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Poverty and Gender Effects of Smallholder Organic Contract Farming in Uganda

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Abstract

Rising demand both for organic tropical products and for year-round supply of some organic temperate products has encouraged organic activists and some donors to promote certified organic export production in a number of tropical African countries, including Uganda. Agricultural produce importers in developed countries have recognized these new market opportunities. As a result, the last decade has seen the emergence and rapid growth of certified organic food and beverage exports from the region (Willer and Yussefi 2007). But organic export growth does not necessarily translate into improved welfare for producers and workers, whether measured in terms of income, health, food security, or other variables. Recent debates have centered on how the rapid conversion of farmland into organic management systems affects food availability and access in poor regions of the world (Sciallaba and Hattam 2002; WWI 2006; FAO 2007).

The objectives of this study were, first, to examine the impacts of certified organic contract farming on the food security of the smallholder farm households participating in such arrangements, and second, to assess the role of gender relations in these dynamics. In particular, the study considered how the costs and benefits of participation are distributed among men and women. In order to meet these objectives, two predominantly qualitative Ugandan case studies were used: the organic pineapple and the organic coffee smallholder contract farming schemes previously mentioned.

The study found that establishment of these two export-oriented certified organic contract farming schemes did not reduce household food security for scheme participants. Rather, it improved food security as higher revenues from certified organic crops enhanced households' capacity to access food through the market. Gender relations were a critical factor for these welfare outcomes, and women generally had much less control over the benefits from scheme participation than did men, while often carrying an equal or larger share of the labor and management burden. The distribution of the benefits and costs of participation was much more skewed against women in the coffee scheme than in the pineapple one.

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1. Introduction

Rising demand both for organic tropical products and for year-round supply of some organic temperate products has encouraged organic activists and some donors to promote certified organic export production in a number of tropical African countries, including Uganda. Agricultural produce importers in developed countries have recognized these new market opportunities. As a result, the last decade has seen the emergence and rapid growth of certified organic food and beverage exports from the region (Willer and Yussefi 2007). But organic export growth does not necessarily translate into improved welfare for producers and workers, whether measured in terms of income, health, food security, or other variables. Recent debates have centered on how the rapid conversion of farmland into organic management systems affects food availability and access in poor regions of the world (Sciallaba and Hattam 2002; WWI 2006; FAO 2007). It can also be argued that the high cost of organic certification will prevent most smallholders from accessing the price premiums offered by organic export markets.

Recent years have also seen an increased interest in all types of contract farming arrangements for smallholders in Uganda and elsewhere in tropical Africa. This interest is indicative of rising concerns that these farmers are being excluded from remunerative value chains, whether for exports or for higher-value products sold on domestic markets (Hazell et al. 2007; Reardon and Berdegúe 2006). However, contract farming is also often seen as a solution to problems such as declining public investment and private market failure—problems that are said to underlie exclusion—since it increases economies of scale and thereby reduces private traders' transaction costs (Poulton et al. 2004; Dorward et al. 2004). Kirsten and Sartorius (2002) found widespread evidence that contract farming has increased farmer income in developing countries. On the other hand, Little and Watts (1994) and Havnevik et al. (2007) challenge whether contract farming schemes generate sustainable income benefits for participants. Others claim that these arrangements increase rural inequalities since it is typically only better-off smallholders that are recruited for them (Key and Runsten 1999). Furthermore, Little and Watts (op. cit.), Raynolds (2002), and others have argued that contract farming also tends to exacerbate gender inequalities by heightening the demand for women's labor while denying women control over cash crop revenues. Others have observed that contract farming can adversely affect household food production and food security because it tends to concentrate female labor—an important household resource—on contract crops (Glover 1994; Kirsten and Sartorius 2002).

In Uganda as in the rest of East Africa, rapid growth in certified organic exports over the last decade has been intrinsically linked to the proliferation of contract farming schemes (Gibbon et al. 2010), suggesting the relevance of many of the issues discussed above. The country is one of the two leading exporters by value of certified organic produce in tropical Africa (the other being Kenya). In 2006 there were between 20 and 25 certified organic exporters in Uganda, while total organic exports were worth just under \$7 million annually (Gibbon 2006). Organic exports were dominated by the traditional cash crops, led by coffee, and the overwhelming share was bound for European markets. Since around 2000, certification of higher-value crops such as fresh fruits and vegetables, vanilla, and spices has occurred – in 2006 Uganda exported about 15 different certified organic products. In contrast to the situation in many developed countries, no direct government assistance is available for organic conversion in Uganda, while private credit and domestic savings are generally too low to support independent conversion. This implies that organic farming is a realistic option only for very large-scale operators, in the context of privately-financed and coordinated contract farming schemes, or, in a few cases, in combination with fair trade certified cooperatives. Hence, nearly all organic export operations in Uganda are organized as smallholder contract farming schemes. Most such

schemes have been supported to different degrees by one or more donor. The Swedish International Development Agency (SIDA), through its Export Promotion of Organic Products from Africa (EPOPA) program, has been the most important donor, providing support to 18 organic exporters in Uganda in 2007.

