090
1. Kampuchea, Dem.	2.6	-0.2	1.9	6.9	8	9	10
2. Lao PDR	1.9	1.8	2.0	3.4	4	4	5
3. Bhutan	1.8	2.0	1.8	1.3	2	2	2
4. Chad	1.8	2.0	2.3	4.5	5	6	7
5. Bangladesh	2.4	2.6	2.3	88.5	99	113	141
6. Ethiopia	2.4	2.0	2.8	31.1	36	41	54
7. Nepal	1.8	2.5	2.1	14.6	16	18	22
8. Somalia	2.4	2.3	2.6	3.9	4	5	7
9. Burma	2.3	2.4	2.2	34.8	39	44	54
10. Afghanistan	2.2	2.5	2.0	15.9	18	19	24
11. Viet Nam	3.1	2.8	2.4	54.2	61	71	88
12. Mali	2.4	2.7	3.0	7.0	8	9	13
13. Burundi	1.6	2.0	2.5	4.1	5	5	7
14. Rwanda	2.6	3.4	3.5	5.2	6	7	10
15. Upper Volta	2.0	1.8	2.6	6.1	7	8	10
16. Zaire	2.0	2.7	2.9	28.3	33	38	51
17. Malawi	2.8	2.9	3.4	6.1	7	8	12
18. Mozambique	2.1	4.0	2.9	12.1	14	16	22
19. India	2.3	2.1	1.9	673.2	740	833	994
20. Haiti	1.5	1.7	2.0	5.0	6	6	7
21. Sri Lanka	2.4	1.6	1.8	14.7	16	18	21
22. Sierra Leone	2.2	2.6	2.9	3.5	4	5	6
23. Tanzania	2.7	3.4	3.3	18.7	22	26	36
24. China	1.9	1.8	1.2	976.7	1,037	1,110	1,245
25. Guinea	2.8	2.9	2.8	5.4	6	7	9
26. Central African Rep.	1.9	2.1	2.7	2.3	3	3	4
27. Pakistan	2.8	3.1	2.5	82.2	93	107	134

Annex Table 1 (cont'd.)

Countries	Average Annual Growth of Population (%)			Population (millions)	Projected Population (millions)		
	1960-70	1970-80	1980-2000 (Projected)	1980	1985	1990	2000
Low-Income Countries (cont'd)							
28. Uganda	2.9	2.6	3.3	12.6	15	17	24
29. Benin	2.5	2.6	3.1	3.4	4	5	6
30. Niger	3.3	2.8	3.2	5.3	6	7	10
31. Madagascar	2.1	2.5	3.1	8.7	10	12	16
32. Sudan	2.1	3.0	3.0	18.7	22	25	34
33. Togo	2.7	2.5	3.1	2.5	3	3	5
Middle-Income Countries	2.5	2.4	2.3	1,138.8	1,273	1,441	1,789
34. Ghana	2.4	3.0	3.4	11.7	14	16	23
35. Kenya	3.2	3.4	4.1	15.9	19	24	36
36. Lesotho	2.0	2.3	2.8	1.3	2	2	2
37. Yemen, PDR	2.1	2.4	2.5	1.9	2	2	3
38. Indonesia	2.0	2.3	2.0	146.6	162	180	216
39. Yemen Arab Rep.	2.3	2.9	2.2	7.0	8	9	11
40. Mauritania	2.5	2.5	3.1	1.5	2	2	3
41. Senegal	3.3	2.8	2.9	5.7	7	8	10
42. Angola	1.5	2.4	2.7	7.1	8	9	12
43. Liberia	3.1	3.4	3.7	1.9	2	3	4
44. Honduras	3.1	3.4	3.0	3.7	4	5	7
45. Zambia	2.8	3.1	3.4	5.8	7	8	11
46. Bolivia	2.3	2.5	2.4	5.6	6	7	9
47. Egypt	2.2	2.1	2.1	39.8	44	50	60
48. Zimbabwa	3.9	3.3	4.3	7.4	9	11	17
49. El Salvador	2.9	2.9	2.7	4.5	5	6	8
50. Cameroon	1.8	2.2	2.6	8.4	10	11	14
51. Thailand	3.0	2.5	1.9	47.0	52	58	68
52. Philippines	3.0	2.7	2.3	49.0	55	63	77

Annex Table 1 (cont'd.)

