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Study

COFFEE PRICE DETERMINATION AND VOLATILITY

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INTRODUCTION

1. The present document is an update of the two previous studies on coffee price determination and volatility (documents EB-3629/97 and EB-3638/97) and aims to analyse the factors capable of influencing coffee price volatility. In the previous study (document EB-3638/97), it was shown that the volatility of coffee prices had increased over the last few years on account of changes that had occurred in the global coffee industry. The low levels of stocks, the management of market supplies, the lack of any regulatory mechanism, and the liberalization of the coffee trade in numerous exporting countries were identified as factors responsible for this increase in the instability of coffee prices.

2. The present update analyses the influence of the fundamental factors connected with the conditions of supply and demand on the volatility of coffee prices. In other words, it is advisable to analyse to what extent these fundamental factors affect the volatility of coffee prices. The following points will be discussed:

   I. Influence of factors connected with coffee supply

   II. Influence of factors connected with coffee demand

   III. Influence of transactions on the futures markets

I. INFLUENCE OF FACTORS CONNECTED WITH COFFEE SUPPLY

3. Production, exports and stocks have an influence on coffee price volatility.

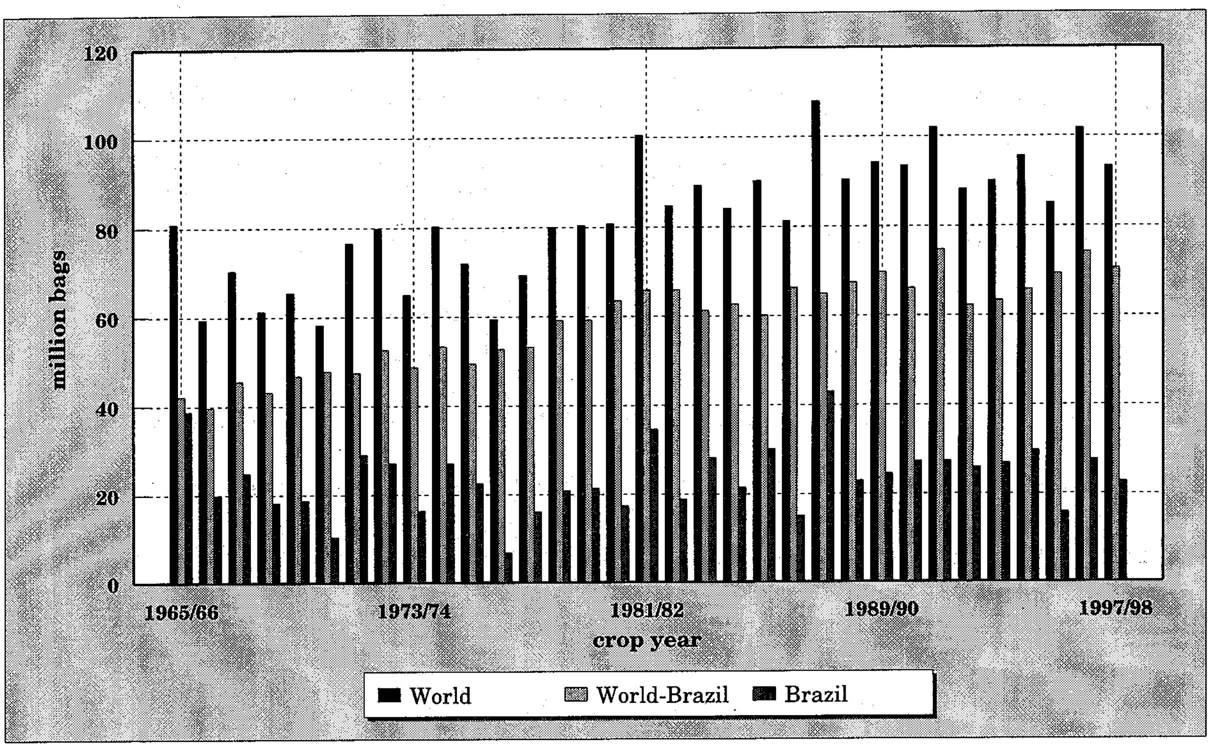
Production and price volatility

4. Like most agricultural commodities, coffee production is subject to wide variability on account of agronomic and climatic factors. For example, a low or excessively high rainfall can affect the volume of production from one year to the next. This uncertainty in production then feeds the very high volatility in coffee prices. Also, among the fundamental factors determining the formation and movement of prices, production itself

has a very marked influence on price instability. Graph 1 shows world production since 1965/66. An examination of this graph shows that production in Brazil is very unstable, which has a knock-on effect on overall world production.

GRAPH 1

**WORLD PRODUCTION AND BRAZILIAN PRODUCTION
CROP YEARS 1965/66 TO 1997/98**



5. The annual variations in overall world production are shown in Table 1 and Graph 2. Brazil, which is by far the world's major producer and accounts for about 30 percent of world production, has a production pattern that is sometimes affected by climatic hazards (frosts and droughts), resulting in exceptional cases of large falls in production and a high degree of instability. The years in which there was a drop in Brazilian production correspond to periods of marked price volatility. Graph 3 shows the ICO composite price since October 1965.