Econometric studies of three certified organic contract farming schemes in Uganda were carried out, examining Arabica coffee, pineapple and joint cocoa-vanilla production (Bolwig, Gibbon and Jones 2009; Gibbon and Lin 2009; Gibbon, Lin and Jones 2009; Gibbon et al. 2010). In each case, revenues earned by participants were compared with those of a control group of conventional farmers, taking into account confounding factors and possible selection bias. The general conclusion from these studies was that participation in organic contract farming schemes had a significant and positive effect on the net revenue earned from the organic export crop, while no significant effect on total household revenue was observed.¹

But in light of the debates outlined above concerning the broad range of possible adverse effects that organic conversion and enrolment in contract farming schemes can have on smallholder households, it is pertinent also to consider the impact on poverty dimensions other than income. Hence the objectives of this study were, first, to examine the impacts of certified organic contract farming on the food security of the smallholder farm households participating in such arrangements, and second, to assess the role of gender relations in these dynamics. In particular, the study considered how the costs and benefits of participation are distributed among men and women. In order to meet these objectives, two predominantly qualitative Ugandan case studies were used: the organic pineapple and the organic coffee smallholder contract farming schemes previously mentioned.

2. Methods and Case Studies

2.1 Mechanisms linking household food security and smallholder organic contract farming

According to Gillespie and Haddad (2001), a household is food secure if it can gain access to a sufficient quantity and quality of food for all household members to enjoy a healthy and active life. The term 'access' means that food may be sourced from one's own farm, through the market, or through social networks. This definition also considers food security as something which is experienced by individuals within households. The present study operationalized food security in relation to the quantity and quality of food accessed by smallholder households through their own farm production or purchase. We examined how both men and women perceived food access at the household level, but did not differentiate levels of food consumption between men, women and children.

Entry into an organic contract farming scheme may have multiple effects on household food security. This study considered four possible scenarios.

- 1) Organic contract farming may increase food access by raising crop revenue for producing households through a number of mechanisms, including by offering higher and more stable prices, by offering improved prices and other incentives to increase volume, by enabling the adoption of a new cash crop, or by reducing the unit cost of production.

¹ Total household income was calculated only for the Arabica coffee scheme. This is the sum of gross crop revenue (coffee and other crops), livestock sales less purchases, and off-farm income. Net organic crop revenue was calculated as sales of the certified crop (coffee or pineapple) less cash outlays on land, hired labor, equipment and inputs, and marketing.

- 2) The adoption of an organic cash crop may divert scarce factors of production away from food crop farming, thereby reducing a household's own food production. The strength of this effect depends on a range of technical, economic and institutional factors that determine the level of competition for family labor, land, and cash resources between the organic cash crop and food crops. This includes the extent to which 'surplus' resources exist in the household that can be mobilized to increase farm output.
- 3) Investment and technology spill-over effects from organic cash crop farming to food crop farming may increase food access in different ways. Organic revenues may be reinvested in food production for household consumption or in other income-generating activities. Investments in children's education can improve food access in the longer term. Scheme participation may also improve access to inputs, equipment and new farming techniques that can help raise food crop yields or reduce production costs.
- 4) The prohibition of synthetic inputs on certified organic farms may reduce food crop yield and hence household food production. It may also reduce cash crop yields, in turn reducing sales revenue and the ability to purchase food, ignoring here other revenue effects of scheme participation. We expect these adverse yield effects to be small, though: In developed countries, where yields are highly dependent on synthetic inputs, organic farming generally causes a decline in yields during the conversion period (Willer and Yussefi 2006), while there is disagreement as to the ability of yields to recover in the longer term (Mäder et al. 2002). In Uganda, however, agriculture is generally semi-industrial or non-industrial, and conventional smallholder producers of coffee and pineapple use very few if any synthetic inputs. This has implications both for changes in yields and for changes in farmers' outlays on synthetic inputs when conversion takes place. It also affects the extent to which farmers who are certified to organic standards have to adopt a new set of farming practices in order to maintain soil fertility and plant health and thus remain economically viable, as they have to do in the developed world. In some settings organic conversion may actually increase yields (Sciallaba and Hattam 2002).