Countries	Average Annual Growth of Population (%)			Population (millions)	Projected Population (millions)		
	1960-70	1970-80	1980-2000 (Projected)	1980	1985	1990	2000
Middle-Income Countries (cont'd)							
53. Nicaragua	2.6	3.4	2.9	2.6	3	4	5
54. Papua New Guinea	2.1	2.3	2.0	3.0	4	4	5
55. Congo, People's Rep.	2.4	2.8	3.4	1.6	2	2	3
56. Morocco	2.5	3.0	2.8	20.2	23	27	36
57. Mongolia	2.9	2.9	2.4	1.7	2	2	3
58. Albania	2.8	2.5	1.9	2.7	3	3	4
59. Peru	2.8	2.6	2.3	17.4	19	22	27
60. Nigeria	2.5	2.5	3.4	84.7	100	119	169
61. Jamaica	1.4	1.5	2.0	2.2	3	3	3
62. Guatemala	3.0	3.0	2.6	7.3	8	10	12
63. Ivory Coast	3.7	5.0	2.9	8.3	10	11	15
64. Dominican Rep.	2.7	3.0	2.5	5.4	6	7	9
65. Colombia	3.0	2.3	2.0	26.7	29	33	39
66. Ecuador	3.0	3.0	2.7	8.0	9	11	14
67. Paraguay	2.5	3.2	2.4	3.2	4	4	5
68. Tunisia	1.9	2.1	1.9	6.4	7	8	10
69. Korea, Dem. Rep.	2.9	2.6	2.2	18.3	20	23	28
70. Syrian Arab Rep.	3.2	3.6	3.0	9.0	10	12	16
71. Jordan	3.0	3.4	2.9	3.2	4	4	6
72. Lebanon	2.8	0.7	2.0	2.7	3	3	4
73. Turkey	2.5	2.4	2.0	44.9	50	56	67
74. Cuba	2.0	1.3	1.2	9.7	10	11	12
75. Korea Rep. of	2.5	1.7	1.6	38.2	41	45	52
76. Malaysia	2.8	2.4	2.0	13.9	15	17	21
77. Costa Rica	3.4	2.5	2.0	2.2	3	3	3
78. Panama	2.9	2.3	2.1	1.8	2	2	3
79. Algeria	2.4	3.2	2.9	18.9	22	26	34
80. Brazil	2.9	2.2	2.0	118.7	131	147	177
81. Mexico	3.3	3.1	2.5	69.8	79	92	115

Annex Table 1 (cont'd.)

Countries	Average Annual Growth of Population (%)			Population (millions)	Projected Population (millions)		
	1960-70	1970-80	1980-2000 (Projected)	1980	1985	1990	2000
Middle-Income Countries (cont'd)							
82. Chile	2.1	1.7	1.4	11.1	12	13	15
83. South Africa	2.6	2.7	2.9	29.3	34	39	52
84. Romania	1.0	0.9	0.7	22.2	23	24	25
85. Portugal	-0.2	1.3	0.8	9.8	10	11	11
86. Argentina	1.4	1.6	1.1	27.7	29	31	34
87. Yugoslavia	1.0	0.9	0.7	22.3	23	24	26
88. Uruguay	1.1	0.3	1.0	2.9	3	3	4
89. Iran	2.9	3.1	2.3	38.8	43	51	61
90. Iraq	3.1	3.3	2.8	13.1	15	18	23
91. Venezuela	3.4	3.3	2.3	14.9	17	19	24
92. Hong Kong	2.6	2.5	1.2	5.1	6	6	6
93. Trinidad and Tobago	2.0	1.3	1.5	1.2	1	1	2
94. Greece	0.5	0.9	0.5	9.6	10	10	11
95. Singapore	2.4	1.5	1.3	2.4	3	3	3
96. Israel	3.4	2.6	1.5	3.9	4	5	5
High-Income Oil Export Countries	4.1	5.0	2.6	14.4	17	19	23
97. Libya	3.8	4.1	2.8	3.0	4	4	5
98. Saudi Arabia	3.4	4.4	2.6	9.0	10	12	15
99. Kuwait	9.8	6.0	2.7	1.4	2	2	2
100. United Arab Emirates	10.8	13.2	1.7	1.0	1	1	1
Industrial Market Countries	1.0	0.8	0.5	714.4	735	755	787
101. Ireland	0.4	1.1	1.0	3.3	4	4	4
102. Spain	1.1	1.0	0.7	37.4	39	41	43

Annex Table 1 (cont'd.)

