PN-ABK-005
86876

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ARABICA PRODUCTION COSTS AND THE IMPACT OF GOVERMENT POLICY

AN APPLICATION OF POLICY ANALYSIS MATRIX

by

Peter WYETH (Ag Economist, CAPP)

CAMEROON AGRICULTURAL POLICY AND PALNNING PROJECT
AND
DEPARTMENT OF AGRO-ECONOMIC SURVEYS
AND AGRICULTURAL PLANNING

January 1990

WSU/CID/USAID/Cameroun
Contract No. 631-0059-C-00-9015-00

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ARABICA PRODUCTION COSTS AND THE IMPACT OF GOVERNMENT POLICY
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From 1978/79 to 1988/89 Cameroon exported an average of FCFA 19,531 million (roughly $56 million) of arabica coffee every year. This places it third among the country's agricultural exports after cocoa and robusta coffee (annual average exports of FCFA 53,221 and FCFA 53,827 respectively over the same period). It is an important income earner for the more than 150,000 farmers who grow the crop, almost all of them in the Western and North-Western provinces. Over recent years there has been a gradual downward tendency in production: the average for the five years 1979/80-1983/84 was 22,522 metric tons, while that for 1984/85-1988/89 was 17,688 tons. As the outlook in the international market is less bleak for arabica than for robusta this is an unfortunate trend.

The aim in this report is to begin to analyze the revenue and costs of arabica production in order to improve our understanding of farmers' incentives to produce, their competitive position in the world market, and the effect of government policy in both of these areas. The analytical method used is known as the "policy analysis matrix" (PAM). This is not a very precise term, because one can imagine any number of different kinds of matrix that could assist in analyzing policy. "Production incentive, trade potential, and policy impact matrix" would be more descriptive though clumsier. These matrices do not produce all the information a decision-maker would like to have on coffee. They do not show, for example, how much total output is likely to change in response to an alteration in price; a different methodology and different data are needed for that. But they do provide information useful in determining policies to promote production and exports.

No earlier PAMs relating to Cameroon have been found, which is not surprising because the method has not been developed in its present form for long. However, the concepts incorporated are not new and this report has been able to build on earlier work done on arabica in this country. The figures have been changed only where better ones could be obtained quickly and they all need to be checked. In the near future, visits to researchers, extension agents and farmers are planned for this purpose. In the meantime the results offered here should help reduce the area of uncertainty.

The plan in this paper is first to explain the methodology of the matrices and what information can be derived from them, and then to consider the tables for arabica and the empirical results.

The Basic Principle

The central idea on which a PAM is based is the difference between financial and economic prices. As the words are used here, financial prices are those which farmers pay, while economic prices are those which reflect the cost to the economy[1]. The distinction is illustrated by a subsidy on

[1]Different terms are often used for the same concepts, for example, private for financial and social for economic. Economic prices are also the same as opportunity costs and border prices.

fertilizer of the kind that has existed in Cameroon. The financial price is that paid by farmers, which is lower than it otherwise would have been because of the subsidy. The economic price is, in the case of Cameroon where fertilizer is imported, the CIF price at the port of entry, Douala, plus the economic cost of delivering this input to farmers.

Another instance arises in the case of farm outputs when their prices to producers are fixed by government, as in the case of coffee and cocoa in Cameroon. The official prices are financial, whereas the economic prices are found by taking the export prices, i.e. the FOB prices at Douala, and subtracting from then the economic cost of handling, transportion and any sorting or processing which takes place between the time the beans are sold by farmers and when they are loaded into the ships' holds.

Frequently there will be more than one item accounting for the difference between financial and economic prices. For instance, the costs of distributing fertilizer and transporting coffee and cocoa include the price of fuel on which there is a tax in Cameroon, as there is in nearly all countries. To arrive at the economic cost of distribution or transportation the impact of this tax on fuel costs must be taken out. More is said in the Annexes A and B about practical complexities, but the principle remains that the economic price is that which would prevail in the absence of any subsidies, taxes or fixed prices.

What a PAM does is to lay out in terms of both financial and economic prices the revenues gained and the costs incurred in producing a hectare of a specific crop. The revenues are found by multiplying the output prices by the quantity produced and the costs by multiplying the amounts of each input used by the appropriate prices. As the examples of fertilizer and cocoa or coffee prices show, the differences between the two resulting sets of revenues and costs can, in general, be attributed to subsidies, taxes or pricing fixing. It is because these items are the consequence of government policies that the table is called a policy analysis matrix[2].

Based on what has been explained so far, a PAM could be summarized very simply in the following form:

	Revenues	Costs	Profits
Financial Prices	Rf	Cf	Pf
Economic Prices	Re	Ce	Pe
Divergences	Dr	Dc	Dp

Rf, Re = Revenue, financial or economic
Cf, Ce = Costs, financial or economic
Pf, Pe = Profits, financial or economic
Dr, Dc, Dp = Divergences in revenues, costs or profits.

[2]Differences between financial and economic prices can also exist where private monopolies exist and exercise their power to raise prices by restricting output. In general, private monopolies do not significantly affect agricultural revenues and costs, but where they do this must be kept in mind when drawing implications from the results of PAMs.

The divergences could be either positive or negative for revenues, costs or profits. For example, in Cameroon producer prices for coffee during the 1989 season were the same as in earlier years even though international prices were much reduced. Consequently, the economic prices of coffee were below the fixed producer (financial) prices, and the divergence between financial and economic revenue, Dr, would have been positive. However, three or four years ago when international prices were much higher, economic prices were above financial prices and Dr would have been negative.

Turning to costs, if the only cost affected by government policy were fertilizer, on which there is (still) a subsidy, the total financial cost would be less than the total in economic terms, and Dc would be negative. On the other hand, if there were no fertilizer subsidy and the only government intervention were a tax on fuel which raised the cost of distributing inputs, Dc would be positive.

The net impact of all government interventions taken together is shown by the divergence shown in the rightmost column, Dp. If the government set producer prices below their economic level, this, taken by itself, would lower profits earned by farmers. On the other hand, a subsidy on fertilizer taken alone would raise farm profits. The figure represented by Dp would show which has the greater effect and whether farm profits are higher or lower as a result of these two interventions which work in opposite directions. A useful summary measure is the ratio of this net effect to the total amount of profits that would be made under economic prices:

Subsidy Ratio to Producers (SRP) = Dp/Re = (Pf-Pe)/Re

If Dp, and therefore this ratio, are negative, the "subsidy" is equivalent to a tax. Comparisons of this ratio among crops would show which benefit most from government interventions.

While the impact of current government interventions can be read off directly, information can also be gained about the impact of alternative interventions: a reduction in subsidies on fertilizers or pesticides, for example. Likewise the effect of changes in producer prices can be gauged or a calculation made of breakeven prices, i.e. those prices where revenues exactly cover costs. For example, if world prices are so low that profits cannot be made at economic prices, the breakeven price would show to what level prices would have to rise before production would become profitable.

An Elaboration: Implications for Trade

To derive the implications for trade, costs must be subdivided into two categories: tradables and domestic factors. An item is tradable if it is either imported or exported, or would be at economic prices. Fertilizer is a tradable input for Cameroon because it is imported and it would still be a tradable input if some of the countrys's needs were met through domestic fertilizer manufacture. Domestic factors are the country's fundamental resources in the form of labor, capital and land, but the cost of land is not included except in those instances where the amount available is a constraint to production. In Cameroon, in general, this is not the case.

This classification does not exhaust the possibilities. In particular, there can be intermediate inputs which are non-tradable, i.e. neither imported nor exported at economic prices. Improved seeds for cereal crops might be an example in Cameroon. In an instance of this kind it is necessary to break the cost of the item down so that they can be attributed to tradable inputs and domestic factors. Fortunately not many inputs fall into this category. The matrix now appears like this:

	Revenues	Tradeable Inputs	Domestic Factors	Profits
Financial Prices	Rf	Tf Ff	Pf	
Economic Prices	Re	Te Fe	Pe	
Divergences	Dr	Dt Df	Dp	

Rf, Re = Revenue, financial or economic
Tf, Te = Tradable input costs, financial or economic
Ff, Fe = Domestic Factor costs, financial or economic
Pf, Pe = Profits, financial or economic
Dr, Dt, Df, Dp = Divergences in revenues, tradables, domestic factors or profits.

With the data provided in this tableau a number of measures of economic performance can be calculated.

Value added. Value added is the difference between the value of output produced and value of intermediate inputs purchased. As the only intermediate inputs in this tableau are tradables, value added is simply revenue minus the cost of tradables. It can be calculated at either financial or economic prices:

Value added (private) = Rf - Tf
Value added (economic) = Re - Te

The larger the value added, the larger the amount of domestic income being generated. However, an activity is not necessarily better just because its value added is higher. This is because, taken on its own, value added leaves out of account the amount of domestic factors needed to produce it. It is not difficult to imagine that a crop could produce twice as much value added per hectare as another but only when three times as much labor and capital are applied. For this reason more accurate comparisons are made when the amount of domestic factors is also considered. The following two measures do precisely this.

Private and Domestic Resource Cost Ratios. These measures are ratios of domestic factors to value added:

Private Cost Ratio (PCR) = Ff/(Rf - Tf)
Domestic Resource Cost Ratio (DRC) = Fe/(Re - Te)

Of these two measures it is the DRC which policy analysts look to in order to assess the efficiency with which resources are being used. The PRC is primarily useful when making comparisons of financial profitability among different crops. As the ratio is domestic resources to value added, and not *vice versa*, a lower figure implies a higher level of income is being generated relative to costs. When the figure is exactly one it means that the resources are earning just enough to pay for their own cost; when it is less than one they are generating a surplus and when the ratio is greater than one the production of this commodity would actually cause the nation's net income to diminish.

Another way of expressing the same idea is in terms of comparative advantage. When the production of a commodity earns an economic surplus it means it is being profitably produced at world prices and the nation has a comparative advantage in that activity. In the opposite case there is a comparative disadvantage and here the country should not produce the commodity, unless there are

good prospects that the DRC will change in the not too distant future (due to an increase in world commodity prices, for example). If the product is one which the country consumes, such as wheat, the implication is that it would be cheaper to import than produce locally.

The existence of a comparative advantage does not necessarily imply that the crop should be exported. It is quite possible to have a comparative advantage in the domestic economy but not the export market. Such a situation is likely to be the case for many of the food crops that Cameroon produces. It is clear, for example, that maize is a profitable crop for many farmers in this country. As there are no government interventions which greatly benefit this crop, the country is no doubt better off producing than importing it; (the DRC is less than one at domestic maize prices). However, to be able to export maize, production costs would have to be below world prices, which is less likely; (i.e. a DRC based on FOB maize prices would probably be greater than one).

Nominal and Effective Protection Coefficients. Governments frequently wish to to encourage the production of a commodity even where there is a comparative disadvantage, for reasons of food security for example. This is commonly achieved through the imposition of a tariff or a quota on imports, in either case raising the price at which domestic sales take place. The ratio between the price at which the commodity is sold and the price at which it could be imported is a measure of the protection given to domestic producers.

It is, however, only a partial measure. A country might establish a tariff to encourage the production of wheat, for instance, but if it has a fertilizer industry too, it might also put up a tariff or quota to protect that. Wheat growers would therefore receive more for their grain but also have to pay more for their fertilizer and the total level of protection would be reduced. If there were a subsidy on fertilizer, on the other hand, the total level of protection would be increased. It would be helpful to be able to measure what the total impact is, and the ratio of value added at financial prices to value added at economic prices is just such a measure. It is known as the Effective Protection Coefficient, as opposed to the Nominal Protection Coefficient which is the simpler ratio of prices. These ratios can be derived directly from the PAM. (The NPC found from the two revenue figures is identical to that which would be obtained from the two prices).

