

COFFEE Handbook

**Commodities and Export Projections Division
Economic Analysis and Projections Department**

March 1982

COFFEE: TECHNICAL CONVERSION FACTORS /a

(percent)

| | |
|-----------------------------------------|------|
| Dry cherry yield of ripe fresh cherries | 70.0 |
| Roasted berry yield of dry cherries | 74.0 |
| Clean coffee yield of roasted coffee | 75.0 |
| Clean coffee yield of dry cherries | 55.5 |

1 bag = 60 kg

/a The factors are for Brazil, the largest producer of coffee.

Source: FAO, Technical Conversion Factors for Agricultural Commodities,
Rome, 1972.

TABLE OF CONTENTS

| <u>Chapter</u> | <u>Page No.</u> |
|--------------------------------------------------------------------------------------------|-----------------|
| I. INTRODUCTION..... | I - 1 |
| II. THE PRODUCT..... | II - 1 |
| A. Physical Characteristics..... | II - 1 |
| B. Methods of Cultivation, Harvesting and Processing..... | II - 1 |
| Cultivation..... | II - 1 |
| Yield..... | II - 2 |
| Harvesting and Processing..... | II - 3 |
| C. Manufacturing of Coffee Products..... | II - 4 |
| D. Grading, Storage, Marketing and Market Structure..... | II - 7 |
| E. Forms of Consumption..... | II - 8 |
| References..... | II - 10 |
| III. PRODUCTION AND EXPORTS..... | III - 1 |
| A. Geographical Distribution of Production..... | III - 1 |
| B. Price Elasticities of Supply..... | III - 5 |
| C. Exports..... | III - 8 |
| References..... | III - 10 |
| IV. CONSUMPTION, IMPORTS AND INTERNATIONAL PRICES..... | IV - 1 |
| A. Consumption and Imports..... | IV - 1 |
| B. Income and Price Elasticities of Demand..... | IV - 6 |
| C. International Prices..... | IV - 9 |
| References..... | IV - 12 |
| V. DEVELOPMENTS - INTERNATIONAL COFFEE AGREEMENTS (ICA)..... | V - 1 |
| A. Background..... | V - 1 |
| B. Main Features of the ICA, 1976..... | V - 2 |
| C. Impact of the Recent Implementation of the Quota on the Market..... | V - 4 |
| References..... | V - 11 |
| <u>ANNEX I: Composition and Voting of the Executive Board for 1980/81.....</u> | V - 7 |
| <u>ANNEX II: Export Entitlements of Exporting Members Exempt from Basic Quota.....</u> | V - 10 |

List of Tables and Figures

Page No.

| | | |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| II-B1 | India: Yields by Type of Coffee 1950/51 - 1977/78 (kg per hectare). | II - 5 |
| II-B2 | Estimated Yields from Coffee Farmed Using Modern Techniques in Colombia (kg per hectare)..... | II - 6 |
| II-A1 | Coffee: World Production, by Main Countries..... | III - 3 |
| III-B1 | Elasticities of Production with Respect to Prices, by Region | III - 6 |
| III-B2 | Short and Long-Run Price Elasticities of Coffee Production..... | III - 7 |
| III-C1 | Coffee: World Exports, by Main Countries..... | III - 9 |
| IV-A1 | World Net Imports of Coffee by Major Countries/ Regions..... | IV - 3 |
| IV-A2 | Disappearance in Importing Member Countries 1974 to 1980..... | IV - 4 |
| IV-A3 | Per Capita Disappearance in Selected Importing Countries..... | IV - 5 |
| IV-B1 | Estimated Income and Price Elasticities of Demand..... | IV - 8 |
| IV-C1 | International Prices and Stocks..... | IV - 10 |
| V-C1 | Exports to All Destinations and to Importing Members by Exporting Members. April - March 1975/76, 1978/79, 1979/80 and Initial and Latest Quotes for 1980/81..... | V - 6 |

Figures

| | | |
|--------|------------------------------------------------|---------|
| III-A1 | World and Brazil's Coffee Production..... | III - 4 |
| IV-C1 | Real World Coffee Prices and World Stocks..... | IV - 11 |

I. INTRODUCTION

Coffee is a commodity almost exclusively produced in developing countries. Except for large consumption levels in a few producing countries such as Brazil, India, Indonesia, Ethiopia and Mexico, most of the coffee produced is exported to industrialized countries. The main consuming regions are the US and Western Europe; they together have a net import market share of more than 80% of total world trade.

World coffee production has fluctuated widely in the past. Because of the very low price elasticity of world demand -- estimated to be about -0.23 -- fluctuating world supply causes prices to fluctuate widely. The main cause of world supply fluctuations has been the erratic movements of Brazil's output, which holds about 33% of world production. The average absolute year-to-year percentage change of Brazil's production for the period 1961-1981 is a phenomenal 39%. World production, which has been increasing since 1976, is to be interrupted in 1982/83 because of a sharp decline in Brazil's production caused by a severe frost in July 1981. However, with recovery in Brazil's production after 1982/83, world production is expected to continue to increase.

World demand has been stagnant for the last decade. One important cause has been the zero consumption growth in the US although fairly good demand growth was observed in Western Europe, especially in the European Community countries. The medium-term demand growth depends heavily on the demand growth in the EC countries, since demand is expected to stay stagnant in the US.

An important factor in the future of the world coffee economy is the prospects for the International Coffee Agreement (ICA). The present agreement, with its export quotas, has been successful in supporting prices since the quotas were introduced in October 1980. The Agreement will expire in September 1983. If the producing members of the ICA agree to maintain the future global export quotas compatible with likely world import demand, real coffee prices will not decline very much. However, to maintain future global quotas at reasonable levels, world production will need to increase at about the same level as the expected world demand growth rate, which is about 1.3% per annum.

II. THE PRODUCT

A. Physical Characteristics

The coffee plant, a tropical evergreen shrub, is cultivated for its seeds or beans from which an invigorating drink -- coffee -- is obtained when the beans are processed. There are two main types of coffee grown in the world: arabicas and robustas ^{1/}. The arabica species of coffee is cultivated mostly in Latin America, while the robusta species predominate in Africa. Both coffee species are grown in India, Indonesia and in other Asian countries.

Climatic factors most important for coffee growth are temperature and rainfall. No coffee specie can resist for long a temperature in the vicinity of 0°C. Medium temperatures between 23° and 28°C are the most favorable for good growth. Rainfall of 1,500 to 2,000 millimeters per year is required along with a dry period of two to three months for the arabica. On the basis of such requirements arabicas are grown at higher altitudes (where temperatures tend to be mild) and/or greater distances from the equator than robustas which can grow in hot and humid climates. These climatic factors, to a large extent, set a limit on the areas where coffee can be grown.

B. Methods of Cultivation, Harvesting and Processing

Cultivation: The bulk of the coffee supplied to world markets is grown on small farms and plantations established in cleared forest land. Plantings, from seedlings or cuttings raised in nurseries, are spaced carefully in rows at the beginning of the rainy season with a density of between 1,200 and 1,800 plants per hectare. However, the techniques of cultivation vary - the traditional method of coffee planting appears to be limited to small farms while more modern methods seem to be adopted in plantations.

The traditional system of cultivating coffee is to open planting holes at 3.5 x 3.5 meters or 3 x 3 meters spacing and to start seeding at the beginning of the rainy season. Whole dry fruits or parchment seed are used, some 20 seeds being placed in each planting whole, the surface of which is about 10 to 15 centimeters below the soil surface. After germination, the

^{1/} IBRD, "Structure and Prospects of the World Coffee Economy", June 1975, p. 3.

young seedlings are protected by pieces of wood placed across the mouth of the hole. Natural selection, insects or diseases eliminate some of the young seedlings so that only about half grow to maturity 1/.

With the modern method of cultivation seedlings from selected seeds are raised in shaded nurseries. At least two selections are made: the first while transplanting from the seedbed to nurserybeds and then during final transplanting when the seedlings are 6 to 12 months old. Before they are taken to the field, usually in bottomless wooden containers, they are gradually hardened to full sunshine exposure. Most new plantings are established on contour lines, 3 to 5 meters apart, the planting holes being spaced 2 or 3 meters in the rows. Planting holes are about 40 x 40 x 40 centimeters and 4 seedlings are placed in each about 25 centimeters apart in the form of a square 2/.

On virgin land young coffee is interplanted with food crops such as maize, beans or upland rice during the early years. On old land, either green manures or beans are interplanted during the wet season.

In the first three to four years after planting (before the coffee trees start producing fruits) care is limited largely to weeding, spraying against diseases and trimming required to give the trees a robust, balanced framework and to stimulate fruiting. The time between blooming and maturing of the fruit varies appreciably with the variety, the climate and the level of maintenance. For the arabica it is about seven months and for the robusta about nine months.

Yield: Yields generally increase with the age of tree and start to decline about 15 years after planting. Under good management, however, this decline is not usually very drastic and the tree can have an economic life of up to 50 years. Yield varies according to the type of coffee and method of cultivation and husbandry. Typical yields from arabica and robusta varieties grown under traditional farming methods are shown in Table II-B1. Yields of 1,500 to 2,800 kilograms of clean coffee per hectare from coffee planted

1/ FAO, World Coffee Survey, Rome 1968, p. 288.

2/ Ibid.

according to modern methods are common compared to 500 to 1,000 kilograms by traditional methods (Table II-B2). However the high yields tend to exhaust the trees rapidly and, depending upon soil conditions and management, their output begins to fall sharply. They are then stumped, and they remain unproductive for a year before commencing again to yield heavily.

Chemical fertilizers can be used to improve yields but that is not always done on all farms. For example, "as a rule", in Colombia (and most likely in all producer countries), "chemical fertilizers are not used or are used only sparingly on traditional holdings..." 1/ On the other hand, where land is farmed using modern methods, heavy applications of fertilizers have helped increase yields significantly. In Brazil, "considerable amounts of chemical fertilizers have been employed in coffee plantations, but in relation to the great area planted to this crop, total quantities employed are still relatively small". 2/ The main types of fertilizers generally used are nitrogen and potassium.