TABLE 1

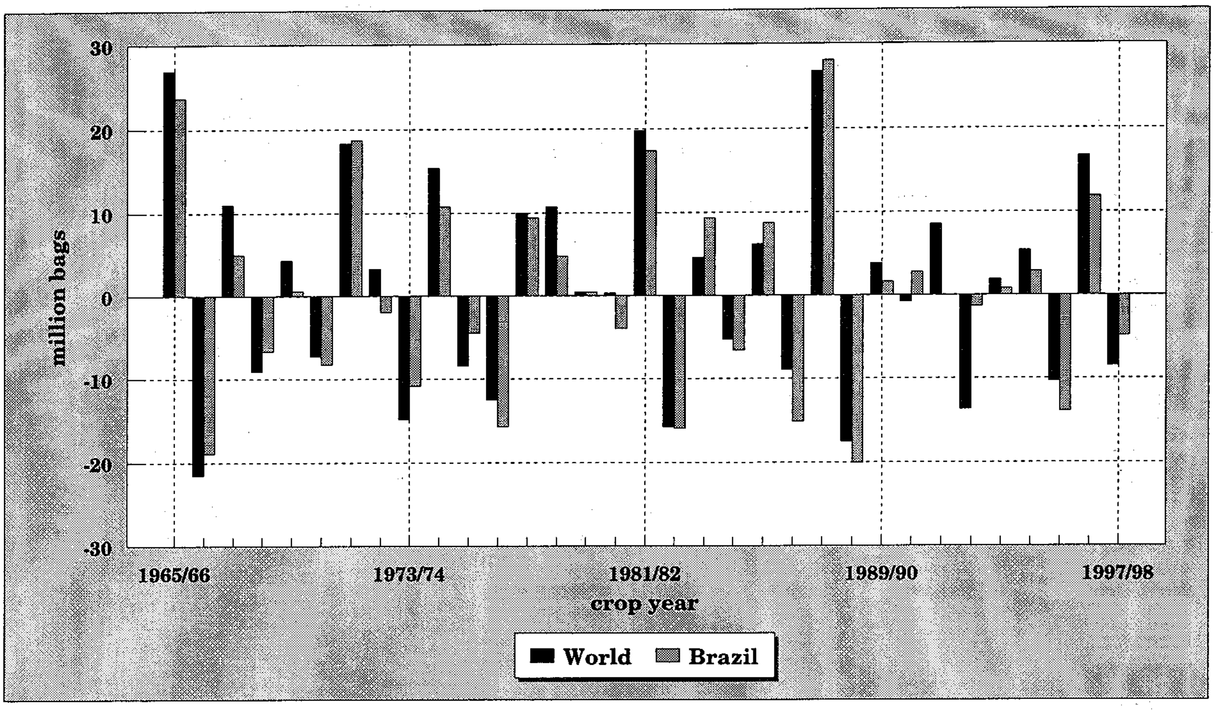
VARIATIONS IN WORLD PRODUCTION AND BRAZILIAN PRODUCTION
1965/66 TO 1997/98

(000 bags)

Crop year	Variation in world production	Variation in Brazilian production
1965/66	26,883	23,697
1966/67	-21,530	-18,954
1967/68	10,985	5,003
1968/69	-9,137	-6,699
1969/70	4,294	573
1970/71	-7,279	-8,309
1971/72	18,290	18,700
1972/73	3,246	-1,942
1973/74	-14,863	-10,888
1974/75	15,399	10,721
1975/76	-8,434	-4,517
1976/77	-12,528	-15,779
1977/78	9,911	9,384
1978/79	10,720	4,805
1979/80	454	443
1980/81	314	-3,989
1981/82	19,770	17,379
1982/83	-15,811	-15,941
1983/84	4,578	9,320
1984/85	-5,272	-6,659
1985/86	6,179	8,695
1986/87	-8,975	-15,143
1987/88	26,719	28,056
1988/89	-17,538	-20,075
1989/90	3,855	1,603
1990/91	-811	2,779
1991/92	8,510	-24
1992/93	-13,742	-1,325
1993/94	1,888	815
1994/95	5,378	2,901
1995/96	-10,407	-13,935
1996/97	16,672	11,832
1997/98	-8,524	-4,880