Countries	Average Annual Growth of Population (%)			Population (millions)	Projected Population (millions)		
	1960-70	1970-80	1980-2000 (Projected)	1980	1985	1990	2000
Industrial Market Countries (cont'd)							
103. Italy	0.6	0.6	0.3	56.9	58	59	61
104. New Zealand	1.7	1.5	0.9	3.3	4	4	4
105. United Kingdom	0.5	0.1	0.2	55.9	56	57	58
106. Finland	0.4	0.5	0.4	4.9	5	5	5
107. Australia	2.0	1.4	0.8	14.5	15	16	17
108. Japan	1.0	1.1	0.6	116.8	120	124	130
109. Canada	1.8	1.1	0.8	23.9	25	26	28
110. Austria	0.6	0.0	0.2	7.5	8	8	8
111. United States	1.3	1.0	0.7	227.7	236	245	259
112. Netherlands	1.3	0.8	0.5	14.1	15	15	16
113. France	1.0	0.5	0.4	53.5	55	56	58
114. Belgium	0.5	0.2	0.2	9.8	10	10	10
115. Norway	0.8	0.5	0.3	4.1	4	4	4
116. Denmark	0.7	0.4	0.2	5.1	5	5	5
117. Sweden	0.7	0.3	( )	8.3	8	8	8
118. Germany, Fed.Rep.	0.9	( )	0.1	60.9	61	61	62
119. Switzerland	1.6	0.3	0.2	6.5	7	7	7
Non-market Industrial Countries	1.0	0.8	0.7	353.3	366	383	409
120. Poland	1.0	0.9	0.7	35.8	37	39	42
121. Bulgaria	0.8	0.6	0.4	9.0	9	9	10
122. Hungary	0.4	0.4	0.2	10.0	11	11	11
123. USSR	1.2	0.9	0.8	265.5	276	291	312
124. Czechoslovakia	0.5	0.7	0.5	15.3	16	16	17
125. German Dem.Rep.	-0.1	-0.1	0.2	16.9	17	17	17
TOTAL					4,750	5,025	6,098