The growth and yield of coffee trees can be hampered by different diseases. Among the diseases of the coffee shrub are leaf rust caused by the fungus hemileia vastatrix, which does considerable damage to the arabica variety, and the coffee berry disease caused by the fungus colletotrichum coffeanum, which also attacks the arabica. Robusta appears to be resistant, or only slightly susceptible to these scourges. The berry borer (stephanoderes hamjei) is another parasite that attacks and damages the seeds of both arabica and robusta. Most of these diseases are controlled by continuous spraying with insecticides.

Harvesting and Processing: Coffee fruits are gathered by hand when they are fully ripe and red purple in color. The ripened fruits are then processed to disengage the coffee seeds from their coverings and from the pulp. Two techniques are frequently used in processing: a wet process and a dry process. The wet process: First the fresh fruit is pulped by a pulping machine. Very often, some pulp still clings to the coffee and this residue, a

1/ ICO, Coffee in Colombia 1979/80, 23 September 1980, p. 14.

2/ FAO, op. cit. p. II-2.

mucilaginous substance, is eliminated by fermentation in tanks. Washing clears all remaining traces of pulp from the coffee seeds, which are then dried to a moisture content of about 12 percent either by exposure to the sun or by hot air driers. The dry process: In this process, the fruits are immediately placed to dry either in the sun or in hot-air driers. In this case, considerable more time and equipment are required for drying than in the wet process. When the fruits are dried to a water content of 12 percent, they are mechanically hulled to free the seeds from their coverings.

C. Manufacturing of Coffee Products

Roasting: The roasting process enhances the aroma. In the most common method of roasting, hot air is propelled by a blower into a metal cylinder containing the coffee. In another technique, called singeing, the seed is submitted to the direct action of a flame. In the latter method, which is older but still in use, a metal cylinder, or sphere containing the coffee is rotated above a source of heat such as charcoal, gas, or electricity. No matter which method is used, the coffee, on leaving the industrial roasters is rapidly cooled in a vat, where it is stirred and subjected to cold air propelled by a blower. Good quality coffees are then sorted by electronic sorters to eliminate those seeds, either too light or too dark, that roasted badly, and whose presence depreciates the quality.

Grinding: Some coffees are left as whole beans to be ground at the time of purchase, or by the consumer at home. But a large part of the coffee is ground, or milled, by the manufacturer immediately after roasting. The degree of fineness of grinding is very important; if a coffee is too coarse, water filters through too fast to pick up enough aroma; if it is too fine, water filters through too slowly and retains particles that deposit at the bottom of the cup.

Packaging: Effective packaging prevents air from reaching the coffee. Ground coffee alters flavor rapidly and loses its aromatic qualities if it is not put immediately into hermetically sealed containers. The air, especially in humid atmospheres, causes rancidity through oxidation of fatty components which may be present in the coffee. A satisfactory solution to this problem is packing under vacuum or in an inert gas, in rigorously impervious containers.

Table II-B1: INDIA: YIELDS BY TYPE OF COFFEE /a
 1950/51 - 1977/78
 (kg per hectare)

| Crop Year | Arabica | Robusta | National Weighted Average |
|---------------------------|---------|---------|---------------------------|
| 1950/51-1954/55 (average) | 242 | 243 | 242 |
| 1955/56-1959/60 (average) | 419 | 369 | 400 |
| 1960/61-1964/65 (average) | 498 | 446 | 477 |
| 1965/66-1969/70 (average) | 525 | 509 | 519 |
| 1970/71-1974/75 (average) | 627 | 599 | 616 |
| 1975/76 | 507 | 466 | 490 |
| 1976/77 | 646 | 424 | 543 |
| 1977/78 | 569 | 745 | 650 |

/a In all coffee producing countries large differences exist in the number of trees planted per hectare depending on the age of trees and location. A given hectare may include pruned, stumped and new trees which have just started to yield, but have not yet reached full production. Hence yield per number of trees or by type of coffee is of more relevance than yield per hectare. Yield by age of tree is equally difficult to project, especially in the traditional coffee producing countries like Brazil where the co-existence of newly replanted trees, pruned and old trees on the same hectare can create uncertainty about the actual age of a particular tree.

Source: Coffee Board of India, and ICO, "Coffee in India 1980", 8 September 1980.

**Table II-B2: ESTIMATED YIELDS FROM COFFEE FARMED USING
MODERN TECHNIQUES IN COLOMBIA
(kg per hectare)**

| Year | | FEDESAROLLO (1) | ICO Mission /a (2) |
|------|---------------|--------------------|-----------------------|
| 0 | Trees planted | 0 | 0 |
| 1 | | 0 | 0 |
| 2 | | 0 | 0 |
| 3 | | 1,500 | 500 |
| 4 | | 2,400 | 1,200 |
| 5 | | 2,800 | 1,500 |
| 6 | | 2,400 | |
| 7 | | 2,800 | |
| 8 | | 2,400 | |
| 9 | | 1,600 | |
| 10 | Trees stumped | 0 | |
| 11 | | 0 | |
| 12 | | 1,500 | |
| 13 | | 2,400 | |

The projected yields in 1979/80 were as follows:

| | Yields (kg/hectare) |
|-------------|------------------------|
| Modern | 1,500 |
| Traditional | 350 |

/a The consultant was informed that the trees should normally be stumped after 5 to 6 crops with a resultant loss of one full crop and half the crop in the second year after stumping. In the absence of stumping, the crowding of trees would lead to a fall in yield to perhaps 1,200 kg/ha.

Source: ICO, Coffee in Colombia 1979/80, WP Board No. 275(E), 23 September 1980.

D. Grading, Storage, Marketing and Market Structure

Grading: The practice of grading coffee gives sellers and buyers a guarantee concerning the origin, nature, and quality of the product to aid their negotiations. Each (producer) country has a certain number of defined types and grades, but international standardization no longer exists outside contract markets.

Storage: Prolonged storage of coffee in the producing countries may present problems, especially in the warm and humid coastal regions where molds and parasites may develop and cause damage. Coffee from such areas is, therefore, exported as quickly as possible. In moderate climates, storage may not pose serious problems as long as the coffees are stocked in well-ventilated places.

Coffee Marketing and Market Structure: An important feature of marketing coffee is for the producers to deliver processed beans to the major (international) importers/consumers on contracts. However, there are different internal procedures in the various producing countries for getting the coffee beans from small producers and estates to international markets. For example, for a long time in Brazil, coffee has been marketed for export and domestic consumption by numerous private enterprises but under the general supervision of IBC ^{1/}. Regional co-operatives also play an increasing role in coffee marketing by exporting their own grades to selected countries. However, prices are fixed by IBC at the beginning of each crop year.

The sole marketing authority in Colombia has been the Federación Nacional de Cafeteros (FNC). It secures prices that it considers adequate for the producers. In Ivory Coast, the farmers sell their coffee to private traders at a price fixed each year (by the Caisse de Stabilisation des prix du café et du cacao) and applicable throughout the coffee area.

Coffee markets at international level are dominated by large private companies (dealers) and other intermediaries in Germany, London, New York and Paris. The coffee producing countries market their products through these

^{1/} FAO, op. cit. p. II-2;

IBC = Instituto Brasileiro do Cafe

companies. These companies, in turn, produce decaffeinated, soluble and other forms of coffee from coffee beans and sell them world-wide for consumption (see forms of consumption in Section II-E).

The major companies producing and marketing soluble and other coffees in the United Kingdom include Nestlé, Lyons and General Foods. 1/ In Germany, Nestlé, Jakobs, D.E.K. and General Foods are the main producers and distributors of the various forms of coffee consumed. 1/ The key producing or distributing companies in France are SOPAD, P. Le Monnier and Vege-France. 1/ For the United States, it was estimated in mid-1978 that about 100 agents and merchants were operating as importers of green coffee and 200 companies were operating as processors. Processors purchase their coffee either directly from producing countries or from importing agents. 2/

E. Forms of Consumption

Coffee is a popular beverage and is consumed in various forms. Its popularity may be attributed to its invigorating effect, which is produced by caffeine, an alkaloid present in green coffee in amounts between 0.8 and 1.5% for the arabica species, and 1.6 to 2.5% for the robusta species. Some of the best known forms of coffee consumed are soluble and decaffeinated.

Soluble Coffee: In the preparation of soluble coffee, a liquid concentration of coffee made with hot water is dehydrated. This can be done by spray drying in hot air, by drying under vacuum, or freeze drying. The resulting soluble powder, on the addition of hot water, forms reconstituted coffee. The average yield is 25 to 30 percent by weight of the ground coffee.

Decaffeinated Coffee: Caffeine may be freed from its combinations in green coffee by the action of acids, hot water or steam. It may also be extracted by using certain chlorinated solvents. The caffeine content of decaffeinated coffees is often regulated by law.

Coffee Substitutes: The most popular of the substitutes for coffee seems to be the roasted and ground root of the chicory plant. Certain cereal

1/ UNCTAD/GATT, Industrial Coffee on Twenty-One European Markets, Geneva 1969.

2/ ICO, Coffee in the United States of America, 29 August 1980, p. 1.

grains, particularly barley, and leguminous seeds such as lupin and soya, are sometimes roasted and used as a coffee substitute. Such substitutes are generally considerably cheaper than coffee and this appears to be the major reason for the demand for them. 1/

1/ FAO, The World Coffee Economy, Rome 1961, p. 25.

