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COFFEE PRICES AND SMUGGLING IN ETHIOPIA

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Abstract:Official and black market coffee price series are brought together to discuss the incentives to produce coffee since 1963. On the basis of empirical analysis of prices and supply response, it is argued that some increased export earnings can be expected from a switch from smuggling into official channels. However, these increases will be relatively small.Coffee production is found to be responsive to prices, but this effect is most likely to be relative to other crop prices, in particular chat. During the period of the Dergue, supply response was found to be smaller than in the 1960s, reflecting the adverse climate for expansion of crop production existing during the 1970s and 1980s. Following the devaluation, coffee production may well increase again, but the increases are unlikely to be very large.

I. INTRODUCTION

Recent economic reforms have raised hopes for a renewed impetus to the Ethiopian economy. Market reforms were started in the last year of the Dergue government including the liberalisation of grain markets. The present transitional government has extended these reforms, embracing IMF-backed stabilization and structural adjustment. These reforms are characterized by the reversion of a strict economic control system to a free market economy. The aim is to provide incentives to all sectors to reverse a long period of economic decline. At the macroeconomic level, stimulating growth and a reduction of the fiscal and trade balance deficits are high on the agenda. In this paper, a discussion is

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offered of the effects of the reform programme on coffee, the single most important export commodity in the country.

The start of the reform programme can be dated back to September 1992, with a large devaluation of the dollar exchange rate from 2.07 birr per dollar to 5 birr. Since then, at least some of the consequences have been remarkable. Consumer prices have not increased substantially since then. In fact, the 12 months following the devaluation were characterised by negative inflation[1]. Another, probably linked, observation is that the black market exchange rate did not move up substantially afterwards, remaining at about 7.5 birr per dollar ever since. During 1993, a harmonisation of the two exchange rate markets has started with regular foreign exchange auctions typically yielding rates of between 5.5 and 6 birr per dollar.

One of the main aims of the exchange rate policy is to stimulate exports. The trade balance has consistently been negative in the 1980s. During the last five years, exports covered less than half the import bill. Since long, coffee has been the most important source of foreign exchange, accounting for more than half of export earnings. Consequently, the effects on coffee production of increased export prices in local currency are important to be investigated. Besides the devaluation, a liberalisation of coffee marketing has also started.

The devaluation and liberalisation are expected to stimulate coffee production, and in this way export earnings. A more immediate effect which is hoped for is the reversal of the large flows of coffee into the parallel channels, both in the domestic and the export market. Much of the contraband trade was financed by illegal exports of coffee to Djibouti, Kenya and the Sudan. No estimates are available of the quantities involved, but they are thought to be very substantial. The gradual harmonisation of the official and the parallel exchange rate markets is hoped to bring these large volumes of trade back into the official circuit, helping to increase official foreign exchange earnings. Finally, Ethiopia is exceptional in Africa to the extent that there is a large domestic consumption of coffee. Any analysis of the effects on export earnings of increased incentives for coffee production needs to take this into account. This paper discusses the effects pricing policy, via exchange rate controls, export taxation and marketing controls has had on coffee production and the supplies to the official markets. It will therefore look at prices received by farmers in the official channels, and compare them with the incentives from the parallel, smuggling system. Contrary to most other African countries, farm-gate prices are not readily available, even for the official channel. In section 3, the methodology to obtain the relevant price indexes will be described. The actual outcome for farmers is a consequence of a combination of exchange rate, marketing and taxation policies. To understand the evolution of farm-gate prices, they are decomposed into these constituting factors. In section 4, a supply function for the official channel is estimated relating pricing policy to outcomes. Its implications for policy, especially for the role of coffee in increasing export earnings, is discussed in section 5. In the next section, a brief overview of the coffee sector, including the marketing arrangements, is given.

II. AN OVERVIEW OF THE COFFEE SECTOR

Coffee is mainly grown in five regions: Sidamo, Keffa, Wellega, Illubabor, and Hararghe. The first three account for more than 70 percent. Small holders account for most of the coffee production. Some commercial farms used to exist, but they were nationalised in the mid-1970s. Since the 1960s, three distinct periods can be considered with respect to the marketing structure[2]. During the Imperial government (until 1974), the marketing structure was market-based. Coffee was bought by traders at various levels of the marketing chain, some of which would reach the terminal markets at Dire Dawa and Addis Ababa where auctions in which exporters participated took place. Government intervention was limited to some regulation and quality control.

After the coup, the Military Government aimed to take over coffee markets at all levels. The socialisation of production was started with producer co-operatives being set up, even though more than 90 percent of coffee production continued to come from private smallholders. Private traders were condoned, but were severely constrained via price controls at all levels of the marketing chain. A government agency, the Ethiopian Coffee Marketing Cooperation (ECMC) took on substantial responsibilities in the marketing of coffee, and soon controlled more than 80 percent of officially handled supplies. Private traders could not freely sell coffee in the domestic markets. Auctions continued to take place in Addis Ababa and Dire Dawa, but prices at the 'auction' were in fact fixed by the Ministry of Coffee and Tea Development. Taxes on coffee were raised substantially, and included surtax, transaction tax, export duty and coffee cess, and became about half of the fob export prices. Tax rates levied on prices were also higher at higher world prices. This strict and high-tax control regime created strong incentives to sell and buy coffee in parallel markets, which emerged and flourished. Coffee was smuggled into Djibouti and Kenya to buy consumer goods; substantial amounts were also brought to the Sudan.

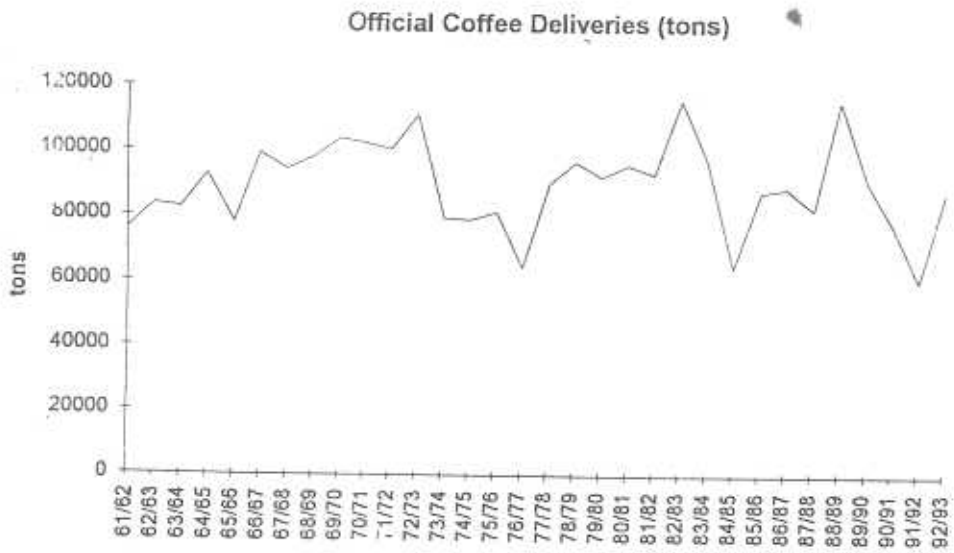
The Transitional Government reversed most of these measures in recent years. Co-operatives have been disbanded, and coffee marketing has been freed. Coffee traders can sell and buy as they wish, even though licenses are still required and are relatively expensive. Taxes have come down, but mainly because of the very low international prices. The auction is, however, allowed to function properly and all price controls have been removed. Instead, the ECMC offers farmers and traders floor prices, which some consider relatively high given the low international prices[3]. Parallel markets are, however, thought to continue to attract substantial flows.

The coffee supply data on quantities cover obviously only the official channels. Consistent data are only available for the two terminal markets, Addis Ababa and Dire Dawa and for exports. The former can give us an impression of the total official domestic plus export supply, and will be used throughout this paper. The ECMC, and at present also private traders, use low quality coffee, rejected for export at the auction, as their main source of 'official' domestic market supply. In coffee areas, it was always legal for licensed traders to sell directly to consumers, and this coffee will not be included in the statistics.

All other domestic and export sales are in fact 'parallel' market transactions, and are therefore also excluded from the statistics.

Figure 1 shows the quantities channelled through the official market since 1961/62[4]. Supplies increased gradually throughout the 1960s until 1972/73. With the revolution during 1973/74, a collapse can be observed, with further low levels until 1976/77. Then a recovery came, but at levels lower than before the revolution in 1974. Since then, there is apparently a decreasing trend, with substantial variability. Very low levels were obtained in 1984/85 (the drought and famine year) and 1991/92 (the year of the fall of the Mangiest government). It is likely that the low levels in these two years are related to these occurrences. Finally, a recovery can be noticed in 1992/93, even though to a level close to the earlier trend.

FIGURE 1



III. COFFEE PRICES IN ETHIOPIA

In this section, the evolution of coffee prices in Ethiopia is assessed since the beginning of the 1960s. In particular, we will discuss the consequences of implicit and explicit taxation on farm-gate prices. More specifically, we aim to disentangle the effects of the exchange rate policy, export taxation, and possible excessive marketing margins on prices. Also, we will try to provide some measure of the price farmers could expect to receive from supplying coffee on the black market for domestic use or export.