Nominal Protection Coefficient (NPC) = Rf/Re for outputs
Tf/Te for tradeable inputs
Effective Protection Coefficient (EPC) = (Rf-Tf)/(Re-Te)

If the EPC is greater than one then the commodity is receiving some net protection, for the value added being generated is greater at financial prices than would be obtained if there were no protective interventions. Note that a commodity need not be imported in order to be protected. Any time a government intervention raises financial relative to value added, through subsidies or price fixing, a degree of net protection follows. The opposite situation, when the EPC is less than one, implies that domestic producers are at a disadvantge to those overseas.

Practical Difficulties and "Reducing the Information Shortage"

While the methodology of policy analysis matrices is simple in principle, complexities soon arise in practice. Economic and even financial prices will sometimes not be easy to pin down: the cost of family labor, for example, or of credit. Farming practices may vary considerably for a given crop, making it difficult to define a typical set of costs. Certainly there will be many regional variations in crops. Where crops are commonly grown together in one field it is more difficult to obtain data on costs and yields. If the exchange rate is overvalued the amount of the distortion must be determined and care taken over identifying those figures which should or should not be adjusted, which is not always obvious.

Most of these difficulties had to be faced in this report, and those that have not had to be (e.g. an estimation of the overvaluation of the exchange rate) will have to be in later work. Some will be resolved with better data, some by creating PAMs for other production systems (e.g. low input farms or different regions). But weaknesses of some kind are always likely to remain, and a set of figures honestly arrived at is better than none at all. While total accuracy is the proper ideal, the practical difficulties seem less discouraging if progress is gauaged in terms of reducing our information shortage.

The Tables for Arabica Coffee

For any tree crop the analysis must take account of the fact that the plantations have lives of many years, with production being zero in early on and costs also being variable through time. This makes the analysis considerably more complicated than it is for an annual crop such as maize or cassava. The earlier studies made on these crops did not ignore this aspect, but their treatment of it was not adequate for present purposes. The approach taken in this study is to lay out revenue and costs for each year separately, and then discount them all to the beginning of the first year. The number of years over which costs are calculated is twenty, including the initial years before the trees begin to produce.

Establishment costs inevitably account for a significant proportion of total costs and farmers considering whether or not to begin or expand production of coffee or cocoa face a different situation from those deciding whether to continue operating an already established plantation. A separate PAM is devised to analyse this latter case, treating the commodity as if it were an annual crop.

Two basic kinds of table are presented here: those showing discounted revenues and costs and the policy analysis matrices themselves. These tables are necessarily based on assumptions about price, quality, yields, inputs used and interest rates. It is useful to consider the effect of alternative assumptions on profits and competitiveness, but the number of possible combinations rapidly grows very large. Tables are offered for the most important variations, which are interests rates, coffee prices and whether or not establishment costs for coffee plantations are included. Additional tables, including those showing the annual figures from which the tables here are derived, are given in Annex C.

The form taken by the PAMs has already been described. Table 1 shows the pattern of the revenue and cost tables. The first row of figures shows the revenue derived from selling all the coffee produced. The financial price is the producer price for arabica; here it is assumed that all the coffee is of good enough quality to receive the maximum price. The economic price is calculated from the average FOB price for the year and the "bareme" or official schedule of marketing costs, the latter being announced each year by the government. Some of the items in the bareme are meant to reflect real transport and handling costs and some are taxes. Only the former are subtracted from FOB costs, for taxes are not economic costs. (See Annex B for details). As already mentioned, in Tables 1 and 2 these particular prices are for the year 1988/89. The new, lower producer price of FCFA 250/kg is discussed later.

Most of the table is taken up with costs. The first group are establishment costs incurred only in the first year. Then come costs of equipment. As arabica production is in the hands of small farmers using traditional methods there are only hand tools. The cost of a pulper is entered separately below so that the total cost of washing can be distinguished from other costs.

At the bottom of the table are shown the net discounted profit or loss, breakeven prices, interest rates, which are corrected for inflation and are used for discounting, and the internal rates of return (IRR). The choice of interest rates is commonly problematic and this case is no exception. The rationale for these figures is given in Annex B.

TABLE		Financial			Economic			Difference
ARABICA Monoculture		Price	Disc'ted Total	Percent Total	Price	Disc'ted Total	Percent Total	between Totals
REVENUE (discounted)								
Coffee	kg	520	2,107,599	101.9	457	1,852,255	83.7	255,344
	Unit							
Clearing	FCFA	20,000	18,182	0.9	20,000	18,182	0.8	0
Staking	person day	800	19,636	0.9	800	19,636	0.9	0
Holing	hole	105	190,909	9.2	105	190,909	8.6	0
Plants	plant	10	18,182	0.9	10	18,182	0.8	0
Transplant	FCFA	11,970	10,882	0.5	11,970	10,882	0.5	0
Planting	person day	800	19,636	0.9	800	19,636	0.9	0
	Life (years)							
Machete	2	2,040	10,007	0.5	2,040	10,007	0.5	0
File	1	960	8,990	0.4	960	8,990	0.4	0
Hoe	2	1,680	8,241	0.4	1,680	8,241	0.4	0
Secateur	3	2,400	8,216	0.4	2,400	8,216	0.4	0
Spade	2	2,800	13,735	0.7	2,800	13,735	0.6	0
Pick	3	2,100	7,189	0.3	2,100	7,189	0.3	0
Wheelbarrow	5	17,000	38,180	1.8	17,000	38,180	1.7	0
	Unit							
Weeding	person day	800	257,889	12.5	800	257,889	11.7	0
Pruning	2/yr/tree	7	168,748	8.2	7	168,748	7.6	0
Spread fert	application	10,000	170,271	8.2	10,000	170,271	7.7	0
Weeding	person day	1,200	256,498	12.4	1,200	256,498		
		50	[illegible]					
	Unit							
	FCFA	[illegible]	[illegible]					
Spray rent	day	[illegible]	[illegible]			[illegible]		0
Subtotal, Production Costs			1,554,738	75		1,699,732	77	-144,995
Jute sacks	unit	360	24,318	1.2	360	24,318	1.1	0
Baskets	"	240	8,106	0.4	240	8,106	0.4	0
Harv. Lab.	kg cherry	6.5	144,897	7.0	6.5	144,897	6.5	0
Drying	kg cherry	0.25	5,573	0.3	0.25	5,573	0.3	0
Transport	kg cherry	3.5	78,022	3.8	3.5	78,022	3.5	0
Subtotal, Harvest			260,917	13		260,917	12	0
Total Costs less Washing			1,815,654	88		1,960,649	89	(144,995)
Pulper	10	57,500	63,428	3.1	57,500	63,428	2.9	0
Pulping	kg cherry	7	156,043	7.5	7	156,043	7.0	0
Ferment	kg cherry	1.5	33,438	1.6	1.5	33,438	1.5	0
Subtotal, Washing			252,909	12		252,909	11	0
TOTAL COSTS (discounted)			2,068,563	100		2,213,558	100	(144,995)
PROFIT/LOSS (discounted)			39,035			(361,303)		400,338
Breakeven Price: w/o washing			449			485		
with washing			511			547		
Interest Rate (inflation adjusted)			10.0%			10.0%		
Internal Rate of Return			10.9%			-1.7%		

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Of the columns, three show the calculations at financial prices, three at economic prices, and the seventh gives the difference between the two. The discounted totals are calculated from the entries made for every revenue and cost item for each of the 20 years. These annual tables are presented at the end of Annex C.

The Empirical Results for 1988/89

The revenue/cost tables. The focus of Table 1 is the figures in the rightmost column of the tables, showing where government interventions have an impact on revenues and costs, assuming for the moment the same interest rate for both financial and economic calcualtions. The effects can be seen wherever there are non-zero numbers. The first difference is in the revenue column and follows directly from the fact that in 1988/89 the producer price was above the border price for arabica coffee, implying a price subsidy to producers amounting to FCFA 255,344.

Had the PAM been drawn up on the basis of the FOB prices of a few years earlier, the producer price would have been below the border price. In fact, the average for 1980/81 to 1987/88 was FCFA 665 per kilo while the producer price was not above 520, implying a reduction in producers' revenue of FCFA 587,696 (see Table A in Annex C), though this was compensated for to a considerable degree by interventions which lowered the interest rate to farmers[3].

While a subsidy on the sale of coffee results in a positive difference between financial and economic revenues because it raises the financial price, a subsidy on an input reduces the financial price and therefore shows up as a negative entry in the difference column. All the differences in input costs are negative and are due to subsidies on fertilizer and pesticides.

The combined effect of these government interventions is necessarily, as they are all subsidies, to raise financial profits above what they would be under economic prices. The virtue of a PAM is that it can measure the size of this combined effect and gauge the importance of each of the interventions. If, as in Table 1, both financial and economic interest rates were 10%, the total impact is sufficient to change a discounted economic loss of FCFA 360,000 to a small discounted financial profit of just almost FCFA 40,000. About 65% of this effect is due to the subsidy on the price of coffee.

In reality the appropriate financial interest rate is more likely around 5%; (see Annex B for explanation). All the discounted totals on the financial side of the table are larger in Table 2 than in Table 1 except where there are subsidies, making financial costs are greater than economic costs. Discounted financial revenues are also larger than they were before, however, and the net result is that the economic loss of almost FCFA 350,000 is converted into an even greater profit of almost FCFA 400,000. Clearly these figures are very sensitive to what rate of interest is chosen. The choice of a correct rate being difficult, it is wise to avoid lending much significance to results which depend on interest rate differences.

One result which is unaffected by the interest rate change is that the price of the commodity has a far greater effect on farm profits than the cost of an single input. This has significant implications for strategies to promote production incentives through output prices or input subsidies. Using the figures in Table 2, an increase of 10% in the coffee price would raise profits by FCFA 349,232. If, on the other hand, fertilizer were completely free, profits would rise by only FCFA 257,020. By the same token, the effect of removing the fertilizer subsidy entirely in this year would

[3]This calculation for the years 1980/81-87/88 is based only on a change in the economic price for coffee. Costs have not been reconstructed from data from earlier years. As costs are likely to have been lower than those used here, the profit figures are probably underestimates.

TABLE 2. ARABICA Monoculture		Financial			Economic			Difference
		Price	Disc'ted Total	Percent Total	Price	Disc'ted Total	Percent Total	between Totals
REVENUE (discounted)								
Coffee	kg	520	3,492,322	112.9	457	1,852,255	84.2	1,640,067
	Unit							
Clearing	FCFA	20,000	19,048	0.6	20,000	18,182	0.8	866
Staking	person day	800	20,571	0.7	800	19,636	0.9	935
Holing	hole	105	200,000	6.5	105	190,909	8.7	9,091
Plants	plant	10	19,048	0.6	10	18,182	0.8	866
Transplant	FCFA	11,970	11,400	0.4	11,970	10,882	0.5	518
Planting	person day	800	20,571	0.7	800	19,636	0.9	935
	Life (years)							
Machete	2	2,040	13,673	0.4	2,040	10,007	0.5	3,665
File	1	960	12,562	0.4	960	8,990	0.4	3,572
Hoe	2	1,680	11,260	0.4	1,680	8,241	0.4	3,019
Secateur	3	2,400	10,983	0.4	2,400	8,216	0.4	2,767
Spade	2	2,800	18,766	0.6	2,800	13,735	0.6	5,031
Pick	3	2,100	9,610	0.3	2,100	7,189	0.3	2,421
Wh'lbarrow	5	17,000	46,934	1.6	17,000	38,180	1.7	10,754
	Unit							
Weeding	person-day	800	383,553	12.4	800	257,889	11.7	125,664
Pruning	2/yr/tree	7	272,691	8.8	7	168,748	7.7	103,943
Spread fert	application	10,000	249,244	8.1	10,000	170,271	7.7	78,973
[illegible]	person day	1,200	427,980	13.8	1,200	[illegible]	[illegible]	[illegible]
[illegible]	kg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	sachet	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	FCFA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spray rent	day	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.9	57,161
Subtotal, Production Costs			2,267,737	73		1,699,732	77	568,005
Jute sacks	unit	360	40,296	1.3	360	24,318	1.1	15,978
Baskets	"	240	13,432	0.4	240	8,106	0.4	5,326
Harv. Lab.	kg cherry	6.5	240,097	7.8	6.5	144,897	6.6	95,200
Drying	kg cherry	0.25	9,235	0.3	0.25	5,573	0.3	3,662
Transport	kg cherry	3.5	129,283	4.2	3.5	78,022	3.5	51,261
Subtotal, Harvest			432,343	14		260,917	12	171,426
Total Costs less Washing			2,700,080	87		1,960,649	89	739,431
Pulper	10	57,500	76,954	2.6	57,500	50,473	2.3	26,481
Pulping	kg cherry	7	258,566	8.4	7	156,043	7.1	102,523
Ferment	kg cherry	1.5	55,407	1.8	1.5	33,438	1.5	21,969
Subtotal, Washing			392,927	13		239,954	11	152,973
TOTAL COSTS (discounted)			3,093,007	100		2,200,603	100	892,404
PROFIT/LOSS (discounted)			399,315			(348,348)		747,663
Breakeven Price: w/o washing			403			465		
with washing			462			544		
Interest Rate (inflation adjusted)			5.0%			10.0%		
Internal Rate of Return			11.4%			-1.1%		

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have reduced profits by FCFA 84,196[4]. This is not an insignificant drop, but an increase of less than 3% in the coffee producer price would have made up for it. Clearly the leverage exerted on profits by the selling price of arabica is far greater than that exerted by input subsidies. This is not to argue for a subsidy on coffee prices but that other policies which could result in higher output prices would have a high payoff, a point returned to at the end of this report.

