The Impact of Coffee Price Changes on Rural Households in Uganda

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1.   Introduction

In Uganda, as in much of Sub-Saharan Africa, poverty is predominantly a rural phenomenon. Throughout the 1990s, more than 90 percent of the country's poor lived in rural areas (Appleton 2001b). Since agriculture accounts for a large share of income for most rural households, policies and external shocks that affect agriculture can be expected to have a significant impact on rural poverty. This is particularly true for the enormous coffee price fluctuations over the 1990s, which arguably have been a main factor behind the evolution of the Ugandan economy. In this paper, we therefore analyze the association between the changes in coffee prices and household incomes.

The paper first provides a short overview of the existing literature, focusing on the transmission of world price changes to domestic markets, and on how strongly such price changes might affect the income situation of different household groups. Based on three surveys that cover the 1990s, we will then investigate in much more detail than previous studies how rural households fared in presence of fluctuating coffee prices.

2.   A Selected Review of the Literature

2.1 Price Changes and Price Transmission

In the course of the 1990s, Ugandan farmers were confronted with pronounced changes in coffee prices. World prices went up dramatically in the first half of the 1990s, more than doubling between 1992/93 and 1994/95. The surge in world prices coincided with a radical liberalization of the coffee market, which included, for instance, the complete withdrawal of the state from marketing, abolishment of minimum prices, and a removal of the export tax. To preserve macroeconomic stability during the boom phase, the Ugandan government introduced a coffee stabilization tax, which came into force in late 1994 (Henstridge and Kasakende 2001). The tax was set at 20 percent on coffee export earnings above a threshold of U Sh 1100 per kilogram, and 40 percent on receipts above U Sh 2200 per kilogram.

Prior to market liberalization, the coffee sector had been taxed both explicitly and implicitly. Explicitly, the government levied an export tax at a rate ranging between 40 and 100 percent. An additional implicit tax burden resulted from fixing producer prices at 20 percent of the export price (Fafchamps et al. 2003). As a consequence of the reforms, farmers received a markedly higher share of world market prices, e.g. about 75 percent in fiscal year 1998/99, which reinforced the effect of the coffee price boom. A cointegration analysis by Krivinos (2004) reveals that coffee market liberalization induced a closer relationship between producer prices and world market prices. By estimating an error-correction model, Krivinos also finds that after the reforms domestic prices adjusted faster to world price changes than they did prior to the reforms.

Finally, the coffee price boom started to be reversed in 1996/97. Coffee prices reached a trough in 2001/02, when they fell below the levels of the early 1990s. Concerning the impact of this reversal on producer prices, Krivinos (2004) does not find evidence of asymmetries in the way positive and negative international price changes are transmitted to the domestic market.

Fafchamps et al. (2003) take a more disaggregated view by examining the transmission of international coffee prices through the domestic value chain, with coffee growers, traders and exporters identified as the main market participants. Their most significant finding is that fluctuations in international prices are not fully reflected in the prices received by coffee farmers. This is mainly attributed to the fact that producers are more likely to sell at the farm gate rather than at the nearest market when prices go up, thereby lowering the price they actually receive (Fafchamps and Hill 2005).

2.2 Impact of Price Changes on Households

Deininger and Okidi (2003) investigate the impact of coffee price changes on per capita incomes and poverty for a panel of about 1200 households that spans the 1992-2000 period. Their regression analysis reveals that the elasticity of both income growth and poverty reduction is high with respect to coffee prices. A simulated 10 percent price increase for coffee is found to result in a marked reduction of the poverty headcount by about 6 percentage points. Deininger and Okidi's general

conclusion that the coffee sector plays an important role for the evolution of poverty is corroborated in a descriptive analysis by Kappel et al. (2005). Based on a classification of Ugandan districts into coffee and non-coffee districts, Kappel et al. find that coffee districts contributed more than non-coffee districts to the overall poverty reduction between 1992/93 and 1999/2000, and that they also contributed slightly more to the recent poverty increase.