Farm-gate coffee prices are hard to come by in Ethiopia. Before 1974, pricing was free, and no prices were systematically recorded. During the military government, prices were controlled at all levels, but, contrary to most East-African coffee producing countries, they were not pan-territorial. Instead, a complex system of deductions relative to the auction and world price was used, implying different prices at each different location and for each type of transaction. Constructing a representative 'farm-gate price' series is therefore quite a haphazard undertaking. The ECMC supplied us estimates of the regional average coffee prices at the farm-gate level since the coffee year 1984/85 for washed and unwashed coffee. Using quantities supplied to the auction from the various regions for each year, average prices could be established for unwashed coffee for the country as a whole[5]. Before 1984/85, no data were available on farm-gate prices. Nevertheless, auction prices are available from before 1960. Assuming that the proportion taken for marketing costs from the farm-gate up to delivery at the auction has remained constant at roughly the average proportion between 1984 and 1992, we estimated farm-gate prices for the pre-1984 period as:

$$FGPBO_i = [\frac{1}{9}\sum_{j=1984}^{1992} (\frac{FGPBO_j}{APB_j})]APB_i \quad \text{..... (1)}$$

where $FGPBO_i$ is the (nominal) farm-gate price in birr in the official channel in year i and APB_i is the auction price in year i. The average ratio between the farm-gate and the auction price between 1984 and 1992 was 81 percent.

If anything, it may be thought that the rigidity of parastatal coffee marketing in a system that was gradually crumbling and collapsing (as the Ethiopian economy was) implied that marketing costs became higher on average in the 1980s than what they were either before the revolution or in the first few years afterwards. Consequently, it is likely that the estimated farm-gate prices are somewhat biased downwards. The real farm-gate price, a measure of the incentive price for coffee (RFGBO), were calculated by deflating the nominal prices by the consumer price index (CPI), recalculated to reflect coffee years[6]. To assess the consequences of the exchange rate policy, taxation and of marketing margins on the coffee prices a series of other price indexes are also calculated. The approach taken is described in Dercon [14, PP. 157-194]. Table 1 summarizes the formulas used.

Table 1. Price Indexes used in the Analysis

PCBO	= PC$*E
RPCBO	= PCB/CPI
RPC$	= PC$/PMV$
RPCBAT	= (RPCB)(1-t)
RFGPBO	= FGBPO/CPI
PCBS	= PC$*EBM
RPCBS	= PCBS/CPI
RFGPBS	= (FGB070/PCBS70).(PC$*EBM)/CPI
With:	
PCBO	= Export price for coffee in birr (current prices)
CPI	= domestic CPI (1970 =100)
PC$	= Export price coffee in dollars (current prices)
E	= Nominal exchange rate against the dollar, official
PMV$	= Manufacturing unit value index (in dollars)(1970 = 100)
RPC$	= Export price coffee in dollars (constant 1970 prices)
RPCBAT	= After tax export price of coffee (constant 1970 prices)
RFGPBO	= Real official farmgate price
FGBPO	= Nominal official farmagate price, birr
t	= Export tax rate
PCBS	= Export price coffee, in birr, smuggling channel (constant 1970 prices)
RPCBS	= Export price coffee, in birr, smuggling channel (constant 1970 prices)
RFGPBS	= Real smuggling farmgate price
EBM	= Parallel market exchange rate against the dollar
FGPBO70	= Official farmgate price in birr in 1970
PCBS70	= Export price in birr, smuggling channel, in 1970

A measure of the world price for Ethiopian coffee is the unit export value index for coffee. The difference between the export price, expressed in Ethiopian birr, and deflated by the CPI, (RPCB) and the farm-gate price (RFGPBO) will give a measure of the total domestic margin for coffee. This margin is, however, divided between the government, via taxation, and the domestic marketing agents. By calculating the unit export value price for

coffee excluding export taxes (RPCBAT) and comparing it with the farm-gate price,(RFGPBO) an estimate of the marketing margin can be obtained. Finally, a measure of the overvaluation of the exchange rate can be obtained by expressing the unit export value index in terms of constant US dollars, (RPC$) using the official exchange rate and the Manufacturing Unit Value index (as calculated by the World Bank) as a deflator. This provides a measure of the international terms of trade for coffee. In this way, we can assess to what extent the exchange rate has not adjusted to domestic inflationary pressures relative to the international level. If the international real price has increased relative to the domestic real price, then domestic terms of trade have not kept up with international terms of trade - incentives for coffee production have been reduced because of overvaluation. To assess the incentives for smuggling coffee, first, the unit export value price for coffee in US dollars was converted into birr using the parallel market exchange rate [13], [22].

Next, an estimate of the farm-gate price for smuggled coffee (RFGPBS) was obtained by first assuming that in a base-year, 1970/71, there was no incentive to smuggle coffee, such that the coffee prices in the official system were the same as in the 'parallel' system at the farm-gate level. Furthermore, we assume that the proportion the farmer received from the smuggling border price in this year is the same proportion as in all years (about 52 percent). This may seem arbitrary but the resulting smuggling farm-gate price provides, if anything, a downward biased measure of the actual smuggling price. First, the assumption of proportional marketing costs will reduce the calculated farm-gate price in the latter years of the period considered, when in the parallel market the dollar was trading at premiums of 200 percent and more relative to the official exchange rate. The construct implies furthermore that in the base-year 1970/71 the risk-premium involved in trading in the parallel market is exactly equal to the gain from using the parallel market exchange rate and evading the export taxes. Consequently, the incentives for farmers to enter in the parallel market in other years, implied in the estimated farm-gate prices, are given relative to the incentives in the base-year. Note that smuggling prices are given relative to the parallel market exchange rate. The deviation of the parallel market exchange rate from the official market exchange rate is related to overvaluation. Because of overvaluation, exchange controls are binding and this causes a premium between the official and the parallel market exchange rate to develop. This does not necessarily mean that the parallel market exchange rate is the 'counterfactual' exchange rate 'if no overvaluation were present'. Consequently we did not use the parallel market exchange rate to construct a measure of taxation because of overvaluation.

These points can be illuminated by showing how these price indexes are related to each other. In particular, defining the real exchange rate against the dollar as r = E*PMV$/P, and m as the proportional marketing margin in the official market, then the real farm-gate price for coffee in the official channel can be rewritten as:

$$RFGPBO = (1-t).(1-m).r.RPC\$ \quad \ldots\ldots\ldots\ldots \quad (2)$$

In words, the real price received by the farmer is obtained by subtracting from the international terms of trade for coffee (the world price for coffee deflated by the MUV index) proportions for marketing margins, export taxes and overvaluation.

For the real price received by the farmer from smuggling a similar formula can be obtained as:

$$RFGPBS = (1-m_s).r_b.RPC\$ \quad \ldots\ldots\ldots\ldots \quad (3)$$

in which r_b is the real *parallel* exchange rate (r_b = EBM . PMV$/P), and m_s is the proportional marketing margin in smuggling, which has been kept constant at the 1970/71 level. In words, the real price received by the farmer from smuggling is obtained by multiplying the international terms of trade for coffee with real parallel exchange rate, allowing for a marketing margin. From (2) and (3), and defining z as the premium in the parallel market exchange rate (expressed relative to the latter), it follows that the relative incentive to supply coffee to the different channels can be defined as:

$$\frac{RFGPBS}{RFGPBO} = \frac{(1-m_s)}{(1-m)(1-t).(1-z)} \quad \ldots\ldots\ldots\ldots \quad (4)$$

in which EBM(1-z) equals E. Since the incentive for selling to the parallel market and to the official channel is assumed to be the same for the base year 1970/71, it follows that (4) can also be written as:

$$\frac{RFGPBS}{RFGPBO} = \frac{(1-m_{70})(1-t_{70}).(1-z_{70})}{(1-m).(1-t)(1-z)} \quad \ldots\ldots\ldots\ldots \quad (5)$$

The subscript 70 refers to the value in the base year. This shows the point that by construction, the relative price incentives to supply officially or in the parallel market are determined relative to the base year.

To compare these series, scaling them as index numbers is necessary, if only because the real dollar price can otherwise not be compared with the other prices, expressed in Ethiopian birr. The base-year chosen was again 1970/71 and the real unit export value (RPCB) and the real dollar price index (RPC$) were both put equal to 100. This assumes that all overvaluation in the other years has to be considered relative to the existing overvaluation in the base-year[7]. The export price after tax (RPCBAT), official farm-gate price (RFGPBO) and the smuggling farm-gate price (RFGBS) were all converted to an index proportional to the unit export value index, by deflating each of these prices by the real unit export value in 1970.

In particular, both the smuggling and the official farm-gate price were in 1970/71 56 percent of the unit export value index, while the after-tax unit export value index was 77 percent of the export value index. Consequently, smuggling and official farm-gate prices were put in an index with 1970/71 equal to 56 and the after-tax index has been scaled to the 1970/71 value of 77. The implication is that the differences between the different series reflect the true (relative) margins between the prices.