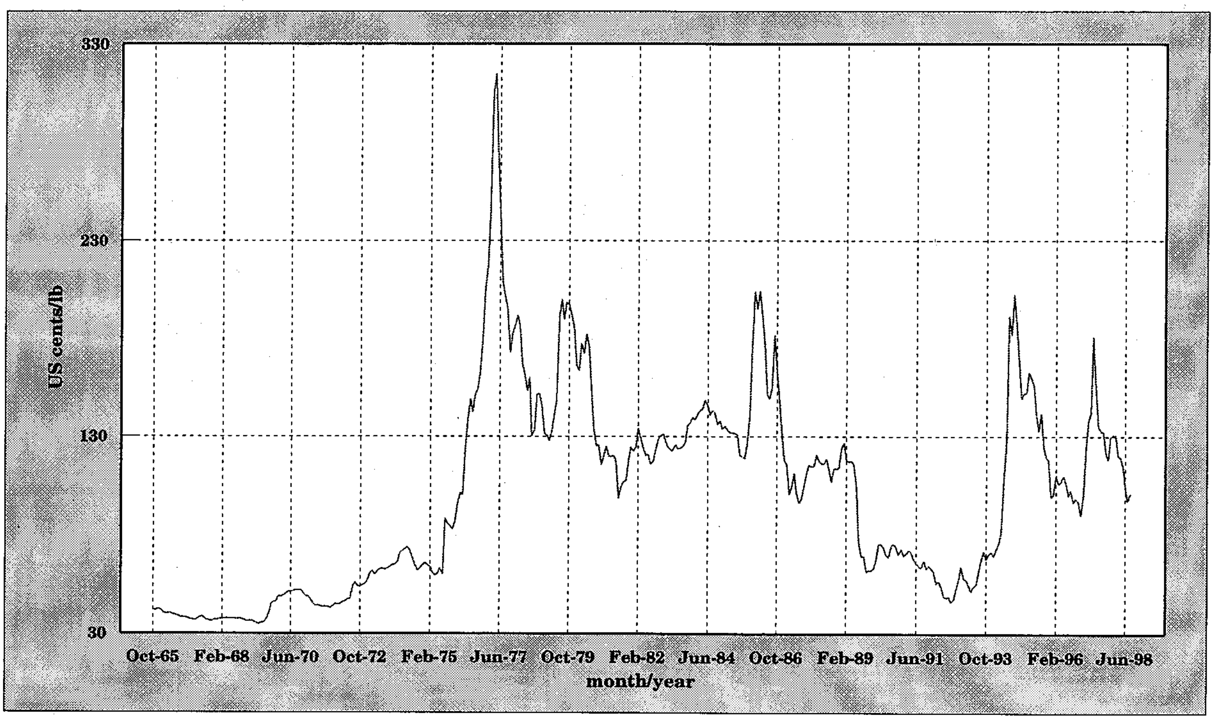
GRAPH 2

VARIATION IN WORLD PRODUCTION AND BRAZILIAN PRODUCTION 1965/66 TO 1996/97



GRAPH 3

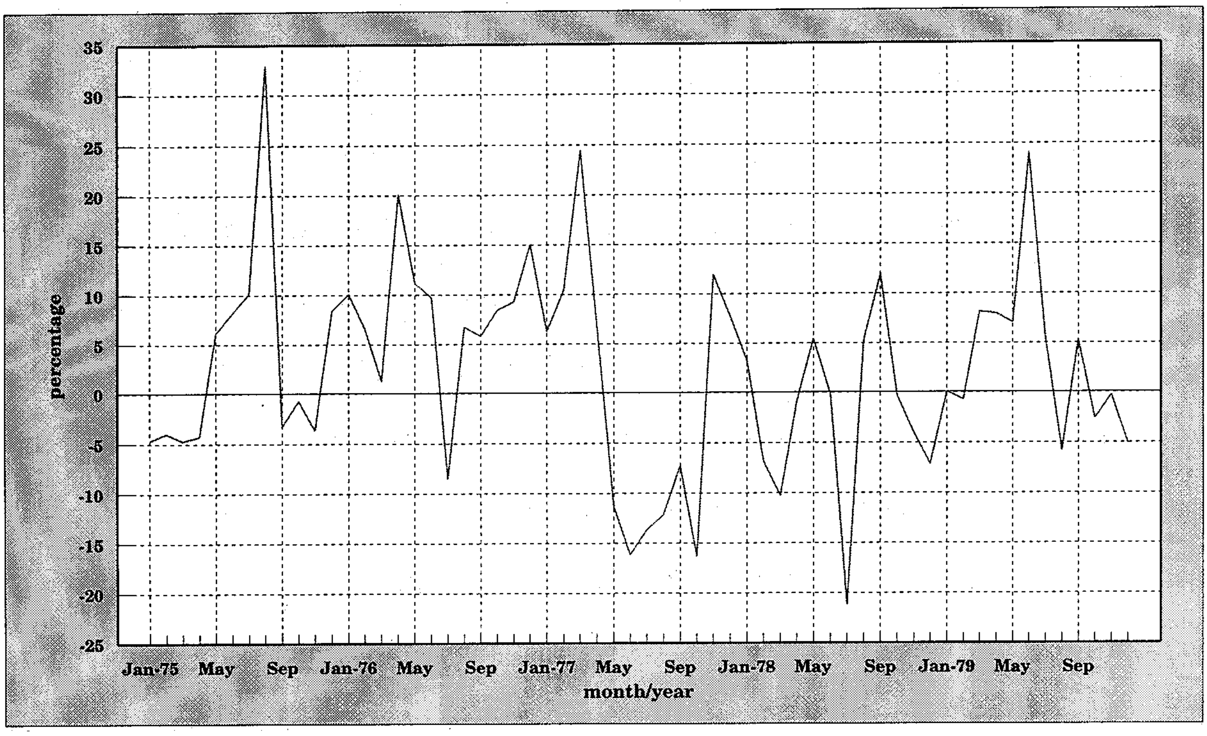
ICO COMPOSITE PRICE 1965 TO 1998



6. Monthly records of coffee prices show a marked instability between 1975 and 1979, then again between 1980 and 1983, in 1986/87, in 1994/95, and more recently in 1997. These periods are related to the fall in Brazilian production due mainly to adverse climatic factors (except for the drop in Brazilian production in 1997, which is connected with the production cycle). The influence of Brazilian production on prices is manifested initially on the New York futures market C contract (NYCSCE), which is based mainly on washed Arabicas from Central America. As a matter of fact, numerous brokers and roasters buy large amounts of Brazilian coffee. When the Brazilian harvest is small, these brokers and roasters are forced to replace their demand for Brazilian coffee by increased purchases of washed Arabicas from Central America, Africa and Asia/Oceania. This excess demand increases the risk of price volatility of the New York C contract. If the Brazilian harvest is plentiful, the demand for coffee from other origins is reduced and the pressure on the New York futures market is lessened. In this case prices drop or remain relatively stable since plentiful Brazilian production reduces the demand for the growths traded on the New York futures market. Insofar as the New York futures market is the main centre for the majority of coffee transactions, the behaviour of the price of these contracts has an overall effect on all other prices. Thus, the periods of marked coffee price volatility coincide with the years during which Brazilian production fell sharply. Graphs 4A, 4B and 4C show the price volatility of the New York C contract for the periods 1975-79, 1980-89 and 1990-98.

