CHAPTER II : THE GROWTH OF TERMINAL MARKETS

1. INTRODUCTION

In this chapter we shall present market profiles of several commodities to illustrate the scope and extent of the growth of terminal market trading. The commodities dealt with, both metals and agricultural (or 'soft' commodities), are a diverse group with different market characteristics, offering a wide range of examples of trends in the international marketing of commodities. For convenience of comparison, as far as possible we have covered the same time period for each commodity - from the early 'sixties' up to the present.

The commodity profiles will outline the principal market features for each. These include the volume of world production, the main production and consumption centres, international trade, market structure, the location and importance of terminal markets compared to other pricing systems, and the stability of the market. Once we have presented the overall picture, we will be in a position to examine why terminal market trading has grown. This question will be the subject of the following two chapters. The discussion of this chapter forms a necessary preliminary to the analysis of whether, and in what sense, terminal markets pose a 'problem' in the marketing of commodities.

Two factors will be examined in each of the commodity profiles. Firstly, the volatility of terminal market prices compared to other price quotations. It will be seen that, even looking at annual average prices, leaving aside monthly price fluctuations, the terminal market price can be quite unstable. A useful statistical measure of volatility is the coefficient of variation. This is equal to the ratio of the standard deviation of a series to its average value. Assuming that the values in the series are

independently and normally distributed, a value of 0.1 for the coefficient of variation means that a single year's price will be within plus or minus 10 per cent of the average value about two-thirds of the time. (The coefficient of variation allows the volatility of different series to be compared because it standardises the absolute variation by relating it to the mean value of the series. However, one should bear in mind that, in a series whose values are on a strong upward trend, the average value will be relatively low for the period as a whole. This will tend to overstate price volatility, when compared to coefficients of variation calculated over a shorter time period).

Secondly, one can look at the ratio of total turnover on terminal markets to total world production of a commodity. If terminal market trading volume bears a stable relationship to total world production, the ratio will be constant. So a significant rise in this ratio will indicate the increasing importance of futures markets.

As noted in Chapter I, very little business conducted on terminal markets results in physical deliveries. Thus, even if terminal market turnover is, for example, only 50 per cent of world production, it is not implied that half of world output passes through the terminal market. In many cases, as we shall see below, market turnover is several times world production, showing very clearly that most business has nothing to do with the physical requirements of traders.

In the profiles that follow, we shall indicate, wherever possible, just how unimportant are physical deliveries in the context of most major terminal markets. However, physical deliveries are peripheral to the main objective of the present chapter, which is to examine whether, and to what degree, the growth in terminal market turnover in the past twenty years has been associated with an increase in commodity price volatility.

2. COMMODITY TRADING

2.1 Copper

Copper is one of the most widely traded commodities, and certainly the most widely traded non-ferrous metal. As we shall see below, it provides a good example of the decline of producer pricing in the face of competition from commodity terminal markets.

Annually, some three million tonnes of refined copper enter into international trade, out of the total production of seven million tonnes in the non-Socialist World. The main copper producing countries are Zaire and Zambia in Africa, Chile in Latin America, the USA and Canada, and West Germany and Japan. These latter two countries have little or no domestic copper mine capacity and import concentrates and blister copper for refining.

The main copper consuming countries in the non-Socialist world are the USA, Japan and West Germany. Owing to its large domestic copper production capacity, the USA is nearly self-sufficient in copper supplies, although, as the biggest industrialised country, it remains a net importer of refined copper. Net imports are some 300,000 mtpy compared to a total refined copper consumption in excess of 2,000,000 mtpy. This relative self-sufficiency, together with the high degree of integration between copper mining companies and downstream semi-manufacturers, has been the basis of the US producer pricing system.

Until 1978, the system of producer pricing of copper was directly counterposed to pricing through a commodity terminal market. Throughout the USA and Canada, the main copper producers would announce the terms on which they sold refined

copper, altering their prices only infrequently in response to the changed balance of supply and demand.

The short-run stability of the system of producer pricing stood in marked contrast to the vagaries of the free market price. In North America, scrap prices are determined by reference to the daily quotations on New York's Comex exchange. Outside the USA and Canada, copper prices are set by the daily quotations of the London Metal Exchange. These, like those on Comex, would fluctuate from day to day, perhaps quite sharply, is response to disturbances in the market - a mine disaster, labour dispute at a refinery, etc - or from outside the copper market, e.g. commodity speculation. Table 2.1 gives annual averages for the US producer price for wirebars compared to the average of the LME wirebar quotation (in £ per tonne and US cents per lb) from 1960-78.

From the coefficient of variation, also give in Table 2.1, we can see that price volatility decreased after 1969. This was particularly true for the LME price, whose coefficient fell from 0.35 to 0.21 between 1960-69 and 1969-78. Over the period as a whole, the US Producer Price does not appear much less volatile than the LME price (particularly when this is transformed into US cents per lb., so discounting fluctuations due to exchange rate changes). However, one must remember that the LME price also fluctuated from day to day, whereas the US Producer Price changed infrequently. For example, during January to April 1974, when the LME price rocketed from a low of £863 to a high of £1400, the US Producer Price remained constant at 68.7 cents.