A second matter concerns the cost of pulping, or washing the coffee, which is necessary to achieve the best quality; (it is done only for arabica, not robusta). A figure per kilo can be found by taking the difference between the breakeven prices calculated with and without washing costs. In Table 2 this is in the region of FCFA 60, at both financial and economic prices. This is likely to vary among farmers with their distance from water, but the figure arrived at here should be a reasonable indicator. If farmers receive less than it costs them to wash their coffee they are likely to abandon the process as a losing proposition and simply dry the cherry as is done for robusta. The result is a lower price on the world market.

This does not imply that the differential between the producer prices for washed and unwashed coffee should be set at FCFA 60 because that is what the process costs. The differential should be the same as that on the world market between washed and unwashed arabica prices, because that is what coffee buyers are willing to pay. A higher differential for farmers would be equivalent to subsidizing the process on behalf of coffee consumers, while a lower differential would mean passing back to farmers less than is received for the better quality. Data on the world market differential need to be collected to examine this issue. If it is found that the the cost of washing to farmers is greater than this, a search must be made for a way to reduce the cost, another point to which we return at the end of the paper.

The policy analysis matrix Table 3 shows that when financial and economic interest rates are identical, government interventions in 1989/90 raised revenue and reduced the cost of tradable inputs. Both caused value added to be higher in financial than economic terms. The next two figures look at profits rather than value added. The Profitability Coefficient is negative here because economic profits (Pe) are negative; (this ratio will be more useful when PAMs are available for other crops and comparisons between them must be made). The Subsidy Rate to Producers summarizes in a single figure the combined impact of government interventions. What we are told here is that producers revenues in 1988/89 were increased by 22% as a result of government interventions. In Table 4, when the financial interest rate is only 5%, the subsidy rate is 40%.

The three coefficients which measure protection show how these subsidies give arabica producers advantages greater on the world market than would be conferred by economic forces alone. In both Tables 3 and 4 the Nominal Protection Coefficient (NPC) for outputs is greater than one, meaning that the government fixed price raises the incentive to produce above world market levels. The NPC for inputs being less than one indicates that tradable inputs were sold at less than world market prices. These two facts reinforce one another, and their total effect measured by the Effective Protection Coefficient which shows that producers' financial position is raised 27% with respect to world market levels in Table 3, over 100% in Table 4.

As a consequence of these conditions, the Private Cost Ratio is lower, i.e. more favorable, than the Domestic Resource Cost Ratio. In spite of this, when both interest rates are 10% even the PCR is barely attractive, for it is 0.98 and at a ratio of exactly 1.0 labor and capital are earning their keep but no surplus. The PCR is more appealing when the financial interest rate is 5% and it drops to 0.87

[4]Found by recalculating the economic cost of fertilizer at an interest rate of 5%, and then subracting the subsidized cost.

TABLE 3.

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

With Establishment Costs

Output Price	financial	526
	economic	457
Discount Rate	financial	10.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	2,107,599	226,840	1,563,467	278,256	2,068,563	39,035
Economic	1,852,255	371,835	1,563,467	278,256	2,213,558	(361,303)
Difference	255,344	(144,995)	0	0	(144,995)	400,338

Value Added (financial)	Rf - Tf	1,880,759
Value Added (economic)	Re - Te	1,480,420
Profitability Coefficient	Pf / Pe	(0.11)
Subsidy Rate to Producers	(Pf - Pe) / Pe	0.22
Nominal Protection Coefficient		
a) Outputs	Rf / Re	1.14
b) Tradable Inputs	Tf / Te	0.61
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	1.27
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	0.9[illegible]
Domestic Resource Cost Ratio	[illegible]	[illegible]

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TABLE 4

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

With Establishment Costs

Output Price	financial	520
	economic	457
Discount Rate	financial	5.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	3,492,322	351,237	2,340,448	401,322	3,093,007	399,315
Economic	1,852,255	371,835	1,563,467	265,300	2,200,603	(348,348)
Difference	1,640,067	(20,598)	776,980	136,022	892,404	747,663

Value Added (financial)	Rf - Tf	3,141,085
Value Added (economic)	Re - Te	1,480,420
Profitability Coefficient	Pf / Pe	(1.15)
Subsidy Rate to Producers	(Pf - Pe) / Pe	0.48
Nominal Protection Coefficients		
a) Outputs	Rf / Re	1.89
b) Tradable Inputs	Tf / Te	0.94
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	2.12
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	0.87
Domestic Resource Cost Ratio	(Le + Ce) / (Re - Te)	1.24

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TABLE 5 ARABICA Monoculture Established		Financial			Economic			Difference
		Price	Total Value	Percent Total	Price	Total Value	Percent Total	between Totals
Revenue								
Coffee	kg	520	390,000	139.7	457	342,750	111.8	47,250
	Life (years)							
Machete	2	2,040	1,097	0.4	2,040	1,175	0.4	(78)
File	1	960	1,008	0.4	960	1,056	0.3	(48)
Hoe	2	1,680	904	0.3	1,680	968	0.3	(64)
Secateur	3	2,400	891	0.3	2,400	965	0.3	(84)
Spade	2	2,800	1,506	0.5	2,800	1,613	0.5	(107)
Pick	3	2,100	771	0.3	2,100	844	0.3	(73)
Wh'lbarrow	5	17,000	3,927	1.4	17,000	4,485	1.5	(558)
Weeding	person day	800	32,000	11.5	800	32,000	10.4	0
Pruning	2/yr/tree	7	28,000	10.0	7	28,000	9.1	0
Spread fert	application	10,000	20,000	7.2	10,000	20,000	6.5	0
Spraying	person day	1,200	48,000	17.2	1,200	48,000	15.7	0
Fertilizer	kg	58	23,200	8.3	77	30,800	10.1	(7,600)
Duroban	liter	0	0	0.0	4,800	9,600	3.1	(9,600)
Ortho.	sachet	0	0	0.0	145	7,250	2.4	(7,250)
Org. fert	FCFA	11,000	11,000	3.9	11,000	11,000	3.6	0
Spray rent	day	400	16,000	5.7	400	16,000	5.2	0
Subtotal, Production Costs			188,293	67		213,757	70	(25,463)
Jute sacks	unit	360	4,500	1.6	360	4,500	1.5	0
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
[illegible]	kg cherry	[illegible]	14,436	[illegible]		[illegible]		
[illegible]			[illegible]	[illegible]		[illegible]		0
[illegible] less Washing			236,575	85		[illegible]	[illegible]	[illegible]
Pulper	10	57,500	7,447	2.7	57,500	9,358	3.1	(1,911)
Pulping	kg cherry	7	28,875	10.3	7	28,875	9.4	0
Ferment.	kg cherry	1.5	6,188	2.2	1.5	6,188	2.0	0
Subtotal, Washing			42,509	15		44,420	14	(1,911)
TOTAL COSTS			279,084	100		306,458	100	(27,375)
PROFIT/LOSS			110,916			36,292		
Breakeven Price: w/o washing			315			349		
with washing			372			409		
Interest Rate (inflation adjusted)			5.0%			10.0%		

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TABLE 6

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

Without Establishment Costs

Output Price	financial	520
	economic	457
	financial	5.0%
	economic	10.0%
Max Yield		750

	Revenue	Tradable	Labor	Capital	Tot Cost	Profit
Financial	390,000	33,0[illegible]	287,21[illegible]	38,85[illegible]	279,084	110,916
Economic	342,750	57,46[illegible]	287,219	41,777	306,458	36,292
Difference	47,250	(24,450)	0	(2,929)	(27,375)	74,625

Value Added (financial)	[illegible]	356,988
Value Added (economic)	[illegible]	285,288
Profitability Coefficient	[illegible]	3.06
Subsidy Rate to Producers	[illegible]	0.22
Nominal Protection Coefficients		
a) Outputs	[illegible]	1.14
b) Tradable Inputs	[illegible]	0.57
Effective Protection Coefficient	[illegible]	1.25
Private Cost Ratio	[illegible]	0.8[illegible]
Domestic Resource Cost Ratio	[illegible]	0.[illegible]

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ARABICA COFFEE - DISTRIBUTION OF FOB PRICE FOR VARIOUS CHARGES AND TAXES
(FCAF/metric ton)

	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
FOB Price Douala	573,070	736,870	927,990	1,177,100	1,350,400	1,411,610	764,860	727,210
Stamps (Bill of Lading)	167	167	167	167	167	167	167	167
Transit Charge	2,598	2,598	2,855	2,855	2,855	2,855	2,855	2,855
Port Tax	1,286	1,286	1,286	1,286	1,286	1,286	1,286	1,286
Sealing Tax	85	85	85	85	85	85	85	85
Toll	52	52	52	52	52	52	52	52
Customs Tax	350	350	350	418	418	418	418	418
Embarkation Tax	867	1,248	1,434	1,434	1,434	1,434	1,434	1,434
Export Tax	65,600	65,600	65,600	65,600	65,600	65,600	65,600	65,600
Custom Fee	135	135	137	137	137	137	137	137
Specific Tax	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Conditioning Tax	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025
Chem. Treatment Tax	50	50	50	50	50	50	50	50
General Fees	7,342	9,223	9,456	10,500	11,550	12,474	13,098	13,098
TOTAL TAXES AND FEES	82,577	83,819	85,497	86,609	87,659	88,583	89,207	89,207
EXPORTER PROFIT	3,500	3,500	3,850	3,990	4,229	4,229	4,229	4,229
VALUE EX-FACTORY	486,993	649,551	838,643	1,086,501	1,258,512	1,318,798	671,424	633,774
CMC Tax								-
Transport Differential								
Warehouse Bonus								
Insurance	[illegible]				[illegible]	[illegible]		[illegible]
Interest Charges	[illegible]			[illegible],018	21,282	21,282	[illegible]	[illegible]
Storage Losses	[illegible]	[illegible]	4,277	4,935	5,896	5,978	2,107	2,945
Handling & Transport	1,384	1,503	1,728	1,970	2,167	2,384	2,384	2,384
Weighing Fee			382	382	382	382	382	382
Calibration Charge	6,000	6,000	6,600	7,524	8,276	8,690	8,690	8,690
Sorting Fee	8,000	8,000	9,000	10,260	11,697	12,857	12,857	12,857
Milling Charges	27,500	30,800	35,840	41,216	47,260	49,891	49,891	49,891
Stamp Tax (3% Prod.Price)							1,320	1,320
TOTAL MARKETING CHARGE	78,014	86,262	105,378	119,970	119,592	124,396	107,911	111,766
FOB VALUE FARMGATE	408,979	563,289	733,265	966,531	1,138,920	1,194,402	563,513	522,008
FARM PRICE + BONUS	350,000	360,000	370,000	430,000	495,000	520,000	520,000	520,000
MARGIN TO RESERVES	58,979	203,289	363,265	536,531	643,920	674,402	43,513	2,008
Total Exports (mt)	93,671	96,050	91,485	95,208	97,468	95,911	89,045	106,905
Est. ONCPB Coffee Operating Costs								
a) total (billions)	14.5	15.3	16.1	16.9	17.8	18.8	19.8	20.8
b) per metric ton	154,797	159,292	175,986	177,506	182,623	196,015	222,360	194,566
ECONOMIC FARMGATE PRICE	336,759	487,816	642,776	875,634	1,043,956	1,086,970	431,680	417,969
Marketing Costs per Ton	236,311	249,054	285,214	301,466	306,444	324,640	333,180	309,241