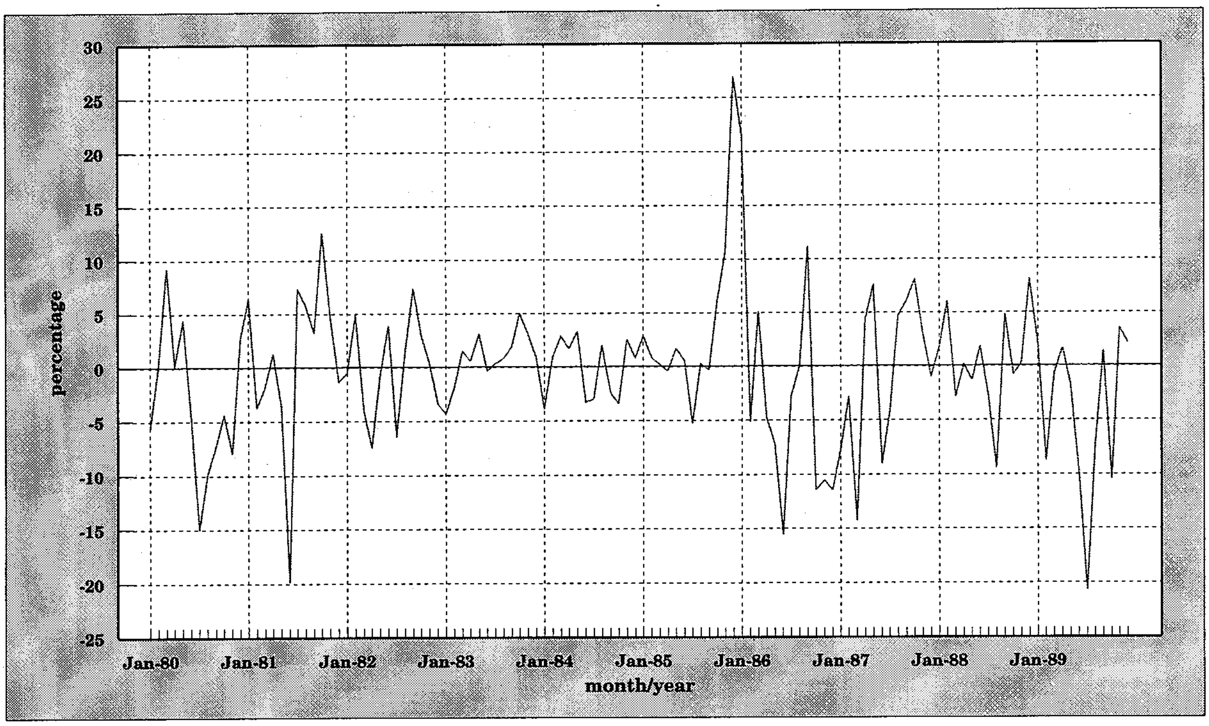
GRAPH 4A

**VOLATILITY OF FUTURES PRICES
1975 TO 1979**



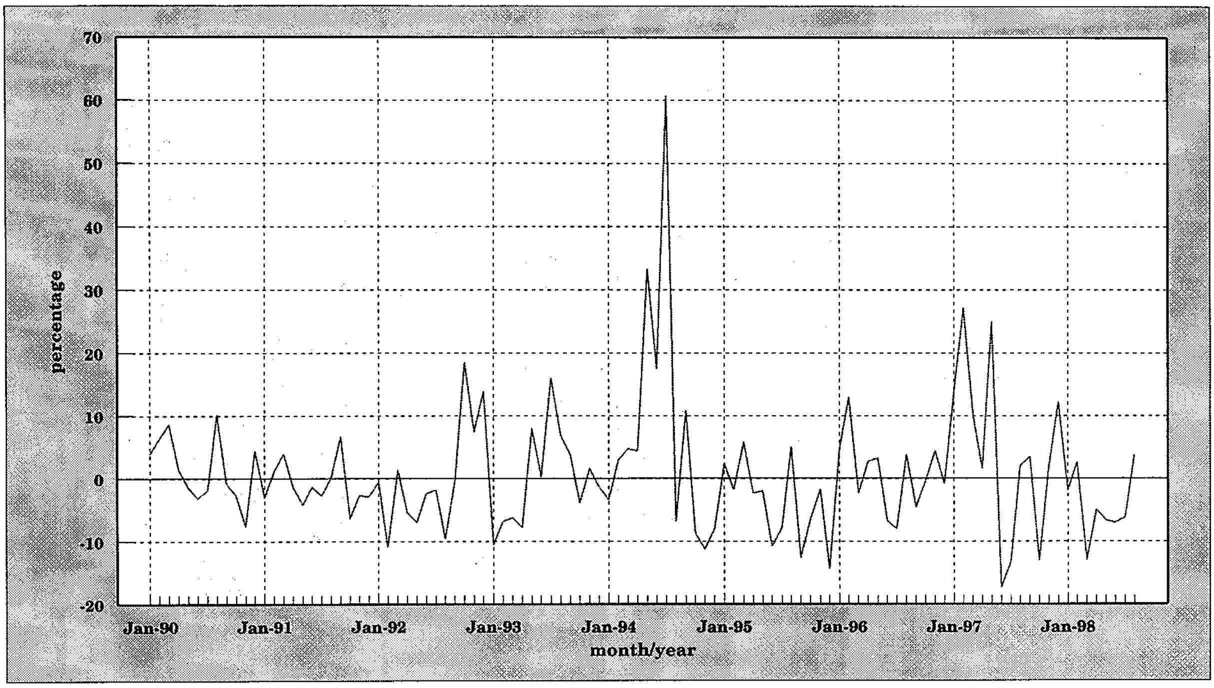
GRAPH 4B

**VOLATILITY OF FUTURES PRICES
1980 TO 1989**



GRAPH 4C

VOLATILITY OF FUTURES PRICES
1990 TO 1998

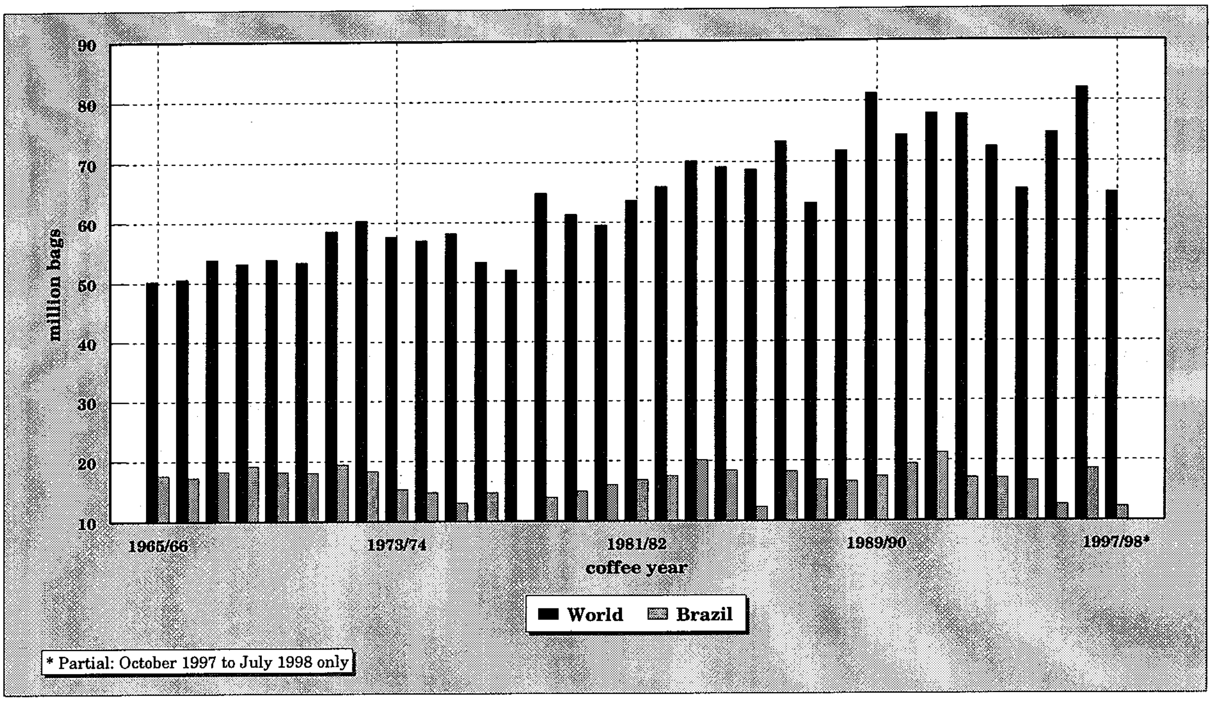


Exports and price volatility

7. Exports reflect on the one hand the level of production in the exporting countries and on the other hand their external trade policy. The pattern of supply to the market thus affects the volatility of coffee prices. In the absence of any system of market regulation and with the liberalization of the coffee trade in numerous exporting countries, the supply of the market is one of the factors responsible for price volatility. In other words, the movement of exports appears to have an effect on price levels. The drop in exports in 1994/95 coincided with a substantial rise in the ICO composite price during the same period. It is interesting to note that the existence of a negative correlation between prices and the movement of exports is used as a justification for any policy of short-term/medium-term restriction or management of exports. This relationship would be much stronger on the assumption of an intentional very low level of stocks in importing countries. Graph 5 shows world exports and Brazilian exports since 1965/66.