A brief inspection of Table 2.1 shows that the US Producer Price was above the LME price when the latter was weak (1960-63, 1971-72, 1975-78) and below the LME when the LME was booming. In particular, the US Producer Price did not rise to the heights of the LME in 1974, nor fall so sharply in succeeding years. This indicates a certain stabilising effect of the

Table 2.1 : Copper Prices, 1960-1978

	US Producer Price[1] (US cents per lb)	LME Copper Price[2] (US cents per lb)	LME Copper Price[2] (£/per tonne)
1960	32.05	30.75	242.07
1961	29.92	28.59	225.94
1962	30.60	29.28	230.29
1963	30.60	29.32	230.57
1964	31.96	43.86	345.52
1965	35.02	58.73	462.46
1966	36.17	69.13	545.71
1967	38.23	51.24	410.75
1968	41.85	56.01	515.70
1969	47.52	66.29	611.44
1970	57.71	63.89	587.90
1971	51.43	49.27	444.43
1972	50.62	48.55	427.96
1973	58.86	80.81	726.82
1974	76.65	93.10	877.00
1975	63.54	56.11	556.81
1976	68.82	64.05	782.40
1977	65.81	59.38	752.68
1978	65.51	61.83	710.13
Coefficient of Variation			
1960-69	0.14	0.31	0.35
1970-78	0.11	0.20	0.21
1960-78	0.30	0.30	0.38

Notes : 1. Annual average cash wirebar price

2. Annual average cash settlement wirebar price

Source : WBMS

producer pricing system. However, the stability of the US Producer Price for copper came under increasing strain after 1974, as more costly domestic copper faced growing competition from cheaper, imported metal, priced on an LME basis. In 1975, the monthly average price changed four times; in 1976 seven times; and in 1977 nine times. By 1978, the US Producer Price system in its traditional sense was abandoned, when major US copper producers decided to link their prices to those of Comex. (An analysis of this development is given in Chapter 3 below).

A serious problem that arises with measures of price volatility, such as those, presented in Table 2.1, is that the period under review experienced considerable inflation. Accordingly, the coefficients of variation in the 1960's and 1970's were distorted by changes in prices that owed little or nothing to conditions in the supply/demand balance of the copper market.

For this reason, we have calculated the real copper price between 1960 and 1978, using the UN index of prices of world manufactured product exports as the deflator. The revised statistics are presented in Table 2.2.. It is remarkable to observe how the adjustment for inflation transforms the picture of price volatility. Instead of a decline in volatility, as implied by Table 2.1, there has been, if anything, a slight increase in volatility since the 1960's, which must be considered unexpected, occurring, as it did, during a decade containing several years overshadowed by an unusually severe recession. The question arises as to how this is associated with terminal market trading, or at least whether terminal markets exacerbated any underlying fluctuations.

A useful indicator of terminal market trading in copper is given in Table 2.3, which compares turnover on the LME and Comex (the only two terminal markets for copper) with world copper production. Looking at the ratio of turnover to

Table 2.2 : Real Copper Prices, 1960-1978[1] in 1970 US cents/lb

	Real US Producer Price	Real LME Copper Price
1960	38.1	36.6
1961	35.2	33.6
1962	36.0	34.4
1963	36.0	34.5
1964	37.2	51.0
1965	39.8	66.7
1966	39.8	76.0
1967	42.0	56.3
1968	46.0	61.5
1969	50.5	70.5
1970	57.7	63.9
1971	49.0	46.1
1972	44.8	43.0
1973	44.3	60.8
1974	47.3	57.5
1975	34.9	30.8
1976	37.6	35.0
1977	33.1	29.8
1978	28.9	27.2
Coefficient of variation		
1960-69	0.11	0.28
1970-78	0.20	0.28
1960-78	0.15	0.30

Note : 1. The UN index of the price of exports of manufactured goods is the deflator.

Table 2.3 : Terminal Market Turnover and World Production of Refined Copper, 1960-1978

	LME Turnover ('000 mt)	Comex[2] Turnover ('000 mt)	Total Turnover ('000 mt)	World Production[1] ('000 mt)	Total Turnover as % World Production
1960	779.3	-	-	4,191.6	-
1961	809.1	1,871.0	2,680.1	4,273.4	63
1962	517.9	1,235.2	1,753.1	4,379.0	40
1963	190.4	889.9	1,080.3	4,440.9	24
1964	737.3	224.9	962.2	4,745.0	20
1965	901.2	2,517.6	3,418.8	5,040.7	68
1966	1303.6	3,848.7	5,152.3	5,173.8	100
1967	1834.5	1,067.0	2,901.5	4,777.3	61
1968	2133.2	1,137.6	3,270.8	5,397.6	61
1969	2335.7	977.4	3,313.1	5,879.7	56
1970	2671.0	2,012.4	4,683.4	6,121.5	77
1971	2888.0	2,669.1	5,557.1	5,773.6	96
1972	2509.8	2,848.8	5,358.6	6,367.3	84
1973	4676.1	6,402.3	11,078.4	6,668.0	166
1974	3171.0	4,661.5	7,832.5	6,945.0	113
1975	3500.0	5,602.1	9,102.1	6,263.8	145
1976	5067.4	14,095.5	19,162.9	6,640.5	289
1977	4325.5	12,136.0	16,461.5	6,874.9	239
1978	5270.6	15,974.3	21,244.9	6,913.4	307

Notes: 1. Non-Socialist World Production of Refined Copper.
2. Until 1969, the Comex turnover statistics refer to the twelve months ending 30th November.

Sources : LME, AMM, WBMS, Comex.

production in the last column, we can observe a substantial rise, from averaging barely 50 per cent in the 'sixties to over 300 per cent in the late 'seventies.

Turnover fell to low levels between 1962 and 1964, because of the attempt by non-US copper producers (in Latin America and Africa) to stabilise the LME price and set up an alternative producer pricing system. The role of the LME as a means of hedging became less valuable when the LME price remained fixed over a long period, and so business declined. However, after 1964, turnover resumed an upward path as the new producer pricing system collapsed under the pressure of lower LME stock levels, the Unilateral Declaration of Independence in Rhodesia and changes of regime in Central Africa. In the 1970's, turnover rose steadily. On the LME, it rose very sharply in 1973, the year of the boom in copper prices, to over 4.5 million tonnes, and reached another peak of over 5 million tonnes in 1976. Copper prices also rose in this latter year, but, as we shall see later, the greater interest in LME dealing was also associated with the marked decline of the sterling exchange rate.