Source: World Bank, World Development Report 1982

Annex Table 2 Projected Average Annual Growth of GDP, 1980 - 2000

Countries	Average Annual Growth of GDP (%)		GDP (Millions of dollars)	Annual Growth of GDP Projected (%)				Projected GDP (Millions of dollars)	Projected GDP (Millions of dollars)					
	1960-70	1970-80	1980	1980-85	1985 - 2000			1985	1990			2000		
					High	Med.	Low		High	Med.	Low	High	Med.	Low
Low-Income Countries														
1. Kampuchea Dem.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2. Lao PDR	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3. Bhutan	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4. Chad	0.5	-0.2	500	2.8	3.1	2.8	2.5	574	669	659	649	908	869	831
5. Bangladesh	3.7	3.9	11,140	2.8	3.1	2.8	2.5	12,789	14,898	14,683	14,450	20,217	19,353	18,497
6. Ethiopia	4.4	2.0	3,690	2.8	3.1	2.8	2.5	4,236	4,935	4,863	4,793	6,697	6,410	6,135
7. Nepal	2.5	2.5	1,860	2.8	3.1	2.8	2.5	2,135	2,487	2,451	2,416	3,375	3,231	3,093
8. Somalia	1.0	3.4	1,130	2.8	3.1	2.8	2.5	1,297	1,511	1,489	1,467	2,050	1,963	1,878
9. Burma	2.7	4.6	5,550	2.8	3.1	2.8	2.5	6,372	7,423	7,315	7,209	10,073	9,642	9,228
10. Afghanistan	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11. Viet Nam	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12. Mali	3.3	4.9	1,410	2.8	3.1	2.8	2.5	1,619	1,886	1,859	1,832	2,559	2,450	2,345
13. Burundi	4.4	2.8	790	2.8	3.1	2.8	2.5	907	1,057	1,041	1,026	1,434	1,372	1,313
14. Rwanda	2.7	4.1	1,120	2.8	3.1	2.8	2.5	1,286	1,498	1,476	1,455	2,033	1,945	1,863
15. Upper Volta	3.0	3.5	980	2.8	3.1	2.8	2.5	1,125	1,311	1,292	1,273	1,779	1,703	1,630
16. Zaire	3.4	0.1	6,160	2.8	3.1	2.8	2.5	7,072	8,238	8,119	8,001	11,179	10,701	10,242
17. Malawi	4.9	6.3	1,420	2.8	3.1	2.8	2.5	1,630	1,899	1,871	1,844	2,577	2,466	2,360
18. Mozambique	4.6	-2.9	2,360	4.4	4.9	4.4	3.9	2,927	3,718	3,630	3,544	5,999	5,584	5,196
19. India	3.4	3.6	142,010	2.8	3.1	2.8	2.5	163,036	189,922	187,175	184,461	257,728	246,706	236,125
20. Haiti	-0.2	4.0	1,410	4.4	4.9	4.4	3.9	1,749	2,222	2,169	2,118	3,585	3,336	3,105
21. Sri Lanka	4.6	4.1	3,760	2.8	3.1	2.8	2.5	4,317	5,029	4,956	4,884	6,824	6,532	6,252
22. Sierra Leone	4.3	1.6	930	2.8	3.1	2.8	2.5	1,068	1,244	1,226	1,208	1,688	1,616	1,546
23. Tanzania	6.0	4.9	4,350	2.8	3.1	2.8	2.5	4,994	5,818	5,733	5,650	7,895	7,556	7,232
24. China	5.2	5.8	252,230	3.8	5.0	3.8	2.5	303,937	387,908	366,244	343,877	631,863	531,794	440,190
25. Guinea	3.5	3.3	1,670	2.8	3.1	2.8	2.5	1,917	2,233	2,201	2,169	3,030	2,901	2,776
26. Central African Rep.	1.9	3.0	780	2.8	3.1	2.8	2.5	895	1,043	1,028	1,013	1,415	1,355	1,297
27. Pakistan	6.7	4.7	21,460	2.8	3.1	2.8	2.5	24,637	28,700	28,285	27,875	38,946	37,281	35,682
28. Uganda	5.6	-1.7	12,790	2.8	3.1	2.8	2.5	14,684	17,106	16,858	16,614	23,213	22,220	21,267
29. Benin	2.6	3.3	950	2.8	3.1	2.8	2.5	1,091	1,271	1,253	1,234	1,725	1,652	1,580
30. Niger	2.9	2.7	1,890	2.8	3.1	2.8	2.5	2,170	2,528	2,491	2,455	3,431	3,283	3,143
31. Madagascar	2.9	0.3	3,260	2.8	3.1	2.8	2.5	3,743	4,360	4,297	4,235	5,917	5,664	5,421
32. Sudan	1.3	4.4	7,190	2.8	3.1	2.8	2.5	8,255	9,616	9,477	9,340	13,049	12,491	11,956
33. Togo	8.5	3.4	1,060	2.8	3.1	2.8	2.5	1,217	1,418	1,397	1,377	1,924	1,841	1,763

Annex Table 2 (cont'd.)