Sources:
All but bottom section: ONCPB Bareme, quoted in Agland Coffee Sub-Sector Study, November 1988
Total Exports (Robusta plus Arabica): ONCPB
Est. ONCPB Coffee Operating Costs: Agland Study, page 9. Assumed as 1/3 of est. annual operating budget
Economic Farmgate Price: (FOB Price) - (Exporter Profit) - (Total Marketing Charge, excl. Stamp Tax)
- (ONCPB Coffee Operating Costs per ton)

More significantly from the point of view of the economy, the DRC of 1.24 (in either table) is well over 1.0, implying that that losses are being made and that the country has no comparative advantage in arabica coffee production at 1988/89 coffee prices. The situation was quite different in earlier years when world prices were higher. At a price of FCFA 665 per kilo Cameroon's comparative advantage was clear, with a DRC of 0.79 (see the Table B in Annex C). To find out at what price level Cameroon begins to have a comparative advantage the breakeven prices were calculated back in Tables 1 and 2, where in economic terms it was found to be FCFA 544. If marketing costs are FCFA 310, which is the estimate used here, this means the FOB price would have to be FCFA 854.

Empirical Results for Established Plantations

So far the costs analyzed have included those incurred in setting up a coffee plantation. A separate set of figures is provided here to analyze the case where the plantation is already at full production and the only costs are those needed to keep it going. This is much simpler, for only the current year's revenues and costs need be included, as in the case of an annual crop. The interest rate still plays a role, in "annualizing" capital costs (see Annex A) but as capital costs are a small proportion of the total, the significance of changes in the interest rate is much reduced.

Table 5 provides the revenues and costs and Table 6 the PAM. Production now is profitable at economic as well as financial 1988/89 prices. None of the prices for inputs or outputs have been changed, so coffee producers continue to receive favorable treatment relative to world price conditions, as the subsidy rates and protection coefficients show. Also the country has a comparative advantage in producing coffee in established plantations, with a domestic resource cost ratio of 0.87. The break-even price below which this comparative advantage would become a comparative disadvantage is FCFA 409, or an FOB price of FCFA 719. For farmers, the financial breakeven price is around FCFA 372.

The Effect of the New Producer Prices

The new producer price for arabica coffee of FCFA 250 is well below this financial breakeven price, implying that at this level farmers would make losses whether or not establishment costs were included. The usual tables cannot be offered here because we have as yet no data on what FOB prices are likely to be (though see Tables I and J in Annex C for a hypothetical case). But at financial prices losses have been calculated at FCFA 1.4 million at 5% interest when establishment costs are included and FCFA 85,384 per year when they are excluded.

It is important to put these figures in their proper perspective. They certainly do not mean that arabica production will cease. As mentioned in the introduction to this paper, these tables are not capable of showing us how total output will alter as producer prices change. They show a particular set of prices which are very useful for analyzing the determinants of production incentives and the effects of government policy. In practice farmers have a wide range of costs and as prices fall only a proportion begin to make losses. Of course, the larger the price fall the larger this proportion is. The recent price fall was large and some kind of fall in output can be expected.

Conclusions

There are no simple or dramatic solutions to the difficulties faced by the arabica subsector. The fundamental problem is a world market which is currently in a poor state, and Cameroon on its own can do nothing about that. However, it can pursue, or continue to pursue, measures which will reduce current difficulties and make it profits possible at an earlier point on the up-turn when it comes.

The analysis here suggests certain actions concerning production and marketing that need to be studied and others that it can already be said are definitely worth following.

There are two aspects of production to consider: costs and quality. In times of low output prices any means of reducing costs per kilo of production would be welcome. An important question is how costs per kilo of arabica produced vary with different fertilizer application rates. To answer this, data on the response of arabica yield to fertilizer will be applied to these tables. Similarly, the advantages of monocropping over intercropping can be evaluated as soon as an adequate treatment is developed of arabica interplanted with other crops. Other improvements that can be brought about through rejuvenating plantations, better pruning and weeding practices and use of pesticides should also be evaluated.

One particular cost item on which this report has focussed is the washing process. The possibility should be considered of setting up local plants which can take over the process from farmers. If such plants could do the job more cheaply than most farmers, the latter would gain by selling their coffee at the cherry instead of the parchment stage because the reduction in price they would have to accept would then be less than the additional costs they would have to pay to do the processing themselves. To safeguard the interests of farmers who can do the work more cheaply, the option of processing the coffee themselves could be preserved.

Reductions in production costs can also be achieved through lower input prices, which can be attained through subsidies or more efficient marketing. Subsidies are not a feasible alternative where the funds to pay for them are not available, and the government has already embarked on a program of removing those on fertilizer. The analysis here has shown that while this will necessarily increase costs somewhat, the producer price of coffee has a very much greater impact on profits, so that a certain percentage increase in fertilizer costs can be removed with a much smaller increase in the producer price. The same reasoning would apply to pesticides.

It may also be possible to mitigate the increase in fertilizer prices through more efficient distribution. The reform program for fertilizer includes this objective, the means being market liberalization. Continued efforts in this direction are important. More efficient input marketing should result not only in lower prices, but also in more timely delivery. Late delivery is as real a cost as higher prices, for it effectively reduces or even removes the benefits gained from using the inputs.

Besides these possibilities for reducing costs, there is also potential for raising the price which can be paid to farmers. One way would be through an increase in quality. Whatever the state of the world market, coffee is sold at a range of prices depending on quality. In fact, when the market turns down it is the high quality coffee which suffers the least. It is not unlikely that the transfer of the washing process from farmers to special plants would bring important benefits here, for the way in which it is carried out plays a significant role in determining the ultimate quality of the beans. This is because the operators of processing plants could be given a level of training which would be too costly to give to farmers, and also because the plants could be put where there are adequate clean water supplies.

Finally, every means should be sought to increase the efficiency of marketing green coffee, so that the farmer obtains as large a share as possible of the FOB price. This by no means rules out price stabilization schemes which may temporarily impose an extra levy on farmers when prices are high, returning it to them later when prices are low. But in the current state of the world market this issue is hardly urgent. Right now the important point is that price increases are more effective than any other way of improving profits. Subsidies, once again, are not a feasible alternative but lower marketing costs are, and means of bring them about should be vigorously sought here too through market liberalization. Just as important as a good price is the payment of farmers at the moment when

they deliver their produce, for any delay in payment effectively lowers the real price, and the longer the delay the lower the real price. Many farmers have been paid late for their coffee in the last year or two, particularly in the North-West. Providing the cooperatives there with access to adequate finance and greater autonomy to pursue their their members' interests is a program which could be implemented quickly and cheaply. Thirdly, better marketing should also provide for rewards to good quality that are comensurate with those provided by export prices.

In sum, these proposals aim at an improvement in the environment in which growers operate so that they will derive the maximum possible benefits from the prevailing market and continue to produce arabica. It will not only be the farmer who benefits, of course, but Cameroon's balance of payments. A farmer's options are often broader than the economy's, for if he gives up growing coffee in favor of some other income earning crop he will still earn money, though perhaps less than before. But the most obvious available alternative crops are not currently exported, and the nation's foreign exchange earnings will decline by more than farmers' incomes. Hence, right now the arabica farmer's interests are the proper focus of attention and these policy analysis matrices are one means of finding out what those interest are.

ANNEX A

TECHNICAL NOTES ON POLICY ANALYSIS MATRICES (PAMs)

The notes here take as their starting point The Policy Analysis Matrix: A Manual for Practitioners, by Scott R. Pearson & Eric A. Monke, Pragma Corporation, July, 1987. As I thought through some of these points I found it useful for my own purposes to add my own embellishments. Readers should be warned, therefore, that there may be errors here for which I alone am responsible.

The basic form of the PAM:

	Revenues	Tradeable Inputs	Domestic Factors	Profits
Financial Prices	Rf	Tf	Ff	Pf
Economic Prices	Re	Te	Fe	Pe
Divergences	Dr	Dt	Df	Dp

Dr < 0: farmers profits are higher due to government policy
Dt, Df < 0: " " " lower " " " "
Dp < 0: " " " lower " " " "

Value Added = Rf - Tf

Private profits (Pf) = Rf - Tf - Ff

Private Cost Ratio (PCR) = Ff/(Rf - Tf)

Domestic Resource Cost Ratio (DRC) = Fe/(Re - Te) = Fe/(Fe + Pe)
implies comparative advantage if DRC < 1, which occurs if Pe > 0

Profitability Coefficient (PC) = Pf/Pe

Nominal Protection Coefficient (NPC) = Rf/Re for outputs
Tf/Te for tradeable inputs

Effective Protection Coefficient (EPC) = (Rf-Tf)/(Re-Te)

Subsidy Ratio to Producers (SRP) = Dp/Re = (Pf-Pe)/Re

One PAM should be defined for each representative commodity system. Such a system is worth defining separately if government policy is likely to affect it in a different way from other systems. It is recognized that there may well be cost variations within a commodity system, but this is not serious as long as policy effects are fundamentally similar throughout. For any given crop there may need to be distinctions among farms according to technology employed or environment (climate, soil), or government assistance (e.g. EAMI). Size differences in themselves are not important, but generally they are accompanied by variations in technology.

Annual costing of fixed inputs:

An annual cost of capital equipment is arrived at by a formula for depreciation. For the sake of convenience in drawing up PAMs the figure should be constant from year to year. Over the life of

the equipment these annual amounts should add up to enough to cover its replacement cost. But this is not all. The funds invested in the equipment have an opportunity cost, and this also should be covered in the annual figure for the cost of capital.

Formally, we begin with an annuity (A) which, when invested at the end of each year at a rate of interest, i, will accumulate to the replacement cost (Z) of the equipment, plus its required rate of return or opportunity cost of capital, also i:

$$A[1 + (1+i) + (1+i)^2 + \ldots + (1+i)^{n-1}] = Z(1+i)^n$$

Rearrange:

$$A = Z(1+i)^n\{1/[\ldots]\}$$

Rewrite expression in braces by multiplying top and bottom by i and adding (1-1 = 0) to the bottom:

$$i/[(1+i)-1].[1 + (1+i) + (1+i)^2 + \ldots + (1+i)^{n-1}]$$
$$= i/(1+i)^n-1$$

So:

$$A = Z[(1+i)^n i] / [(1+i)^n-1]$$

where the expression in square brackets after Z is the Capital Recovery Factor. By dividing the top and bottom by $(1+i)^n$ this has been further simplified to:

$$A = Z\{ i / [1-1/(1+i)^n]\}.$$

Note: as the number of years goes up, i constant, the CRF falls because a given cost is spread over a larger number of years, but as i goes up, years constant, the CRF rises because the higher rate raises opportunity cost more than it discounts the present value.

To take account of salvage value, discount it from year of sale to present, and subtract result from cost to get Z.

If no data is available on the life of fixed inputs, use:

buildings: 30 - 40 years	machinery: 10 - 15 years
implements: 10 - 20 years	small tools: 5 years.