Comex copper turnover has risen much more rapidly than that on the LME; more than trebling between 1970 and 1973, and more than doubling again after 1975. (However, official LME figures significantly understate actual turnover because they do not include dealings negotiated outside the official Ring). By 1976, the Comex turnover of over 14 million tonnes was more than double the entire world production of refined copper. Using information from the US Commodity Futures Trading Commission, we can examine briefly some characteristics of this growth.

Table 2.4 indicates the proportion of deliveries to total copper turnover on Comex. Despite considerable fluctuations between 1974 and 1978, this remained less than five per cent,

even through Comex was being used as a delivery point for nearly 200,000 tonnes of surplus stocks. Market estimates of business on the LME indicate a somewhat higher figure, but still only 15 per cent of officially recorded Ring turnover at most. The Comex delivery figures underline the fact that terminal markets are used mainly for hedging and speculative transactions. This is further borne out by looking at the figures for "open interest", or the volume of outstanding futures contracts. From an end-month average of 136,000 tonnes in 1974, open interest increased substantially to 553,000 tonnes in the 1978 fiscal year.

Table 2.4 : Comex Copper Turnover

	Turnover ('000 mt)	Deliveries ('000 mt)	Deliveries as per cent of Turnover	Average Open Interest[2] ('000 mt)
1974	5854	25	0.4	136
1975	3595	163	4.5	142
1976	10795	126	1.2	445
1977	12721	397	3.1	520
1978	13829	331	2.4	553

Source : CFTC, Databank '78

Notes : 1. All data are based on fiscal years, not calendar years. The fiscal year for 1974, 1975 and 1976 is July 1 to June 30; for 1977 and 1978 it is October 1 - September 30.

2. "Open interest" refers to the volume of futures contracts outstanding, i.e. not liquidated by an offsetting transaction or fulfilled by delivery. The average open interest shown is the average of open interest on the last day of each month of the fiscal year.

2.2 Cocoa

In 1978, world production of cocoa beans amounted to just over 1.4 million tonnes, after a peak of over 1.5 million tonnes earlier in the decade. The main producing countries are in West Africa (Ghana, Nigeria, Ivory Coast and the Cameroons in order of importance). Outside West Africa, the only significant producer is Brazil. Over 70 per cent of production is exported to consuming countries, and around half of imports are absorbed by the USA and the EEC countries, in particular, West Germany and the UK.

The market for cocoa has been considerably more volatile than that for copper in the 'seventies, although in the previous decade it was more stable in terms of the market price. The cocoa market has elements of instability built into it which do not operate, or operate to a lesser degree, for metals. Firstly cocoa is a seasonal crop, with an uneven schedule of production and supply to the market. Secondly, the consumption of cocoa is highly sensitive both to price and incomes. Consequently, major market imbalances very often arise, resulting in significant price fluctuations.

Price fluctuations have an important effect on the foreign exchange earnings of producing countries. In order to try and reduce the volatility of prices (see Table 2.5), an International Cocoa Agreement was negotiated, and, after 15 years of discussions between exporting and importing countries, was concluded in 1972. The Agreement aimed to keep prices within an agreed range. However, its economic clauses have remained inoperative, since supply shortages have kept prices well above the official upper price limit. Prices are now lower, but there is uncertainty over renewal of the Agreement because of differences between producing and consuming countries as to appropriate new lower and upper limits.

Table 2.5 : Terminal Market Cocoa Prices, 1960-1978

	London Spot Ghana Price (£ per tonne)	New York Spot Ghana Price (cents per lb)	
		Nominal	Real (1970c/lb)[1]
1960	222.3	28.4	33.8
1961	177.1	22.6	26.6
1962	167.4	21.0	24.7
1963	204.9	25.3	29.8
1974	187.7	23.4	27.2
1965	138.4	17.3	19.7
1966	193.2	24.4	26.8
1967	238.0	29.1	32.0
1968	319.5	34.4	37.8
1969	415.5	45.7	48.6
1970	305.5	34.2	34.2
1971	232.4	26.8	25.5
1972	270.5	32.3	28.6
1973	585.4	64.4	48.4
1974	990.1	98.1	60.6
1975	722.7	74.8	41.1
1976	1399.4	109.3	59.7
1977	2943.8	202.6	101.8
1978	2005.6	174.2	76.7
Coefficient of Variation			
1960-69	0.32	0.26	0.23
1970-78	0.79	0.61	0.42
1960-78	1.15	0.88	0.48

Note : 1. As for Table 2.2, above.

Source : Gill & Duffus Cocoa Statistics, ICO Quarterly Bulletin of Cocoa Statistics.

As noted above, volatility has been particularly marked in the 'seventies. Table 2.5 gives the annual averages for the price of cocoa on the main futures markets trading cocoa, in London and New York, from 1960-78.

Prices have clearly been very unstable, even on an annual average basis. Between 1960 and 1969, the coefficients of variation of the London and New York spot prices for Ghana cocoa were 0.32 and 0.26 respectively. In the next decade, instability on this measure more than doubled to 0.79 and 0.61 respectively. Adjusting for inflation does not alter the picture. The coefficient of variation of the real price rose from 0.23 in the 1960's to 0.42 in the 1970's. The price of cocoa more than trebled between 1972 and 1974, and, after a set-back in 1975, quadrupled again in London, to reach a peak of nearly £3000 per tonne, and almost trebled in New York to over $2 per pound.

What relation has there been between these price fluctuations and futures trading? It would be foolish to imply that dealing on terminal markets has been the main cause of price instability, because factors such as changing demand and crop diseases affecting cocoa supplies have clearly underpinned the major movements. Nevertheless, it is interesting to look at the growth of futures trading and see if any prima facie link with market instability is present.