GRAPH 5

**WORLD EXPORTS AND BRAZILIAN EXPORTS
COFFEE YEARS 1965/66 TO 1996/97**



Stocks and price volatility

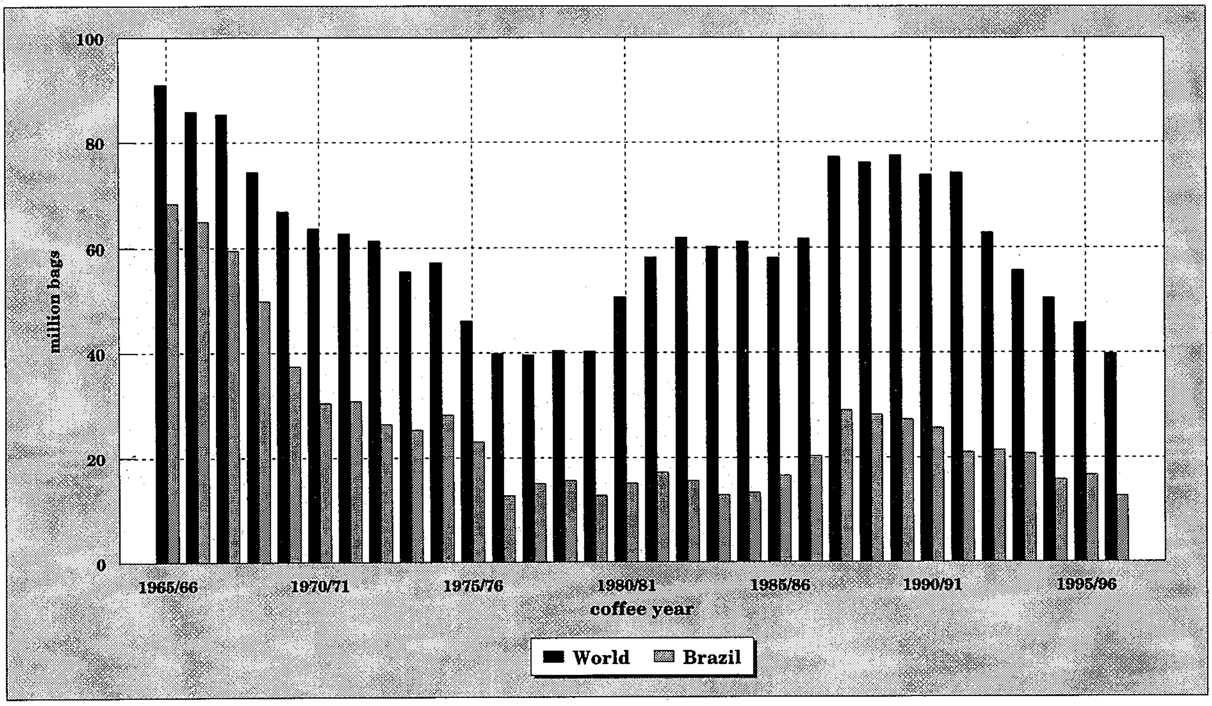
8. World stocks have experienced a regular drop since 1992/93. Inventories in importing countries have fallen substantially over the last few years. When one studies the evolution of stocks since 1965/66, it is found that the sharpest drop in world stocks occurred during the period from 1976 to 1979, corresponding to a marked fall in world production. When world stocks are high, they can act as a moderating influence on price volatility by enabling possible imbalances between production and market requirements to be corrected. If there is insufficient production, stocks in exporting countries are used to maintain the level of exports. Similarly, importing countries use their inventories to alleviate possible market tensions.

9. The liberalization of trade has led to low levels of stocks and thus to price instability. In fact, there are no longer any public or semi-public organizations able to stockpile in order to supply the market in a regular and regulated manner. The private sector in the exporting countries is not interested in stockpiling on account of the risk of

depreciation and also because of the high storage charges (for example, high interest rates). In the importing countries, roasters prefer the so-called just-in-time strategy in order to let the brokers bear the risk associated with building up large stocks. The size of stocks thus has a not inconsiderable influence on coffee price volatility, particularly in view of unstable production and exports and a relatively stable demand. Graph 6 shows world stocks and Brazilian stocks from 1965/66 to 1996/97.

GRAPH 6

WORLD STOCKS AND BRAZILIAN STOCKS
COFFEE YEARS 1965/66 TO 1996/97



II. INFLUENCE OF FACTORS CONNECTED WITH COFFEE DEMAND

10. The evolution of world consumption and fragmentation of the market affect the coffee price volatility.

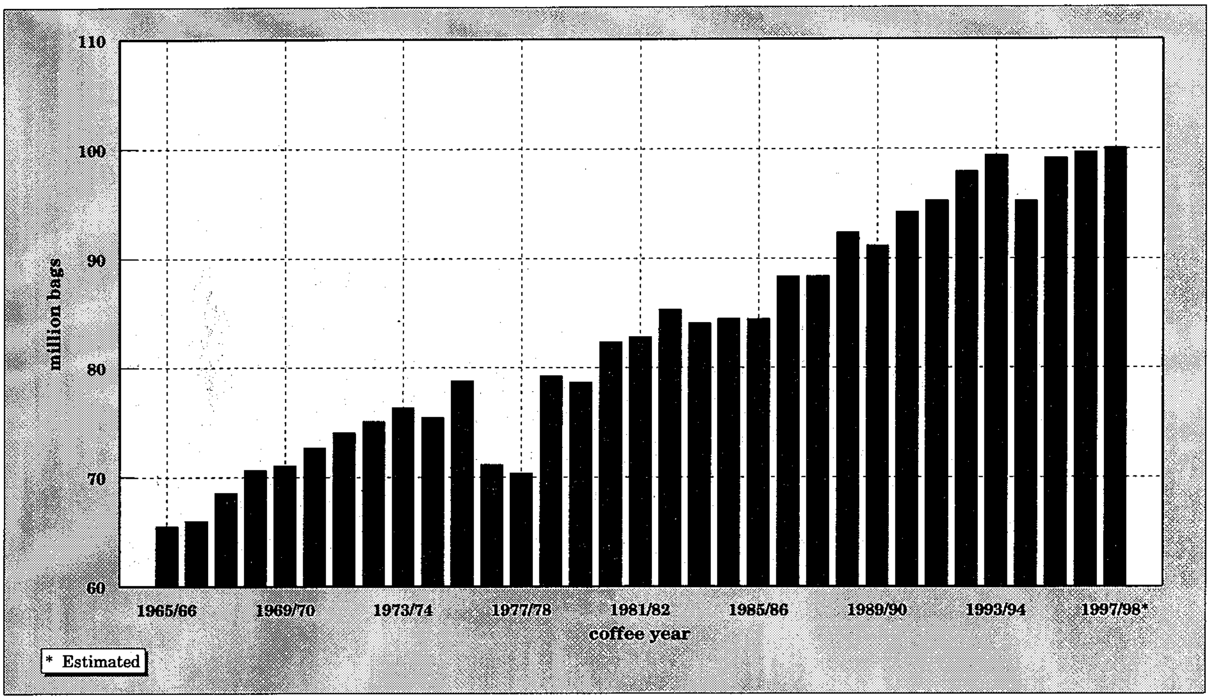
Evolution of consumption and price volatility