References

1. FAO, World Coffee Survey, Rome, 1968.
2. _____, The World Coffee Economy, Rome, 1961.
3. _____, Technical Conversion Factors for Agricultural Commodities, Rome, 1972.
4. IBRD, "Structure and Prospects of the World Coffee Economy, June 1975.
5. ICO, Coffee in Colombia 1979/80, 23 September 1980.
6. _____, Coffee in India 1980, 3 September 1980.
7. _____, Coffee in Brazil 1980, 18 March 1981.
8. _____, Coffee in The United States of America, 29 August 1980.
9. UNCTAD/GATT, Industrial Coffee on Twenty-One European Markets, Geneva, 1969.

III. PRODUCTION AND EXPORTS

A. Geographical Distribution of Production

World production of coffee has grown at the rate of about 1.0% per annum in the last two decades. During that time, global coffee production has gone through two phases: 1961-76, when production stagnated; and 1976-81, when production increased at the rate of 7.8% per year (Table III-A1).

A few countries in Africa, Asia and Latin America produce most of the coffee traded internationally. Ethiopia, Ivory Coast, Kenya and Uganda are the main coffee producing countries in Africa. India and Indonesia have emerged as important coffee producers in Asia. In Latin America, the key coffee producing countries include Brazil, Colombia, El Salvador, Guatemala and Mexico.

Latin America has been the dominant coffee producing area (with the bulk of the crop being produced in Brazil). However, its share of world production has been declining, from about 79% in 1961 to about 66% in 1980. ^{1/} This decline has been due mainly to the falling trend of Brazilian production since the early 1960s. During the same time African producers increased their share from 17% to 23% and Asian producers from 4% to 10%.

In spite of its declining share, Brazil continues to play a leading role in the world coffee economy. Fluctuations in its coffee production greatly influence movements of world coffee output (Figure III-A1).

The cycles in Brazil's production tend to be matched fairly closely with movements in prices. High coffee prices in the early to mid-1950s (which resulted from increases in world demand after World War II, and Korean War commodity boom) were followed by an increase in Brazil's production from the three-year average of 19.9 million bags between 1954/55 and 1956/57 to an average of 37.9 million bags for the period 1959/60 - 1961/62. ^{2/}

The fluctuations in Brazil's coffee production, have, on occasions, been caused by frost. In 1975 there was a severe frost which reduced

^{1/} Shares are derived from production figures shown on Table III-A1.

^{2/} IBRD; mimeo, "Analysis of the World Coffee Market", November 1981.

production from 23 million bags in 1975/76 to a mere 9.3 million bags in 1976/77. The Brazilian frost caused world coffee prices to triple in real terms. The high coffee prices during 1976-78 led to substantial increases in production both in Brazil and in Colombia. Brazilian production went from 20 million bags in 1978/79 to 32 million bags in 1981/82. In Colombia production was 14 million bags in 1980/81, up from 11.8 million bags in 1978/79. World production reached 94 million bags in 1981/82 up from 82.8 million in 1980/81 (Table III-A1). Significant increases in production were achieved by Indonesia and Ivory Coast during the same period.

In 1981 Brazil suffered another severe frost which is expected to drastically reduce its output in the 1982/83 crop year. Given that situation, the prospects for world coffee production in the years immediately following is most likely to depend on the speed and extent to which Brazil recovers from that frost. At present, it is expected that Brazil's production will recover to a 30 million bag level in a few years time. If it does, world coffee production will be at the 95-98 million bag level in the mid 1980s.

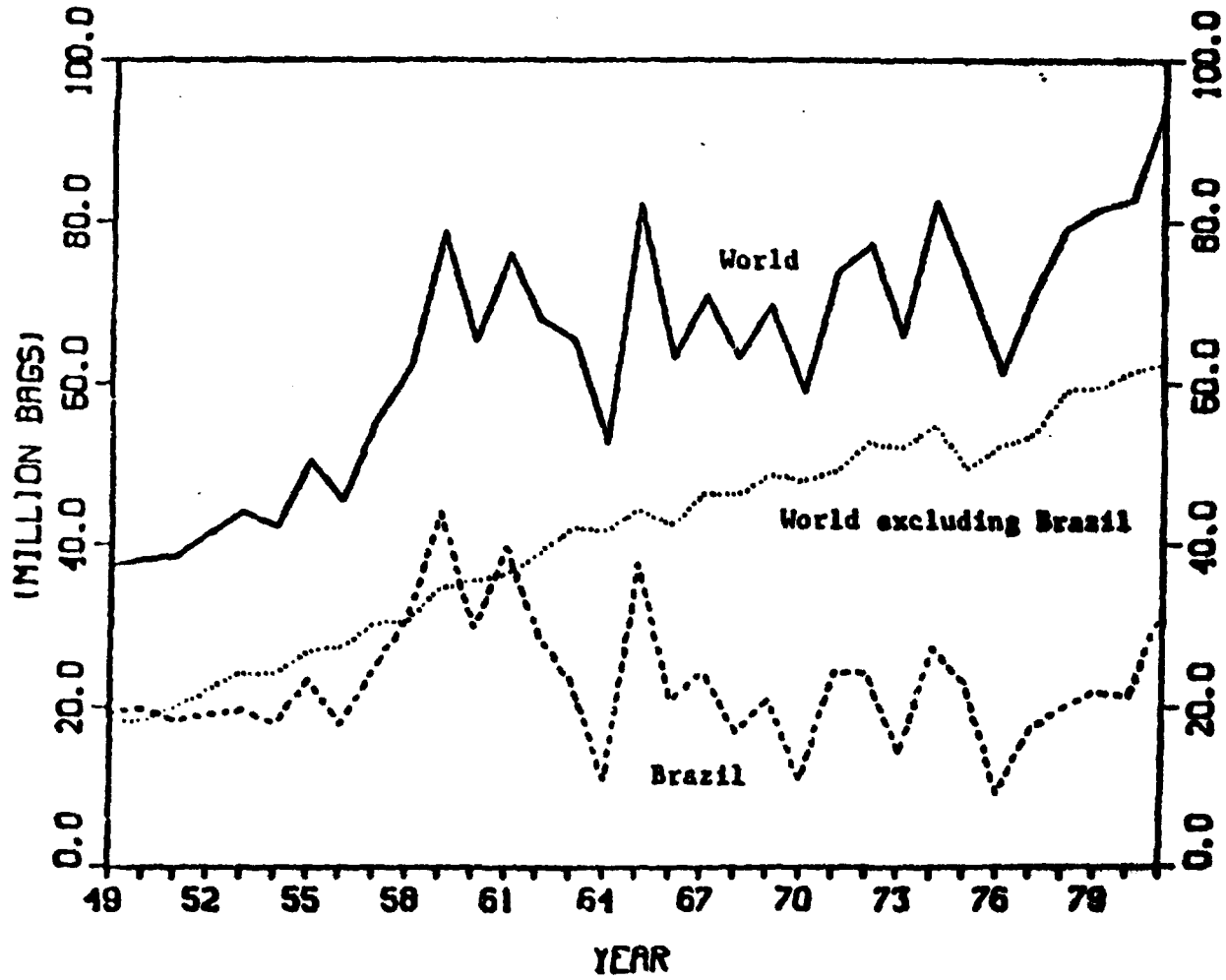
Table III-A1. COFFEE: WORLD PRODUCTION, BY MAIN COUNTRIES

| Seasons | 1961/62 | 1970/71 | 1976/77 | 1978/79 | 1979/80 | 1980/81 | 1981/82 | Trend Growth Rates | | | |
|------------------|------------------------------|---------|---------|---------|---------|---------|---------|-----------------------|---------|---------|---------|
| | | | | | | | | /a 1961-76 | 1961-80 | 1961-70 | 1970-80 |
| | -----million 60 Kg bags----- | | | | | | | ----- (percent) ----- | | | |
| WORLD PRODUCTION | 75.95 | 58.98 | 61.40 | 79.13 | 81.50 | 82.75 | 94.18 | 0.31 | 0.85 | -0.97 | 1.84 |
| TOTAL America | 59.80 | 34.18 | 35.18 | 52.90 | 54.02 | 54.30 | 65.47 | -0.79 | 0.35 | -3.42 | 2.60 |
| Brazil | 39.60 | 11.00 | 9.30 | 20.00 | 22.00 | 21.50 | 32.02 | -3.66 | -1.94 | -8.18 | 1.47 |
| Colombia | 7.57 | 8.00 | 9.30 | 12.60 | 12.71 | 14.00 | 14.50 | 0.98 | 2.68 | 0.99 | 6.32 |
| Mexico | 2.35 | 3.20 | 3.30 | 4.04 | 3.60 | 3.60 | 3.75 | 3.25 | 2.49 | 3.18 | 0.55 |
| Guatemala | 1.70 | 1.97 | 2.21 | 2.83 | 2.25 | 2.60 | 2.60 | 1.91 | 2.45 | 0.85 | 2.96 |
| El Salvador | 1.93 | 2.05 | 2.78 | 3.42 | 3.12 | 2.38 | 2.22 | 2.96 | 2.77 | 2.24 | 2.30 |
| TOTAL AFRICA | 12.68 | 19.31 | 19.53 | 17.98 | 18.25 | 19.17 | 18.95 | 2.44 | 1.16 | 4.17 | -1.60 |
| Ethiopia | 2.01 | 2.59 | 2.78 | 3.14 | 3.09 | 3.10 | 3.20 | 1.47 | 2.08 | 2.46 | 3.20 |
| Uganda | 2.02 | 2.67 | 2.66 | 1.82 | 2.08 | 2.00 | 1.90 | 1.45 | -1.04 | 3.36 | -5.99 |
| Kenya | 0.53 | 1.00 | 1.69 | 1.24 | 1.53 | 1.45 | 1.58 | 5.87 | 5.09 | 5.11 | 3.76 |
| Ivory Coast | 1.61 | 4.00 | 4.87 | 4.62 | 4.12 | 5.00 | 4.67 | 4.35 | 2.88 | 5.80 | 0.66 |
| TOTAL ASIA | 3.37 | 5.01 | 6.01 | 7.49 | 8.36 | 8.41 | 8.84 | 2.81 | 4.13 | 4.07 | 6.92 |
| India | 0.77 | 1.91 | 1.85 | 1.84 | 2.60 | 2.18 | 2.33 | 4.18 | 4.64 | 5.77 | 4.36 |
| Indonesia | 1.86 | 2.33 | 3.32 | 4.79 | 4.81 | 5.16 | 5.43 | 2.83 | 4.66 | 4.12 | 9.30 |

/a Estimates.