Table 2.6 gives market turnover figures for the two principal cocoa terminal markets, London and New York, and their relation to world production of cocoa. Other terminal markets dealing in cocoa are Amsterdam and Paris. Trading in Paris is more than ten times that in Amsterdam, but at most only some twenty per cent of that in either London and New York. In recent years the market in Paris has traded less than 300,000 tonnes of cocoa contracts per year. Consequently we shall only look at the London and New York markets.

Table 2.6 : Terminal Market Turnover and World Production of Cocoa, 1960-1978

	London ('000 mt)	New York ('000 mt)	Total ('000 mt)	World Production 1 ('000 mt)	Turnover as % World Production
1960	262.0	961.9	1,223.9	1164	105
1961	427.2	1,737.8	2,165.0	1123	193
1962	446.8	1,573.3	2,040.1	1162	176
1963	916.0	2,805.4	3,721.4	1238	301
1964	723.6	1,578.8	2,302.4	1490	155
1965	1,263.6	3,025.6	4,289.2	1219	352
1966	1,977.4	6,934.4	8,911.8	1336	667
1967	2,118.1	5,543.0	7,661.1	1352	567
1968	3,596.3	5,405.5	9,001.8	1236	728
1979	5,029.7	5,540.5	10,570.2	1424	742
1970	5,736.9	4,267.4	10,004.3	1493	670
1971	5,227.3	2,895.0	8,122.3	1583	513
1972	5,242.0	3,774.5	9,016.5	1398	645
1973	11,474.0	5,874.1	17,348.1	1548	1121
1974	9,543.7	4,697.8	14,241.5	1511	943
1975	7,425.8	4,269.6	11,695.4	1341	872
1976	11,717.1	4,537.2	16,254.3	1491	1090
1977	11,477.3	4,186.2	15,663.5	1425	1099
1978	9,826.3	3,037.6	12,863.9		

Note : 1. Crop year 1960-61 production is attributed to 1960 and similarly for the following years.

Sources : ICCH, Gill & Duffus, Commodity Research Bureau Commodity Yearbook.

Table 2.7 : New York Cocoa Turnover[1]

	Turnover ('000 mt)	Deliveries ('000 mt)	Deliveries as % of Turnover	Average Open (2) Interest ('000 mt)
1974	5315	7	0.1	149
1975	4452	4	0.1	130
1976	4305	2	0.0	128
1977	4346	6	0.1	149
1978	3288	4	0.1	113

Source: CFTC Databook '78

NOTES: 1. See Note 1 Table 2.4 on the period of the fiscal year.

2. See Note 2 Table 2.4.

From Table 2.6 we can see that market turnover in both London and New York increased substantially between 1960 and 1978, although somewhat faster in the former case, so that London trading is now roughly twice the volume of New York's market. By comparing turnover with world cocoa production, the relative increase is from near twice world production at the start of the period to over ten times world production by the late 'seventies. Evidently, a considerable proportion of futures contracts cannot have resulted in a final delivery to the consumer!

Market turnover can also be seen to be related to price volatility. Apart from the upward trend of each, in general a sharp upward or downward movement in prices coincides with a similar change in turnover. The doubling of cocoa prices between 1972 and 1973 saw a near quadrupling of total cocoa trading (the main increase being in London). In the next year, trading fell back only slightly as prices moved up further. Between 1975 and 1978, the leap in cocoa prices, followed by a sharp decline, was also, to a certain extent, mirrored by movements in turnover.

An insight into the nature of cocoa futures turnover is gained by looking at the volume of deliveries and hedging business. This breakdown for the New York Cocoa Exchange is given in Table 2.7. Between 1974 and 1978, deliveries were very small indeed. In 1976 (the fiscal year from 1 July 1976 to 30 June 1977), as a percentage of total turnover, they were less than 0.5 per cent. This was the period of the sharpest increase in cocoa prices and one might assume that a greater than normal proportion of trade was hedging price uncertainty. (Some confirmation for this is found in the fact that, although the volume of open interest declined over the period shown in the table, its level relative to total trade increased).

2.3 Coffee

Coffee trees are best suited to a tropical, highland climate. They require ample rainfall, and drought or frost can severely damage the harvest. The right conditions, however, can produce a bumper crop. Coffee production generally follows a two year cycle, since the trees need rejuvenation in alternate years, following seasons of heavy production. It takes five years before a new seedling can produce coffee, but a mature tree will produce coffee for up to thirty years. Consequently, it takes many years for the supply of coffee to react to changes in demand and price conditions.

The main coffee producing regions of the world are Latin America and West Africa. The 13 major producing countries account for 90 per cent of world exports, and Brazil alone accounts for more than one-third of world exports. Roughly a third of the world's supply of coffee is imported by the USA, and another third by the EEC countries.

Because the world supply of coffee is crucially dependent on the Brazilian crop, a frost in Brazil can have a disastrous effect on world production. This occurred in 1970 and 1973; and also in 1975, when one night's frost killed most of the 1976 Brazilian crop and damaged production prospects for years to come. Production has still not recovered, and the latest forecast for 1980 production is 20 million bags (one bag is 60 kg), well below the 27 million bags, which had been forecast for 1976, before the frost struck. World production is expected to be back to 'normal' by 1981, barring further disasters.

The Brazilian frost in 1975 caused such a supply shortage that prices rocketed, and demand fell dramatically. However, despite continued high prices, the demand for coffee has subsequently recovered, in part because the prices of competitive beverages have risen as strongly as those of coffee.

Table 2.8: New York Coffee Prices, 1960-1978
(cents per lb)

	New York Brazilian Coffee	
	Nominal	Real (1970 c/lb)[1]
1960	36.6	43.6
1961	36.0	42.4
1962	34.0	40.0
1963	34.1	40.1
1964	46.7	54.3
1965	43.8	49.8
1966	40.6	44.6
1967	37.7	41.4
1968	37.4	41.1
1969	40.9	43.5
1970	55.8	55.8
1971	44.7	41.8
1972	52.6	46.5
1973	69.2	52.0
1974	73.3	45.3
1975	82.6	45.4
1976	149.5	81.7
1977	267.2	134.3
1978	165.3	72.8
Coefficient of Variation:-		
1960-69	0.10	0.10
1970-78	0.62	0.44
1960-78	0.81	0.47

Note : 1. As for Table 2.2, above.