FIGURE 2

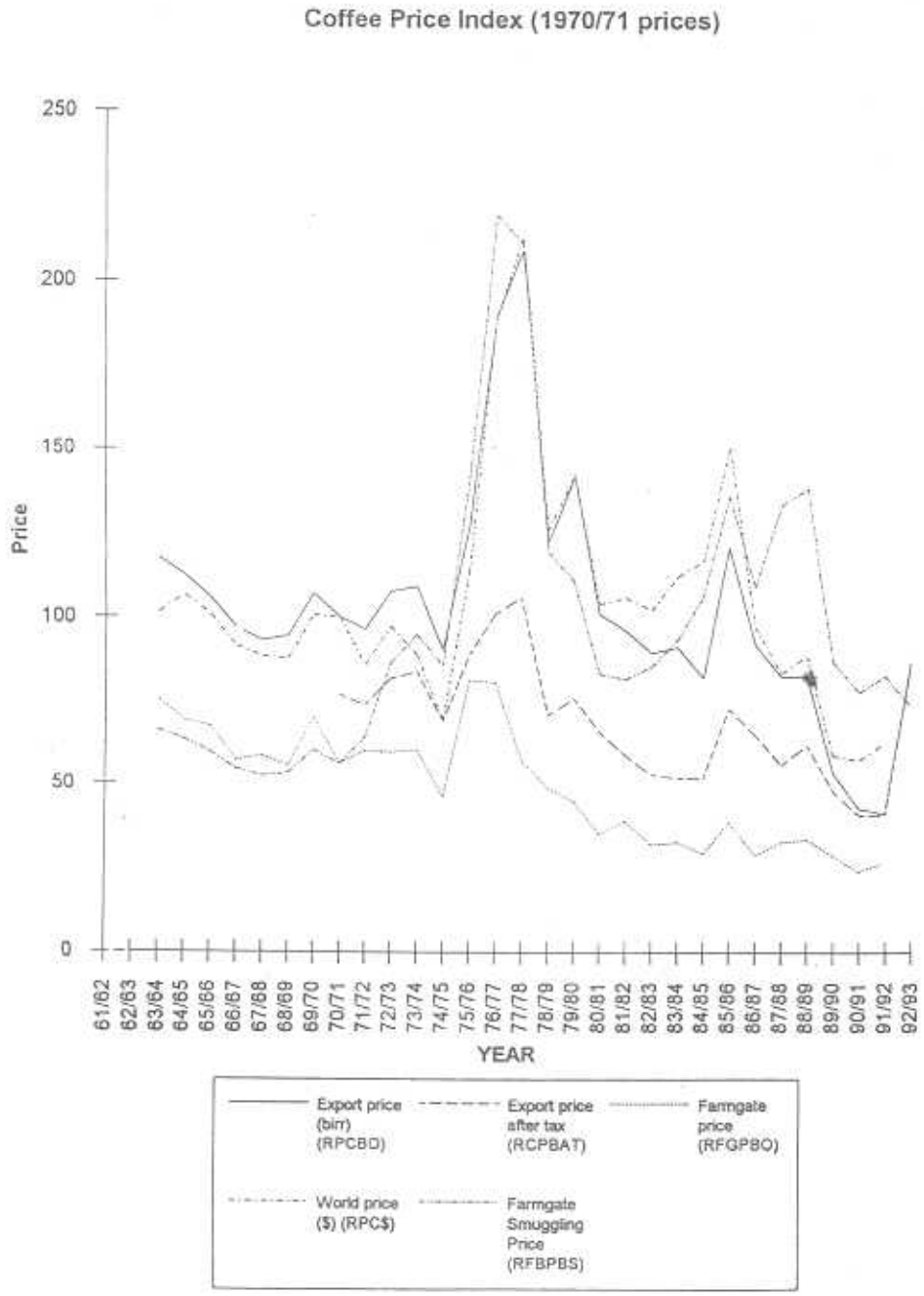

Coffee Price Index (1970/71 prices)
250
200
150
100
50
0
Price
61/62
62/63
63/64
64/65
65/66
66/67
67/68
68/69
69/70
70/71
71/72
72/73
73/74
74/75
75/76
76/77
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
87/88
88/89
89/90
90/91
91/92
92/93
YEAR
Export price (birr) (RPCBO)
Export price after tax (RCPBAT)
Farmgate price (RFGPBO)
World price ($) (RPC$)
Farmgate Smuggling Price (RFBPBS)

Figure 2 shows the results. First, the unit export value index in dollar prices reflects the evolution in the world price for coffee. Prices gradually declined in the 1960s, but they suddenly surged up during the coffee boom years in the mid-1970s. Afterwards, prices declined again, but quite high levels were reached again around 1985/86. Since then, world prices have slumped to all time lows. The Ethiopian birr unit export value index follows this pattern. In the 1960s and early 1970s, it stayed somewhat above the dollar price index, suggesting some undervaluation relative to the levels in the base-year 1970/71. From late 1970s up to 1980, the two prices were virtually identical, but then overvaluation set in. The overvaluation became large by the mid-1980s, though it declined for a while afterwards; it started growing again from 1990 onwards. Finally, the devaluation of September 1992 went beyond what was needed to restore the terms of trade of coffee in domestic currency, relative to the international terms of trade - at least compared to what they were in 1970/71 - resulting in the 1992/93 index ending much higher than the dollar price index. In other words, the devaluation created possibilities to increase incentives to coffee growers, beyond what was needed to keep up with international market incentives for coffee production.

In fact, the exchange rate policy did not create very high implicit taxation, at least compared to the direct taxation via export taxes (in various forms). Total taxes went up with higher world prices, resulting in a much flatter index of unit export value prices after taxes. As a percentage of the unit export value price, nearly a quarter was paid in taxes between 1970/71 and 1975/76, rising after the revolution to 44 percent in the latter half of the 1970s, and 40 percent between 1981/82 and 1985/86. With declining world prices, rates dropped to about 25 percent between 1986/87 and 1989/90. The further decline in world prices and the start of gradual economic reforms brought the tax rate down to about 4 percent in 1990/91 and 1991/92. By 1992/93, taxes as a percentage of the unit export value index were very small.

The farm-gate prices are heavily affected by these export taxes. In fact, they were calculated relative to these prices, with deductions at the various levels of the marketing chain. Recall that the farm-gate prices from 1984/85 onwards are the actual prices where as those before this date are calculations relative to the auction price in Addis Ababa, an important part of the marketing chain. Despite a lot of political and economic upheavals in the 1980s, the marketing deductions did not change dramatically as figure 2 confirms. Consequently, the estimated farm-gate prices for the earlier period may well be quite reasonable approximations. The series consistently mirrors as one would expect the unit export value series after tax. The implication is that the series reflects the declines of the world prices, but has not been allowed to benefit from the boom in the mid-1970s nor from the mini-boom in the mid-1980s. Ever since the revolution in mid-1970s, prices have declined. The first recovery came only after the devaluation. Note however that the increase is far less than the increase in the after-tax unit export value index.

Finally, the smuggling price needs to be considered. Note that this price is calculated with moderate assumptions about marketing margins so that it will mainly reflect the effects of the parallel market exchange rate and the high coffee taxes. Incentives to smuggle must have been low in the 1960s, according to these estimates. A first jump came in the early 1970s when the parallel market rate for currency moved up with increased policy

uncertainty before the revolution. The high taxation during the coffee boom and further rise in parallel market exchange rates more than doubled the smuggling price for coffee in just two years. Even though it declined with declining world prices in the first part of the 1980s, it shot up again in the mid-1980s, staying at high levels despite lower world prices by virtue of further depreciation of the birr in the parallel market. Even after the devaluation, a large premium remained in 1992/93 in the parallel market, implying that the smuggling price at the producer level has remained substantially higher than the official market price: strong incentives to smuggle coffee remain.

Table 2 summarizes the effects on the coffee price of the various implicit and explicit taxes, with 1970 referring to the coffee year 1970/71. It gives the percentage increase in the real coffee price which could have been possible if a particular explicit or implicit tax had been removed. The total effect of export taxes and exchange rate overvaluation is particularly large in the period since the mid-1970s. Between 1976 and 1980 prices could have increased by more than 130 percent if virtually all export taxation were abolished. Between 1981 and 1985, this went up to 176 percent, with increasing implicit taxation through the overvaluation of the birr exchange rate. Since then, lower world prices gave less possibilities to increase producer prices, but still more than 70 percent higher prices could have been paid between 1986 and 1991, increasingly due to increasing overvaluation. Devaluation has rectified the taxation of coffee, as the figures for 1992 show, relative to the 1970/71 levels. Ignoring any effect of the marketing margin, prices now would have only been a quarter of the present coffee producer prices if devaluation had not taken place.

Table 2. Effects of Taxation

	Percentages with which real official market coffee producer prices could have increased if taxation were removed						
	63-69	70-75	76-80	81-85	86-89	90-91	92
Effect of tax (1)		43%	128%	111%	65%	6%	3%
Effect of overvaluation (2)	-11%	-22%	5%	64%	14%	70%	-75%
Total Effect of overvaluation and tax (3) = (1) + (2)		21%	133%	176%	79%	76%	-72%
Effect of margin kept at 1984/85 level (4)				15%	13%	-28%	46%
Total effect of overvaluation, tax and margin 1984/85 : (5) = (4) + (3)				191%	92%	47%	-26%
Premium on smuggling (% relative to official producer price)	-9%	45%	173%	195%	273%	216%	70%

This result is, however, somewhat misleading. It assumes that the marketing margin in each year including 1992/93 has been reflecting real marketing costs under efficiency. If the marketing margin had stayed exactly at its 1984/85 level (in real terms), in most years of the 1980s, prices could have been somewhat higher. However, by 1990/91 and 1991/92, margins seem to have been squeezed, allowing the coffee prices paid to farmers not to drop by a further 28 percent. After the devaluation, margins became in real terms 46 percent higher than that in 1984/85 . This may be a reflection of somewhat higher marketing costs - the CPI used may not appropriately reflect the effects on fuel prices and other transport costs; in other words, the factors important for marketing costs.

Still, the large increase in margins for the marketing agents seems to be excessive, and the result was that despite an increase of close to 150 percent in the birr/dollar exchange rate, farmers' prices are only about 60 percent higher in real terms than those before the devaluation (ie. the net effect of devaluation and increased margins is that removing both effects would reduce prices by a quarter). Marketing agents have taken the lion's share of the effects of the devaluation. Note further that the increase in farm-gate prices in 1993/94 is unlikely to have reversed this fundamentally.