Source: USDA, Foreign Agricultural Circular: Coffee (various issues)

FIGURE III-A1 WORLD AND BRAZIL'S COFFEE PRODUCTION



B. Price Elasticities of Supply

Coffee producers (like the producers of other tree crops) adjust their production to changes in prices with some lags. Estimates of price elasticities of supply (especially short-run) have, therefore, been low. A 1975 study derived a global short-term price elasticity of supply of 0.056 and a long-term price elasticity of 0.291. 1/ Adams and Behrman, in a 1974 study, found "no evidence of a short-run price response" but they found "evidence of a long-run price response with a gestation period of six or seven years." 2/ Their estimate of a world long-run elasticity of supply is 0.33.

Different estimates of price elasticities of supply for the major coffee producing countries and regions are shown in Tables III-B1 and III-B2. In Table III-B2 (an excerpt from a recent IBRD study) 3/ the short-run price elasticities range from 0.07 for Colombia to 0.29 for Indonesia. The price elasticity obtained for Ivory Coast, after a three year lag, is 0.55. World short-term and long-term price elasticities are 0.12 and 0.74 respectively.

From Table III-B2, it is observed that the long-run price elasticities are fairly high, particularly for the major coffee producers, compared with the short-run elasticities.

1/ IBRD, "Structure and Prospects of the World Coffee Economy", Working Paper No. 208, June 1975.

2/ F. Gerald Adams and Jere R. Behrman, "Seven Models of International Commodity Markets", University of Pennsylvania, 1974.

3/ IBRD, op. cit. p. III-1.

Table III-B1: ELASTICITIES OF PRODUCTION WITH RESPECT TO PRICES, BY REGION

| Region | <u>Short Term Price Elasticity (lag 1 year)</u> | <u>Long Term Price* Elasticity (lag 7 years)</u> |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|
| Brazil | .20 | .444 |
| Colombia | .03 | .176 |
| Other South America | .062 | .460 |
| North America | .030 | .137 |
| Africa | .123 | .436 |
| Asia and Oceania | .10 | .433 |
| World (excluding Brazil) | .056 | .291 |

* Strictly speaking this is a kind of "medium term" price elasticity of supply, since it measures changes over a seven year period only.

Source: IBRD, "Structure and Prospects of the World Coffee Economy", Working Paper No. 208, June 1975.

Table III-B2: SHORT /a AND LONG-RUN /b PRICE ELASTICITIES
OF COFFEE PRODUCTION

| | <u>Short-run</u> | <u>Long-run</u> |
|---------------|------------------|-----------------|
| Brazil | .093* | 1.10* |
| Colombia | .0673** | 0.96** |
| El Salvador | .207** | .56** |
| Guatemala | .110 | .50* |
| Ivory Coast | .55* /c | .73 |
| Indonesia | .285* | 1.05* |
| Rest of World | .0771** | .38** |
| World Total | .12 | .739 |

* Significant at the 90% level.

/a Short run elasticities refer to the production response to prices in either the current or the previous year, except in the case of Brazil where the lag is at 2 years.

/b Long run elasticities refer to the effect of a 1 percent change in price on production after 10-13 years.

/c In the equation reported the current and first two lags on prices were insignificant and so were dropped from the specification. The elasticity of .55 was estimated at lag 3.

Source: IBRD, "Analysis of the World Coffee Market", November 1981.

C. Exports

Producing countries export the bulk of their coffee output to industrialized markets of Western Europe, North America and to the Centrally Planned Economies (CPEs). Consumption in producing countries is substantial only in Brazil, India, Indonesia and in Mexico. The main coffee exporting countries and regions as well as the volumes and growth rates of exports for the period 1961-1980 are shown on Table III-C1.

From Table III-C1, it is seen that steady increases in exports of coffee between 1961 and 1980 have been achieved by India (6.6% growth rate per annum), Indonesia (5.4% per annum), Kenya (5.1% per annum), Mexico (3.3% per annum) and Colombia (3.0% per annum). During the same period Brazil's export growth rate has been declining (-1.4% per annum) with an even faster than average decline between 1970 and 1980 (-3.4% per annum).

Most of the coffee exported is in the form of beans. Although exports of soluble coffee have been growing, its share in total coffee exports was about 5% in 1980. Brazil is the largest exporter of soluble coffee and it provided 82% of the total soluble coffee exports by producing countries in 1980/81 and 1981/82. ^{1/} This fact partly explains the declining trend in Brazil's exports of coffee beans.

^{1/} IBRD, op. cit. p. III-1.

Table III-C1: COFFEE: WORLD EXPORTS, BY MAIN COUNTRIES

| | 1961 | 1970 | 1976 | 1978 | 1979 | 1980 | Trend Growth Rates | | | |
|---------------|----------------------------------|-------|-------|-------|-------|-------|-----------------------|---------|---------|---------|
| | | | | | | | 1961-76 | 1961-80 | 1961-70 | 1970-80 |
| | ----- (Million 60 Kg bags) ----- | | | | | | ----- (Percent) ----- | | | |
| WORLD EXPORTS | 46.15 | 51.89 | 57.21 | 64.71 | 62.10 | 59.36 | 1.87 | 1.45 | 1.97 | 0.60 |
| TOTAL America | 32.52 | 32.36 | 36.40 | 42.01 | 40.17 | 38.97 | 1.17 | 1.05 | 1.05 | 0.84 |
| Brazil | 17.41 | 16.04 | 17.32 | 13.70 | 14.00 | 16.50 | -0.23 | -1.43 | 0.89 | -3.42 |
| Colombia | 5.59 | 6.53 | 5.79 | 11.83 | 11.94 | 9.75 | 1.45 | 2.99 | 1.91 | 5.40 |
| Mexico | 1.58 | 1.51 | 2.15 | 3.09 | 2.29 | 2.00 | 3.84 | 3.25 | 0.67 | 2.95 |
| Guatemala | 1.54 | 1.56 | 1.90 | 2.56 | 2.15 | 1.96 | 1.99 | 2.20 | 0.25 | 2.40 |
| El Salvador | 1.94 | 1.62 | 2.98 | 3.38 | 2.72 | 2.19 | 3.46 | 3.07 | 0.60 | 3.50 |
| TOTAL AFRICA | 11.66 | 16.95 | 16.40 | 16.69 | 15.73 | 14.65 | 2.81 | 1.24 | 3.65 | -2.19 |
| Ethiopia | 1.04 | 1.33 | 0.72 | 1.38 | 1.31 | 1.20 | -1.11 | -0.15 | 2.35 | -0.63 |
| Uganda | 2.19 | 3.03 | 2.45 | 2.35 | 2.18 | 1.60 | 1.44 | -0.94 | 3.51 | -6.69 |
| Kenya | 0.47 | 0.95 | 1.43 | 1.23 | 1.37 | 1.31 | 6.19 | 5.12 | 5.36 | 1.88 |
| Ivory Coast | 2.66 | 3.37 | 4.61 | 4.34 | 3.50 | 3.70 | 3.77 | 2.53 | 1.81 | 0.67 |
| TOTAL ASIA | 1.71 | 2.15 | 3.56 | 5.21 | 5.39 | 5.10 | 3.92 | 5.70 | 3.13 | 10.55 |
| India | 0.34 | 0.63 | 0.89 | 1.11 | 1.20 | 1.37 | 6.37 | 6.60 | 3.53 | 6.43 |
| Indonesia | 1.16 | 1.34 | 2.27 | 3.71 | 3.76 | 3.25 | 3.06 | 5.41 | 3.6 | 12.00 |

Source: USDA, Foreign Agricultural Circular: Coffee

References

1. FAO, Production Yearbook, (various issues).
2. F. Gerald Adams and Jere R. Behrman, "Seven Models of International Commodity Markets", University of Pennsylvania, 1974.
3. IBRD, "Analysis of the World Coffee Market", November 1981.
4. _____, Price Prospects for Major Primary Commodities, 814, 1980.
5. _____, "Structure and Prospects of the World Coffee Economy", June 1975.
6. ICO, Quarterly Statistical Bulletin on Coffee, January - March 1980, 17 July 1980.
7. USDA, Foreign Agricultural Circular, (various Issues).

IV. CONSUMPTION, IMPORTS AND INTERNATIONAL PRICES

A. Consumption and Imports

As Tables IV-A1 and IV-A2 show, consumption in coffee importing countries (measured by net imports) 1/ declined substantially in the 1970s compared to the 1960s. The growth of total world net imports went from 2.0% per annum in the 1961-70 period to a mere 0.6% per annum in the 1970-79 period. All the main consuming regions have contributed to this decline. A notable and disquieting trend is that of US net imports. The United States, which is the single most important consuming country, shows a long-term declining trend in its consumption at a rate of 1.9% per annum. The main factor causing this decline appears to be competition from other beverages such as soft drinks, juices and tea. A recent ICO study 2/ shows that in 1980, the percentage of the population over 10 years of age who drank coffee was down by 18.1% compared with 1963, while the corresponding figures for soft drinks, juices and tea showed increases of 18.5%, 3.8% and 7.0% respectively. If this drinking pattern is followed by the Western European countries, which is the largest coffee consuming region in the world, the prospects for growth in world demand for coffee will become very limited.