Source : IFS.

The first International Coffee Agreement was set up in 1962, with the objective of stabilising prices to the mutual benefit of producers and consumers. The Agreement was successful, and was renewed in 1968. However, in 1971 the dollar was devalued, and as the price of coffee is generally quoted in dollars, this bit deeply into the foreign exchange earnings of coffee-exporting countries.

Producers then demanded a compensatory 4 cents per lb increase in coffee prices in the Agreement. The USA and Canada later rejected a compromise 2 cents per lb increase, and within a few months the Agreement had collapsed.

A new Agreement was negotiated at the end of 1975, which included export quotas designed to reduce the flow of coffee to the markets and keep the price up. However, the export quotas proved unnecessary, as supply shortages caused by frost damage were sufficient to keep prices at high levels.

More important than the Agreement in recent years has been the Bogota Fund, established by leading South American producers, which plays an important role in stabilising the market by buying when prices threaten to fall, and selling when the market is strong. In May 1979, the Fund enjoyed an extra boost, when a frost in Brazil provided it with a substantial windfall profit. Since then, it has spent large sums of money propping up the price, which is under constant pressure because of excess supply.

The activities of the Bogota Fund have caused considerable resentment in the USA, where it is claimed that producers are manipulating prices in their favour. Under pressure from consumers, the US government has taken action to investigate the activities of producers on the New York coffee futures market.

The unilateral action of coffee producers has undermined co-operation between exporters and importers, based on the International Coffee Agreement, and consequently the Agreement has little control over the market.

Coffee futures contracts are traded in London, New York and Paris; the latter market being fairly insignificant. The contracts in London and Paris are for Robusta coffee, whilst the New York contract has been for Arabica coffee. However, in April of this year, a futures market for Arabica coffee was re-launched in London. The contract had previously failed due to lack of interest; but it is now felt that the lifting of exchange controls, by allowing unrestricted trading in a dollar contract, has made a futures contract in Arabica coffee a viable proposition. A further reason for launching the contract is that the Arabica contract in New York is being surrounded with more curbs and regulations, as the CFTC seeks to gain control over futures markets. The CFTC has investigated the intervention on the New York market by the Bogota Fund, which apparently insisted on taking physical delivery of coffee, thereby squeezing supplies and pushing prices up. With coffee, as with cocoa, and other perishable crops, terminal markets exist predominantly to undertake "paper" transactions, rather than to see actual delivery made of large numbers of contracts. Hence, the holding of futures contracts to maturity, as was done by the Bogota Fund, constitutes a highly effective means of forcing up prices, at least temporarily. Since the US futures markets are becoming increasingly concerned about the role of "foreign" traders in the markets, it is believed that representatives of the Bogota Fund suggested the launching of the London Arabica contract, which would provide them with an alternative trading centre.

During the 1960's and early 1970's, the price stability created by the International Coffee Agreement led to a loss of interest in futures trading on the New York market. As trading declined, market liquidity declined, and consequently the market was less open to speculative influences. This can be seen from Table 2.9.

Table 2.9 : Terminal Market Trading and World Production of Coffee, 1960-1978

	London Turnover ('000 mt)	New York Turnover ('000 mt)	Total Turnover ('000 mt)	World Production ('000 mt)	Total Turnover as % of World Production
1960	117.3	394.5	511.8	3168.8	16
1961	40.6	304.6	345.2	3496.5	10
1962	27.1	76.2	103.3	3203.6	3
1963	80.5	94.1	174.6	3414.1	5
1964	320.6	559.7	880.3	2152.7	41
1965	455.7	257.2	712.9	3974.6	18
1966	329.4	54.5	383.9	2669.0	14
1967	194.9	7.6	202.5	3103.6	6
1968	190.9	1.3	192.2	2604.6	7
1969	246.6	1.2	247.8	2884.7	9
1970	540.3	1.8	542.1	2409.2	23
1971	397.5	2.7	400.2	3185.0	13
1972	306.6	130.3	436.9	3437.1	13
1973	774.4	3106.1	3880.5	2660.4	148
1974	2117.6	2584.0	4701.6	3772.9	125
1975	1141.5	1209.1	2350.6	3289.7	71
1976	3300.9	2968.2	6269.1	2633.2	238
1977	5695.9	3643.6	9339.5	3072.1	304
1978	4151.5	2788.9	6940.4	3118.7	223

Note : Crop year attributed to beginning of period.

Sources : ICCH, New York Coffee and Sugar Exchange, Commodity Bureau 'Commodity Yearbook'.

However, the marked price fluctuations of the 1970's - shown in Table 2.8 as an increase in the coefficient of variation of the real price from 0.10 in the 1960's to 0.44 - increased the need for hedging, and opened the door to speculative activity on the London and New York futures markets. Table 2.9 shows that the volume of futures trading rose dramatically, from a mere 13 per cent of world production in 1972 to more than three times world production in 1977.

2.4 Lead

Half of the non-Socialist world's production of refined lead comes from just four countries - the USA, the UK, West Germany and Japan. Canada and Australia, however, are important producers of primary lead and are the two leading exporters of lead concentrates. Of the three million tonnes of refined lead consumed annually in the non-Socialist world, the USA accounts for one-third and the EEC countries another third.