Apart from these two survey-based studies, several authors have used Computable General Equilibrium (CGE) models to assess the impact of coffee price changes on representative Ugandan household groups. Employing a static version of the standard IFPRI CGE model that accounts for limited transmission of prices from world markets to domestic producers, and distinguishing 9 household groups (farmers in 6 agro-climatic zones, non-farm rural, urban poor, urban non-poor), Dorosh et al. (2003) simulate the effects of a 60 percent decline in the world price of coffee along with a 20 percent decline in coffee production, thereby approximating the actual price and quantity changes over the period 1998/99 to 2000/01. They find that in response to this large negative external shock Uganda's real exchange rate depreciates by more than 10 percent. Farmers in all six agro-climatic zones incur real income losses, with the largest decline (about 8 percent) in the major coffee-producing Lake Victoria region, but with a 3 percent decline even in the non-coffee-producing northern zone because of the fall in prices of non-traded food crops. In addition, rural non-farm households and the urban poor, who earn their living mainly from occupations with a low trade orientation, suffer income losses that amount to 4 and 2 percent, respectively. Real incomes of the urban non-poor increase, by contrast, as the real exchange rate depreciation tends to raise the producer prices and output of textiles and other manufactured goods, leading to higher returns to capital and skilled labor.

Chant et al. (2004) examine the short and medium-run impact of the 1994-95 coffee boom on 6 different household groups (farmers, farm wage labor, rural non-farm, urban wage labor, urban self-employed, urban unemployed). In doing so, they make use of a conventional recursive-dynamic CGE model. Their most striking result is that less than halve of the simulated short-run welfare

gains in the order of 7 percent (measured as changes in the Equivalent Variation) accrue to farm households. This is because, on balance, urban households benefit strongly from an enormous real appreciation (68 percent in the peak year 1994). After the boom, welfare gains drop to about 1 percent, and the distribution of remaining gains shifts back in favor of rural households. The analysis thus points to a large albeit temporary impact of the coffee boom on household welfare, but the results have to be taken cautiously as some features of the model, e.g. the assumption of full price transmission, appear to be excessively stylized.

Overall, the existing empirical evidence tentatively suggests that the pronounced shifts in coffee prices during the 1990s have had a sizeable impact on poor households, and that the impact may not have been confined to coffee growers. Making extensive use of survey information, the subsequent analysis aims to refine, and possibly qualify, this broad picture.

3.   The Coffee Price Shock and its Transmission to Ugandan Producers

The three surveys on which our analysis is based cover one period preceding the coffee boom (1992/93), one period right after the boom (1995/96), when world market prices for Robusta coffee had already dropped quite substantially, and a later period (1999/00) that follows a further significant decline in world market prices. This enables us to capture the impact of both upward and downward price movements.

Figure 1 shows for each of the survey periods how world market prices relate to farm-gate selling prices and the prices coffee producers can fetch in local markets. Our results largely corroborate the findings of Fafchamps et al. (2003). A comparison of the three surveys suggests that prices received by farmers respond to changes in international prices, where the rather steep increase in producer prices between 1992/93 and 1995/96 has to be interpreted as a combined response to the coffee price boom and the domestic price liberalization. In 1992 Ugandan Shillings, farm-gate prices fluctuated around 200 USh in 1992/93, then rose to around 500 USh in 1995/96, and fell again to around 330 USh in 1999/00.

The price movements within individual survey periods point to lags in the transmission process. A continuous drop in world market prices from more than US\$ 3 to about US\$ 2 per kilogram during 1995, for example, was followed by markedly falling domestic producer prices only in early 1996, and the falling international price during the third survey period was not associated with any discernible domestic price trend.

Furthermore, price transmission does not seem to be complete. Since the changes between the first and second survey are "contaminated" by the price liberalization, this can most directly be seen by comparing the second and third survey. While in 1995/96 farmers received less than a quarter of the world market price, the share rose to about one third over the 1999/00 period. Analogous to what Fafchamps et al. (2003) found for rising world market prices, this lack of price transmission may reflect that producers are more likely to sell their coffee at local markets when prices go down, thereby fetching higher prices than at the farm gate.