Countries	Average Annual Growth of GDP (%)		GDP (Millions of dollars)	Annual Growth of GDP Projected (%)				Projected GDP (Millions of dollars)	Projected GDP (Millions of dollars)					
	1960-70	1970-80	1980	1980-85	1985 - 2000			1985	1990			2000		
					High	Med.	Low		High	Med.	Low	High	Med.	Low
Middle-Income Economies														
34. Ghana	2.1	-0.1	15,390	4.4	4.9	4.4	3.9	19,087	24,245	23,672	23,111	39,118	36,412	33,882
35. Kenya	6.0	6.5	5,590	2.8	3.1	2.8	2.5	6,418	7,476	7,368	7,261	10,145	9,711	9,295
36. Lesotho	5.2	7.9	250	2.8	3.1	2.8	2.5	287	334	329	325	453	434	416
37. Yemen PDR	---	---	540	4.4	4.9	4.4	3.9	670	851	831	811	1,373	1,278	1,189
38. Indonesia	3.9	7.6	69,800	5.4	6.5	5.4	4.3	90,794	124,396	118,103	112,067	233,509	199,833	170,734
39. Yemen Arab Rep.	---	9.2	2,610	4.4	4.9	4.4	3.9	3,237	4,112	4,015	3,919	7,719	6,176	5,746
40. Mauritania	---	1.7	490	4.4	4.9	4.4	3.9	608	772	754	736	1,246	1,160	1,079
41. Senegal	2.5	2.5	2,650	4.4	4.9	4.4	3.9	3,287	4,175	4,077	3,980	6,736	6,271	5,835
42. Angola	4.8	-9.5	2,500	4.4	4.9	4.4	3.9	3,101	3,939	3,846	3,755	6,355	5,916	5,505
43. Liberia	5.1	1.7	1,040	4.4	4.9	4.4	3.9	1,290	1,639	1,600	1,562	2,644	2,461	2,290
44. Honduras	5.3	3.6	2,230	4.4	4.9	4.4	3.9	2,766	3,513	3,430	3,349	5,668	5,276	4,910
45. Zambia	5.0	0.7	3,790	4.4	4.9	4.4	3.9	4,700	5,970	5,829	5,691	9,632	8,966	8,343
46. Bolivia	5.2	4.8	6,100	4.4	4.9	4.4	3.9	7,565	9,609	9,382	9,160	15,504	14,431	13,429
47. Egypt	4.3	7.4	22,970	4.4	4.9	4.4	3.9	28,488	36,186	35,332	34,494	58,384	54,347	50,571
48. Zimbabwa	4.3	1.6	3,640	4.4	4.9	4.4	3.9	4,514	5,734	5,598	5,466	9,251	8,611	8,014
49. El Salvador	5.9	4.1	3,390	4.4	4.9	4.4	3.9	4,204	5,340	5,214	5,090	8,616	8,020	7,462
50. Cameroon	3.7	5.6	6,010	4.4	4.9	4.4	3.9	7,454	9,468	9,245	9,025	15,276	14,220	13,231
51. Thailand	8.4	7.2	33,450	4.4	4.9	4.4	3.9	41,486	52,696	51,452	50,232	85,022	79,142	73,644
52. Philippines	5.1	6.3	35,490	4.4	4.9	4.4	3.9	44,016	55,910	54,590	53,295	90,208	83,969	79,134
53. Nicaragua	7.3	0.9	2,120	4.4	4.4	4.4	3.9	2,629	3,261	3,261	3,183	5,016	5,016	4,667
54. Papua New Guinea	6.5	2.3	2,490	4.4	4.9	4.4	3.9	3,088	3,922	3,830	3,739	6,328	5,891	5,482
55. Congo People's Rep.	2.7	3.1	1,750	4.4	4.9	4.4	3.9	2,170	2,756	2,691	2,627	4,447	4,139	3,851
56. Morocco	4.4	5.6	17,940	4.4	4.9	4.4	3.9	22,250	28,262	27,595	26,941	45,599	42,446	39,497
57. Mongolia	---	---	---	---	---	---	---	---	---	---	---	---	---	---
58. Albania	---	---	---	---	---	---	---	---	---	---	---	---	---	---
59. Peru	4.9	3.0	19,240	4.4	4.9	4.4	3.9	23,862	30,310	29,594	28,893	48,904	45,521	42,359
60. Nigeria	3.1	6.5	91,130	5.4	6.5	5.4	4.3	118,540	162,410	154,194	146,314	304,866	260,899	214,507
61. Jamaica	4.4	-1.1	2,660	4.4	4.4	4.4	3.9	3,299	4,092	4,092	3,994	6,294	6,294	5,855
62. Guatemala	5.6	5.7	7,850	4.4	4.9	4.4	3.9	9,736	12,367	12,075	11,789	19,954	18,573	17,283
63. Ivory Coast	8.0	6.7	7,030	4.4	4.9	4.4	3.9	8,719	11,075	10,814	10,557	17,869	16,634	15,477
64. Dominican Rep.	4.5	6.6	7,120	4.4	4.9	4.4	3.9	8,830	11,216	10,951	10,692	18,096	16,844	15,675
65. Colombia	5.1	5.9	29,570	4.4	4.9	4.4	3.9	36,674	46,584	45,484	44,406	75,161	69,962	65,102
66. Ecuador	---	8.8	11,380	5.4	6.5	5.4	4.3	14,803	20,281	19,255	18,271	38,070	32,580	27,836
67. Paraguay	4.2	8.6	4,450	4.4	4.9	4.4	3.9	5,519	7,010	6,845	6,683	11,310	10,529	9,798
68. Tunisia	4.7	7.5	7,300	4.4	4.9	4.4	3.9	9,054	11,501	11,229	10,963	18,556	17,272	16,073
69. Korea Dem. Rep.	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Annex Table 2 (cont'd.)