Because there are scenarios involving both positive and negative potential effects on food access and because the magnitude of the effect of each depends on different contextual factors, the 'net effect' on food access of scheme participation cannot be assumed. A key contextual factor is gender relations, which we expect to influence how each of the above scenarios plays out in practice. This is because women are often mainly responsible for food supply, while at the same time contributing labor to cash crop farming, and because they often have little control over the cash crop income.

2.2 The case studies

The paper is based on research carried out in 2005-06 among smallholder farmers in Uganda belonging to two certified organic export schemes established with the support of the EPOPA program. The first was the Luwero-Kayunga pineapple scheme in central Uganda operated by Biofresh (U) Ltd, owned jointly by an East African exporter and a specialized organic importer in Europe (henceforth, the 'Biofresh scheme'). The second was the Sipi Organic and Utz Certified Arabica Coffee Project on the slopes of Mount Elgon in Kapchorwa district in eastern Uganda, operated by Kawacom (U) Ltd, a subsidiary of the international trading house Ecom (henceforth the 'Kawacom scheme'). In both cases, organic production was organized using contract farming schemes operated by the firm exporting the organic product and holding the certification. Both schemes were certified to meet the EU organic regulation 2092/91, and the coffee scheme was also certified to meet the Utz Certified standard. The grower contracts

issued to each scheme member moreover stipulated a number of additional requirements (see below) that allowed exporters to transfer post-harvest costs to smallholders and achieve better flavor and other quality attributes.

The analyses that follow are based primarily on focus group interviews with members and families of the Biofresh and Kawacom schemes conducted during October 2006. In the pineapple case, we interviewed two male and two female focus groups, one of each in Luwero and Kayunga districts. The interviewees were selected by the pineapple growers' chairman. The age of the interviewees ranged from 18 to 70 years. We interviewed five groups of Kawacom scheme participants: one female and one male group of 'small' farmers, one female and one male group of 'large' farmers, and one male group of farmers known to sell most of their coffee off-scheme. The groups were identified by Kawacom's field officers. The discussions addressed food production, food security, and gender issues and took about three hours each. We also interviewed scheme staff, individually and in groups.

The quantitative analyses are based on formal household surveys of 32 Biofresh scheme members and 112 Kawacom scheme members, carried out in early 2006. The surveys used a questionnaire administered to heads of households by trained enumerators. They covered information on household demographics, farm area, number of trees/plants, expenditure on labor and other inputs and assets, and on processing and marketing, as well as production, sales, and farm and non-farm income.² All these data pertain to 2005. An exchange rate of US\$ 1000 = US\$ 0.56 was used. The main results from these surveys, which also included matching samples of non-scheme members, as well as details on survey methods, are reported in Bolwig, Gibbon and Jones (2009) for the coffee study, Gibbon and Lin (2009) for the pineapple study, and in Gibbon et al. (2010) for both studies.

There were two sets of reasons for the emphasis on qualitative methods in the present study. First, the household surveys were focused on organic cash crop farming and did not produce detailed data on food production or on food expenditures and consumption. Furthermore, the surveys were designed for cross-sectional analyses rather than longitudinal. Secondly, we wanted to examine aspects that are not easily quantified, specifically gender relations and changes in farm management and family labor use. Finally, we considered the costs and benefits accruing only to the farmers, not to the scheme operators, and we did not take into account the cost of EPOPA program support.

3. Organic Pineapple in Luwero and Kayunga

3.1 Scheme characteristics

The Biofresh organic pineapple scheme was certified in 2004 and had 34 members, equivalent to 13 percent of pineapple farmers in the two districts covered by the scheme. The areas farmed receive bimodal rainfall and lie at about 1200 meters above sea level— suitable conditions for pineapple growing. Each scheme member had on average a total farm size of 3.6 hectares, farmed 29,640 pineapple plants, and harvested 11,050 pineapples annually. The size of pineapple plots operated by the focus group participants ranged from one to five acres.³ The

² As is common in farm budget-related surveys in Africa, no attempt was made to collect data on family labor inputs. This is because subjects typically find it more difficult to recall such inputs relative to hired labor inputs, because of the difficulty in attributing accurate time values to some family labor tasks such as supervision, and because of difficulty in applying a common metric to labor by children and by adults.