4. Impact on households

In the subsequent analysis, we try to capture the combined poverty impact of both coffee price changes on international markets and the effect of the liberalization of the Ugandan coffee market. To set the stage for more detailed household-specific considerations, Table 1 presents the nation-wide evolution of poverty, excluding Kampala, Uganda's main urban agglomeration. All three measures of the Foster-Greer-Thorbecke group point to a substantial poverty reduction in the course of the 1990s, which accelerated in the second halve of the decade.

4.1 How different households fared

Table 2, which provides a more disaggregated view on the evolution of the poverty headcount, reveals two main things: first, starting from roughly equal headcount ratios in 1992, non-coffee farmers were markedly less successful in reducing poverty than coffee farmers and farmers with some coffee. While the dramatic improvements for coffee farmers in the early 1990s are consistent with rising coffee prices, the poverty of coffee farmers continues to go down between 1995 and

1999 despite falling prices (see below for possible explanations). Second, in striking contrast to all three farm households, non-agricultural households experienced a worsening of their poverty situation over the period 1995-1999. The shifts in population shares shown in Table 2 suggest that this mainly reflects the migration of non-coffee farmers, who are on average much poorer than non-agricultural households, into low-paying non-farm activities. Table 2 also shows that the share of farmers growing at least some coffee production rose substantially between 1992 and 1995 – it more than doubled for the less specialized group of farmers with some coffee – and stayed at the higher level until 1999. This provides some preliminary evidence that the rise in coffee prices may have led to a positive supply response.

To understand more clearly how different groups of coffee farmers fared in presence of fluctuating prices, we additionally rank the coffee households according to their degree of specialization and their size in terms of coffee production. Looking at the degree of specialization (Table 3), it turns out that in 1992, and still after the price increase until 1995, the households most dependent on coffee exhibited the highest incidence of poverty. The picture changed markedly in 1999, where only a few large and comparably rich farmers earned more than 80 percent of their agricultural income from growing coffee despite falling prices. This is consistent with the fact that the number of large farms in terms of coffee production more than doubled over the 1990s, and that the mean production of these firms also increased remarkably (Table 4). Unlike the degree of specialization, the size of farms appears to be negatively associated with poverty incidence in all three survey periods.

4.2 Coffee farmers' supply response

Regarding the evolution of coffee production, 1992 and 1995 should not be compared because of large differences in the survey design, while 1995 and 1999 are more readily comparable. The data show a massive expansion of coffee production across all farm sizes, which may at least partly explain why coffee households could raise their living standards in a phase of falling prices. In combination with the rising share of coffee farmers, this dramatic production increase also provides

an indication that farmers have indeed responded to the coffee price boom, with the delay in production maybe reflecting the time that has to pass between planting and harvesting.

The supply response to which these observations point can have come about via changing yields for a given set of inputs and/or via changes in input use. We are not able to draw any conclusions concerning possible yield improvements based on the information given in the surveys. Among the inputs used, we can say something about the area planted with coffee, which is obviously a key determinant of production. As shown in Table 5, the overall land size is larger for coffee farmers than for farmers with some coffee and non-coffee farmers. In contrast to a commonly held view in Uganda the data do not point to a general decline in plot sizes. As concerns the size of coffee plantations, we find that over the period 1995-1999 coffee farmers have extended the area planted when measured at the mean. The same is true for farmers with some coffee when measured at the median. Due to a lack of data for 1992, a comparison between 1992 and 1995, where a fairly strong expansion of coffee areas could have taken place, cannot be made.

Unfortunately, there is very little information on other agricultural inputs in the 1995/96 survey. Actually, only hired farm labor turns out to be an agricultural input that is comparable across the three surveys, but the data appears to be severely contaminated by changes in survey design between 1992/93 and 1995/96. Yet, there is some evidence that in the second half of the 1990s more permanently hired labor was used in agriculture, and disproportionately so by coffee farmers.