The premiums which farmers would get from smuggling coffee on top of the official price are also shown in table 2, expressed as the percentage of official farm-gate prices farmers participating in the parallel market would have got. Since the latter part of the 1970s smuggling allowed large rents to farmers, with parallel market farm-gate prices which may well have been up to 4 times the official price by the end of the 1980s. With the gradual removal of export taxes and the reduction of official margins, smuggling premiums started to decline in the beginning of the 1990s. The devaluation erased most of the premium, even though a 50 percent premium in parallel market exchange rates initially remained. The increased margins in the official market meant that coffee prices in the parallel market were estimated to be still 70 percent higher than the official prices[8]. Note that these parallel market prices for coffee are calculated as national averages, using conservative estimates of marketing margins. However, some additional risk premium may need to be deducted. But this risk premium is in many areas not likely to be very large, since a lot of coffee is grown in areas with easy access to neighbouring countries.

IV. EFFECTS OF COFFEE PRICING

Coffee pricing policy and the incentives to smuggle coffee are likely to have affected coffee production and official market supply considerably. In this section we will try to quantify this effect. Data on coffee prices could be reconstructed going back up to 1963/64. Supply to the official market data since that date are also available. The approach taken is to estimate an official market supply function as a log-linear approximation. The dependent variable is the log of the total supply to the auctions from all the regions per coffee year.

The first explanatory variable attempts to measure the 'switching effect' between the official and the black market. We use the logarithms of the ratio of the incentive prices for

coffee in both the black and the official. Since supply to official channels has to be looked at relative to the incentives to supply in the black market, the ratio, rather than the levels of official and smuggling prices, was used. This also means that the results will be independent of the choice of the base-year and the actual level of the smuggling price in that year, contrary to the analysis in the previous section. Furthermore, since all the variables are in logarithms, the use of the calculated producer price index for smuggled coffee is equivalent (up to some constant) to using the unit export value index expressed in birr using the black market exchange rate. It seems reasonable to assume that the producer prices, for coffee that will be smuggled, will be related to the border price using the black market exchange rate. Therefore, the only assumption we need to make in the analysis is that the actual price received by farmers is in some sense proportional to this border price, without needing to specify explicitly the marketing margin nor the risk premium. We do not try to model the black market for domestic consumption of coffee separately. Since coffee is very tradable, it is reasonable to assume that the domestic black market and the smuggling market are integrated, and the domestic black market price will be closely related to the smuggling prices: for farmers and agents in the chain it does not matter whether coffee is in the end smuggled out of the country or moved to consumers to other parts of the country.

Relative black market to official prices will measure the incentives for farmers behaviour as traders, not as producers. In particular, if both official and black market prices go up, farmers may be producing more, and supply more to the official market as well, despite a constant ratio between official and black market price. This effect would be the production supply response of farmers. The expectation would be for this response to be positive. Two forms of production responses ought to be considered: aggregate and relative supply responses. An aggregate supply response measures the production increase following an increase in the price which does not imply any reduction in the output of alternative crops. A relative supply response measures the increase in production of one crop which occurs at the cost of a reduction of the output of another crop through an increase in one crop price relative to other crop prices.

To assess the relative price responsiveness, the main competing crop needs to be included. A typical alternative for coffee is *enset* (false banana) in Ethiopia. *Enset* is highly valued as a food crop. As a cash crop, it has its limitations, since the market for it is confined to specific ethnic groups and since it is bulky to transport. Most coffee producers would intercrop coffee with *enset*, but reliance on the latter for cash earnings is rather rare. In some areas, (such as in Kembata), farmers have started to grow avocados, other vegetables or tobacco as alternatives to channel new investment into. Fruit trees have also been introduced in larger numbers. However, by far the most popular alternative for coffee appears to be *chat*, (Q'at), the mild stimulant increasingly popular throughout Ethiopia and in the surrounding countries (Djibouti, Somalia, Yemen and other Arab countries). Even though it has been made illegal in most Western countries, its consumption is fully legal in Ethiopia and the neighbouring countries.

Even though its optimal growing conditions are not exactly the same as for coffee, in most coffee growing areas it has become a highly valued alternative crop. Indeed, during

field trips, we found *Chat* being grown for sale not just in its traditional areas in Hararghe, but also in Jima, Shashemene (Southern Shoa), Sidamo, Kembata, Gurage and even as far afield as Debre Libanos (Gojjam), though with very little success in the latter. *Chat* is a perennial crop, just as is coffee, but it can be harvested already after a few years. The young leaves can in principle be harvested gradually throughout the year, but after harvesting, they need to reach the market still fresh to keep its value. Consequently, most peasants seem to wait before harvesting until itinerant traders pass nearby. Transport and marketing is entirely controlled by private traders, and government intervention is minimal. *Chat* is moved to the markets by trucks and other vehicles, but also by chartered planes to Djibouti and to the Arab world.

Figures 3 to 5 illustrate the attraction to enter into chat production. Figure 3 gives the unit export value index, deflated by the CPI, since the beginning of the 1960s, data availability permitting. Trade statistics for some years have been repressed, since by the 1960s it was considered too sensitive to publish information on *chat*, since it has all the characteristics of a soft drug. Export taxation has consistently been minimal (close to 4 percent on average), so this index will give an indication of the changing incentives to produce the crop, assuming that farm-gate prices are directly related to export prices (which is likely since it is a tradable, not liable to controls). The real dollar price index, calculated using the official exchange rate and the manufacturing unit value index, gives the unit export value index in dollars, which is the international terms of trade of chat, and avoiding a bias because of overvaluation in the former index, as before. Finally, an export unit value index in birr is presented using the parallel market exchange rate, to show incentives to smuggle the commodity. All figures are scaled to 1970/71 equal to 100. (Note that the calculations are similar to the one for coffee presented earlier.) The figures show that world *chat* prices experienced a temporary slump in the 1970s, but since the mid-1970s they have been rising to reach double of their world price levels of 1970/71. The devaluation has meant that even at the official exchange rate, prices are about 3 times the 1970/71 levels, and double the levels of the mid-1980s. The rise in the parallel market exchange rate has meant that incentives to smuggle the commodity have consistently been rising: levels are close to 4 or 5 times the 1970 level, and 10 times prices of the mid-1970s. The main reason for the rise in world prices is the rapidly expanding demand in the Arab world.

Figure 4 shows the prices of coffee and chat, using the unit export value indexes of both products, reflecting the relative incentives on the world market. This implicitly gives the relative incentives in the parallel market or the relative incentives if the coffee market were liberalised and taxes were abolished. A second index gives a relative price index of the official coffee market price and the export unit value index for *chat* at the parallel exchange rate. The latter will be directly related to the parallel market farm-gate price for *chat*. Since no control mechanisms on the export of *chat* existed (such as price fixing, trade restrictions, high export taxation and other government interventions), there would have been little incentive to use 'official' channels for exporting the commodity. Given the large premiums involved in the parallel exchange market, it appears that the parallel market *chat* price would best reflect the incentives to grow *chat*. Consequently, the index in figure 4 will therefore show the relative incentives to grow chat or to grow coffee for the official market.

The pattern of the indexes of international or domestic prices is initially similar, even though the taxation in the coffee market has meant that relative farm-gate prices declined well before the fall in world prices for coffee and the increase in world chat prices. During the coffee-boom, the relative coffee - *chat* prices were 6 times higher than that in 1992/93, even ignoring the overvaluation effect. This is unlikely to be a temporary change, it is rather part of a longer cycle of relative prices.

Figure 5 gives relative unit export value indexes since 1944. Chat prices did not follow the commodity boom periods near the Korea-war and in the 1970s. Nevertheless, the increase in *chat* prices relative to coffee goes much beyond any relative price level in the post-war period. These graphs show that, during the last decade, *chat* prices have risen very substantially. The increases are largely demand-led, and the substantial habit formation involved in its consumption are likely to make these increases to persist in the medium run. It provides strong incentives for farmers to invest into this crop rather than planting new coffee. It may not be the only alternative to coffee in Ethiopia, but the large relative price increases have made it very attractive. In the supply function official coffee prices relative to parallel market *chat* prices will be used to capture the changes in relative incentives. The missing data for some years in the 1960s for *chat* were reconstructed using linear interpolation.

In the estimation, a relative price index of the official coffee market price and the export unit value index for chat at the parallel exchange rate is used to capture the relative incentives to produce coffee and chat. Consequently, it will allow us to assess the relative supply response of coffee relative to *chat*. The expectation is a positive effect: the higher the relative coffee and *chat* price, the more coffee will be grown. The existence of an aggregate supply response can also be tested via the inclusion of the official coffee price deflated by the consumer price index, as was used before. If this additional effect is positive, then one may conclude that coffee production can be increased without a reduction in other crops.

Since coffee is perennial crop, some further considerations have to be taken into account. Coffee is a perennial crop, and substantial lags (3 to 7 years) exist before a harvest can be obtained from any newly planted coffee trees. This means that farmers will have to base their planting decisions (and therefore supply) on their expectations about future prices. By lack of data on expectations, lagged prices are included to account for the lags in production responses[9].

Estimating a supply function implies an important assumption about the constancy of parameters over the sampling period. This could especially be troublesome for the present data set. The period after the revolution must be looked upon as being fundamentally different from the earlier period. The change in economic policies after the revolution meant that a strict control regime was installed, in which all factor markets became liable to important restrictions. If supply response is possible through a reallocation of factors of production to more profitable activities, then the supply response may well have been reduced considerably in the period after the revolution. Furthermore, the investment climate will not have been conducive for long term investment and since coffee

is a perennial crop, the responsiveness to incentives may have been reduced even further. To allow for a different supply responsiveness, we allowed for a different production response for the period after 1973/74 than before.