Correcting interest rates for inflation

$$(1 + i_N)/(1 + f) = 1 + i_R$$

where: i_N = nominal interest, f = inflation, i_R = real interest.

$$(1 + i_N)-(1 + f) \sim (1 + i_R)$$

when rates of nominal interest and inflation are low.

To estimate the marginal rate of return to capital

Collect data stock of capital in the economy, and distribution of GDP among land, labor and capital.

Average rate of return to K: (share of K in GDP)/(value of K stock).

Under competitive conditions MVP/AVP = factor's share in total income (from Euler's theorem). Therefore, MVP = AVP x factor share.

Tradable vs. Imported Inputs.

(a) The question might be asked when calculating the DRC ratio for a product why the proper distinction is between tradable inputs and domestic factors instead of between imported and domestic inputs. After all, if a tradable input is produced domestically, at a socially profitable rate, should this not increase the country's comparative advantage in this activity?

The answer is, no, not at all. The objective is to show whether domestic factors are earning enough to pay their way in their current activity.

$$\text{DRC ratio} = Fe/(Re - Te) = Fe/VAe$$

If this ratio is less than one it means that the factors are adding less value to production than the opportunity cost of employing them, clearly a losing proposition.

In this calculation, where tradables are produced is not relevant. (If the object were to figure the net impact on the balance of payments they would be relevant, but that is not the point here). It is possible for tradable inputs to be locally made (and socially profitable) but the particular activity where they are being employed is not profitable at all. Unfortunately this is very common, e.g. where countries produce primary commodities but have no comparative advantage at all in processing them.

(b) Another question arises about pricing domestically produced tradables. Suppose that the input is produced more cheaply (calculating costs at economic prices) than it is imported. Should the quantity produced domestically not be valued at a lower price than imports? The answer is no, because, in a free market, as long as some of the domestic manufacturer cannot supply all the country's needs, the ruling price will be determined by the import price.

Disagregating Non-tradables.

A good can be non-tradable but not be a domestic factor. This applies to any intermediate input which is non-tradable, that is, it is produced locally and cannot be profitably substituted (at economic prices) for an input that is tradable. If it can be substituted for a tradable input, the latter's price can be used and the item classed as tradable. But if this kind of substitution is not possible, the non-tradable input must itself be disaggregated into tradable and domestic factor components. These are then added to the other tradables and domestic factors entering into the production of the crop whose PAM is being constructed. This procedure is necessary because the crop cannot be produced without these non-traded inputs and the domestic factors which help create these inputs must pay their way along with the domestic factors directly involved in producing the crop.

For an input to be non-tradable, there must be no possibility that it would be traded in the absence of any distortions to prices that might be brought about by government or monopoly.

Inputs such as fuel or seeds could be non-tradables even though they are available on the world market. This would happen if the (economic) price were above the FOB export price and below the CIF import price.

Non-tradable inputs need to be disaggregated only where they are intermediate inputs. Machetes and coffee seedlings are probably non-tradable but are properly treated as capital items.

Interest rates

The economic interest rate must reflect the opportunity cost of capital to the economy. As economies accumulate more and more capital this opportunity cost tends to fall, and because less developed economies have not yet accumulated large amounts, the opportunity cost of their capital is still high. In the least developed countries the rate is generally taken to be between 10% and 15% per year, in countries of medium development 6% to 10% and in highly developed countries 2-6%. It should be understood that these are real rates of interest. That is, if the rate chosen is 10% and the rate of inflation in the country is 10%, projects should earn 20% in nominal terms to justify their economic existence.

The usual practice in choosing a financial rate is to identify that rate at which farmers can typically borrow funds, and then correct it for inflation (see paragraph above on the method of correction). There is often a practical difficulty in that money is borrowed at widely varying rates, from not far above zero to several percent per month, depending on the source and the purpose. If necessary two or more alternative rates can be used to see whether important conclusions are affected.

Multicropping

If two crops a year are grown, their technical coefficients are likely to be different. The easiest approach would be to draw up two PAMs, one for each season. A question does arise concerning how to treat annualized capital costs, given that we are now dealing with a period of less than a year. The solution is to use the same approach as that taken when the same equipment is used for more than one crop: allocate annual capital cost among crops according to the time spent working on each or the weight of crop harvested.

Permanent Crops: Discounting versus Amortization of Establishment Costs

It is common practice in calculating budgets for tree and other permanent crops to define costs for those years needed to establish the crop, and then calculate a figure which will amortize the total over the assumed life of the trees. The other figures in the table are operating costs and revenues for a typical year of a fully established plantation.

The question arises as to what the differences and relative merits are of this method over that adopted in this paper, namely, laying out the revenues and costs for each year separately and then discounting them all to the present. In principle, while amortizing establishment costs is undoubtedly preferable for accounting purposes, from the point of view of economic analysis the discounting approach is clearly superior. The question the analysis is supposed to answer is, "If an investment were made in this activity, starting now, what would be the net returns?" For a permanent crop this means looking at the future flow of returns and costs, and the only way of adding these amounts up across years is by expressing them in monetary units of the same year, in practice the present. By contrast, the amortization approach only allows for annual flows in so far as it is necessary to calculate total establishment costs, and aims to take a snapshot of a typical year (which is why is an accountant would find it better than discounting).

That is the answer in principle. In practice the difference may not be so critical, depending on the figures being examined. A experiment using both approaches was carried for arabica coffee and the ratios, with the exception of the Profitability Coefficient, were of similar magnitudes in each case. Whether they would always be similar is another question, which is ducked here. It is to be expected that profits/losses and value added would be different between the two methods (because different time periods are involved), but breakeven prices are too. If much weight were placed on breakeven prices in the analysis it is clear that the approach adopted matters considerably, and here economic principles point to discounting as the more appropriate. If these prices are avoided, it may not matter.

A final point concerns sensitivity to the choice of interest rate. It might be thought that the amortization approach might be less sensitive to the choice of interest rate, which would be a practical advantage. However, profits and value added are sensitive to interest rates here too, unless there is only a year or two of establishment costs. The DRCs and other ratios (except the Profitability Coefficient) are not as sensitive to interest rate choices in either method.

Exchange rate corrections.

The over- or under-valuation of a country's exchange rate will itself cause a divergence between financial and economic prices. In general, appropriate corrections must be made. The one exception occurs in the case of tradable outputs, if the assumption is made that the economy is moving from one long run equilibrium position to another. In this case prices for all items, even domestic factors, would be adjusted by the same proportion and while the money terms would change, the various ratios, in particular the DRC, would be unaffected (see Pearson and Monke, p. 105 - 106). However, such an assumption is usually ruled out. (For example, it is not consistent with the existence of any loss or of any profit above the opportunity cost of capital).

Where corrections are necessary to the prices of tradables, there are no particular technical problems: their prices would adjust by whatever the percentage over- or under-valuation is reckoned to be. For nontradables --domestic factors of production in the case of PAMs -- the technical difficulties are severe, as a reading of the quotation below will attest. One can only fall back on observation of what has occurred to factor prices in countries where there have been devaluations, namely, a change approximating 20 or 30 percent of the total change in the value of the currency.

As if this were not enough, a decision also has to be made concerning the extent of the over- or under-valuation. The complexities in economic theory are daunting, involving elasticities of demand for imports and exports. However, a reasonable approximation can be made using recent issues of the IMF's "International Financial Statistics". This publication offers indices of "real adjusted exchange rates", where the adjustment is made from the relative movements of price indices in the country concerned and its trading partners. These are not an ideal solution, but they do offer a practicable approach which is much superior to ignoring the question of overvaluation altogether.

* * *

The following quotations are taken from J. Saul Lozondo and Peter J. Montiel, "Contractionary Devaluation in Developing Countries: An Analytical Overview", IMF Staff Papers, vol. 36, March 1989.

> "The effect of a devaluation on the demand for traded goods is clear-cut and well-known. As long as the law of one price holds and the country in question is small, the demand curve faced by its traded-goods sector is perfectly elastic and will shift up in proportion to the nominal devaluation.
>
> "Given the production technology and the stock of capital in the traded-goods sector, the domestic supply of traded goods depends on the nominal wage, the price of imported inputs, and the real interest rate measured in terms of traded goods, which affects the cost of working capital. Of these, the behavior of the nominal wage is likely to prove most important, given the substantial share of labor in production costs. The response of the nominal wage to devaluation will in general depend on the properties of labor contracts in the economy -- most important, on the degree and nature of indexation -- as well as on the parameters of labor demand, especially the sectoral allocation of the labor force and the degree of substitutability between labor and imported inputs. <u>In general, it seems reasonable to expect an increase in the nominal wage that is less than in proportion to the amount of devaluation</u>. By contrast, the price of imported inputs will rise exactly in proportion to the devaluation. Finally, if changes in external inflation are ignored and it is assumed that no further devaluation is expected, the behavior of the real interest rate in terms of traded goods will depend on the behavior of the nominal interest rate. This in turn will be heavily influenced by the substitutability between domestic and foreign interest-bearing assets, and in the event of imperfect substitutability, by various properties of asset demand functions. Although an adverse effect on traded-goods supply from higher working capital costs cannot be ruled out, the many ways in which this effect may be mitigated leads us to be skeptical of the possibility that it could result in a contraction of traded-goods output. <u>If the nominal wage rises less than in proportion to the devaluation and effects on working capital costs can be treated as being</u>

of a second order of magnitude, then the vertical shift of the demand curve for traded goods is likely to exceed that of the supply curve, and traded goods output can be expected to expand [emphasis added].

Matters are much less favorable in the case of the nontraded-goods sector. The supply-side effects of a devaluation are, as in the case of traded-goods, unambiguously negative -- the price of imported inputs will rise by the full amount of the devaluation, while the nominal wage and the nominal interest rate, as indicated above, are also likely to increase. An expansion of nontraded-goods output is to be expected only in the event of an increase in demand sufficiently strong to offset the adverse supply shift.

... Although the pure substitution effect on consumption is of course favorable, all other factors that affect consumption may -- though they need not -- work in the opposite direction. The real income effect, for example, is likely to be negative if devaluation occurs under an initial trade balance deficit and if demand for imported inputs is relatively inelastic. ... [R]eal tax payments may well rise, particularly if the public sector is a significant external debtor and relies on taxes to finance increased debt service payments. Wealth effects on consumption could also be negative, unless the private sector holds substantial assets denominated in foreign currency. The importance of changes in investment demand depends on the extent to which capital accumulation uses nontraded-goods. In any event, although a favorable effect on investment in the traded-goods sector is likely, this will be offset at least in part by a negative effect on investment in the nontraded-goods sector.

Both consumption and investment demand are dependent on the intertemporal terms of trade -- that is, on the real interest rate -- and it is here that the limitations of our analysis are most severely felt [for this rate depends on the relations between expectations, inflation, and exchange rates]. . . . We find, then, that the effects of a devaluation of the demand for nontraded goods are quite complex . . . [Furthermore, our] analysis follows the bulk of the literature on contractionary devaluation in ignoring the complications that arise in heavily distorted economics that are characterized by quantitative restrictions on trade as well as by rationing of credit, foreign exchange, or both. Such phenomena are prevalent in some developing countries and may have important implications for the effects of devaluation on the level of real economic activity. . . . Combined with the analysis presented here, this leads us to the conclusion that in the present state of our knowledge there can be no presumption as to the nature of the impact effect of a previously unanticipated devaluation on domestic macroeconomic activity in developing countries.

SUMMARY CONCLUSIONS CONCERNING THE IMPACT OF DEVALUATION[5]

1) Demand for and prices of tradable outputs
Supply and prices of tradable inputs

Both rise by the proportion of the devaluation.