4.3 Consumption smoothing

Increases in production are not the only possible explanation for the observation that coffee farmers could reduce poverty with falling coffee prices after 1995. They might also have responded by selling assets in order to smooth consumption. Table 6 provides a first piece of evidence that points to the relevance of consumption smoothing. The share of farmers owning cattle, arguably the asset that can most readily be sold, increased over the period 1995-1999 for all three farm households, but less so for both groups of coffee farmers. The mean and median value of cattle in constant prices went up for all households, with the notable exception of coffee farmers' whose mean cattle

value fell. What this means can be seen more clearly when looking at coffee farmers according to their degree of specialization (Table 7). It turns out that farmers with over 60 percent coffee in terms of cultivated land experienced a fall in the median real value of cattle between 1995 and 1999, which suggests that highly specialized coffee farmers have tended to sell cattle in order to cushion the negative impact of falling prices.

This evidence is supported by qualitative questions in the 1999/2000 survey, in which households were asked to assess the availability of different types of assets at the date of interview compared to 1992. Table 8 shows that farmers who grow coffee on more than 60 percent of their cultivated land reported declining livestock assets. Under the plausible assumption that the evaluations of farmers mainly refer to recent changes in asset availability, this fits well with the quantitative findings in Table 7.

4.4 Income diversification

Beside the expansion of coffee production and the smoothing of consumption, a diversification of income sources towards alternative crops or non-farm employment might be a third factor explaining coffee farmers' continued poverty reduction when prices went down after 1995. However, there is no compelling evidence of coffee farmers moving into non-agricultural activities between 1995 and 1999. The average number of household members with non-farm employment did not rise when looking only at primary employment, and did rise only very slightly when also looking at secondary employment (Table 9).[1]

Within agriculture, by contrast, a pattern of diversification emerges. Both coffee farmers and farmers with some coffee increased the number of crops planted over the second halve of the 1990s, after having grown fewer crops when coffee prices rose (Table 10). The diversification into alternative crops after 1995 holds for more and for less specialized coffee farmers alike (Table 11).

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[1] We do not attempt to assess diversification in terms of the incomes earned in different occupations because the reliability of the income information given in the surveys is highly questionable.

4.5 Regional differences

Coffee farming is not equally distributed across the country. In 1992, the combined share of coffee farmers and farmers with some coffee was 0.24 and 0.04, respectively, in coffee and non-coffee regions. It increased to 0.38 and 0.09 until 1995 and then remained at the higher level. Throughout the 1990s, slightly less than 50 percent of the population lived in coffee regions.

Given the differences in economic structure, did the coffee price changes lead to an uneven regional development? In 1992, non-coffee regions were only moderately poorer than coffee regions (Table 12). This gap widened dramatically in the course of the 1990s. Between 1992 and 1995, poverty in non-coffee regions remained virtually stagnant, suggesting that Uganda's poverty reduction during the first halve of the 1990s was largely owed to the coffee price boom. After 1995, both regions seem to have participated in the general economic upswing. Disaggregating the regional poverty profile by household type provides two main additional insights: first, between 1992 and 1995, non-coffee farmers fared differently in the two regions (Table 13). While they seem to have benefited from the price boom in coffee regions, their poverty incidence did not change in non-coffee regions. Second, the worsening of the poverty situation for non-agricultural households, which we linked to the movement of non-coffee farmers into non-agricultural activities, is confined to non-coffee regions. The different regional performance of non-coffee farmers may be one reason why they emigrated in non-coffee regions but not in coffee regions.

5. Concluding Remarks

This paper has investigated the impact on coffee and non-coffee households of the pronounced coffee price fluctuations in Uganda during the 1990s. It turned out that the price changes, which included a coffee price boom and domestic price liberalization in the first halve of the 1990s as well as declining world coffee prices after 1995, were transmitted to the farm-gate level, albeit not completely. As expected, the price hike was associated with substantial poverty reduction for coffee farmers. More strikingly, their poverty incidence continued to go down when prices fell again. Our

data analysis suggests that this may be due to a combination of factors: first, coffee production increased after 1995, probably as a delayed response to improved price incentives; second, there is evidence of consumption smoothing among specialized coffee farmers; and third, coffee farmers seem to have diversified into alternative crops. These adjustments point to a lasting impact of the domestic price liberalization that was not reversed under adverse world market conditions.