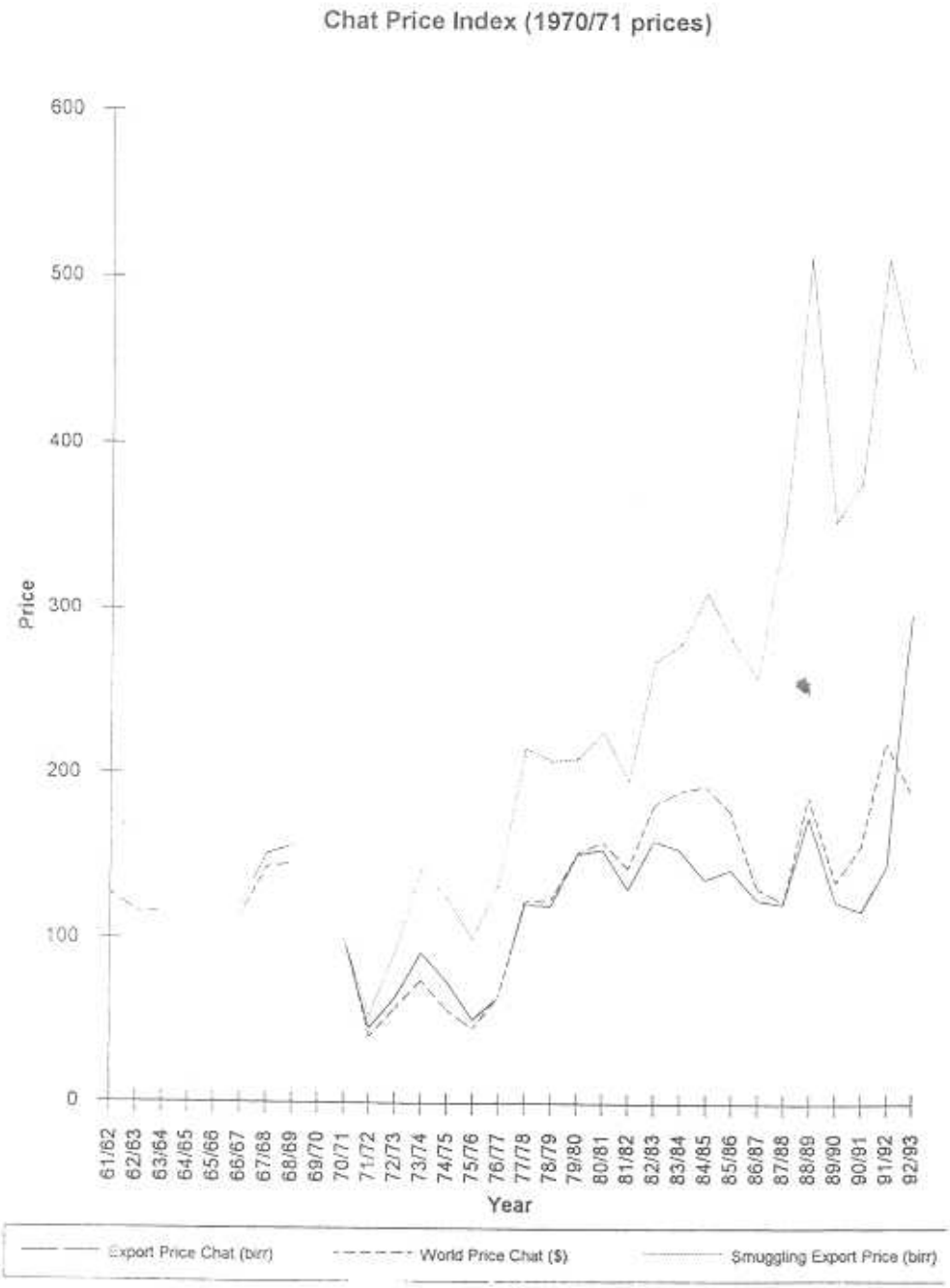
Finally, we allowed for a temporary disruption in supplies to the official markets in three periods. First, between 1973/74 to 1976/77, to account for the effects of first the revolution, followed by the uncertainty over land ownership until the land reform in 1976. The 1977/78 figures reflect the first full coffee year after these disruptive period. A dummy for the period mentioned was introduced. Secondly, we allow, using a dummy, for the specific disruption during the worst year of the drought and the famine in 1984/85. The famine disrupted not just the main (Northern) famine areas, but the effects were felt throughout the country on production and through transport bottlenecks and migration disrupting food and other trade. Finally, we allow for a dummy for the coffee year coinciding with the last year of the Mangiest regime and the take-over by the new government. War disrupted in that year movement considerably, and Addis Ababa was effectively closed off for a few months, implying difficulties to deliver coffee to the capital. The introduction of these dummies may seem arbitrary, but their main effect has been to increase the efficiency of the estimation. Virtually exactly the same, but less significant, results were obtained if they were dropped, but the same conclusions were reached, suggesting that their combined effects have little correlation with the actual movement of relative prices.

$$\ln Supply_t = \alpha_0 + \alpha_1.\ln\frac{P^{cof}_{smug,t}}{P^{cof}_{off,t}} + \alpha_2.\ln\frac{P^{cof}_{off,t}}{P^{chat}_{smug,t}} + \alpha_3.\ln\frac{P^{cof}_{off,t-1}}{P^{chat}_{smug,t-1}} \quad (6)$$

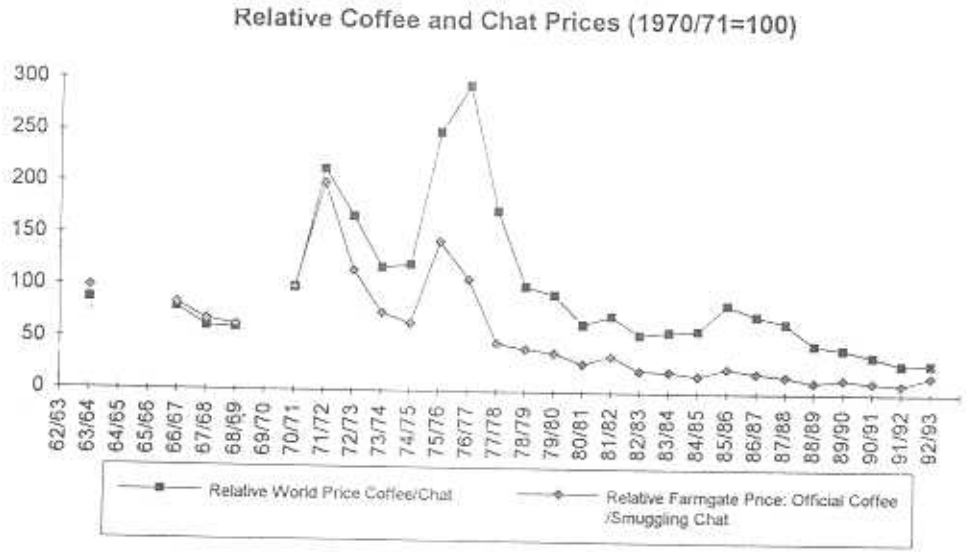
$$+ \alpha_4.\ln\frac{P^{cof,60s}_{off,t}}{P^{chat,60s}_{smug,t}} + \alpha_5.\ln\frac{P^{cof,60s}_{off,t-1}}{P^{chat,60s}_{smug,t-1}} + \alpha_6.dummy_{74-76} + \alpha_7.dummy_{84} + \alpha_8.dummy_{91}.....$$

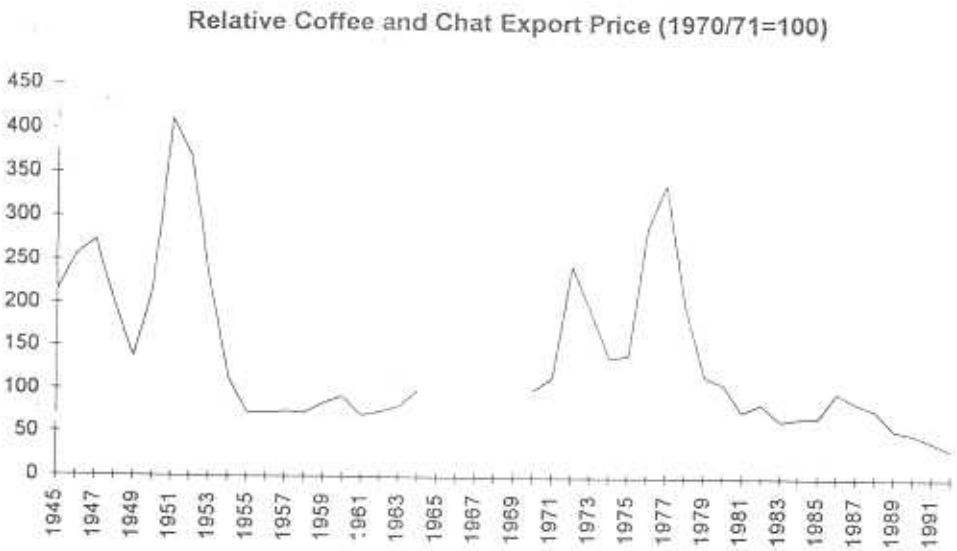
All these variables were included in a log-linear specification of total official supply (equation (6)). The premium was expressed as the ratio between black and official market prices for coffee ($P_{smug,t}^{coff} / P_{off,t}^{coff}$), and the coefficient is expected to be positive. Note that no lagged price is included: one is likely to be able to switch between markets relatively fast. To capture supply response to increases in official market prices from an estimation of the official supply function, the ratio between official coffee prices and its main competing crop, chat ($P_{off,t}^{coff} / P_{smug,t}^{chat}$) is included. We included the same price series again for the sixties, setting its values zero after 1972/73, to capture the potentially different supply response in each period. Consequently, the short run supply response in the 1960s can be found as ($\alpha_2 + \alpha_4$), while in the later period it is only α_2. The long run supply response will be found as ($\alpha_2 + \alpha_3 + \alpha_4 + \alpha_5$) in the 1960s, while from the 1970s it is ($\alpha_2 + \alpha_3$). An issue to be resolved is the choice of the lag structure for prices. Since it takes at least of few years before any newly planted chat or coffee can be harvested, some experimentation was done. The (absolute) minimum number of years needed before any newly planted coffee or chat can be harvested is about 3 years, even though for coffee trees it takes longer to mature fully. The estimates were quite similar when we used 3 or 4 lags.