In the USA, a producer price system operates for lead, but unlike the case with zinc and copper, lead is not traded on Comex. In 1977, the US Council on Wage and Price Stability argued that there was no historical relationship between movements in the LME lead price and the US Producer Price for lead. COWPS concluded that lead should therefore be included in the voluntary price controls the government was promoting. This view appears to be borne out by Table 2.10, tabulating the USPP and the LME prices for lead between 1960 and 1978. For example, from 1972-73, the LME price rose by 46 per cent while the USPP rose only 8 per cent, and from 1977-78, the LME price fell by 31 per cent while the USPP rose by 10 per cent.

For both the LME price and the USPP, nominal price instability, as measured by the coefficient of variation, increased during the 'seventies. However, a good deal of the fluctuations in price were caused by inflation, rather than shifts in supply and demand. Once prices are adjusted for the effects of inflation, the volatility of the real lead price can be seen to have decreased slightly between the 1960's and the 1970's. The only conclusion that remains valid is that, over the whole period from 1960-78, the LME price was considerably more volatile than the USPP.

Table 2.10: Comparative Lead Prices, 1960-1978

	LME Price		US Producer Price	
	Nominal (£ per tonne)	Real[1] (1970 US cents/lb)	Nominal (US cents/lb)	Real[1] (1970 US cents/lb)
1960	73.30	11.1	11.95	14.2
1961	65.24	9.7	10.87	12.8
1962	57.22	8.6	9.63	11.3
1963	64.44	9.6	11.14	13.1
1964	102.66	15.2	13.60	15.8
1965	116.97	16.9	16.00	18.2
1966	96.70	13.5	15.12	16.6
1967	85.16	11.7	14.00	15.4
1968	103.42	12.3	13.20	14.5
1969	124.59	14.4	14.90	15.9
1970	126.60	13.8	15.62	15.6
1971	103.92	11.0	13.82	13.2
1972	120.62	12.1	15.03	13.3
1973	175.05	14.6	16.29	12.2
1974	252.80	16.6	22.50	13.9
1975	185.88	10.3	21.53	11.8
1976	249.82	11.2	23.10	12.6
1977	353.62	14.0	30.70	15.4
1978	242.55	9.3	33.65	14.8
Coefficient of Variation :-				
1960-1969	0.23	0.21	0.14	0.14
1970-1978	0.35	0.18	0.29	0.10
1960-1978	0.54	0.19	0.36	0.13

Note : 1. As for Table 2.2, above.

Source : Metallgesellschaft, 'Metal Statistics'.

Table 2.11: Terminal Market Turnover and World Production of Lead, 1960-1978

	LME Turnover ('000 mt)	Non-Socialist World Production of Refined Lead ('000 mt)	LME Turnover as % World Production
1960	395.1	2140.7	18.5
1961	435.8	2195.7	19.8
1962	356.5	2111.8	16.9
1963	454.2	2261.2	20.1
1964	578.9	2347.7	24.7
1965	588.3	2427.5	24.2
1966	445.8	2495.6	17.9
1967	461.8	2530.1	18.3
1968	564.7	2668.1	21.2
1969	699.9	2963.2	23.6
1970	721.3	3061.1	23.6
1971	778.8	2929.9	26.6
1972	910.8	3027.8	30.1
1973	1341.3	3118.7	43.0
1974	974.4	3125.7	31.2
1975	931.3	2890.3	32.2
1976	1179.9	3065.6	38.5
1977	1901.7	3157.6	60.2
1978	1876.1	3132.8	59.9

Source : LME; Metallgesellschaft, 'Metal Statistics'.

Outside North America, the price is determined on the LME. Unlike zinc, there is no European producer list price, and consequently lead producers intervene on the LME so that the market will more directly reflect changes on the supply side. However, the producers' active participation in the market was due partly to the existence of an Australian producers' cartel. The cartel arranged sales of lead onto the LME and purchases from it in order to maintain price and revenue stability during 1976; but the US Justice Department has been investigating its activities, and its influence is likely to have diminished sharply.

The volume of turnover on the LME has more than doubled over the past decade, as shown in Table 2.11. In recent years, it has been some 60 per cent of non-Socialist world refined lead production. The increased volume of trading appears to reflect in part the desire of producers, merchants and consumers to hedge price risks, particularly in Europe. However, LME trading still seems fairly limited. This may simply be because there is a large volume of unrecorded dealings on the LME, but we believe that the continuing predominance of producer pricing systems in North America (which both impair the effectiveness of hedging, and also reduce the need for it) is an important factor.

2.5 Sugar

Sugar is produced either from beet or cane. Beet sugar in produced in temperate climates, and cane sugar in tropical, or semi-tropical, climates. This climatic range enables sugar to be produced in nearly every country of the world. The world's main producers are the EEC countries, the Soviet Union, and Cuba. The main exporting countries are, in order of importance, Cuba, Brazil, Australia, Philippines and France.

However, protectionism has been a historical feature of the world sugar market. Industrialised countries have used it as a method of fostering domestic beet production, to attain self-sufficiency in sugar. The EEC has achieved this aim, and its exports of white sugar have risen in recent years. As a result of protectionism and various trade agreements between producing and consuming countries, trading on terminal markets directly affects the selling prices of a relatively small amount of world production.

The two important terminal markets for sugar are in London and New York. There is a relatively insignificant market in Paris. New York has two contracts : a domestic contract, calling for delivery in the ports of New York and Philadelphia, and a world contract which calls for delivery in any one of twenty-one cane sugar exporting countries. The volume of trading on the domestic contract is only five per cent of that on the world contract. The London contract calls for delivery in Great Britain.

Both European and American beet producers are aided by price support schemes. Prices in the USA are supported by specific tariffs which hold the domestic price above the terminal market price by the amount of the tariff plus the cost of delivery to the USA.