Concerning possible intersectoral repercussions of the coffee price changes, the two sub-periods differ. For the period 1992-1995, we tentatively conclude that non-coffee farmers in coffee regions benefited from the income generated through the price boom und thus could reduce poverty while staying on the farm, whereas in non-coffee regions they faced persistently high poverty and partly moved into non-farm employment. Uganda's overall success in reducing poverty between 1992 and 1995 arguably was to a large extent owed to rising coffee prices. For the period 1995-1999, it is impossible to discern any indirect effect of the fall in coffee prices from the data, which does, however, not necessarily indicate that there was none but may as well be due to the fact that other factors dominated the price change during this very dynamic phase of Uganda's economic development.

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Figure 1: Robusta prices on international reference markets, on local Ugandan markets and producer selling prices during the three surveys
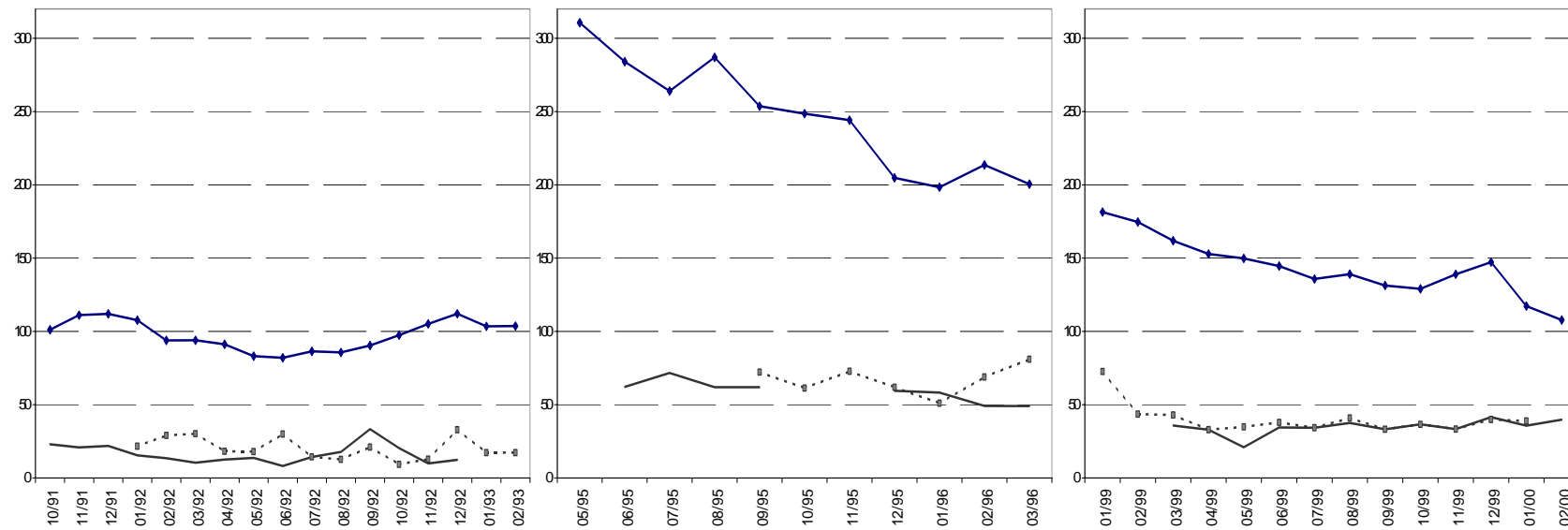
Sources: International Coffee Organization (www.ico.org), September 2005, IHS 1992/93, UNHS 95/96, UNHS 99/00; author's calculations.

Table 1: Poverty in Uganda (except Kampala), 1992/93–1999/2000

	1992	1995	1999
P0	0.58	0.51	0.36
P1	0.21	0.17	0.11
P2	0.10	0.08	0.05

Note: In all our calculations, we use the official (per adult equivalent) consumption aggregate provided by UBOS based on the excellent work by Simon Appleton. For details, see the technical appendix in Appleton (2001a). We also use official poverty lines as documented in Appleton (2003).