Western Europe, especially the EC, has been increasing its import demand steadily for the last 20 years. Even during the period 1970-79, when world import demand increased at only 0.6% per annum, the EC's net imports grew at 1.9% per annum. Per capita consumption in the EC is still less than in Scandinavian countries. Thus the EC remains as an area with considerable growth potential. However, recent ICO studies of coffee consumption in West Germany and the UK 3/ indicate that the growth in per capita coffee consumption in these countries is already slowing down, while fruit juice and soft drink consumption is increasing at a rapid rate. It is possible,

1/ Data on actual consumption are available only for some countries. To gauge total consumption in importing countries no better proxy than net imports is available.

2/ ICO, Coffee in the United States of America, August 1980, p. 34.

3/ ICO, Coffee in the Federal Republic of Germany, October 1979, p. 32; ICO, Coffee in the United Kingdom, March 1980, p. 29.

therefore, that coffee demand in Western Europe will follow the same path as in the United States. Per capita disappearance of coffee in selected importing countries for the period 1974-78 is shown on Table IV-A3.

The countries and regions which are increasing consumption considerably are Japan, non-producing developing countries and the centrally planned economies of Eastern Europe and the USSR. However, their starting consumption base is small, as each accounts for only about 5% of world net imports. Thus, even if their consumption grew at a high rate, the effect on world demand will not be substantial in the medium term.

Table IV-A1: WORLD NET IMPORTS OF COFFEE BY MAJOR REGIONS/COUNTRIES

| | 1961 | 1965 | 1970 | 1975 | 1979 | Trend Growth Rates | | |
|-----------------------------------|------|------|------|------|------|--------------------|-----------|-----------|
| | | | | | | 1961-1979 | 1961-1970 | 1970-1979 |
| U.S. | 22.4 | 21.2 | 19.4 | 19.6 | 18.5 | -1.9 | -1.7 | -2.4 |
| EEC | 12.4 | 14. | 16.9 | 20.0 | 22.2 | 2.8 | 3.6 | 1.9 |
| Middle Europe | 0.7 | 0.9 | 1.2 | 1.6 | 1.6 | 4.9 | 5.8 | 1.8 |
| North Europe | 2.4 | 2.7 | 3.7 | 3.4 | 3.8 | 1.2 | 4.2 | -0.7 |
| South Europe | 0.7 | 1.1 | 1.9 | 2.0 | 2.4 | 6.6 | 11.6 | 1.0 |
| Japan | 0.3 | 0.3 | 1.4 | 1.8 | 2.9 | 15.0 | 21.6 | 7.4 |
| Other industrialized countries | 1.5 | 1.7 | 2.0 | 2.4 | 2.3 | 1.8 | 2.8 | 0.17 |
| Centrally-planned economies | 1.3 | 1.7 | 2.7 | 3.2 | 3.1 | 5.5 | 9.0 | 1.7 |
| Developing countries | 1.8 | 1.9 | 2.0 | 2.7 | 3.3 | 2.6 | 2.4 | 5.4 |
| TOTAL | 43.5 | 45.3 | 51.2 | 56.7 | 60.1 | | | |
| World* | 46.2 | 50.0 | 51.9 | 59.6 | 62.1 | 1.5 | 2.0 | 0.6 |

* World total taken from USDA to ensure consistency between production, export and producer stock data in the model.

Source: FAO, Trade Yearbook(s)

**Table IV-A2: DISAPPEARANCE IN IMPORTING MEMBER COUNTRIES
1974 TO 1980**

(100 bags)

| Importing Member | 1975 | 1976 | 1977 | 1978 | 1979 | 1979 | | 1980 | | |
|----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | | | | | III | IV | I | II | III* |
| TOTAL | 53,642 | 55,183 | 44,726 | 49,822 | 56,203 | 13,627 | 14,435 | 13,480 | 13,483 | 12,147 |
| EEC | 20,626 | 21,099 | 18,181 | 19,904 | 22,539 | 5,717 | 5,665 | 5,584 | 5,134 | 5,101 |
| Belgium/Luxembourg | 1,178 | 1,483 | 963 | 1,211 | 1,331 | 345 | 292 | 295 | 302 | 301 /a |
| Denmark | 1,098 | 1,026 | 912 | 935 | 903 | 206 | 235 | 255 | 205 | 229 /b |
| F.R. of Germany | 5,423 | 6,021 | 5,859 | 6,068 | 6,900 | 1,887 | 1,793 | 1,659 | 1,401 | 1,765 |
| France | 4,974 | 4,823 | 4,436 | 4,955 | 5,158 | 1,137 | 1,318 | 1,447 | 1,269 | 1,040 |
| Ireland | 39 | 61 | 38 | 48 | 70 | 17 | 16 | 17 | 10 | 18 |
| Italy | 3,356 | 3,547 | 3,076 /b | 3,231 /b | 3,786 /b | 915 /b | 1,063 /b | 834 /b | 939 /b | 910 /b |
| Netherlands | 2,141 | 2,209 | 1,276 | 1,715 | 1,936 | 548 | 395 | 541 | 432 | 421 |
| United Kingdom | 2,017 | 1,929 | 1,621 | 1,741 | 2,455 | 662 | 553 | 536 /b | 576 /b | 417 /b |
| Other Members | 13,023 | 13,210 | 10,873 | 11,993 | 14,175 | 3,510 | 3,668 | 3,290 | 3,497 | 3,267 |
| Australia | 405 | 482 | 390 | 419 | 561 | 170 | 152 | 131 | 96 | 163 /a |
| Austria | 611 | 624 | 520 | 602 | 729 | 220 | 152 | 226 | 222 | 219 |
| Canada | 1,639 | 1,681 | 1,364 | 1,655 | 1,785 | 430 | 449 | 431 | 460 /a | 288 /b |
| Cyprus | 23 | 25 | 16 | 22 | 32 | 10 | 2 | 5 | 11 | 6 |
| Finland | 1,077 | 1,197 | 833 | 928 | 1,021 | 315 | 184 | 293 | 281 | 235 |
| Hong Kong | 173 | 0 | 40 | 5 | 80 | 13 | 40 | 33 | 19 | 22 |
| Hungary | 545 | 632 | 767 | 346 | 652 | 123 | 180 | 92 | 147 | 116 |
| Israel | 178 /b | 292 | 159 | 196 | 177 /b | 44 /b | 44 /b | 45 /b | 45 /b | 49 /b |
| Japan | 2,334 | 2,341 | 2,362 | 2,173 | 3,171 | 894 | 846 | 691 | 909 | 858 |
| New Zealand | 81 | 86 | 65 | 95 | 96 | 23 | 35 | 21 | 28 | 20 /b |
| Norway | 651 | 694 | 485 | 754 | 691 | 169 | 180 | 152 | 140 | 196 |
| Portugal | 253 | 337 | 181 | 221 | 237 | 18 | 65 | 22 /b | 55 /b | 34 /b |
| Spain | 1,615 | 1,401 | 1,122 | 1,574 | 1,745 | 386 | 476 | 358 | 413 | 267 |
| Sweden | 1,924 | 1,922 | 1,183 | 1,674 | 1,681 | 366 | 506 | 353 | 377 | 422 /b |
| Switzerland | 740 | 685 | 554 | 558 | 547 | 137 | 135 | 165 | 127 | 201 |
| Yugoslavia | 774 | 611 | 832 | 771 | 970 | 192 | 222 | 245 /b | 167 /b | 171 /b |

Note: Disappearance is derived on the basis of the data on net imports of all forms of coffee adjusted for changes in visible inventories. Figures are adjusted for net exports by Hong Kong, if necessary.

* Preliminary

/a Includes estimates provided by the Member

/b Estimated

Source: ICO, Quarterly Statistical Bulletin, number 14/15
April-June and July-September 1980

Table IV-A3: PER CAPITA DISAPPEARANCE IN
SELECTED IMPORTING COUNTRIES

| | 1974 | 1975 | 1976 | 1977 | 1978 |
|-------------------------------|-------|--------|-------|-------|-------|
| U.K.: kilos per annum | 1.97 | 2.17 | 2.07 | 1.74 | 1.87 |
| Index (1974-75 = 100) | 95 | 105 | 100 | 84 | 90 |
| USA: kilos per annum | 5.94 | 5.68 | 5.88 | 4.38 | 4.98 |
| Index (1974-75 = 100) | 102 | 98 | 101 | 75 | 85 |
| F.R. Germany: kilos per annum | 5.03 | 5.65 | 5.87 | 5.73 | 5.94 |
| Index (1974-75 = 100) | 94 | 106 | 110 | 107 | 111 |
| France: kilos per annum | 5.25 | 5.65 | 5.47 | 5.03 | 5.55 |
| Index (1974-75 = 100) | 96 | 104 | 100 | 92 | 102 |
| Denmark: kilos per annum | 12.90 | 13.021 | 12.14 | 10.79 | 11.44 |
| Index (1974-75 = 100) | 100 | 100 | 94 | 83 | 80 |
| Ireland: kilos per annum | 0.66 | 0.75 | 1.16 | 0.71 | 0.89 |
| Index (1974-75 = 100) | 94 | 106 | 165 | 101 | 128 |

Source: ICO, Coffee in the United Kingdom, March 1980, p. 29.

B. Income and Price Elasticities of Demand

In a recent IBRD study, ^{1/} world income elasticity of import demand was estimated to be 0.448 while world short-term and long-term price elasticities were -0.186 and -0.230 respectively. This study found "no income response in the US" but the short-term price elasticity of demand is given as -0.372. The estimated demand equation (of the study) indicates that recent low US consumption levels were due in large part to the high real coffee prices that prevailed in the last few years (especially starting from 1977). This implies that consumption may rise if coffee prices decline. However, if the trend of recent years in US consumption was also due, as it appears, to factors such as changes in relative prices of other beverages and health consideration, which the demand equation for US could not capture, the declining consumption trend may continue irrespective of the price level.