Since the late 1960's, the sugar market has resisted all attempts to impose price stability on it. In 1966, the market price was only 1.9 cents per lb, whereas the subsidised price in the USA was 7 cents per lb. Stocks were at an all-time high; consequently, in 1967 an International Sugar Agreement was established for 1968-73, the aims of which were to stabilise prices, guarantee incomes for producer countries, and to balance production and consumption. However, the low price of sugar led to the abandonment of the development of sugar substitutes and there was a resurgence of demand. Although the production of sugar also increased, the price rose by almost 500 per cent during the period of the Agreement. Consequently, the powers granted under the Agreement saw little use.

The re-negotiation of the Agreement in 1973 merely re-iterated the main elements of the old Agreement, without reaching a consensus on the important questions of export quotas and prices. In 1974, the US Congress refused to ratify the Agreement, opening up the American market to imported sugar. The same year also saw the withdrawal of Britain from the British Commonwealth Sugar Agreement, under which Britain bought most of the sugar produced in the Commonwealth. Both of these developments led to more physical trade being based on terminal market quotations.

In 1974 and 1975, prices reached peak levels. The consequent growth of production during 1975-77 was rapid; but the burden of large carry-over stocks in 1977 forced prices below the production costs of many countries. Hence, another International Sugar Agreement was established in 1978.

Tables 2.12 and 2.13 summarise price and terminal market trading information for sugar. From Table 2.12, we can see that prices have been very volatile, and that nominal price instability in both New York and London has increased in the 1970's. The trend in the instability of the real sugar price is less clearcut.

As we noted above, the proportion of world trade affected by terminal market trading has been fairly limited in sugar,

by comparison with a number of other commodities. Nevertheless, the volume of trading in relation to world sugar production rose to a peak of almost 120 per cent in 1972 and 1973, over treble the level of the mid 1960's, and has subsequently fallen back only modestly.

Table 2.12 : Sugar Prices, 1961-1978

	London Spot Price		New York World Spot Price[2]	
	Nominal (£ per tonne)	Real[1] (1970 US cents/lb)	Nominal (US cents/lb)	Real[1] (1970 US cents/lb)
1961	25.3	3.8	2.7	3.2
1962	25.2	3.8	2.8	3.3
1963	70.6	10.6	8.5	10.0
1964	50.3	7.4	5.9	6.9
1965	21.2	3.1	2.1	2.4
1966	17.6	2.4	1.9	2.1
1967	19.1	2.6	2.0	2.2
1968	21.5	2.6	2.0	2.2
1969	33.3	3.8	3.3	3.5
1970	39.4	4.3	3.7	3.7
1971	45.5	4.8	4.5	4.3
1972	71.5	7.2	7.4	6.5
1973	97.9	8.2	9.6	7.2
1974	300.3	19.7	29.9	18.5
1975	213.0	11.8	20.4	11.2
1976	151.0	6.7	11.5	6.3
1977	114.9	4.5	8.2	4.1
1978	101.2	3.9	n.a.	n.a.
Coefficient of Variation				
1961-69	0.49	0.59	0.59	0.68
1970-78	0.59	0.61	0.66[2]	0.64[2]
1961-78	0.92	0.68	0.95[2]	0.74[2]

Sources : New York Coffee and Sugar Exchange; London Commodity Exchange

Notes : 1. As for Table 2.2, above.

2. The New York quotations only extend up until 3rd November 1977. After that date, spot quotations were suspended.

Table 2.13: Terminal Market Turnover and World Production of Sugar, 1961-1978

	New York Turnover ('000 mt)	London Turnover ('000 mt)	Total Turnover ('000 mt)	World Production ('000 mt)	Total Turnover as % World Production
1961	630	2,292	2,922	51,699	6
1962	3,209	4,031	7,240	49,800	15
1963	17,521	15,364	32,885	54,358	60
1964	11,944	13,303	25,247	65,831	38
1965	9,528	10,295	19,823	62,861	32
1966	13,261	8,740	22,001	64,511	34
1967	31,725	23,242	54,967	66,230	83
1968	26,715	20,095	46,810	67,618	69
1969	27,234	29,439	56,673	71,894	79
1970	18,218	26,970	45,188	70,523	64
1971	23,113	34,350	57,463	70,595	81
1972	44,461	44,657	89,118	75,520	118
1973	52,307	43,388	95,694	80,488	119
1974	37,438	48,598	86,036	78,620	109
1975	40,166	41,875	82,041	81,888	100
1976	50,024	43,567	93,619	86,913	108
1977	53,647	48,670	102,317	92,065	111
1978	51,654	34,642	86,296	90,170	96

Source: New York Coffee and Sugar Exchange, ICCH, Commodity Research Bureau 'Commodity Yearbook'.

2.6 Zinc

Canada is the main non-Socialist producer of zinc, supplying 25 per cent of total world production; other important producers are the USA and Japan. Approximately half of non-Socialist world production of refined zinc is exported, principally by Canada and Australia. Western Europe, the USA and Japan account for over 80 per cent of world consumption.

American zinc prices are based on the US Producer Price, which is determined by producers on the basis of output costs and the state of the free market. Whilst the USPP follows the LME price, it displays less short run volatility, although it tends to exhibit a stronger correlation when the price is rising. The relative degrees of stability of the LME price and the USPP are illustrated by the coefficient of variation. Between 1960 and 1978 the coefficient was 0.67 for the LME price, and 0.48 for the USPP, or, where prices are adjusted for inflation, 0.37 and 0.15 respectively.

A futures market in zinc was revived on Comex in 1978, but has received little support. Only 675 contracts were traded in the market's first year, largely because consumers and producers have historically negoitated directly with each other in North America.

Outside North America, the reference price for producers selling onto the European market has, until recently, been the European Producer Price (EPP), established by primary producers and smelters in 1964. Prior to 1964, the non-US price was determined on the LME.