FIGURE 3


Chat Price Index (1970/71 prices)
600
500
400
300
200
100
0
Price
61/62
62/63
63/64
64/65
65/66
66/67
67/68
68/69
69/70
70/71
71/72
72/73
73/74
74/75
75/76
76/77
77/78
78/79
79/80
80/81
81/82
82/83
83/84
84/85
85/86
86/87
87/88
88/89
89/90
90/91
91/92
92/93
Year
Export Price Chat (birr)
World Price Chat ($)
Smuggling Export Price (birr)

FIGURES 4 AND 5





So in order not to lose too many degrees of freedom, three years lagged prices were included to capture the long-run planting effects on chat and coffee.

Table 3. OLS-Regression of Logarithm of Official Supplies

Dependent Variable : ln(Supply): Sample 1966/67 to 1992/93		
Variable	**Coefficient**	**t-Value**
Constant	4.59	(124.23)**
$\ln(P_{smug,t}^{coff}/P_{off,t}^{coff}$	-0.11	(-2.21)**
$\ln(P_{off,t}^{coff}/P_{smug,t}^{chat})$	-0.10	(-1.11)*
$\ln(P_{off,t-3}^{coff}/P_{smug,t-3}^{chat})$	0.10	(1.62)*
$\ln(P_{off,t}^{coff,60s}/P_{smug,t}^{chat,60s}$	0.17	(1.97)**
$\ln(P_{off,t-3}^{coff,60s}/P_{smug,t-3}^{chat,60s}$	-0.06	(-0.40)
$Dummy_{74-76}$	-0.23	(-3.43)**
$Dummy_{84}$	-0.38	(-6.24)**
$Dummy_{91}$	-0.41	(-5.65)**
$R^2 = 0.77$	DW= 2.10	
Joint Significance F(8,18) = 7.46**		
Hausman-test for endogeneity		
- adding predicted value of ln(Psmug,tcoff/Poff,tcoff): t-value = 1.098		
- adding predictd value of ln(Poff,tcoff/Psmug,tchat): T-value = 0.908		
**= Significant at 5%	*= Significant at 10%	

Table 3 shows the results of the log-linear OLS regression of official supply (1970/71=100)[10]. First, a significant negative effect can be detected on the relative prices in each market: a ten percent increase in the black market coffee price relative to the official price will reduce supplies in the official market by 1.1 percent. This is clear evidence for switching on the part of farmers from supplying in the official channel to supplying in the black market in response the increasing premium during the 1970s and 1980s. Secondly, a significant long-run supply response to increases in official market prices(α_1) can be detected for the period as a whole, but also a significant additional short-run effect for the 1960s (α_4). No short-run effect can be detected for the later period (α_2), nor any extra long-run effect for the 1960s (α_5). These effects have to be interpreted with caution because of the insignificance of the latter terms.

Table 4 summarizes the implications of the production response estimates. If we ignore the insignificant terms (ie. put them equal to zero, as the test results would not discourage us from doing so), then the short-run elasticity since the 1970s has been virtually zero, but the long-run elasticity is 0.10 percent. In the 1960s, the elasticities both in the

short-run and in the long-run were higher, 0.17 percent and 0.27 percent. The latter estimates are quite in line with estimates for coffee in other countries (Askari and Cummings, 1977). If the insignificant estimates are included as well, then the results are somewhat different, but again, the estimates in the 1960s are higher than afterwards. In fact, the elasticities may even have been negative in the short run and zero in the long run in the 1970s.

Table 4. Supply Response Estimates

Effects of 1 percent change in coffee prices relative to Chat black market prices on official supplies (Ignoring insignificant estimates)		
	Short-run	Long-run
1966/67 - 1972/73	0.17%	0.27%
1973/74 - 1992/93	0.00%	0.10%

Some further tests were performed on the presence of an *aggregate* supply response, by including official coffee prices in real terms. Missing variable tests were performed by adding these variables in various combinations and performing F-tests under the null hypothesis that the additional variables were jointly equal to zero. An F-test of adding present and lagged (3 lags) coffee prices for the entire period and for the earlier period was insignificant ($F(1,17)=0.620$), not rejecting the null that they were irrelevant. Other combinations of these variables, such as testing whether they matter only in the 1960s, or only in the short run, or only in the long run, also did not suggest that they were missing variables in the regression. Consequently, no evidence exists to suggest that an aggregate supply response existed in coffee, neither in the 1960s nor later. The only supply response is relative to other, competing crops.The result implies that expansion of coffee production in response to better incentives will most likely be accompanied by a reduction of other crop output. Given that land is increasingly become scarce in highly fertile areas, this ought not to come as a surprise. In other countries similar results have been found (for evidence on Tanzania, see [14, PP. 157-194]).

The period after the revolution is therefore clearly characterized by a reduction in the supply responsiveness of production, both in the short run as in the long run. The response may even have become insignificant during this period. The restrictions on factor markets for land and labour, rationing in input and in consumer goods markets, and a generally unfavourable investment climate would contribute to little resource mobility and insignificant responses to changing incentives [16, PP. 1400-1417]. In the 1960s, it was possible to increase production in the short run by switching resources and inputs between competing crops, while later on factor mobility may have become far more limited during a period of controls over labour, fertiliser and pesticide markets.

Even though the production response found in the model is broadly consistent with those in other coffee producing countries and in line with expectations, the relatively low significance urges us to be cautious about the interpretation of the results. The estimated

coefficient on the relative smuggling and official price of coffee - the switching effect - seems more robust[11]: increases in the premium caused quantities of coffee to switch from the official market to the black market. From this figures, and assuming that in the beginning of the 1970s the black market did not exist, it is possible to quantify the volumes of coffee which were smuggled. A counterfactual official supply series was calculated, assuming that parallel market prices relative to official market prices had remained at their 1970/71 level. This counterfactual series was then subtracted from the actual official supply series. Table 5 summarizes these results.

Table 5. The Size of the Parallel Market

Switching Effect: Lost Supplies to Official Channel from increased smuggling						
Year	1973-75	1976-80	1981-85	1986-89	1990-91	1992
Extra Official Supplies (in tons) if no incentive to smuggle (average per year)	4997	10281	11350	14956	9479	5377
Estimated black market share	6%	11%	11%	14%	12%	6%
In million dollars (export unit values)	7	37	37	44	22	12

Source : Own calculation from different documents.

The estimates suggest that during the period 1976-91 about 10 to 15 percent of total marketed production was switched from the official channel into the black market. Since the devaluation, the black market may have contracted by about half. The estimates do not account for the additional effects captured by the dummies in the regression. While the 1984-dummy additional negative shock is mainly related to the drought and famine, some of the negative effects on the official supplies in the immediate period after the 1974 revolution ($Dummy_{74-76}$) and the fall of the Mengistu-government ($Dummy_{91}$) may have involved additional quantities sold in the parallel market. Note however that the 1992/93 estimated share of the parallel market is unaffected by this: even if in 1991/92 substantially higher quantities went into the black market, by 1992/93 the black market share after the devaluation is still about 6 percent.

Unfortunately, there is very little scope to cross-check these estimates with published statistics[12]. Statistics from the Sudan or Kenya on their coffee *exports*, or at any point of the marketing chain do not distinguish between Ethiopian or local coffee. Djibouti is a different case: since it produces no coffee itself, all the coffee exported is Ethiopian coffee. Even though Djibouti's trade statistics are often decades out of date, the ECMC obtained some data on coffee exports, and which can be cross-checked with its own statistics. In particular, data could be obtained on Harar coffee, a particular, high quality coffee variety, only cultivated in the Haraghe region. This particular quality is only exported via Djibouti,

and is virtually not sold for domestic consumption (in Ethiopia and in Djibouti), since it is sold at a high premium at the world market. Consequently, total marketed production for this variety is close to the total exports from Djibouti. From these data and from the data on official coffee supplies to the ECMC of this coffee quality, it was found that average exports from Djibouti during the period 1984 and 1991 for this variety was about 4180 tons per year, of which 3470 tons on average could be accounted for by the ECMC as official exports from Ethiopia, suggesting that about 710 tons came from coffee smuggled from Ethiopia. Since no other destination is likely to exist for this particular coffee variety, given the location of the only production region, this leads us to find an estimate of the black market share in total marketed coffee production of this quality of about 17 percent. This estimate is slightly higher than what was found from the econometric analysis. However, the area involved is notorious for its traditions of smuggling and contraband trade, and government control in that region was very weak during that period. In some other areas smuggling is likely to have been far more difficult, so the estimates from the econometric model may be realistic for the country as a whole.

These estimates of black market activity imply that the benefits to be expected from the reform programme and the devaluation may not be very large, at least with respect to encouraging the return to the official channels of the black market coffee exports. The black market in coffee is likely to disappear and the quantities may flow back to the official market. However, the gains to be expected from the disappearance of the black market in the short run may not be more than about 12 million US dollars of extra export earnings at 1992 prices, or about 2 percent of the trade deficit in 1992.

V. CONCLUSIONS

This paper attempted to analyze coffee pricing and its consequences in Ethiopia since the 1960s. Taxation, overvaluation and high marketing margins contributed to the development of black markets for coffee in this period. During the second half of the 1970s, export taxation was the most important factor for the low official market prices. In the first half of the 1980s this effect was compounded through increasing overvaluation. Just before the fall of the Mengistu government, taxation became down, but overvaluation increased. In 1992 the trend was reversed with a substantial devaluation. Nevertheless, increased marketing margins reduced the net increase in coffee prices. These forms of implicit and explicit taxation resulted in substantial premiums in the black market, of around 200 percent and more in the 1980s. After the devaluation, a 70 percent premium has remained.