The income elasticity coefficient obtained for the EC is 0.597 and the short-run and long-run price elasticities are -0.068 and -0.039 respectively. It seems (from this income elasticity estimate) that future world demand for coffee will depend very much on Western Europe's demand prospects and especially from that of the EC. Since population growth in the EC is expected to be close to zero for the rest of the 1980s, future coffee demand increase in this region is likely to depend heavily on future income growth.

Estimates of income and price elasticities of demand provided by this study for other countries and regions are shown in Table IV-B1. As shown in this table, the estimated income elasticities for Japan (1.99) and for the CPEs (1.03) are high. In both of these cases, present levels of coffee consumption are so small that future consumption growth (associated with growth in income) may not substantially change the pattern of world coffee demand.

^{1/} IBRD, op. cit. p. III-1.

The income elasticity indicated above for the CPEs is close to that (1.447) obtained by Adams and Behrman 1/ in 1974 but the long-term price elasticities obtained for this region are substantially different -- the IBRD study gives a value of -0.027 while Adams/Behrman's estimate is -1.25 2/. For the remaining two regions ("developed" and "developing" countries) that Adams/Behrman's study covered, the respective income and long-term price elasticities are 0.197, -0.24 and 0.40, -0.314.

For estimates of income and price elasticities from a previous IBRD study for coffee producing countries, the US and other importers, see 3/ below.

1/ Adams, and Behrman, op. cit. p. III-5.

2/ The period and number of observation as well as the length of lags may account for some of the difference.

3/ IBRD, Working Paper No. 208, June 1975.

Table IV-B1: ESTIMATED INCOME AND PRICE ELASTICITIES OF DEMAND

| | <u>Income</u> <u>Current</u> | <u>Price</u> | |
|-------------------------|---------------------------------|----------------|---------------|
| | | <u>Current</u> | <u>Lagged</u> |
| Net Importing Countries | | | |
| U.S. | /a | -0.372** | /a |
| EC | 0.597**/b | -0.0677 | -0.0392 |
| Scandinavia | 0.330** | -0.1237 | -0.2215* |
| South Europe | 0.537 | -0.0971 | -0.213* |
| Middle Europe | 1.140** | -0.0190 | -0.1072 |
| Japan | 1.99** | -0.3963* | /a |
| Other Industrialized | 0.0716 | -0.103* | -0.0942* |
| CPEs | 1.073** | -0.168* | -0.0256 |
| Exporting Countries | | | |
| Brazil | /a | -0.1493 | |
| Others | /a | -0.0679 | |

/a Excluded from equations due to wrong signs.

/b At 1979 income level.

* Significant at the 90% level.

** Significant at the 95% level.

Source: IBRD, "Analysis of World Coffee Market", November 1981.

C. International Prices

In general, movements of world coffee prices are inversely related to those of world stocks (Figure IV-C1). The high levels of stocks and low real prices which prevailed during the 1960s and early 1970s were changed by the severe frost that caused considerable damage to Brazilian coffee in 1975. Brazil's recovery in production since then, especially in terms of its large crop output in 1981, has led to a build-up of coffee stocks and declining prices (Table IV-C1).

The frost that hit Brazil's coffee in late July 1981 dampened somewhat the accumulation of stocks. Since changing fortunes of the coffee industry in Brazil continue to exert pressures on international coffee markets, global movements in stocks and prices in the near future are bound to depend heavily on the way Brazil's production recovers from the latest frost. If it recovers quickly to the pre-frost production levels, as it has done in the past, oversupply and low coffee prices are most likely to ensue.

Table IV-C1: INTERNATIONAL PRICES AND STOCKS

| | Prices /a | | Stocks /c |
|---------|-------------------|---------|------------------|
| | Current | Real /b | |
| | -----US\$/lb----- | | --Million bags-- |
| 1963/64 | 33.5 | 90.4 | 84.6 |
| 1964/65 | 43.3 | 115.3 | 79.2 |
| 1965/66 | 40.2 | 105.0 | 91.3 |
| 1966/67 | 39.8 | 102.1 | 87.7 |
| 1967/68 | 37.3 | 96.1 | 84.5 |
| 1968/69 | 37.6 | 98.1 | 77.8 |
| 1969/70 | 38.7 | 101.4 | 72.2 |
| 1970/71 | 50.2 | 120.3 | 61.1 |
| 1971/72 | 44.9 | 101.1 | 59.6 |
| 1972/73 | 50.5 | 104.4 | 57.1 |
| 1973/74 | 61.9 | 107.7 | 46.7 |
| 1975/76 | 72.0 | 92.7 | 46.7 |
| 1976/77 | 142.5 | 185.8 | 32.7 |
| 1977/78 | 250.3 | 299.4 | 37.1 |
| 1978/79 | 163.3 | 163.3 | 31.0 |
| 1979/80 | 174.2 | 152.2 | 32.8 |
| 1980/81 | 171.4 | 133.9 | 37.1 |

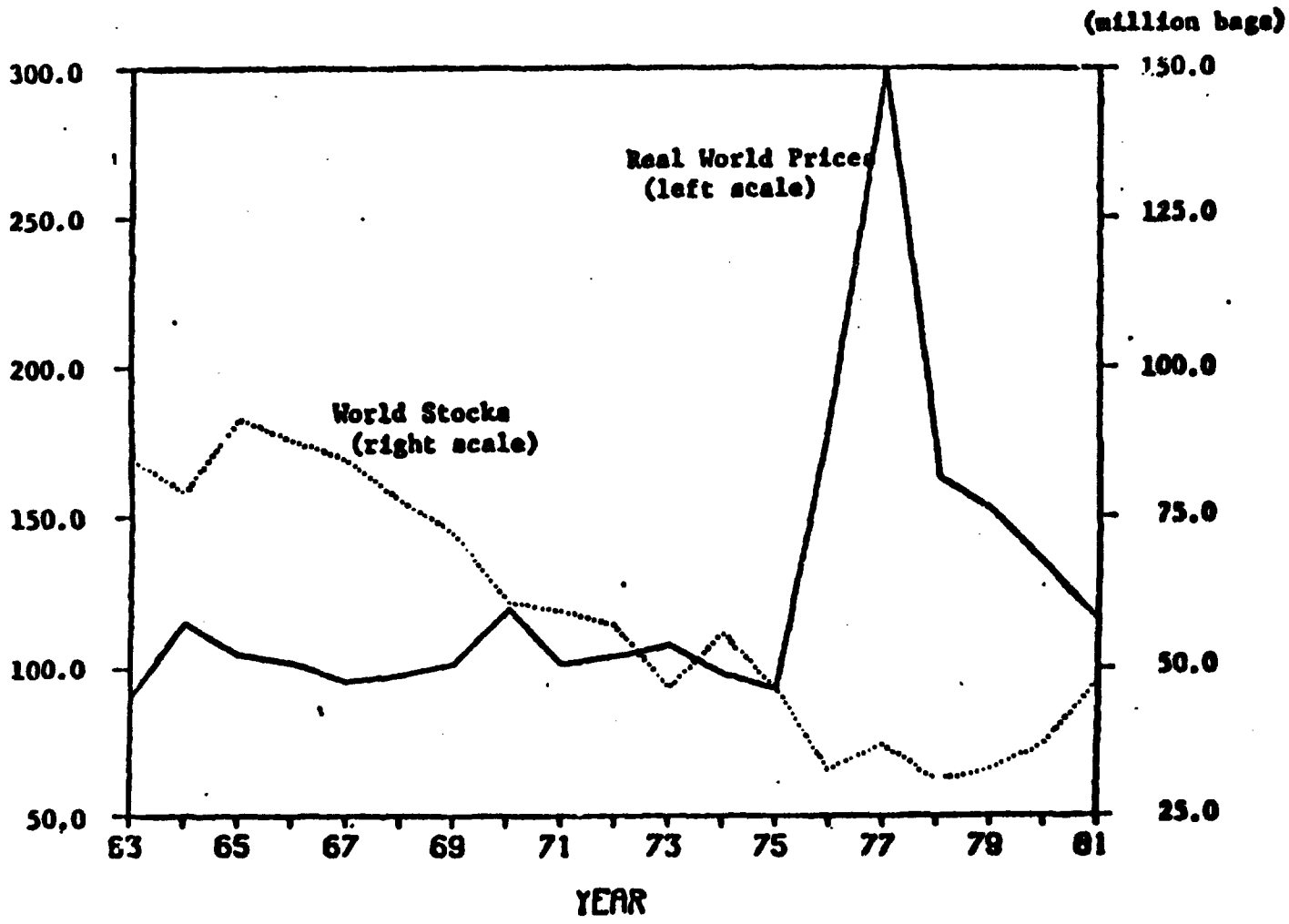
/a Average of Colombian mild arabicas, other milk arabicas, unwashed arabicas and robustas.

/b Deflated by Bank's IPI (1978-100).

/c ICO, Quarterly Statistical Bulletin on Coffee (various issues).

Source: UNCTAD, Monthly Commodity Price Bulletin (various issues).

FIGURE IV-C1: REAL WORLD COFFEE PRICES Δ AND WORLD STOCKS



Δ Deflated by Bank's IPI (1978=100)

References

1. FAO, Trade Yearbook (various issues).
2. F. Gerald Adams and Jere R. Behrman, "Seven Models of International Commodity Markets", University of Pennsylvania, 1974.
3. IBRD, "Structure and Prospects of the World Coffee Economy", June 1975.
4. _____, Price Prospects for Major Primary Commodities, 814, 1980.
5. ICO, Coffee in the United States of America , August 1980.
6. _____, Coffee in the Federal Republic of Germany , October 1979.
7. _____, Coffee in the United Kingdom , March 1980.
8. _____, Quarterly Statistical Bulletin, number 14/15 April-June and July-September 1980.
9. UNCTAD, Monthly Commodity Price Bulletin Vol. 1, No. 9, September 1981.