2) Demand for and prices of domestic factors of production

a) Pearson and Monke start and finish with firms earning normal profits in the long run. If the prices of tradable output and inputs alter by the amount of the devaluation, then the prices of domestic factors must also.

b) Disregarding this long run situation:

Labor. To attract more labor to the export goods sector, wages will rise except where unemployment is such that sufficient additional labor is forthcoming at the current wage. On the other hand, wages will not rise by as much as the devaluation except where the supply of labor is totally inelastic. This implies not only full employment but that all industries produce export goods, for the demand for domestically consumed goods cannot be assumed to rise by as much (see below). Such a situation is possible only in limited regions for As the opportunity cost of labor varies regionally, regional variations can be expected in the extent to which wages rise after a devaluation.

c) Capital. Interest rates will also rise to attract capital to the expanding capital goods sector. How far they rise will depend on the availability of unemployed capital funds and funds from abroad (belonging to both domestic and foreign investors). As it is difficult to imagine circumstances where the supply of local as well as foreign capital funds will be perfectly inelastic, it can be concluded that the increase in interest rates will be less than the amount of the devaluation.

3) Demand for and prices of non-traded outputs

The substitution effect will be positive. The real income effect, wealth effect and tax effect will be positive in the export sector and negative in the domestic goods sector. The net result is indeterminate.

4) Profits and output in the export sector

Can be expected to rise, because though tradable input prices will go up by the amount of the devaluation, so will output prices, and domestic factor prices will increase by less.

5) Profits and output in the domestic goods sector

Indeterminate and variable: all input prices will go up and what happens to demand will vary from industry to industry.

Conclusions for PAMs

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[5]Based on thoughts from Pearson & Monke, Lozondo & Montiel, Holland, and myself:

For tradable outputs, increase the prices of the output and tradable inputs by the degree of overvaluation. Increase the prices of domestic factors by 20% to 30%.

For nontradable outputs, the same treatment of input prices. Whether output price is raised, reduced or kept the same will depend on a judgement based on whether the demand for the output is particularly influenced by sectors where incomes are growing or falling.

TABLE A ARABICA Monoculture		Financial			Economic			Difference between Totals
		Price	Disc'ted Total	Percent Total	Price	Disc'ted Total	Percent Total	
REVENUE (discounted)								
Coffee	kg	520	2,107,599	101.9	665	2,695,294	121.8	(587,696)
	Unit							
Clearing	FCFA	20,000	18,182	0.9	20,000	18,182	0.8	0
Staking	person day	800	19,636	0.9	800	19,636	0.9	0
Holing	hole	105	190,909	9.2	105	190,909	8.6	0
Plants	plant	10	18,182	0.9	10	18,182	0.8	0
Transplant	FCFA	11,970	10,882	0.5	11,970	10,882	0.5	0
Planting	person day	800	19,636	0.9	800	19,636	0.9	0
	Life (years)							
Machete	2	2,040	10,007	0.5	2,040	10,007	0.5	0
File	1	960	8,990	0.4	960	8,990	0.4	0
Hoe	2	1,680	8,241	0.4	1,680	8,241	0.4	0
Secateur	3	2,400	8,216	0.4	2,400	8,216	0.4	0
Spade	2	2,800	13,735	0.7	2,800	13,735	0.6	0
Pick	3	2,100	7,189	0.3	2,100	7,189	0.3	0
Wh'lbarrow	5	17,000	38,180	1.8	17,000	38,180	1.7	0
	Unit							
Weeding	person day	800	257,889	12.5	800	257,889	11.7	0
Pruning	2/yr/tree	7	168,746	8.2	7	168,746	7.6	0
Spread fert	application	10,000	170,271	8.2	10,000	170,271	7.7	0
Spraying	person day	1,200	256,498	12.4	1,200	[illegible]	[illegible]	0
[illegible]	kg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	sachet	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	FCFA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spray [illegible]	day	400	[illegible]	[illegible]	[illegible]	80,499	3.9	0
Subtotal, Production Costs			1,554,756	75		1,699,732	77	-144,995
Jute sacks	unit	360	24,318	1.2	360	24,318	1.1	0
Baskets	"	240	8,106	0.4	240	8,106	0.4	0
Harv. Lab.	kg cherry	6.5	144,897	7.0	6.5	144,897	6.5	0
Drying	kg cherry	0.25	5,573	0.3	0.25	5,573	0.3	0
Transport	kg cherry	3.5	78,022	3.8	3.5	78,022	3.5	0
Subtotal, Harvest			260,917	13		260,917	12	0
Total Costs less Washing			1,815,654	88		1,960,649	89	(144,995)
Pulper	10	57,500	63,428	3.1	57,500	63,428	2.9	0
Pulping	kg cherry	7	156,043	7.5	7	156,043	7.0	0
Ferment.	kg cherry	1.5	33,438	1.6	1.5	33,438	1.5	0
Subtotal, Washing			252,909	12		252,909	11	0
TOTAL COSTS (discounted)			2,068,563	100		2,213,558	100	(144,995)
PROFIT/LOSS (discounted)			39,035			481,736		(442,701)
Breakeven Price: w/o washing			449			485		
with washing			511			547		
Interest Rate (inflation adjusted)			10.0%			10.0%		
Internal Rate of Return			10.9%			19.4%		

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TABLE B

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

With Establishment Costs

Output Price	financial	520
	economic	665
Discount Rate	financial	10.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	2,107,599	226,840	1,563,467	278,256	2,068,563	39,035
Economic	2,695,294	371,835	1,563,467	278,256	2,213,558	481,736
Difference	(587,696)	(144,995)	0	0	(144,995)	(442,701)

Value Added (financial)	Rf - Tf	1,880,756
Value Added (economic)	Re - Te	2,323,459
Profitability Coefficient	Pf / Pe	0.08
Subsidy Rate to Producers	(Pf - Pe) / Re	(0.16)
Nominal Protection Coefficients		
a) Outputs	Rf / Re	0.78
b) Tradable Inputs	Tf / Te	0.61
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	0.81
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	0.96
Domestic Resource Cost Ratio	(Le + Ce) / (Re - Te)	0.79

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TABLE C. ARABICA Monoculture		Financial			Economic			Difference
		Price	Disc'ted Total	Percent Total	Price	Disc'ted Total	Percent Total	between Totals
REVENUE (discounted)								
Coffee	kg	520	3,492,322	112.9	665	2,695,294	122.5	797,028
	Unit							
Clearing	FCFA	20,000	19,046	0.6	20,000	18,182	0.8	866
Staking	person day	800	20,571	0.7	800	19,636	0.9	935
Holing	hole	105	200,000	6.5	105	190,909	8.7	9,091
Plants	plant	10	19,048	0.6	10	18,182	0.8	866
Transplant	FCFA	11,970	11,400	0.4	11,970	10,882	0.5	518
Planting	person day	800	20,571	0.7	800	19,636	0.9	935
	Life (years)							
Machete	2	2,040	13,673	0.4	2,040	10,007	0.5	3,665
File	1	960	12,562	0.4	960	8,990	0.4	3,572
Hoe	2	1,680	11,260	0.4	1,680	8,241	0.4	3,019
Secateur	3	2,400	10,983	0.4	2,400	8,216	0.4	2,767
Spade	2	2,800	18,766	0.6	2,800	13,735	0.6	5,031
Pick	3	2,100	9,610	0.3	2,100	7,189	0.3	2,421
Wh'lbarrow	5	17,000	48,934	1.6	17,000	38,180	1.7	10,754
	Unit							
Weeding	person day	800	383,553	12.4	800	257,889	11.7	125,664
Pruning	2/yr/tree	7	272,691	8.8	7	168,748	7.7	103,943
Spread fert	application	10,000	249,244	8.1	10,000	170,271	7.7	78,973
Spraying	person day	1,200	427,980	13.8	1,200	256,498	11.7	171,483
Fertilizer	[illegible]	[illegible]	[illegible]	8.3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	11,000	118,163	[illegible]	11,000	76,085	[illegible]	[illegible]
[illegible]	day	400	142,[illegible]	[illegible]	400	85,499	[illegible]	57,161
[illegible] Production Costs			2,267,737	73		[illegible]	[illegible]	[illegible]
Jute sacks	unit	360	40,296	1.3	360	24,318	1.1	15,978
Baskets	"	240	13,432	0.4	240	8,106	0.4	5,326
Harv. Lab.	kg cherry	6.5	240,097	7.8	6.5	144,897	6.6	95,200
Drying	kg cherry	0.25	9,235	0.3	0.25	5,573	0.3	3,662
Transport	kg cherry	3.5	129,283	4.2	3.5	78,022	3.5	51,261
Subtotal, Harvest			432,343	14		260,917	12	171,426
Total Costs less Washing			2,700,080	87		1,960,649	89	739,431
Pulper	10	57,500	78,954	2.6	57,500	50,473	2.3	28,481
Pulping	kg cherry	7	258,566	8.4	7	156,043	7.1	102,523
Ferment	kg cherry	1.5	55,407	1.8	1.5	33,438	1.5	21,969
Subtotal, Washing			392,927	13		239,954	11	152,973
TOTAL COSTS (discounted)			3,093,007	100		2,200,603	100	892,404
PROFIT/LOSS (discounted)			399,315			494,692		(95,376)
Breakeven Price: w/o washing			403			485		
with washing			462			544		
Interest Rate (inflation adjusted)			5.0%			10.0%		
Internal Rate of Return			11.4%			19.7%		

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TABLE D

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

With Establishment Costs

Output Price	financial	520
	economic	665
Discount Rate	financial	5.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	3,492,322	351,237	2,340,448	401,322	3,093,007	399,315
Economic	2,695,294	371,835	1,563,467	265,300	2,200,603	494,692
Difference	797,028	(20,598)	776,980	136,022	892,404	(95,376)

Value Added (financial)	Rf - Tf	3,141,085
Value Added (economic)	Re - Te	2,323,459
Profitability Coefficient	Pf / Pe	0.81
Subsidy Rate to Producers	(Pf - Pe) / Re	(0.04)
Nominal Protection Coefficients		
a) Outputs	Rf / Re	1.30
b) Tradable Inputs	Tf / Te	0.94
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	1.35
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	0.87
Domestic Resource Cost Ratio	(Le + Ce) / (Re - Te)	0.79

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TABLE E ARABICA Monoculture		Financial			Economic			Difference
		Price	Disc'ted Total	Percent Total	Price	Disc'ted Total	Percent Total	between Totals
REVENUE (discounted)								
Coffee	kg	250	1,679,001	54.3	350	1,418,576	64.5	260,425
	Unit							
Clearing	FCFA	20,000	19,046	0.6	20,000	18,182	0.8	866
Staking	person day	800	20,571	0.7	800	19,636	0.9	935
Holing	hole	105	200,000	6.5	105	190,909	8.7	9,091
Plants	plant	10	19,046	0.6	10	18,182	0.8	866
Transplant	FCFA	11,970	11,400	0.4	11,970	10,882	0.5	518
Planting	person day	800	20,571	0.7	800	19,636	0.9	935
	Life (years)							
Machete	2	2,040	13,673	0.4	2,040	10,007	0.5	3,665
File	1	960	12,562	0.4	960	8,990	0.4	3,572
Hoe	2	1,680	11,260	0.4	1,680	8,241	0.4	3,019
Secateur	3	2,400	10,983	0.4	2,400	8,216	0.4	2,767
Spade	2	2,800	18,766	0.6	2,800	13,735	0.6	5,031
Pick	3	2,100	9,610	0.3	2,100	7,189	0.3	2,421
Wh'lbarrow	5	17,000	48,934	1.6	17,000	38,180	1.7	10,754
	Unit							
Weeding	person day	800	383,553	12.4	800	257,889	11.7	125,664
Pruning	2/yr/tree	7	272,691	8.8	7	168,748	7.7	103,943
Spread fert	application	10,000	249,244	8.1	10,000	170,271	7.7	78,973
Spraying	person day	1,200	427,980	[illegible]	[illegible]	[illegible]	11.7	171,483
Fertilizer	kg	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	34,315
[illegible]	[illegible]			[illegible]		[illegible]		(51,300)
[illegible]	[illegible]			[illegible]	140	38,742	[illegible]	(38,742)
[illegible]	FCFA	[illegible]	[illegible]	[illegible]	[illegible]	78,095	[illegible]	42,068
[illegible]	day	[illegible]	[illegible]	[illegible]	400	85,499	[illegible]	[illegible]
Subtotal, [illegible] Costs			[illegible]	73		1,699,732	77	568,005
Jute sacks	unit	360	40,296	1.3	360	24,318	1.1	15,978
Baskets	"	240	13,432	0.4	240	8,106	0.4	5,326
Harv. Lab.	kg cherry	6.5	240,097	7.8	6.5	144,897	6.6	95,200
Drying	kg cherry	0.25	9,235	0.3	0.25	5,573	0.3	3,662
Transport	kg cherry	3.5	129,283	4.2	3.5	78,022	3.5	51,261
Subtotal, Harvest			432,343	14		260,917	12	171,426
Total Costs less Washing			2,700,080	87		1,960,649	89	739,431
Pulper	10	57,500	78,954	2.6	57,500	50,473	2.3	28,481
Pulping	kg cherry	7	258,566	8.4	7	156,043	7.1	102,523
Ferment	kg cherry	1.5	55,407	1.8	1.5	33,438	1.5	21,969
Subtotal, Washing			392,927	13		239,954	11	152,973
TOTAL COSTS (discounted)			3,093,007	100		2,200,603	100	892,404
PROFIT/LOSS (discounted)			(1,414,006)			(782,027)		(631,979)
Breakeven Price: w/o washing			403			485		
with washing			462			544		
Interest Rate (inflation adjusted)			5.0%			10.0%		
Internal Rate of Return			#DIV/0!			#DIV/0!		