Source: Authors' calculations.

Table 2: Poverty headcount (P0) among coffee and non-coffee households, 1992/93–1999/2000

Household type	Population			P0			Contribution overall		
	1992	1995	1999	1992	1995	1999	1992	1995	1999
Non-agricultural	0.11	0.08	0.14	0.39	0.25	0.34	0.07	0.04	0.13
Non-coffee farmers	0.73	0.66	0.60	0.61	0.57	0.40	0.77	0.74	0.68
Farmers with some coffee	0.04	0.09	0.09	0.64	0.53	0.35	0.05	0.09	0.09
Coffee farmers	0.11	0.18	0.17	0.55	0.39	022	0.11	0.13	0.10

Note: Non-agricultural household report zero agricultural production. The very low share of non-agricultural households in 1995/96 might be due to a possible bias introduced by the sample design (for details please contact the authors). Non-coffee farmers do not produce any coffee. Coffee farmers are those farmers who produce more than 50 percent of the median quantity of farm coffee output. Farmers with some coffee are those producing less. The reason for taking half the median of coffee farm production as a threshold for identifying coffee farmers is motivated by the difficulties to compute agricultural production data for a specific time period that would be comparable across the three surveys. There are important design differences in the agricultural modules of the surveys including different numbers of visits. These design changes do not allow to fix an absolute coffee farmer production threshold.

Source: Authors' calculations.

Table 3: Coffee production, mean expenditure and poverty according to the degree of specialization in coffee

Degree of specialisation, coffee income as share of agricultural income	1992	1995	1999	1992	1995	1999
	Share of farms			*Mean coffee production*		
no coffee	0.845	0.793	0727			
<0.2	0.044	0.042	0.138	167.4	126.0	187.0
<0.4	0.043	0.047	0.079	269.1	213.1	422.7
<0.6	0.030	0.040	0.034	374.5	457.8	924.3
<0.8	0.024	0.039	0.017	468.7	482.8	1217.4
>0.8	0.015	0.040	0.005	806.1	479.4	2477.0
	Mean expenditure			*P0*		
no coffee	6582	7208	8943	0.61	0.56	0.40
<0.2	7828	8258	9830	0.51	0.39	0.29
<0.4	7015	7606	10047	0.53	0.42	0.26
<0.6	6917	8387	12027	0.60	0.46	0.23
<0.8	6911	8271	10808	0.65	0.45	0.27
>0.8	6099	7912	13600	0.78	0.58	0.09

Source: Authors' calculations.

Table 4: Coffee production, mean expenditure and poverty according to farm size in terms of coffee production

Coffee production as share of coffee production median (of each year)	1992	1995	1999	1992	1995	1999
	Share of farms			*Mean coffee production*		
no coffee	0.838	0.737	0.722			
<0.5	0.056	0.098	0.099	64.7	41.0	63.0
<1	0.036	0.048	0.061	163.9	133.6	183.5
<2	0.035	0.055	0.057	318.8	262.9	346.4
<4	0.021	0.037	0.038	639.8	495.7	682.6
>4	0.013	0.026	0.025	1481.6	1694.0	2491.9
	Mean expenditure			*P0*		
no coffee	6584	7053	8929	0.61	0.57	0.40
<0.5	6845	7998	8936	0.64	0.53	0.34
<1	6748	7552	9879	0.59	0.45	0.28
<2	7233	8714	10005	0.61	0.37	0.30
<4	7304	8121	11123	0.49	0.46	0.19
>4	8362	10712	16300	0.42	0.27	0.10

Source: Authors' calculations.

Table 5: Land size and planted coffee area of coffee farmers

	1992	1995	1999	1992	1995	1999
	Mean cultivated area			*Median cultivated area*		
Non-coffee farmers	2.58	2.21	2.35	2.00	1.40	1.75
Farmers with some coffee	2.67	2.56	2.11	2.00	1.30	1.63
Coffee farmers	3.60	3.90	3.85	3.00	2.30	2.75
	Mean coffee area			*Median coffee area*		
Non-coffee farmers						
Farmers with some coffee		0.36	0.31		0.12	0.20
Coffee farmers		0.99	1.10		0.50	0.50

Source: Authors' calculation.