11. The effect of consumption on volatility depends on the level of world stocks. In a commodities market such as the coffee market, characterized by a very unstable supply and a relatively stable demand, the stocks/consumption ratio is a very sensitive indicator

of price volatility. When during the 1960s this ratio was high, reaching a value corresponding to about 17 months' consumption, the prices were less unstable. This is explained by the fact that, with a relatively stable demand, any decrease in stocks increases the volatility when supplies are low. Furthermore, the price elasticity of the demand varies between -0.2 and -0.35 in the majority of the industrialized coffee importing countries. Graph 7 shows world consumption since 1965.

GRAPH 7

WORLD CONSUMPTION
COFFEE YEARS 1965/66 TO 1996/97



12. Consumption in importing countries is increasing only slightly or remains stable in some countries. Domestic consumption in many exporting countries is growing steadily. Brazil, which consumes about 40 percent of its coffee production, is the second largest consumer in the world, after the United States of America and in front of Germany. Thus, the market becomes extremely volatile when Brazilian production drops sharply, for the brokers and roasters take into account the size of domestic consumption in order to increase their demand for replacement coffees, thereby causing tension in the markets.

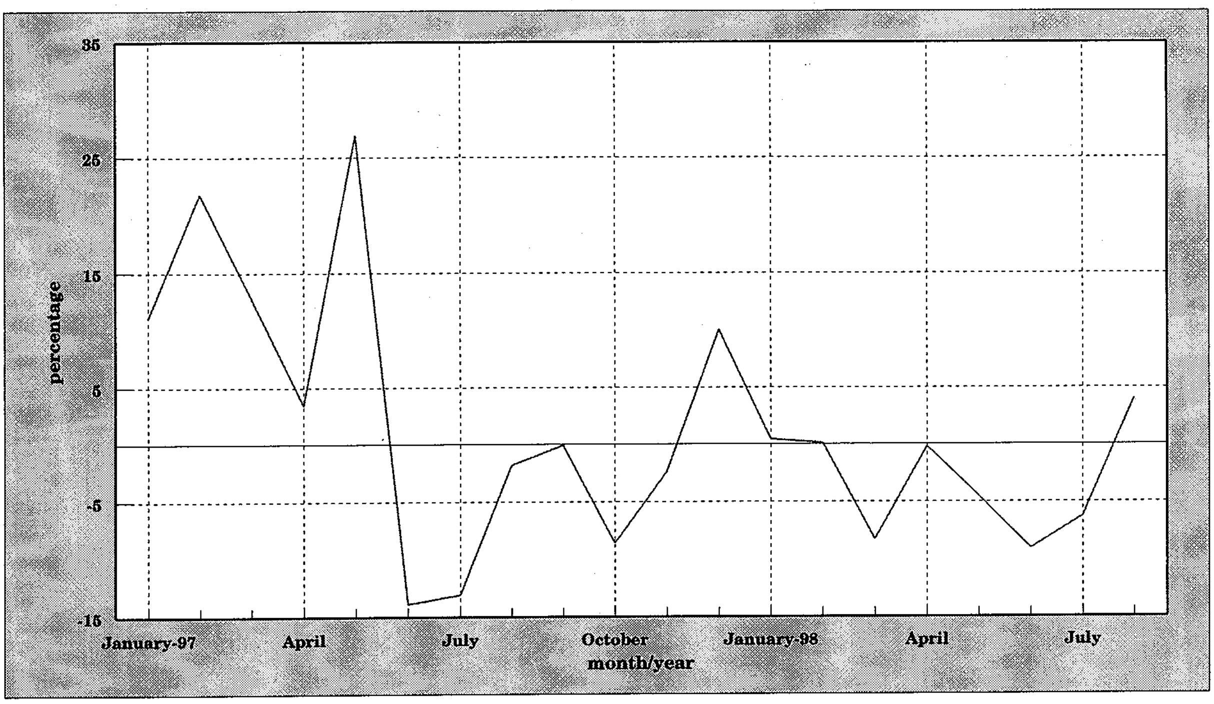
When Brazilian production is plentiful, the level of its domestic consumption should have a moderating influence on the movement of exports. However, it is worth noting in this particular case that the market appears to ignore the volume of Brazilian domestic consumption in order to speculate on the size of its production.

Market segmentation and price volatility

13. The segmentation of the world coffee market can have a knock-on effect on price volatility. In fact, an increase in demand for certain types of coffee such as coffee from a specific origin can cause a drop in demand for other types of coffee and thereby make the market less flexible, which in turn increases volatility. If for example there is a deficit or overproduction in one origin, the possibility of replacement thereby being reduced, the market price may fluctuate wildly. Graphs 8A, 8B and 8C show the volatility of the composite price and indicator price of Arabicas (Other Milds) and of Robustas in 1997 and 1998.