V. DEVELOPMENTS - INTERNATIONAL COFFEE AGREEMENTS

A. Background

Before World War II, there was no international action on coffee because Brazil, then accounting for about two-thirds of world production, followed a strong price support policy on its own. Other producing countries benefited from this policy and thus saw no reason to undertake international action.

World War II, which precluded producers from shipping coffee to the European market, created the prospect of huge oversupplies. In the face of this situation an Inter-American Coffee Agreement was signed by the United States and 14 Latin American producers, and entered into force in April 1941. Its main economic measure in support of coffee prices was a system of export quotas. Initially the system was effective, but towards the end of the war, quotas were set so liberally that its effect was drastically diminished.

Declining world coffee prices, starting in the mid-1950s, created a situation which led again to international action. After some attempts by producing countries to regulate the market on their own, an International Coffee Agreement (ICA) was signed in 1962 by a large group of consuming and producing countries. It entered into force in October 1963. Its main market regulatory instrument was an export quota system. This Agreement succeeded in halting the declining price trend; prices started to increase in nominal terms, although they remained stagnant in real terms. With strong market prospects in the early 1970s, producing countries pressed for higher prices and lower overall quotas than importing countries were willing to accept. Producers and consumers were not able to reach an agreement and no regulation of the coffee market under the International Coffee Agreement was in force after 1973.

The ICA 1962, (followed by the ICA 1968) was extended until September 1976 when a new agreement, the International Coffee Agreement, 1976, was concluded. The ICA 1976 differs from the previous one in that both the Diversification Fund and the requirement of producers to submit production policy plans to the Organization were dropped; furthermore, the quotas for each country are determined not only on the basis of past export performance but also on the basis of the stocks held by each of them.

B. Main Features of the ICA, 1976

Like the other ICAs before it, the ICA 1976 is an export quota agreement. It differs, therefore, from the new International Cocoa Agreement which has a buffer stock as the main market regulatory instrument.

The Agreement has as members producing countries that account for over 90% of world net exports and importing countries that account for about 90% of world net imports. Important non-member importing countries are the Eastern European countries, the USSR and some countries in North Africa and the Middle East. Consumers and producers as blocks have equal votes (1,000 each) in the Executive Board of the Agreement. Within each block, votes are allocated on the basis of the relative importance of each country as a producer or consumer of coffee. 1/ Two key elements of the Agreement's economic provisions, i.e. export quotas and trigger prices, are described below.

- (f) Export Quotas. The Council, which is the highest authority in the International Coffee Organization (ICO), sets a global annual quota for each coffee year. In setting the global annual quota, factors taken into account include annual consumption and estimated changes in the level of inventories in importing member countries.

For the allotment of the global quota among the individual exporting countries, small exporters are allotted fixed export quotas while larger exporters are allotted "basic quotas" which serve as the basis for determining their export quotas. The size of fixed quotas for countries exporting less than 400,000 bags for the coffee year

1/ See Annex I for composition of votes for member countries as at July 1, 1981.

(October to September) 1976/77 was specified for each country in an Annex to the Agreement. 1/ These quotas were to be increased by 10% each year for those countries whose initial quota is less than 100,000 bags and by 5% each year for those countries whose initial quota is between 100,000 and 400,000 bags. For countries exporting more than 400,000 bags, the quotas are calculated on the basis of "basic quotas" derived from recent annual averages of exports, and variable parts, distributed in proportion to verified stocks in producer countries.

- (ii) Trigger Prices For the purpose of introducing, suspending or reintroducing quotas, an indicator price, a composite price reflecting the overall world coffee price, is calculated daily. The export quota is introduced when the 15-day moving average 2/ composite indicator price falls below the ceiling of the price range agreed by the Council or in case when there are no agreed price range when it falls 15% or more below the average for the previous year. Quotas are suspended when the 15-day moving average composite price goes above the agreed ceiling price or if there are no agreed ceiling price when it is 15% or more above the previous year's average. Within a coffee year, the Council may adjust the annual and quarterly quotas if it finds the market situation so requires.

1/ See Annex II.

2/ Previously it was a 20-day moving average, but from October 1981 it was changed to 15 days in order to make export quotas respond to prevailing market conditions faster.

C. Impact of the Recent Implementation of the Quota on the Market

World coffee prices started declining in June 1980 and by October 1980 were about 25% below their June level. The International Coffee Council met in September 1980 to introduce export quotas to halt the declining price trend. The ceiling and floor prices were set at US\$155/lb and US\$115/lb respectively. The initial global quota set for the 1980/81 coffee year was 58.19 1/ million bags of 60 kg each. It was decided by the Council in October 1980 that the global quota would be cut by 1.4 million bags each time the composite indicator price went below a certain level.

The indicator price fell below US\$115/lb in June 1981, which was the floor price at the time, resulting in an ICO Executive Board decision to apply the 4th quota cut, thus reducing the global quota to 51.8 million bags.

The sharply declining price trend that lasted until mid-1981, despite implementation of export quotas, is surprising, given that the global quota level was substantially below the export level of recent years (see Table V-C1) and coffee supplies were tight in mid-1981. The main explanation for declining prices, despite the low global quota, seems to have been the market expectation that, with substantial increases in world coffee supply for the 1981/82 season, especially from Brazil, either the members of ICA would be unable to agree on a global quota level for the 1981/82 season or the global quota decided on would be so generous that it would not have any impact on the market. Other reasons for the declining prices include the recession in the industrial economies and the high interest rates in most of the industrialized countries which make stock holding of coffee quite costly. This recent experience with export quotas shows that the price support effect of the quota system is quite limited when the medium to long term fundamentals of the market are weak.

The declining price trend during the summer of 1981 was halted and prices increased in August and September because of the severe frost that occurred in Brazil in late July and the recent decision of the ICO members to limit the global export quota for the 1981/82 coffee season to a level of 56

1/ See footnote /a of Table III-A1.

million bags, which is lower than last season's initial quota. Further, the quota for the first quarter of the 1981/82 coffee year was set at an annual rate of 52 million bags -- equivalent to the quota level in the 4th quarter of the 1980/81 coffee year. This reduction in quota should increase the stocks in producing countries, which will then be available to compensate for Brazil's production decline in the 1982/83 season.

Table V-C1: EXPORTS TO ALL DESTINATIONS AND TO IMPORTING MEMBERS BY EXPORTING MEMBERS.
 APRIL-MARCH 1975/76, 1978/79, 1979/80 AND INITIAL AND
 LATEST QUOTES FOR 1980/81.
 ('000 bags)