As can be seen from Table 2.14, the creation of the EPP system resulted in a sharp drop in the volume of metal traded on the LME. Producers party to the agreement refrained from placing metal on the LME, and the greater price stability induced by

Table 2.14 : Terminal Market Turnover and World Production of Refined Zinc, 1960–1978

	LME Turnover ('000 mt)	Non-Socialist World Production of Refined Zinc ('000 mt)	LME Turnover as % World Production
1960	304.6	2,438.4	12.5
1961	379.7	2,566.3	14.8
1962	351.7	2,659.5	13.2
1963	402.7	2,748.2	14.7
1964	527.0	2,961.8	17.8
1965	358.4	3,127.5	11.5
1966	308.3	3,295.7	9.4
1967	226.3	3,284.8	6.9
1968	276.3	3,689.0	7.5
1969	391.6	4,056.8	9.7
1970	301.5	3,954.6	7.6
1971	640.2	3,762.5	17.0
1972	941.4	4,091.2	23.0
1973	1,324.6	4,246.6	31.2
1974	1,205.1	4,359.6	27.6
1975	1,158.5	3,743.6	30.9
1976	1,326.6	4,109.1	32.3
1977	1,259.0	4,270.6	29.5
1978	1,287.8	4,288.9	30.0

Sources: LME, Metallgesellschaft 'Metal Statistics'.

the new producer price system reduced the need for hedging. However, the LME has retained as influence through its ability to highlight market disequilibria, and has managed to maintain its turnover at historically high levels since the commodity price boom of the early 1970's.

The zinc traded on the LME comes mainly from the Socialist countries, who do not participate in the producer price system, and from consumers re-selling onto the market. Western producers rarely sell onto the LME, although they may buy in order to support the price. Indeed, in 1977, it was revealed that a zinc producers' cartel had existed since 1974, and met informally to set a minimum price. As prices began to fluctuate in the 'seventies, the producers organised buying on the LME to boost the LME price, which can exert a downward pressure on the EPP when the market is weak.

The EPP was intended to provide revenue stabilisation for producers and reduce price uncertainty for consumers. This worked well during the 'sixties, when free market fluctuations stayed within reasonable limits and zinc consumption and smelter capacity grew in tandem. However, the sharp cyclical variations in economic activity during the 'seventies have destroyed the hopes of revenue stabilisation, and led to wide fluctuations in the LME price. Since the 1975 recession, the EPP has been under severe pressure from the LME price. For long periods in 1976 and 1977, European producers found themselves obliged to sell their metal at a discount to their own EPP, and even at a discount to the LME price (as occurred in 1977 and 1978). As a result, since 1977, the prices received by producers have fluctuated in line with LME prices, and consequently no longer provide either price or income stabilisation for producers or consumers.

Table 2.15 : Comparative Zinc Prices, 1960-1978

	LME Price[1] (£ per tonne)	European Producer Price (£ per tonne)	US Producer Price (cents per lb.)
1960	90.75	-	12.95
1961	79.00	-	11.55
1962	68.54	-	11.63
1963	78.00	-	12.01
1964	119.78	-	13.57
1965	114.78	111.77	14.50
1966	103.63	105.47	14.50
1967	102.15	103.40	13.85
1968	112.94	116.16	13.50
1969	123.07	123.46	14.65
1970	123.13	127.95	15.32
1971	126.76	139.81	16.14
1972	150.98	156.25	17.73
1973	346.70	215.48	20.84
1974	528.13	332.14	35.94
1975	335.38	366.30	38.89
1976	394.36	440.15	37.38
1977	338.17	412.32	35.21
1978	308.39	316.34	31.30
Coefficient of Variation:			
1965-1970	0.06	0.06	0.03
1971-1978	0.36	0.34	0.29
1965-1978	0.57	0.54	0.43
1960-1978	0.67		0.48

Note : 1. Annual average standard cash price

Source : Metallgesellschaft, 'Metal Statistics'

Table 2.16 : Comparative Real Zinc Prices, 1960-1978
(in 1970, US cents per lb)

	LME Price	European Producer Price	US Producer Price
1960	13.7	-	15.4
1961	11.8	-	13.6
1962	10.2	-	13.7
1963	11.7	-	14.1
1964	17.7	-	15.8
1965	16.6	16.1	16.5
1966	14.4	14.7	15.9
1967	14.0	14.2	15.2
1968	13.5	13.9	14.8
1969	14.2	14.2	15.6
1970	13.4	13.9	15.4
1971	13.4	14.8	15.4
1972	15.2	15.7	15.7
1973	29.0	18.0	15.7
1974	34.6	21.8	22.2
1975	18.6	20.3	21.4
1976	17.6	19.7	20.4
1977	13.4	16.3	17.7
1978	11.8	12.1	13.8
Coefficient of Variation			
1965-1970	0.07	0.05	0.04
1971-1978	0.40	0.17	0.18
1965-1978	0.37	0.17	0.16
1960-1970	0.15	-	0.06
1960-1978	0.37	-	0.15

Note : 1. As for Table 2.2, above.

Between 1975 and 1970, the coefficients of variations of the nominal LME price and the EPP were both 0.06, indicating that both prices were relatively stable over this period. However, between 1971 and 1978, the coefficients of variation were 0.36 for the LME price and 0.34 for the EPP. For the EPP, as for the USPP, the general inflation in commodity prices has been one cause of the apparent increase in price volatility in the 1970's; but Table 2.16, in which appropriate deflators have been applied to the various zinc prices, demonstrates that, for the real, as well as the nominal zinc price, price variability increased dramatically during the 'seventies, especially on the LME.

One result of the increased uncertainty of the 'seventies, is seen in Table 2.14. There has been a massive increase in the volume of trading on the LME : from 301,500 tonnes in 1970, to 1,380,200 tonnes in 1979.

In the following chapters we shall examine more closely the reasons behind the greater activity on terminal markets. By looking at the way producers and consumers can use terminal markets, and assessing the role of non-trade interests, we will be able to gain a clearer understanding of the relation between terminal markets and market stability.