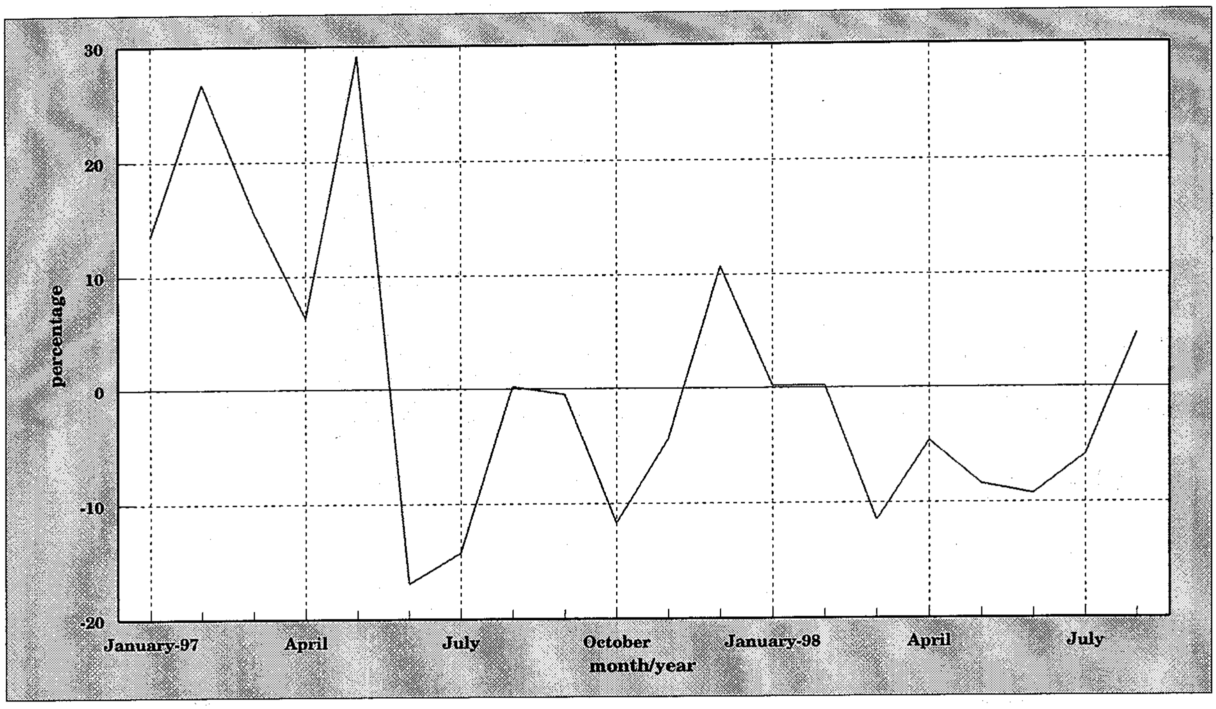
GRAPH 8A

**VOLATILITY OF THE COMPOSITE PRICE
1997 AND 1998**



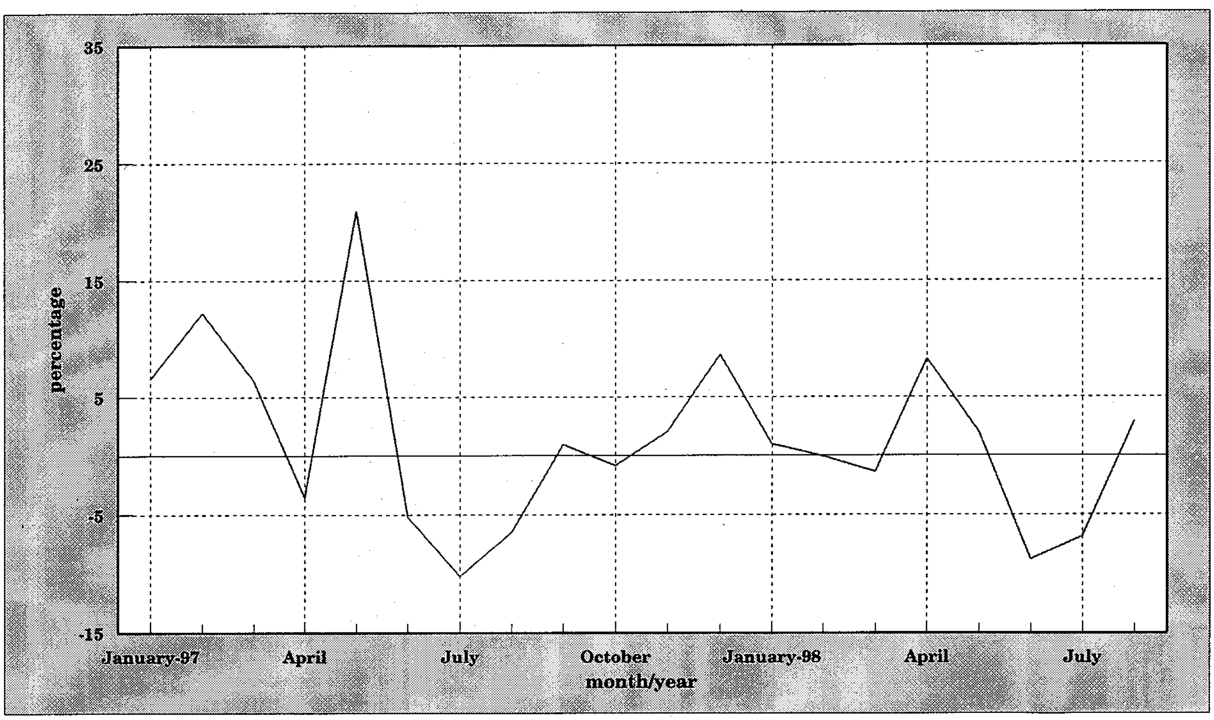
GRAPH 8B

**VOLATILITY OF THE INDICATOR PRICE OF OTHER MILDS
1997 AND 1998**



GRAPH 8C

**VOLATILITY OF THE INDICATOR PRICE OF ROBUSTAS
1997 AND 1998**



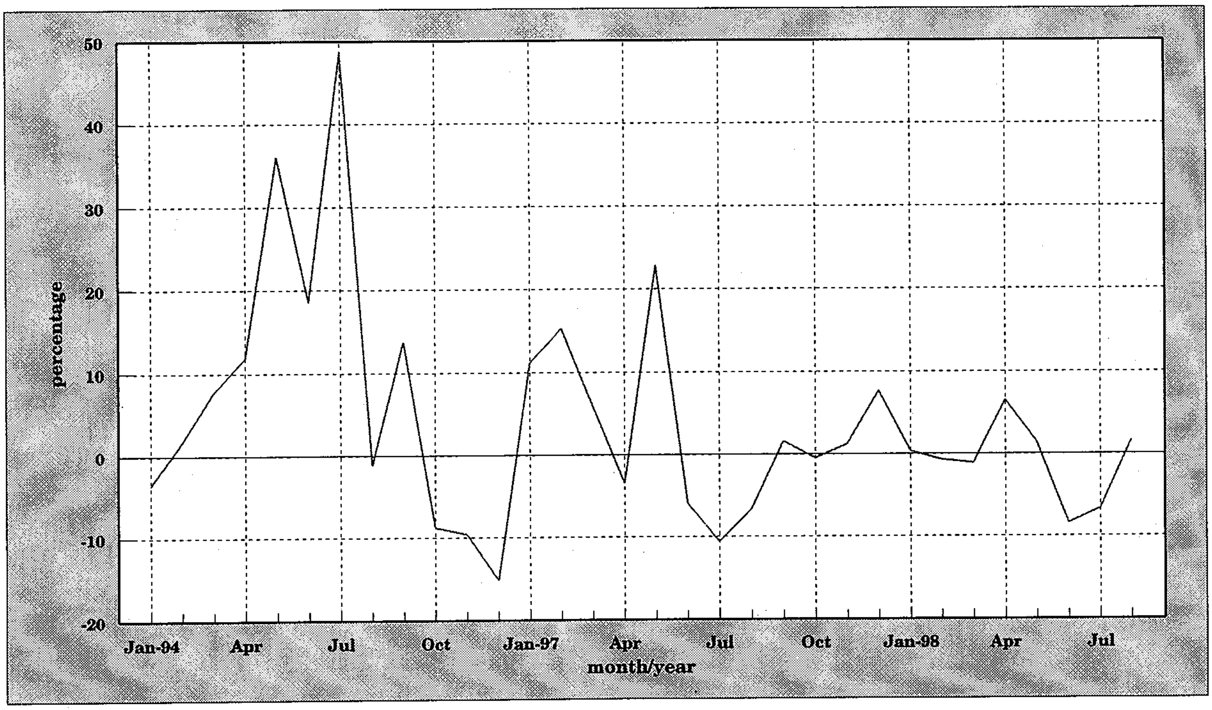
III. INFLUENCE OF TRANSACTIONS ON THE FUTURES MARKETS

14. The futures markets are financial institutions that handle the sale and purchase of futures contracts for terms ranging from 3 to 18 months, and enable the risk of price fluctuations to be managed by means of hedging operations. The New York (CSCE) and London (LIFFE) futures markets are the main centres for world coffee transactions. The futures markets bring together investors (speculators) who contribute liquidity, and the professional operators who wish to cover themselves against the price risk connected with their daily business. However, these speculators, with large investment funds, may exacerbate the price volatility caused by fundamental supply factors such as social unrest or climatic problems in exporting countries.

15. In fact, the various technical analysis methods developed and employed by these investment fund managers in their daily transactions do not appear to take sufficient account of the market fundamentals and contribute to the short-term price volatility. Graphs 9A and 9B show the volatility of the New York and London futures markets in 1994, 1997 and 1998.

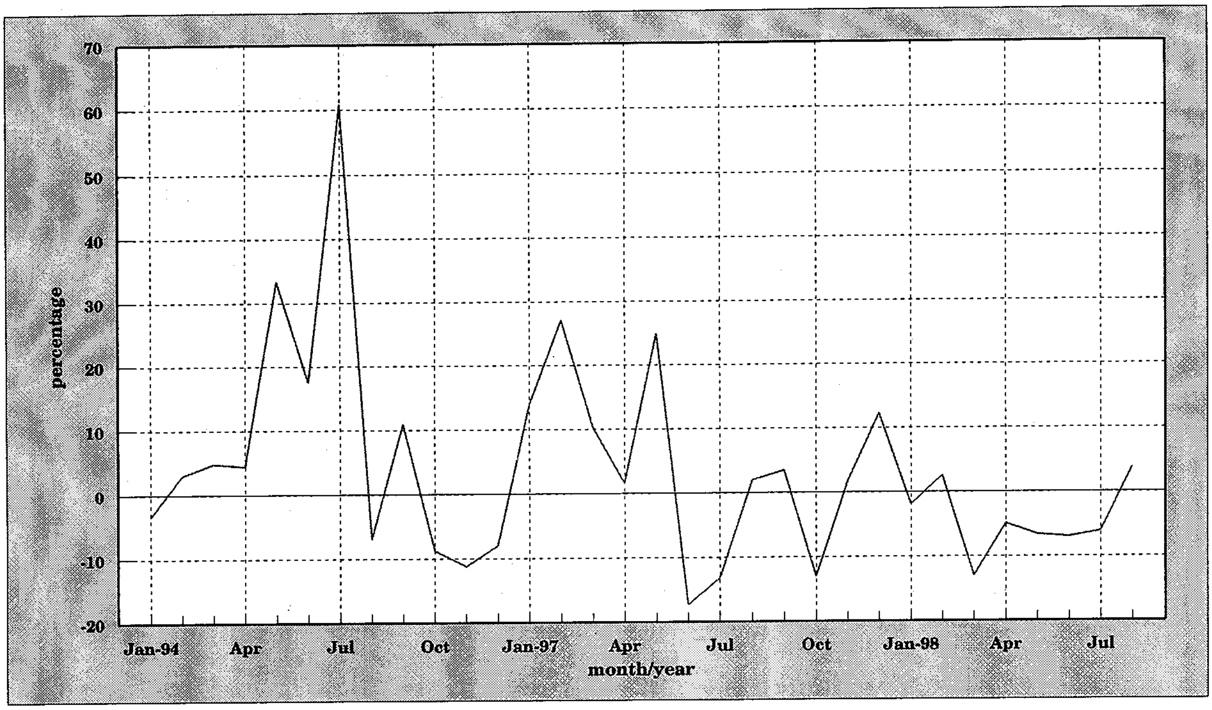
GRAPH 9A

VOLATILITY ON THE NEW YORK FUTURES MARKET
1994, 1997 AND 1998



GRAPH 9B

VOLATILITY ON THE LONDON FUTURES MARKET
1994, 1997 AND 1998



CONCLUSION

16. As with numerous other agricultural commodities, the main factors in coffee price instability are connected with the supply conditions, in particular production. Variations in the level of Brazilian production are therefore a determining factor in the evolution and volatility of coffee prices. Moreover, since the price elasticities of coffee supply and demand are weak in the short term, the delayed reactions between production and consumption compared to the evolution of prices cause an overreaction, which sometimes leads to a marked volatility.

14. By and large, the factors responsible for the excessive volatility of coffee prices should be sought first of all in the market fundamentals, in particular those associated with coffee supply. It is the conditions affecting the evolution of these market fundamentals that can favour or prevent the occurrence of speculative factors, in particular

investment fund movements. In other words, the instability of Brazilian production combined with the low level of world stocks mitigates against any attempt to relieve the imbalance that is created between supply and demand, and exacerbates price volatility.

18. The low level of stocks over the last few years results on the one hand from the just-in-time supply policy of roasters, and on the other hand from the liberalization of coffee trading in numerous exporting countries, where the private sector, unlike public or semi-public bodies, is unable to support storage charges.

19. Moreover, the fragmentation or segmentation of the market makes it more difficult to find possible alternative sources of coffee, and could therefore create tension as regards those types of coffee where there is a deficit or overproduction. Consequently, increasing the possibilities of mixing coffees from various origins could help to reduce coffee price volatility.

20. Finally, any lack of transparency in the market will continue to feed speculative practices and thereby increase coffee price volatility. In fact, with the disappearance of the system of verification of world stocks, the level of world stocks is now in the realm of speculation. The market is therefore deprived of real time information on the movement of world stocks and their real effect on the evolution of coffee prices.