Table 6: Cattle endowments by farm type, 1995/96–1999/2000

Household type	Share of farmers with cattle		Value of cattle (in 1989 prices)			
			1995		1999	
	1995	1999	mean	median	mean	median
Non-coffee farmers	0.1477	0.2303	197879	97403	260071	120643
Farmers with some coffee	0.1870	0.2378	64855	51948	159880	85791
Coffee farmers	0.2500	0.3483	287604	97403	235192	107239

Source: Authors' calculations.

Table 7: Cattle endowments of coffee farmers according to degree of specialization, 1995/95–1999/2000

Degree of specialisation, coffee area as share of cultivated land	Share of farmers with cattle		Value of cattle (in 1989 prices)			
			1995		1999	
	1995	1999	mean	median	mean	median
<0.2	0.2417	0.3352	112553	68182	216158	126005
<0.4	0.2256	0.3458	130585	77922	217641	104558
<0.6	0.2256	0.2760	204062	97403	297733	115282
<0.8	0.1840	0.2968	115337	97403	198115	80429
>0.8	0.1569	0.2399	1401190	129870	152543	115282

Source: Authors' calculations.

Table 8: Coffee farmers' assessment of change in livestock assets between 1992 and 1999

Degree of specialisation, coffee area as share of cultivated land	Evaluation of change of livestock assets compared to 1992	
no coffee	3.082396	
<0.2	3.490793	
<0.4	3.296801	(3 equal, >3 less in 1992,
<0.6	3.074189	<3 more in 1992)
<0.8	2.911656	
>0.8	2.173931	

Source: Authors' calculations.

Table 9: Average number of household members engaged in non-agricultural employment by farm type

	Primary and secondary occupation			Only primary occupation		
	1992	1995	1999	1992	1995	1999
Non-coffee farmers	1.21	1.22	1.25	1.15	1.21	1.19
Farmers with some coffee	1.15	1.18	1.21	1.09	1.17	1.18
Coffee farmers	1.23	1.19	1.21	1.19	1.24	1.21

Source: Authors' calculations.

Table 10: Number of crops planted, by farm type

	Mean number of crops			Median number of crops		
	1992	1995	1999	1992	1995	1999
Non-coffee farmers	4.89	4.72	5.16	5	5	5
Farmers with some coffee	6.04	4.71	6.45	6	4	6
Coffee farmers	6.03	5.93	6.91	6	6	7

Source: Authors' calculations.

Table 11: Number of crops planted, according to degree of coffee specialization

	Mean number of crops		Median number of crops	
	1995	1999	1995	1999
<0.2	5.56	7.09	5	7
<0.4	5.73	6.78	6	7
<0.6	4.84	6.56	5	7
<0.8	4.08	6.09	4	6
>0.8	3.71	4.57	3	5

Source: Authors' calculations.

Table 12: Poverty measures by region

	1992	1995	1999	1992	1955	1999
	P0			*P1*		
Non-coffee region	0.62	0.60	0.44	0.23	0.22	0.14
Coffee region	0.53	0.40	0.26	0.19	0.11	0.06
	Contribution to P0			*Contribution to P1*		
Non-coffee region	0.57	0.64	0.67	0.58	0.70	0.73
Coffee region	0.43	0.36	0.33	0.42	0.30	0.27

Source: Authors' calculations.

Table 13: Poverty in coffee- and non-coffee regions by household type

Household type	Coffee region			Non-coffee region		
	P0			P0		
	1992	1995	1999	1992	1955	1999
Non-agricultural households	0.38	0.23	0.18	0.40	0.29	0.47
Non-coffee farmers	0.54	0.41	0.29	0.65	0.65	0.45
Farmers with some coffee	0.65	0.53	0.34	0.61	0.52	0.38
Coffee farmers	0.55	0.40	0.22	0.55	0.37	0.25

Source: Authors' calculations.