Testing the responsiveness to the premium in the black market is quite straightforward, since lags are unlikely to be relevant. A negative effect was found, consistent expectations. Higher black market prices resulted in quantities to be switched to the black market. It is estimated that these quantities resulted in a decline in foreign exchange earnings in the official market equal to between 20 and 40 million dollars per year between 1976 and 1991.

With respect to the production response, only evidence for an effect relative to its main alternative, chat, could be found. Nevertheless, the estimation was hindered by the perennial nature of coffee, with substantial lags between planting and harvesting. Furthermore, the results are likely to have been convoluted by other factors, such as the repression of factor markets during most of the period, and other policy factors. Nevertheless, a small, but significant long run effect could be detected since the 1970s (0.10 percent following a one percent price increase). For the 1960s, a significant additional short run supply response (0.17 percent) could be detected, and by implication a larger long run supply response (0.27 percent). However, other policy factors during the period after the revolution could also account for this difference.

The implication of the results is first that the black market may not have been as large as is sometimes is thought. During the period 1976 to 1991, the share of total marketed production which went to the black market is estimated at about 10 to 15 percent. While this is significant, and even if the recent reforms and further devaluations will succeed in making the black market become unattractive, its effect on exports and on the trade balance will remain relatively small.

The recent strong price increases of chat have made this crop a very attractive alternative, and the elasticities suggest that switching between crops has been taking place, especially if supply responses are restored to the levels found in the 1960s in response to the reforms. However, since the black market exchange rate will have been reflected in the farm-gate chat prices, the increases in the official market coffee prices following devaluation will contribute to some strengthening of the position of coffee production relative to *chat*. The recent strong increases in coffee prices following world price movements will help, at least temporarily. Nevertheless, given the possibly secular rise in *chat* prices, policy makers may be fouled by believing that coffee production expansion will be at the root of strong improvements in the trade balance.

These conclusions may seem to be very pessimistic. On the one hand, coffee is a crop for which Ethiopia is renowned in the world and it has an undeniable comparative advantage of producing some of the highest quality varieties. Nevertheless, its contribution to the regeneration of the Ethiopian economy may be limited. Chat, on the other hand, is essentially a soft drug with likely addictive characteristics. While it undoubtable has a social function, some are concerned about its negative impact on health and social life. To put the future of Ethiopian exports in this crop may seem questionable.

This reading of the results is however too limited. The relative incentives have undoubtably moved in favour of chat in recent years and for the near future this situation may well remain so. Nevertheless in the long run the international market for *chat* is likely to be relatively limited. Despite the nature of *chat*, it is very encouraging to observe that farmers in rural Ethiopia respond significantly to increased incentives for alternative crops, and in this process better themselves. The widespread adoption of *chat* illustrates that many Ethiopian farmers are far more entrepreneurial and dynamic than policy makers may give them credit for. The worst possible policy response to the increased popularity of chat would be to try to repress this market and even make it illegal. The consequence would be

that Ethiopian farmers are again discouraged to grow the crops which are most profitable for them. At the same time, it would be providing new incentives to set up black markets and induces again losses of foreign exchange via legal trade.

The constructive response would be to realize that coffee may not be the future for Ethiopia. Farmers will only produce coffee if it is profitable for them to do so. At present, chat is the most profitable alternative, but in the future other crops may emerge. Nevertheless, the institutional set-up is biased against any alternative for coffee. Marketing infrastructure, the provision of modern inputs or extension services in the traditional coffee growing areas are all exclusively focusing on coffee, and biased against any potential alternatives. Investment in marketing infrastructure and non-price support for crop agriculture should not be limited to coffee. Export crop policy in Ethiopia should recognize reality and provide positive and equal support to all activities, rather than just sticking to the traditional support for coffee.

NOTES

[1] Collier and Gunning (1992) have provided a plausible explanation for this. Very few consumer transactions on tradables passed via the official channels, but, instead, via the black market, where prices reflected the black market exchange rate. Devaluation of the official exchange rate would not affect these prices, especially since the official and black foreign exchange markets were relatively segmented with very little possibility nor incentive for cross-trade. The negative inflation figures are slightly misleading because of the exceptionally good harvest in 1992/93. However, correcting for this effect, inflation figures remained very low and remarkable.

[2] For an overview of coffee marketing, see Akalu Negewo (1993).

[3] The evidence in this paper does nevertheless not support this view altogether.

[4] Data are for coffee years, ie. from October to September. All the data used are given in the appendix, with references of the sources involved. Further details on the data can be obtained from the authors on request.

[5] These estimates exclude the Hararghe data, to allow a direct comparison with the auction prices in Addis Ababa. Hararghe coffee is supplied to the Dire Dawa auction and is of a far higher quality, fetching better prices. Including them would not change fundamentally the results, but would be misleading with respect to the average marketing margins between the farm-gate and the auction prices.

[6] Consumer price indexes under systems of price controls and black markets may be poor indicators of actual prices if statistical offices concentrated on the official prices. In Ethiopia, however, the data collection procedures at the Central Statistical Authority may have avoided this problem since it always collected most of its data at the open market. Furthermore, for most consumer goods official prices were set for rationed sales at the government retail outlets, while it remained legal for private retailers to sell consumer goods at market prices. It is therefore unlikely that the CPI has been systematically and considerably underestimating the actual cost of living. Nevertheless, in some years, underestimation may have occurred, although no obvious alternative exists.

[7] At the time the parallel market exchange rate was about 2.50 birr for a US dollar, compared to 2.30 in the official market.

[8] Since then the premium has declined further through a further, gradual devaluation of the official exchange rate.

[9] This does not mean that short-run responses are not possible: farmers may respond to increased incentives by increasing their own labour supply on the crop or by increasing the use of fertilisers, pesticides, etc. Production can still increase in the short-run, even without new plantings. This short-run effect is however likely to be smaller than the long run response.

[10] No obvious problems with the error structure could be detected in this regression. Lagrange multiplier higher autocorrelation tests proved insignificant, as did χ^2-test for non-normality of the errors and a Reset test for adding the squared predicted values..

[11] The robustness of this coefficient was tested by the changing lag structure of the other variables and by including and dropping dummies for particular periods. Estimated values consistently remained between 0.075 and 0.12, and significant.

[12] The Central Statistical Authority is responsible for most data collection on production and yields for agricultural production. Their sample survey programme only focused on annual food crops, and no coffee statistics can be found in their publications. The FAO produces coffee area, yield and production statistics in its annual yearbooks on all countries of the world. The source of their data is

unclear. Until the end of the 1980s their statistics follows closely the pattern of the series of official supplies, with the exception of a few years. In 1984/85 (the year of the drought), FAO reports an unlikely record harvest, returning afterwards to the earlier trend. From 1990 the series becomes suddenly much higher than both the official series and our estimated total marketed production series. The FAO production increase coincides with a sudden jump in yields from between 400 and 470 kilogrammes per hectare in the 1980s to between 600 and 730 kilogrammes since 1990. Such yield increases were quite impossible in Ethiopia at the time, suggesting the unreliability of production and yield data. The same applies to the data on areas harvested: from 1991 the series suddenly show of decline by one-third. The series had previously been revised downwards by almost half in 1986.

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APPENDIX

KEYS:

Tables

Figures

Table 1. Deflators Used

Year (G.C)	Year (Eth. C.)	CPI '70/71=100	MUV$	E	EBM
61/62	1954		82	2.50	2.50
62/63	1955		81	2.50	2.50
63/64	1956	77	82	2.50	2.50
64/65	1957	85	83	2.50	2.50
65/66	1958	88	85	2.50	2.50
66/67	1959	89	87	2.50	2.50
67/68	1960	89	87	2.50	2.50
68/69	1961	90	89	2.50	2.50
69/70	1962	97	94	2.50	2.50
70/71	1963	100	100	2.30	2.30
71/72	1964	96	108	2.30	2.71
72/73	1965	100	123	2.07	2.95
73/74	1966	108	147	2.07	3.20
74/75	1967	116	168	2.07	3.48
75/76	1968	141	176	2.07	4.08
76/77	1969	169	188	2.07	4.25
77/78	1970	195	213	2.07	3.70
78/79	1971	225	243	2.07	3.58
79/80	1972	243	269	2.07	2.86
80/81	1973	257	278	2.07	3.03
81/82	1974	272	255	2.07	3.11
82/83	1975	276	270	2.07	3.30
83/84	1976	291	264	2.07	3.76
84/85	1977	336	262	2.07	4.24
85/86	1978	332	296	2.07	4.10
86/87	1979	315	332	2.07	4.30
87/88	1980	327	359	2.07	5.90
88/89	1981	352	365	2.07	6.10
89/90	1982	373	378	2.07	6.00
90/91	1983	470	391	2.07	6.70
91/92	1984	551	405	2.07	7.30
92/93	1985	551	405	5.00	7.50
93/94	1986	579	–	–	–

Definitions: (see also main text) Data are for coffee years.

CPI = Consumer price index (1970/71=100).
MUV$ = Manufacturing Unit Value Index (G5 countries) (1970/71=100)
E = Official exchange rate (Birr per US dollar)
EBM = Black Market Exchange Rate (Birr per US dollar)

Sources: All data compiled from publications available at the Institute of Development Research Library at Addis Ababa University, except for black market exchange rates and some of the data after 1989.

CPI = Statistical Abstracts since 1963 and data supplied by the Central Statistical Authority
MUV$ = World Bank Development Reports (various years) and Commodity Outlook Reports
E = National Bank of Ethiopia
EBM = Cowitt (various years), World Currency Yearbook Series.