	Countries	Average Annual Growth of GDP (%)		GDP (Millions of dollars)	Annual Growth of GDP Projected (%)				Projected GDP (Millions of dollars)	Projected GDP (Millions of dollars)					
		1960-70	1970-80	1980	1980-85	1985 - 2000 High	1985 - 2000 Med.	1985 - 2000 Low	1985	1990 High	1990 Med.	1990 Low	2000 High	2000 Med.	2000 Low
Middle-Income Countries (cont'd)															
70.	Syrian Arab Rep.	4.6	10.0	12,900	4.4	4.9	4.4	3.9	15,999	20,322	19,842	19,372	32,789	30,520	28,401
71.	Jordan	---	---	2,190	4.4	4.9	4.4	3.9	2,716	3,450	3,368	3,289	5,566	5,181	4,822
72.	Lebanon	4.9	---	---	---	---	---	---	---	---	---	---	---	---	---
73.	Turkey	6.0	5.9	53,820	4.4	4.9	4.4	3.9	66,749	84,786	82,784	80,821	136,798	127,336	118,489
74.	Cuba	---	---	---	---	---	---	---	---	---	---	---	---	---	---
75.	Korea Rep. of	8.6	9.5	58,250	4.4	4.9	4.4	3.9	72,243	91,765	89,598	87,473	148,058	137,817	128,242
76.	Malaysia	6.5	7.8	23,600	4.4	4.9	4.4	3.9	29,269	37,178	36,300	35,439	59,985	55,836	51,956
77.	Costa Rica	6.5	5.8	4,850	4.4	4.4	4.4	3.9	6,015	7,460	7,460	7,283	11,475	11,475	10,677
78.	Panama	7.8	4.0	3,390	4.4	4.4	4.4	3.9	4,204	5,214	5,214	5,090	8,020	8,020	7,462
79.	Algeria	4.3	7.0	39,870	5.4	5.5	5.4	4.3	51,862	71,056	67,461	64,013	133,382	114,145	97,524
80.	Brazil	5.4	8.4	237,930	4.4	4.9	4.4	3.9	295,088	374,827	365,977	357,298	604,765	562,935	523,824
81.	Mexico	7.2	5.2	166,700	4.4	4.9	4.4	3.9	206,746	262,613	256,413	250,332	423,713	394,407	367,004
82.	Chile	4.5	2.4	28,080	4.4	4.9	4.4	3.9	34,826	44,237	43,192	42,168	71,374	66,437	61,821
83.	South Africa	6.3	3.6	74,660	3.1	3.7	3.1	2.5	86,972	104,298	101,315	98,401	149,991	137,486	125,961
84.	Romania	8.6	8.6	57,650	2.8	3.0	2.8	2.5	66,186	76,727	75,985	74,884	103,115	100,152	95,858
85.	Portugal	6.2	4.6	21,930	2.0	3.7	3.1	2.5	24,212	29,035	28,205	27,394	41,755	38,275	35,067
86.	Argentina	4.2	2.2	130,920	4.4	4.9	4.4	3.9	162,371	206,247	201,377	196,602	332,769	309,752	288,232
87.	Yugoslavia	5.8	5.8	62,150	2.8	3.0	2.8	2.5	71,352	82,716	81,916	80,728	111,164	107,969	103,338
88.	Uruguay	1.2	3.5	8,430	4.4	4.9	4.4	3.9	10,455	13,280	12,967	12,659	21,427	19,945	18,559
89.	Iran	---	---	---	---	---	---	---	---	---	---	---	---	---	---
90.	Iraq	6.1	12.1	35,810	5.4	6.5	5.4	4.3	46,581	63,820	60,592	57,495	119,799	102,523	87,594
91.	Venezuela	6.0	5.0	60,030	5.4	6.5	5.4	4.3	78,086	106,985	101,573	96,382	200,826	171,864	146,838
92.	Hong Kong	10.0	9.3	20,230	4.4	4.9	4.4	3.9	25,090	31,870	31,117	30,379	51,421	47,863	44,538
93.	Trinidad and Tobago	4.0	5.1	5,310	4.4	4.4	4.4	3.9	6,586	8,168	8,168	7,974	12,564	12,564	11,690
94.	Greece	6.9	4.9	35,650	1.0	3.7	3.1	2.5	37,469	44,933	43,648	42,393	64,618	59,231	54,266
95.	Singapore	8.8	8.5	10,480	4.4	4.9	4.4	3.9	12,998	16,510	16,121	15,738	26,638	24,797	23,073
96.	Israel	8.1	4.1	15,340	4.4	4.9	4.4	3.9	19,025	24,166	23,595	23,036	38,991	36,293	33,772
High-Income Oil Export Countries															
97.	Libya	24.4	2.2	32,090	5.4	6.5	5.4	4.3	41,742	57,190	54,297	51,522	107,354	91,872	78,494
98.	Saudi Arabia	---	10.6	115,430	5.4	6.5	5.4	4.3	150,149	205,718	195,311	185,329	386,161	330,470	282,349
99.	Kuwait	5.7	2.5	27,290	5.4	6.5	5.4	4.3	35,498	48,635	46,175	43,815	91,295	78,129	66,752
100.	United Arab Emirates	---	---	30,020	5.4	6.5	5.4	4.3	39,049	53,501	50,794	48,198	110,429	85,944	73,430