APAMF.XLS - 1/26/90

TABLE F

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

With Establishment Costs

Output Price	financial	250
	economic	350
Discount Rate	financial	5.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	1,679,001	351,237	2,340,446	401,322	3,093,007	(1,414,006)
Economic	1,418,576	371,835	1,563,467	265,300	2,200,603	(782,027)
Difference	260,425	(20,598)	776,980	136,022	892,404	(631,979)

Value Added (financial)	Rf - Tf	1,327,764
Value Added (economic)	Re - Te	1,046,741
Profitability Coefficient	Pf / Pe	1.81
Subsidy Rate to Producers	(Pf - Pe) / Pe	(0.45)
Nominal Protection Coefficients		
a) Outputs	Rf / Re	1.18
b) Tradable Inputs	Tf / Te	0.94
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	1.27
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	2.66
Domestic Resource Cost Ratio	(Le + Ce) / (Re - Te)	1.75

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TABLE G ARABICA Monoculture Established		Financial			Economic			Difference
		Price	Total Value	Percent Total	Price	Total Value	Percent Total	between Totals
Revenue								
Coffee	kg	520	390,000	141.4	457	342,750	112.9	47,250
	Life (years)							
Machete	2	2,040	1,175	0.4	2,040	1,175	0.4	0
File	1	960	1,056	0.4	960	1,056	0.3	0
Hoe	2	1,680	968	0.4	1,680	968	0.3	0
Secateur	3	2,400	965	0.3	2,400	965	0.3	0
Spade	2	2,800	1,613	0.6	2,800	1,613	0.5	0
Pick	3	2,100	844	0.3	2,100	844	0.3	0
Wh'lbarrow	5	17,000	4,485	1.6	17,000	4,485	1.5	0
Weeding	person day	800	32,000	11.6	800	32,000	10.5	0
Pruning	2/yr/tree	7	28,000	10.2	7	28,000	9.2	0
Spread fert	application	10,000	20,000	7.3	10,000	20,000	6.6	0
Spraying	person day	1,200	48,000	17.4	1,200	48,000	15.8	0
Fertilizer	kg	42.5	17,000	6.2	70	28,000	9.2	(11,000)
Duroban	liter	0	0	0.0	4,800	9,600	3.2	(9,600)
Ortho.	sachet	0	0	0.0	145	7,250	2.4	(7,250)
Org. fert	FCFA	11,000	11,000	4.0	11,000	11,000	3.6	0
Spray rent	day	400	16,000	5.8	400	16,000	5.3	0
Subtotal Financial Costs			183,107	66		210,957	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	4,500	[illegible]	[illegible]	4,500	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	1,500	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	28,313	[illegible]	[illegible]	[illegible]		
[illegible]	kg cherry	[illegible]	1,031	[illegible]	[illegible]	[illegible]		
[illegible]sport	kg cherry	3.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0
Subtotal, Harvest			48,281	16		48,281	16	0
Tot. Costs less Washing			231,388	84		259,238	85	(27,850)
Pulper	10	57,500	9,358	3.4	57,500	9,358	3.1	0
Pulping	kg cherry	7	28,875	10.5	7	28,875	9.5	0
Ferment	kg cherry	1.5	6,188	2.2	1.5	6,188	2.0	0
Subtotal, Washing			44,420	16		44,420	15	0
TOTAL COSTS			275,808	100		303,658	100	(27,850)
PROFIT/LOSS			114,192			39,092		
Breakeven Price: w/o washing			309			346		
with washing			368			405		
Interest Rate (inflation adjusted)			10.0%			10.0%		

TABLE H

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

Without Establishment Costs

Output Price	financial	520
	economic	457
	financial	10.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	390,000	26,813	207,219	41,777	275,808	114,192
Economic	342,750	54,663	207,219	41,777	303,658	39,092
Difference	47,250	(27,850)	0	0	(27,850)	75,100

Value Added (financial)	Rf - Tf	363,188
Value Added (economic)	Re - Te	288,088
Profitability Coefficient	Pf / Pe	2.92
Subsidy Rate to Producers	(Pf - Pe) / Re	0.22
Nominal Protection Coefficients		
a) Outputs	Rf / Re	1.14
b) Tradable Inputs	Tf / Te	0.49
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	1.26
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	0.69
Domestic Resource Cost Ratio	(Le + Ce) / (Re - Te)	0.86

TABLE I ARABICA Monoculture Established		Financial			Economic			Difference
		Price	Total Value	Percent Total	Price	Total Value	Percent Total	between Totals
Revenue								
Coffee	kg	250	187,500	68.7	350	262,500	86.4	(75,000)
	Life (years)							
Machete	2	2,040	1,097	0.4	2,040	1,175	0.4	(78)
File	1	960	1,008	0.4	960	1,056	0.3	(48)
Hoe	2	1,680	904	0.3	1,680	968	0.3	(64)
Secateur	3	2,400	881	0.3	2,400	965	0.3	(84)
Spade	2	2,800	1,506	0.6	2,800	1,613	0.5	(107)
Pick	3	2,100	771	0.3	2,100	844	0.3	(73)
Wh'lbarrow	5	17,000	3,927	1.4	17,000	4,485	1.5	(558)
Weeding	person day	800	32,000	11.7	800	32,000	10.5	0
Pruning	2/yr/tree	7	28,000	10.3	7	28,000	9.2	0
Spread fert	application	10,000	20,000	7.3	10,000	20,000	6.6	0
Spraying	person day	1,200	48,000	17.6	1,200	48,000	15.8	0
Fertilizer	kg	42.5	17,000	6.2	70	28,000	9.2	(11,000)
Duroban	liter	0	0	0.0	4,800	9,600	3.2	(9,600)
Ortho.	sachet	0	0	0.0	145	7,250	2.4	(7,250)
Org. fert	FCFA	11,000	11,000	4.0	11,000	11,000	3.6	0
Spray rent	day	400	16,000	5.9	400	16,000	5.3	0
Subtotal, Production Costs			[illegible]	[illegible]		210,957	69	(28,863)
[illegible]	[illegible]	[illegible]	4,500	1.5	[illegible]	4,500	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	1,500	0.5	[illegible]	1,500	[illegible]	[illegible]
[illegible]	kg cherry	[illegible]	[illegible]	9.8	6.5	[illegible]	[illegible]	[illegible]
[illegible]	kg cherry	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Transport	kg cherry	[illegible]	14,438	5.3	3.5	14,438	4.8	[illegible]
Subtotal, Harvest			48,281	18		48,281	16	0
Tot. Costs less Washing			230,375	84		259,238	85	(28,863)
Pulper	10	57,500	7,447	2.7	57,500	9,358	3.1	(1,911)
Pulping	kg cherry	7	28,875	10.6	7	28,875	9.5	0
Ferment	kg cherry	1.5	6,188	2.3	1.5	6,188	2.0	0
Subtotal, Washing			42,509	16		44,420	15	(1,911)
TOTAL COSTS			272,884	100		303,658	100	(30,775)
PROFIT/LOSS			(85,384)			(41,158)		
Breakeven Price: w/o washing			307			346		
with washing			364			405		
Interest Rate (inflation adjusted)			5.0%			10.0%		

TABLE J

POLICY ANALYSIS MATRIX - Arabica Coffee, Monoculture

Without Establishment Costs

Output Price	financial	250
	economic	350
	financial	5.0%
	economic	10.0%
Max. Yield		750

	Revenue	Tradables	Labor	Capital	Tot. Cost	Profit
Financial	187,500	26,813	207,219	38,853	272,884	(85,384)
Economic	262,500	54,663	207,219	41,777	303,658	(41,158)
Difference	(75,000)	(27,850)	0	(2,925)	(30,775)	(44,225)

Value Added (financial)	Rf - Tf	160,688
Value Added (economic)	Re - Te	207,838
Profitability Coefficient	Pf / Pe	2.07
Subsidy Rate to Producers	(Pf - Pe) / Re	-0.17
Nominal Protection Coefficients		
a) Outputs	Rf / Re	0.71
b) Tradable Inputs	Tf / Te	0.49
Effective Protection Coefficient	(Rf - Tf) / (Re - Te)	0.77
Private Cost Ratio	(Lf + Cf) / (Rf - Tf)	1.53
Domestic Resource Cost Ratio	(Le + Ce) / (Re - Te)	1.20

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	A	B	C	D	E	F	G	H
1	TABLE K	**ARABICA / Monoculture**						
2		Financial		Disc'ted	Percent			
3			Price	Total	Tot. Costs	Tradables	Labor	Capital
4	REVENUE (discounted)							
5	Coffee	kg	520	3,492,322	112.9			
6		Unit						
7	Clearing	FCFA	20,000	19,049	0.6		19,049	
8	Staking	person day	800	20,571	0.7		20,571	
9	Holing	hole	105	200,000	6.5		200,000	
10	Plants	plant	10	19,048	0.6	6,349	6,349	6,349
11	Trspt plants	FCFA	11,970	11,400	0.4		11,400	
12	Planting	person day	800	20,571	0.7		20,571	
13		Life (years)						
14	Machete	2	2,040	13,673	0.4			13,673
15	File	1	969	12,562	0.4			12,562
16	Hoe	2	1,680	11,260	0.4			11,260
17	Secateur	2	2,400	10,983	0.4			10,983
18	Spade	2	2,800	18,766	0.6			18,766
19	Pick	2	2,100	9,910	0.3			9,910
20	Wheelbarrow	5	17,000	48,934	1.6			48,934
21		Unit						
22	Weeding	person day	800	383,553	12.4		383,553	
23	Pruning	2/yr/tree	7	272,691	8.8		272,691	
24	Spread fert	application	10,000	249,244	8.1		249,244	
25	Spraying	person day	1,200	427,398	13.8		427,398	
26	Fertilizer	kg	531	257,020	8.3	257,020		
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
28	[illegible]	[illegible]						
29	[illegible]	FCFA	[illegible]	[illegible]				
30	Spray rent	day	400	[illegible]	[illegible]			
31	Subtotal: Fertilization Costs			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	Jute sacks	unit	380	49,296		[illegible]		
33	Baskets	"	240	13,402	0.4	4,477	4,477	4,477
34	Harv. Lab	kg cherry	6.5	240,097	7.8		240,097	
35	Drying	kg cherry	0.25	9,235	0.3		9,235	
36	Transport	kg cherry	3.5	129,283	4.2	43,094	43,094	43,094
37	Subtotal: Harvest			432,343	14	87,869	296,903	47,572
38	Total Costs less washing			2,700,080	87	351,237	2,026,474	322,368
39	Pulper	10	57,500	78,954	2.6			78,954
40	Pulping	kg cherry	7	258,566	8.4		258,566	
41	Ferment.	kg cherry	1.5	55,407	1.8		55,407	
42	Subtotal: Washing			392,927	13	0	313,973	78,954
43	TOTAL COSTS (discounted)			3,093,007	100	351,237	2,340,449	401,322
44	PROFIT/LOSS (discounted)			399,315				
45	Breakeven Price: w/o washing			403				
46	with washing			462				
47	Interest Rate (inflation adjusted)			5.0%				
48	Internal Rate of Return			11.4%				