Table 2. Nominal Prices

Year	Year (EC)	PCBO	CTAX	PCBAT	APB	FGPBO	PCS	PCBS	PChBO	Ch TAX	PCh BAT	PChS	PChBS
61/62	1954	1705			1307	1045	681	1705	2865			1146	2865
62/63	1955	1671			1268	1014	669	1671	2609			1043	2609
63/64	1956	2058			1655	1323	823	2058	2611			1044	2611
64/65	1957	2185			1681	1344	874	2185					
65/66	1958	2125			1700	1359	850	2125					
66/67	1959	1965			1456	1164	786	1965	2718			1086	2718
67/68	1960	1900			1498	1198	760	1900	3420			1368	3420
68/69	1961	1947			1431	1144	779	1947	3567			1427	3567
69/70	1962	2361			1941	152	945	2361					
70/71	1963	2284	535	1749	1610	1287	992	2281	2538	102	2436	1102	2535
71/72	1964	2118	496	1622	1651	1320	920	2492	1102	44	1057	438	1296
72/73	1965	2456	575	1881	1703	1365	1180	3500	1620	65	1556	783	2131
73/74	1966	2691	630	2061	1866	1492	1100	4160	2507	100	2407	1211	3876
74/75	1967	2398	560	1838	1532	1225	1158	4031	2377	87	2090	1052	3659
75/76	1968	1099	1220	2879	2281	2623	1980	8079	1816	73	1743	877	3579
76/77	1969	7323	3430	3893	3896	3115	3538	15035	3751	110	2641	1329	5648
77/78	1970	9330	4590	4740	3190	2550	4507	16677	5946	218	5709	2873	10629
78/79	1971	6281	3620	3661	3150	2519	3034	10863	6841	274	6568	3305	11832
79/80	1972	7886	3680	4206	3122	2496	3810	10896	9323	373	8948	4501	12879
80/81	1973	5932	2080	3852	2595	2075	2866	8683	10041	402	9640	4851	14698
81/82	1974	5991	2310	3681	3044	2434	2894	9001	8947	358	8589	4322	13441
82/83	1975	9660	2310	3350	2528	2022	2714	9570	11126	445	10681	5375	18812
83/84	1976	8076	2640	3436	2728	2181	2915	11017	11317	453	10864	5473	20593
84/85	1977	6316	2330	3986	2878	2261	3051	14465	11524	461	11063	5567	26388
85/86	1978	9171	3620	5551	3896	2938	4431	18336	11885	476	11414	5744	23760
86/87	1979	6645	1950	4695	2792	2087	3210	13911	9826	393	9433	4747	20569
87/88	1980	6171	2010	4161	3054	2461	2981	17688	10002	400	9602	4832	28668
88/89	1981	6662	1700	4962	2742	2717	3218	19739	15466	619	14847	7471	45824
89/90	1982	4560	510	4050	3018	2466	2203	13344	11577	463	11113	5595	33369
90/91	1983	4616	232	4384	3728	2593	2230	14866	13958	558	13398	6743	44933
91/92	1984	5227	109	5118	4214	3389	2525	18518	20223	809	19414	9770	71644
92/93	1985	10988	150	10838	7005	5468	2198	16483	41611			8322	62417
93/94	1986				8083	6309							

Definitions : (see also main text) Data are for coffee years.

PCBO = Export price for coffee in birr per ton (current prices); CTAX = Export tax paid per ton

PCBAT= Export price coffee after tax per ton (current prices); APB = Auction price for unwashed coffee at Addis Ababa

FGPBO = Farm-gate price for coffee per ton (national average excluding Hararghe price); PC$ = Export price in US dollars per ton (current prices)

PCBS = Export price in birr per ton in smuggling channel (current prices); PChBO = Export price for chat in birr per ton (current prices)

ChTAX = Export tax on chat exports in birr per ton (current prices); PChBAT =Export price chat after tax per ton (current prices)

PCh$ = Export price chat in dollars per ton (current prices); PChBS = Export price chat in smuggling channel per ton (current prices)

Sources : All data compiled from publications available at the Institute of Development Research Library at Addis Ababa University, except for black market exchange rates and some of the data after 1989.

PCBO, CTAX, PCBAT, PC$, PChBO, PChBAT, ChTAX, PCh$: Data from Statistical Abstracts (various years) Foreign Trade Tables and (for most recent years) supplied by National Bank of Ethiopia and Ministry of Planning and Economic Development.

APB: National Coffee Board of Ethiopia, Coffee Statistics Handbook 1962/63 - 1971/72 (July 1973); Coffee and Tea Develpment and Marketing Authority, Coffee Statistics Handbook 1961-62 to 1975-76 (July 1977); Ministry of Coffee and Tea Development, Coffee Statistics Handbook 1967/78 to 1989/90, (December 1990), and for most recent years, data supplied by the Ministry of Coffee and Tea Development.

FGPBO:Calculated from data supplied by the Ethiopian Coffee Marketing Corporation (see text for details)PCBS, PChBS: Caiculated from sources as in PCBO and EBM (see main text).

Table 3. Real Prices and Quantities

Year	RPCBO	RPCBAT	RAPB	RFGPBO	RPCS	RPCBS	RPBPBS	QUANTITY	RPCMBO	RPCMS	RPCMBS
61/62								76077		127	
62/63								83470		117	
63/64	118		94	76	101	118	66	82552	134	116	134
64/65	113		87	69	107	113	64	92909			
65/66	106		83	68	101	106	60	77918			
66/67	97		72	57	91	97	55	99223	120	114	121
67/68	93		73	59	89	93	53	94226	151	143	151
68/69	95		70	56	88	95	53	97988	156	145	156
69/70	107		88	70	101	107	60	103745			
70/71	100	77	70	56	100	100	56	102388	100	100	100
71/72	97	74	75	60	86	114	64	100458	45	40	53
72/73	108	82	75	60	98	155	86	111185	64	58	91
73/74	109	84	76	60	89	169	95	79374	91	75	142
74/75	91	69	58	46	69	152	86	78918	74	57	124
75/76	127	89	102	81	114	251	142	81181	31	45	100
76/77	190	101	101	81	190	390	220	64365	64	64	172
77/78	209	106	72	57	213	375	211	90048	120	122	215
78/79	122	71	61	49	126	232	119	96620	120	124	207
79/80	142	76	56	45	143	197	111	92040	151	152	209
80/81	101	66	44	35	104	148	83	95641	154	158	226
81/82	96	59	49	39	106	145	82	92813	130	142	195
82/83	90	53	40	32	102	152	86	115857	159	181	269
83/84	93	52	41	33	112	186	94	96988	154	188	279
84/85	82	52	38	29	117	189	106	64349	135	192	310
85/86	121	73	51	39	151	242	136	87435	141	176	282
86/87	92	65	39	29	98	194	109	88765	123	130	258
87/88	83	56	41	33	84	237	134	82095	121	122	346
88/89	83	62	34	34	89	246	139	115502	173	186	514
89/90	54	48	36	29	59	154	87	90650	122	134	353
90/91	43	41	35	24	57	139	78	77516	117	158	377
91/92	42	41	33	27	63	147	83	60155	145	219	513
92/93	87	86	56	43	55	131	74	87669	298	187	447

Definitions: (see also main text) Data are for coffee years.

RPCBO = Export price for coffee in birr per ton (real terms, 1970/71=100)
RPCBAT= Export price coffee after tax(constant prices, index relative to RCPBO)
RAPB = Auction price for unwashed coffee at Addis Ababa (constant prices)
RFGPBO = Farm-gate price for coffee per ton (national average excluding Hararghe price, in real terms, index relative to RCPBO)
RPC$ = Export price in US dollars per ton (real terms, 1970/71=100)
RPCBS = Export price in birr per ton in smuggling channel (real terms, 1970/71=100)
RFBPBS = Estimated farm-gate price for coffee per ton in smuggling channel (real terms, relative to RCPBO)
RPChBO = Export price for chat in birr per ton (real terms, 1970/71=100)
RPCh$ = Export price chat in dollars per ton (real terms, 1970/71=100)
RPChBS = Export price chat in smuggling channel per ton (real terms, 1970/71=100)

Sources: Prices are calculated from tables 1 and 2. For details see main text.
Quantities = total supply marketed in official channels. Compiled from National Coffee Board of Ethiopia, Coffee Statistics Handbook 1962/63 - 1971/72 (July 1973); Coffee and Tea Development and Marketing Authority, Coffee Statistics Handbook 1961-62 to 1975-76 (July 1977); Ministry of Coffee and Tea Development, Coffee Statistics Handbook 1967/78 to 1989/90, (December 1990), and for most recent years, data supplied by the Ministry of Coffee and Tea Development.

Table 4. Relative Coffee and Chat Price Index (Export Prices) since 1945

Year	P.I	Year	P.I	Year	P.I	Year	P.I	Year	P.I	Year	P.I	Year	P.I	Year	P.I
1945	214	1951	412	1957	76	1963	82	1969		1975	140	1981	75	1987	86
1946	256	1952	370	1958	73	1964	100	1970	100	1976	288	1982	85	1988	79
1947	274	1953	224	1959	86	1965		1971	115	1977	339	1983	63	1989	55
1948	198	1954	113	1960	93	1966		1972	245	1978	200	1984	68	1990	50
1949	137	1955	74	1961	72	1967	92	1973	191	1979	117	1985	70	1991	42
1950	220	1956	74	1962	76	1968	71	1974	137	1980	108	1986	98	1992	33

Source: As in Table 2.
Earlier data found in Ethiopia, Background Data on Agriculture (mimeographed, s.d.), which contains export/import data compiled from Statistical Abstracts since 1945.