Annex Table 2 (cont'd.)

Countries	Average Annual Growth of GDP (%)		GDP (Millions of dollars)	Annual Growth of GDP Projected (%)				Projected GDP (Millions of dollars)	Projected GDP (Millions of dollars)					
	1960-70	1970-80	1980	1980-85	1985 - 2000			1985	1990			2000		
					High	Med.	Low		High	Med.	Low	High	Med.	Low
Industrial Market Countries														
101. Ireland	4.2	3.5	17,800	1.5	3.7	3.1	2.5	19,176	22,996	22,338	21,696	33,071	30,313	27,773
102. Spain	7.1	4.0	198,320	1.5	3.7	3.1	2.5	213,646	256,206	248,878	241,721	368,450	337,732	309,422
103. Italy	5.3	3.0	393,950	1.5	3.7	3.1	2.5	424,394	508,938	494,381	480,164	731,904	670,885	614,648
104. New Zealand	3.9	2.3	23,300	2.0	3.7	3.1	2.5	25,725	30,850	29,967	29,106	44,365	40,666	37,258
105. United Kingdom	2.9	1.9	522,850	1.5	3.7	3.1	2.5	563,256	675,462	656,143	637,273	971,382	890,399	815,760
106. Finland	4.8	3.1	49,900	1.0	3.7	3.1	2.5	52,445	62,893	61,094	59,337	90,446	82,906	75,956
107. Australia	5.6	3.0	148,060	2.0	3.7	3.1	2.5	163,470	196,035	190,428	184,952	281,918	258,415	236,753
108. Japan	10.9	5.0	1,039,980	3.5	3.7	3.1	2.5	1,235,174	1,481,233	1,438,867	1,397,488	2,130,161	1,952,571	1,788,896
109. Canada	5.6	3.9	253,350	2.0	3.7	3.1	2.5	279,719	335,442	325,847	316,477	482,399	442,181	405,116
110. Austria	4.5	3.7	76,980	1.0	3.7	3.1	2.5	80,907	97,024	94,249	91,539	139,530	127,898	117,117
111. United States	4.3	3.0	2,587,100	2.5	3.7	3.1	2.5	2,927,071	3,510,173	3,409,774	3,311,717	5,047,980	4,627,132	4,239,263
112. Netherlands	5.2	2.9	167,630	0.0	3.7	3.1	2.5	167,630	201,024	195,274	189,658	289,093	264,991	242,777
113. France	5.5	3.5	651,890	1.5	3.7	3.1	2.5	702,268	842,167	818,079	794,553	1,211,120	1,110,150	1,017,091
114. Belgium	4.7	3.0	116,480	1.0	3.7	3.1	2.5	122,422	146,810	142,611	138,509	211,127	193,526	177,303
115. Norway	4.4	4.8	57,290	0.5	3.7	3.1	2.5	58,737	70,438	68,423	66,456	101,297	92,851	85,069
116. Denmark	5.4	2.5	66,380	1.0	3.7	3.1	2.5	69,766	83,664	81,271	78,934	120,317	110,286	101,042
117. Sweden	4.4	1.7	122,750	1.5	3.7	3.1	2.5	132,236	158,579	154,043	149,613	228,052	209,039	191,517
118. Germany, Fed. Rep.	4.4	2.6	819,140	1.0	3.7	3.1	2.5	860,924	1,032,429	1,002,899	974,058	1,484,736	1,360,954	1,246,872
119. Switzerland	4.3	1.2	101,470	1.0	3.7	3.1	2.5	106,646	127,890	124,233	120,660	183,919	168,587	154,454

Note: --- Sign indicates data not available.
Source: The Study Team

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