	J	K	L	M	N	O	P	Q	R	S
1										
2	Year	1	Year	2	Year	3	Year	4	Year	5
3	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
4			%	max yield	0.14		0.43		0.64	
5		0		0	105	54,600	323	167,700	480	249,600
6										
7	1	20,000		0		0		0		
8	27	21,600		0		0		0		
9	2,000	210,000		0		0		0		
10	2,000	20,000		0		0		0		
11	1	11,970		0		0		0		
12	27	21,600		0		0		0		
13										
14		1,097		1,097		1,097		1,097		1,097
15		1,008		1,008		1,008		1,008		1,008
16		904		904		904		904		904
17		881		881		881		881		881
18		1,506		1,506		1,506		1,506		1,506
19		771		771		771		771		771
20		3,927		3,927		3,927		3,927		3,927
21										
22	20	16,000	40	32,000	40	32,000	40	32,000	40	32,000
23		0		0		0	4000	28,000	4,000	28,000
24	2	20,000	2	20,000	2	20,000	2	20,000	2	20,000
25		0		0		0		0	40	48,000
26			200	11,600	300	17,400	400	23,200	400	23,200
27				0						
28										
29										
30										
31		357,063		78,693		[illegible]		[illegible]		[illegible]
32	0	0	0	0	2	[illegible]	[illegible]	[illegible]		[illegible]
33	0	0	0	0	1	210	3	645	4	960
34	0	0	0	0	578	3,754	1,774	11,529	2,640	17,160
35	0	0	0	0	578	144	1,774	443	2,640	660
36	0	0	0	0	578	2,021	1,774	6,208	2,640	9,240
37		0		0		6,759		20,761		30,900
38		357,063		78,693		94,253		144,554		219,193
39		0		0		7,447		7,447		7,447
40	0	0	0	0	578	4,043	1,774	12,416	2,640	18,480
41	0	0	0	0	578	866	1,774	2,661	2,640	3,960
42		0		0		12,355		22,523		29,887
43		357,063		78,693		106,608		167,078		249,080
44	Undisc'd	(357,063)		(78,693)		(52,008)		622		520
45										
46										
47	5.0%	0.952381		0.9070295		0.8638376		0.8227025		0.7835262
48										

	T	U	V	W	X	Y	Z	AA	AB	AC
1										
2	Year	6	Year	7	Year	8	Year	9	Year	10
3	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
4	0.00		0.00		1		1		1	
5	645	335,400	698	362,700	750	390,000	750	390,000	750	390,000
6										
7										
8										
9										
10										
11										
12										
13										
14		1,097		1,097		1,097		1,097		1,097
15		1,008		1,008		1,008		1,008		1,008
16		904		904		904		904		904
17		881		881		881		881		881
18		1,506		1,506		1,506		1,506		1,506
19		771		771		771		771		771
20		3,927		3,927		3,927		3,927		3,927
21										
22	40	32,000	40	32,000	40	32,000	40	32,000	40	32,000
23	4,000	28,000	4,000	28,000	4,000	28,000	4,000	28,000	4,000	28,000
24	2	20,000	2	20,000	2	20,000	2	20,000	2	20,000
25	40	48,000	40	48,000	40	48,000	40	48,000	40	48,000
26	400	23,200	-		400	23,200	400	23,200	400	23,200
27										
28										
29										
30										
31										
32	1	[illegible]	12	4,185	13	4,500	13	1,500	[illegible]	[illegible]
33	5	1,290	6	1,395	6	1,500	6	1,500	6	1,500
34	3,548	23,059	3,836	24,936	4,125	26,813	4,125	26,813	4,125	26,813
35	3,548	887	3,836	959	4,125	1,031	4,125	1,031	4,125	1,031
36	3,548	12,416	3,836	13,427	4,125	14,438	4,125	14,438	4,125	14,438
37		41,522		44,902		48,281		48,281		48,281
38		229,815		233,195		236,575		236,575		236,575
39		7,447		7,447		7,447		7,447		7,447
40	3,548	24,833	3,836	26,854	4,125	28,875	4,125	28,875	4,125	28,875
41	3,548	6,321	3,836	5,754	4,125	6,188	4,125	6,188	4,125	6,188
42		37,600		40,055		42,509		42,509		42,509
43		267,416		273,250		279,084		279,084		279,084
44		67,984		89,450		110,916		110,916		110,916
45										
46										
47		0.7492154		0.7106812		0.6769394		0.6446089		0.6139133
48										

	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM
1										
2	Year	11	Year	12	Year	13	Year	14	Year	15
3	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
4										
5	750	390,000	750	390,000	750	390,000	750	390,000	750	390,000
6										
7										
8										
9										
10										
11										
12										
13										
14		1,097		1,097		1,097		1,097		1,097
15		1,008		1,008		1,008		1,008		1,008
16		904		904		904		904		904
17		881		881		881		881		881
18		1,506		1,506		1,506		1,506		1,506
19		771		771		771		771		771
20		3,927		3,927		3,927		3,927		3,927
21										
22	40	32,000	40	32,000	40	32,000	40	32,000	40	32,000
23	4,000	28,000	4,000	28,000	4,000	28,000	4,000	28,000	4,000	28,000
24	2	20,000	2	20,000	2	20,000	2	20,000	2	20,000
25	40	48,000	40	48,000	40	48,000	40	48,000	40	48,000
26	400	23,200	400	23,200	[illegible]	[illegible]	400	23,200	400	23,200
27	[illegible]	[illegible]							2	0
28	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	16,000	[illegible]	16,000
31		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
32	[illegible]	4,500	[illegible]	4,500	13	4,500	13	4,500	13	4,500
33	6	1,500	6	1,500	6	1,500	6	1,500	6	1,500
34	4,125	26,813	4,125	26,813	4,125	26,813	4,125	26,813	4,125	26,813
35	4,125	1,031	4,125	1,031	4,125	1,031	4,125	1,031	4,125	1,031
36	4,125	14,438	4,125	14,438	4,125	14,438	4,125	14,438	4,125	14,438
37		48,281		48,281		48,281		48,281		48,281
38		236,575		236,575		236,575		236,575		236,575
39		7,447		7,447		7,447		7,447		7,447
40	4,125	28,875	4,125	28,875	4,125	28,875	4,125	28,875	4,125	28,875
41	4,125	6,188	4,125	6,188	4,125	6,188	4,125	6,188	4,125	6,188
42		42,509		42,509		42,509		42,509		42,509
43		279,084		279,084		279,084		279,084		279,084
44		110,916		110,916		110,916		110,916		110,916
45										
46										
47		0.5846793		0.5568374		0.5303214		0.505068		0.4810171
48										

	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
1										
2	Year	16	Year	17	Year	18	Year	19	Year	20
3	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
4	1		1		1		1		1	
5	750	390,000	750	390,000	750	390,000	750	390,000	750	390,000
6										
7										
8										
9										
10										
11										
12										
13										
14		1,097		1,097		1,097		1,097		1,097
15		1,008		1,008		1,008		1,008		1,008
16		904		904		904		904		904
17		881		881		881		881		881
18		1,506		1,506		1,506		1,506		1,506
19		771		771		771		771		771
20		3,927		3,927		3,927		3,927		3,927
21										
22	40	32,000	40	32,000	40	32,000	40	32,000	40	32,000
23	4,000	28,000	4,000	28,000	4,000	28,000	4,000	28,000	4,000	28,000
24	2	20,000	2	20,000	2	20,000	2	20,000	2	20,000
25	40	49,000	40	49,000	40	49,000	40	49,000	40	49,000
26	400	23,200	400	23,200	400	23,200	[illegible]	[illegible]	[illegible]	23,200
27	2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	40	16,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40	16,000
31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	13	4,500	[illegible]	4,500	[illegible]	4,500	13	4,500	13	4,500
33	6	1,500	6	1,500	6	1,500	6	1,500	6	1,500
34	4,125	26,813	4,125	26,813	4,125	26,813	4,125	26,813	4,125	26,813
35	4,125	1,031	4,125	1,031	4,125	1,031	4,125	1,031	4,125	1,031
36	4,125	14,438	4,125	14,438	4,125	14,438	4,125	14,438	4,125	14,438
37		48,281		48,281		48,281		48,281		48,281
38		236,575		236,575		236,575		236,575		236,575
39		7,447		7,447		7,447		7,447		7,447
40	4,125	28,875	4,125	28,875	4,125	28,875	4,125	28,875	4,125	28,875
41	4,125	6,188	4,125	6,188	4,125	6,188	4,125	6,188	4,125	6,188
42		42,509		42,509		42,509		42,509		42,509
43		279,084		279,084		279,084		279,084		279,084
44		110,916		110,916		110,916		110,916		110,916
45										
46										
47		0.4581115		0.4362367		0.4155207		0.395734		0.3768895
48										

ANNEX B

SOURCES

The production costs in this report are taken from the Coffee Sub-sector Study, Cameroon, by William E. Scott and Kenneth C. Wilson of Agland Investment Services, November 1988, financed by the African Development Bank. They in turn drew on a 1983 report by Moreau for UCCAO.

The main difference between the production model used in this report and the Moreau/UCCAO model is in how account is taken of the long life span of coffee trees. The Moreau approach is to define costs for a typical year when the plantation is in full production. Establishment costs incurred during the first four years when there is no output are added up and converted to an annual figure, "amortized establishment costs", which is then treated as one of the annual costs. The approach in this report is to define a separate set of costs for each year for 20 years and then discount them to the present. The reasons for folloiwng this latter approach are explained in Annex A.

Cost figures were taken from the Agland study without modification, except where the sources were as follows:

- wheelbarrows: production cost data collected for robusta and cocoa by the EAMI project.

- fertilizer: USAID records on the Fertilizer Sub-Sector Reform Program. Prices apply to 1988/89.

- pulper: current price for a small pulper in Bamenda

- coffee prices: producer prices - ONCPB
  economic prices - calculated from ONCPB bareme, as shown in accompanying table

- interest rates: See Annex A for the principles applied in choosing appropriate rates. An economic rate of 10% would seem to be appropriate for a country at Cameroon's level of development. The choice of financial interest rate is more problematic. Here the starting point is 12%, which is around the rate at which funds for investment are available to farmers from credit unions. That has been corrected to allow for future inflation, which was assumed to be about 6.5%, so arriving at 5%. Those who think this is too low a figure can look at the tables where 10% is used for the financial as well as the economic rate, though they must remember to add their their assumed inflation rate on to that to obtain the nominal rate paid by farmers.

A word should be said about the rates charged by tontines. These informal credit organizations are often sources of funds for many people in Cameroon, including farmers. The rates of interest charged are commonly very much higher than 12% per year. It is not necessary to carry out the calculations to know that coffe production, or any other medium or long run investment, would be unprofitable if the farmer's opportunity cost of capital were reflected by tontine rates. For this very reason, while tontine funds might be used to finance a substantial investment (e.g. establishing a coffee plantation) for a short period, or a small investment (e.g. a wheelbarrow) for a somewhat longer period, farmers could not use them for a large investment over several years and make money. Hence they would not be a good indicator of farmers' overall opportunity cost of capital.