| | 1975/76 | | 1978/79 | | 1979/80 | | Quotas | | | |
|-------------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|---------------|--------------|---------------|--------------|
| | Importing Members | All Destinations | Importing Members | All Destinations | Importing Members | All Destinations | Initial | As % /a | Initial | As % /a |
| TOTAL | 53,495 | 59,698 | 54,224 | 60,455 | 54,532 | 60,382 | 58,193 | 107.0 | 56,000 | 103.0 |
| Colombian Mils | 10,136 | 10,737 | 12,225 | 13,063 | 12,286 | 13,104 | 11,800 | 96.3 | 10,885 | 88.8 |
| Colombia | 8,085 | 8,495 | 9,421 | 10,649 | 10,363 | 11,090 | 9,700 | 85.6 | 8,671 | 85.5 |
| Kenya | 1,095 | 1,152 | 1,337 | 1,421 | 1,220 | 1,257 | 1,300 | 101.7 | 1,400 | 109.5 |
| Tanzania | 946 | 990 | 967 | 993 | 703 | 757 | 800 | 95.8 | 814 | 97.4 |
| Other Mils | 15,400 | 16,356 | 16,718 | 17,694 | 16,553 | 17,566 | 16,022 | 96.3 | 14,502 | 87.2 |
| Murundi | 306 | 306 | 364 | 384 | 445 | 462 | 400 | 98.8 | 400 | 98.7 |
| Costa Rica | 1,138 | 1,176 | 1,452 | 1,566 | 1,381 | 1,427 | 1,500 | 105.9 | 1,314 | 92.8 |
| Dominican Republic | 672 | 708 | 206 | 394 | 599 | 693 | 470 | 105.0 | 575 | 128.6 |
| Ecuador | 1,006 | 1,146 | 1,487 | 1,645 | 1,224 | 1,357 | 1,300 | 95.9 | 1,134 | 83.7 |
| El Salvador | 2,954 | 2,963 | 3,216 | 3,216 | 2,399 | 2,413 | 2,300 | 81.9 | 2,325 | 82.8 |
| Guatemala | 2,128 | 2,160 | 2,429 | 2,449 | 2,386 | 2,399 | 2,100 | 87.2 | 1,884 | 78.2 |
| Haiti | 424 | 424 | 215 | 413 | 414 | 414 | 400 | 127.4 | 400 | 127.4 |
| Honduras | 924 | 728 | 1,098 | 1,099 | 1,037 | 1,039 | 1,100 | 103.0 | 960 | 88.9 |
| India | 489 | 930 | 700 | 1,108 | 556 | 1,032 | 1,100 | 175.2 | 960 | 152.9 |
| Jamaica | 16 | 17 | 9 | 10 | 14 | 15 | 16 | 139.1 | 16 | 139.1 |
| Malawi | 1 | 2 | 2 | 3 | 3 | 5 | 8 | 320.0 | 6 | 240.0 |
| Mexico | 2,725 | 2,843 | 2,349 | 2,447 | 2,509 | 2,683 | 2,200 | 90.6 | 1,909 | 78.6 |
| Nicaragua | 785 | 787 | 881 | 882 | 1,081 | 1,091 | 800 | 81.5 | 688 | 71.1 |
| Panama | 40 | 40 | 37 | 37 | 56 | 57 | 57 | 122.6 | 62 | 133.4 |
| Papua New Guinea | 572 | 580 | 793 | 792 | 802 | 802 | 700 | 87.8 | 610 | 76.5 |
| Peru | 636 | 665 | 840 | 878 | 1,025 | 1,050 | 900 | 96.5 | 785 | 84.2 |
| Rwanda | 430 | 436 | 267 | 285 | 557 | 561 | 360 | 87.4 | 375 | 91.0 |
| Venezuela | 354 | 355 | 283 | 283 | 66 | 66 | 311 | 178.2 | 89 | 51.0 |
| Zimbabwe /b | | | | | | | | | 72 | |
| Unwashed Arabian | 17,474 | 15,231 | 12,292 | 14,688 | 11,243 | 13,331 | 16,100 | 136.8 | 17,011 | 144.5 |
| Bolivia | 63 | 90 | 75 | 87 | 81 | 115 | 102 | 128.3 | 106 | 133.3 |
| Brazil | 11,455 | 13,763 | 11,366 | 13,285 | 9,998 | 11,728 | 14,500 | 135.2 | 15,500 | 145.1 |
| Ethiopia | 945 | 1,070 | 851 | 1,223 | 1,156 | 1,466 | 1,400 | 139.5 | 1,300 | 129.6 |
| Paraguay | 1 | 99 | 0 | 93 | 5 | 22 | 98 | 1,960.0 | 105 | 2,100.0 |
| Robustas | 15,485 | 17,374 | 12,989 | 15,010 | 14,450 | 16,381 | 14,269 | 104.0 | 14,700 | 107.2 |
| Angola | 1,510 | 2,600 | 702 | 1,345 | 163 | 1,012 | 400 | 75.0 | 431 | 80.8 |
| Ghana | 46 | 47 | 18 | 18 | 20 | 20 | 33 | 173.7 | 60 | 315.8 |
| Guinea | 16 | 59 | 0 | 11 | 24 | 43 | 83 | 345.8 | 100 | 416.7 |
| Indonesia | 2,033 | 2,196 | 3,267 | 3,609 | 3,444 | 3,717 | 3,200 | 95.4 | 3,300 | 68.5 |
| Liberia | 99 | 99 | 115 | 116 | 175 | 174 | 120 | 83.4 | 125 | 87.1 |
| Nigeria | 39 | 44 | 29 | 29 | 23 | 23 | 98 | 376.0 | 68 | 261.5 |
| OAMCAF | (7,046) | (8,244) | (5,253) | (5,383) | (6,969) | (7,378) | (6,662) | (109.0) | (7,163) | - |
| Benin | 14 | 33 | 3 | 3 | 1 | 1 | 45 | 1,350.0 | 50 | 1,277.8 |
| Cameroon | 1,816 | 1,951 | 1,109 | 1,310 | 1,740 | 1,759 | 1,602 | 105.1 | 1,500 | 98.4 |
| Central African Rep. | 180 | 180 | 156 | 161 | 99 | 99 | 204 | 160.0 | 256 | 200.8 |
| Congo | 25 | 25 | 24 | 25 | 30 | 30 | 35 | 42.9 | 38 | 46.4 |
| Gabon | 1 | 1 | 4 | 4 | 7 | 7 | 8 | 145.5 | 38 | 691.1 |
| Ivory Coast | 3,767 | 4,765 | 2,897 | 3,524 | 3,943 | 4,669 | 3,521 | 103.0 | 4,200 | 122.8 |
| Madagascar | 1,088 | 1,231 | 708 | 784 | 934 | 998 | 977 | 119.0 | 800 | 97.4 |
| Togo | 153 | 158 | 102 | 102 | 155 | 155 | 270 | 210.1 | 281 | 218.7 |
| Philippines | 35 | 84 | 162 | 246 | 123 | 222 | 262 | 183.9 | 400 | 280.8 |
| Sierra Leone | 95 | 95 | 146 | 146 | 180 | 182 | 175 | 107.4 | 221 | 135.6 |
| Sri Lanka /b | | | | | | | | | 50 | - |
| Thailand /b | | | | | | | | | 95 | - |
| Trinidad & Tobago | 45 | 63 | 21 | 29 | 20 | 28 | 36 | 175.6 | 30 | 146.4 |
| Uganda | 2,440 | 2,756 | 2,056 | 2,374 | 2,117 | 2,175 | 2,000 | 95.9 | 2,602 | 124.7 |
| Zaire | 1,083 | 1,088 | 1,218 | 1,224 | 295 | 1,011 | 1,200 | 108.5 | 1,200 | 108.4 |

/a As percentage of average exports to member importing countries of 1978/79 and 1979/80.

/b New members.

Source: International Coffee Council

ANNEX ICOMPOSITION AND VOTING OF THE EXECUTIVE BOARD FOR 1980/81 /1

| <u>Exporting Countries</u> | <u>Votes</u> | <u>Representing</u> | |
|----------------------------|--------------|---------------------|-------|
| Brazil | 212 | Brazil | (212) |
| Colombia | 159 | Colombia | (159) |
| | | Panama | (-) |
| El Salvador | 86 | Costa Rica | (28) |
| | | El Salvador | (58) |
| Ethiopia | 74 | Burundi | (11) |
| | | Ethiopia | (21) |
| | | Kenya | (29) |
| | | Liberia /2 | (-) |
| | | Malawi | (5) |
| | | Sierra Leone | (8) |
| | | Tanzania /2 | (-) |
| Guatemala | 102 | Dominican Republic | (14) |
| | | Ecuador /2 | (-) |
| | | Guatemala | (46) |
| | | Honduras | (22) |
| | | Papua New Guinea | (20) |
| | | Peru /2 | (-) |
| Mexico | 170 | Bolivia | (5) |
| | | Haiti | (11) |
| | | India | (15) |
| | | Indonesia | (60) |
| | | Jamaica | (5) |
| | | Mexico | (45) |
| | | Nicaragua /2 | (-) |
| | | Paraguay | (5) |
| | | Philippines | (9) |
| | | Trinidad and Tobago | (5) |
| | | Venezuela | (10) |
| OAMCAF | 118 | OAMCAF | (118) |

/1 As a consequence of document EB-1815/80 Rev. 12.

/2 Voting rights suspended.

ANNEX I (contd.)

| <u>Exporting Countries</u> | <u>Votes</u> | <u>Representing</u> | |
|--------------------------------|-----------------|--------------------------------|-------|
| Uganda | 69 | Angola | (12) |
| | Ghana | (5) | |
| | Rwanda | (10) | |
| | Uganda | (42) | |
| | Zaire <u>/2</u> | (-) | |
| | <u>990</u> | <u>(990)</u> | |
| <u>Importing Countries</u> | <u>Votes</u> | <u>Representing</u> | |
| Belgium* | 78 | Belgium | (30) |
| | | Netherlands | (48) |
| Canada | 99 | Australia | (13) |
| | | Canada | (32) |
| | | Japan | (47) |
| | | New Zealand | (7) |
| Federal Republic of Germany | 124 | Federal Republic of Germany | (124) |
| Finland | 108 | Finland | (21) |
| | | Hungary | (14) |
| | | Israel | (8) |
| | | Norway | (16) |
| | | Sweden | (30) |
| | | Yugoslavia | (19) |
| France | 104 | Cyprus | (5) |
| | | France | (93) |
| | | Ireland | (6) |
| Switzerland | 36 | Austria | (15) |
| | | Portugal <u>/2</u> | (-) |
| | | Spain <u>/2</u> | (-) |
| | | Switzerland | (21) |

* Includes Luxembourg.

/2 Voting rights suspended.

ANNEX I (contd.)

| <u>Importing Countries</u> | <u>Votes</u> | <u>Representing</u> | |
|-----------------------------|--------------|-----------------------------|--------------|
| United Kingdom | 128 | Denmark | (21) |
| | | Italy | (61) |
| | | United Kingdom | (46) |
| United States of America | 323 | United States of America | (323) |
| | <u>1,000</u> | | <u>1,000</u> |

COFFEE YEAR 1981/82

ANNEX IIEXPORT ENTITLEMENTS OF EXPORTING MEMBERS
EXEMPT FROM BASIC QUOTA

(60 kilo bags)

| | Export entitlement |
|-----------------------------------------------------------------------------------|----------------------------|
| TOTAL (a) with OAMCAF | <u>3 438 350</u> |
| (b) without OAMCAF | <u>2 776 350 1/</u> |
| Sub-total of Members exporting less than 100 000 bags (without OAMCAF) | <u>666 850</u> |
| Bolivia | 105 850 |
| Ghana | 59 500 |
| Jamaica | 16 000 |
| Malawi | 5 500 |
| Nigeria | 67 500 |
| Panama | 61 500 |
| Paraguay | 105 000 |
| Sri Lanka | 49 500 |
| Thailand | 95 000 |
| Trinidad and Tobago | 30 000 |
| Zimbabwe | 71 500 |
| Sub-total of Members exporting more than 100 000 bags (without OAMCAF) | <u>2 109 500</u> |
| Burundi | 400 000 |
| Guinea | 100 000 |
| Haiti | 400 000 |
| Liberia | 125 000 |
| Philippines | 400 000 |
| Rwanda | 375 000 |
| Sierra Leone | 220 500 |
| Venezuela | 89 000 |
| OAMCAF | <u>662 000</u> |
| (a) Members exporting less than 100 000 bags | <u>124 500</u> |
| Benin | 49 500 |
| Congo | 37 500 |
| Gabon | 37 500 |
| (b) Members exporting more than 100 000 bags | <u>537 500</u> |
| Central African Republic | 256 250 |
| Togo | 281 250 |

1/ Estimated additional shortfalls of 638 350 bags to be declared

References

1. Carlos Manuel Petáez, "The Inter-American Coffee Agreement, ICA", in Essays on Coffee and Economic Development, Brazil 1973, p. 252.
2. IBRD, "Analysis of World Coffee Market", November 1981.
3. ICO, International Coffee Agreement, 1962.
4. ____, International Coffee Agreement, 1968.
5. ____, International Coffee Agreement, 1976.