³ The survey did not collect data on pineapple plot size or pineapple yields. Pineapple yields per area were generally very large and, given the relatively large landholdings, were not considered an important aspect of profitability in the scheme.

scheme members were recruited by a mixture of farmer self-selection and selection by company staff. Sixteen percent of the member households were female-headed. Farmers were trained and monitored by a field officer with professional training in agronomics based in Kampala. A limited range and number of inputs were provided free or at cost. The scheme operated through 'contact farmers' selected from local community leaders.

Biofresh specializes in export of air-freighted organic fresh produce to Europe and procured 150 tons of organic pineapple from the scheme in 2005. The volume purchased was limited by the size of the export orders, and represented 24 percent of all pineapple sold by scheme members; they sold the rest on the conventional market. The organic price premium for export-size pineapples was on the order of 30-40 percent during the main buying season.

3.2 Effects on farm management and production costs

Key pineapple management practices and production standards

Spacing, intercropping, weeding, mulching, and field rotation are critical management practices in pineapple farming. Spacing determines plant population per unit area and influences yield and fruit size. Intercropping enables households to continue food production within the pineapple farm in the first one or two years, and intercropping with legumes such as beans, groundnuts, or cowpeas helps improve soil fertility through nitrogen fixation. Clean weeded fields produce tastier pineapples and better quality fruits due to reduced pest and disease infestation, and enhance yields through reduced competition for nutrients and moisture. Low soil fertility was a general problem, especially in Kayunga where mulching with large volumes of coffee husks was a critical part of establishing a new pineapple plantation. Crop rotations were used in both Kayunga and Luwero; as a rule pineapple plots should be rotated every 5-7 years to avoid nematode infestation and soil nutrient depletion.

Supplying the export market for air freighted organic pineapple moreover requires meeting specific quality criteria that Biofresh demands from farmers. The size of the fruit must be 1.0–1.6 kg, which is smaller than most pineapple harvested from well-managed fields. The fruit must also be two-thirds ripe, clean, insect free, undamaged, and harvested with a knife, leaving a stalk of 1-1½ inch on the crown in order to reduce fungus attack and bruising during transport.

Changes in pineapple management practices and costs

Entry into the Biofresh pineapple scheme caused several changes in pineapple management practices (Table 1). Increased time spent in weeding was the biggest change in terms of increased inputs of family and hired labor. Better weeding practices were perceived to benefit both pineapple yield and fruit quality and was vigorously promoted by Biofresh. Farmers also reduced plant spacing in order to increase the proportion of fruits of export size, which made weeding more time-consuming and reduced the available space for intercrops. Harvesting with a knife is more labor-intensive than the traditional method of breaking the stem.

Table 1—Changes in pineapple management practices after scheme entry

Change in pineapple management	Main reason for change	Cost implications
More weeding by hand.	Closer spacing inhibits use of hoes for weeding.	More family and hired labor.
More frequent weeding – about 6 times a year in young fields.	Export quality requirement (better taste, more uniform ripening). Higher yield.	More family and hired labor.
Reduced spacing between plants.	Produce smaller fruits of export size.	More family labor.
Harvesting with a knife, leaving an inch of stem on fruit.	Export quality requirement (reduces damage during transport).	More family labor.
Increased use of organic fertilizers (animal manure, coffee husks and bean residues).	Recommended by Biofresh and approved by organic certifier.	More family labor. Higher cash expenses on coffee husks.
Increased use of organic pesticides against nematodes in banana.	New practice taught by Biofresh	Not significant. Mainly done by women.
Planting in rows and measuring spacing.	Biofresh requirement.	More family labor.
More use of legumes as intercrops.	Recommended by Biofresh and approved by organic certifier.	Cash required for seeds.
Reduced number of intercrops in pineapple.	Result of closer spacing.	Lower yields of intercrops.
More careful transportation and sorting. Longer transport of fruits.	Export quality requirement. Farmers must bring the pineapple to the scheme's central collection point (other buyers collect the fruits in the field).	More family and hired labor.
More frequent and better timing of field rotations.	Biofresh recommendation. More constant planting means more constant production (stability of supply).	More land for pineapple. More family and hired labor for clearing and planting. Bigger cash outlays on suckers.

Source: Focus group interviews in Luwero and Kayunga, October 2006.

The farmers observed that these and other changes in pineapple management brought about by scheme participation significantly increased production costs in terms of both family labor inputs and cash expenses (Table 1, last column). According to the household survey, in 2005 each farmer spent on average UShs 438,000 (US\$ 245) on pineapple farming (fixed and variable costs of production, excluding the cost of family labor). Hired labor was the biggest single-cost item, accounting for 34 percent of all production costs, followed by land purchase and rental (30 percent of total costs) and the purchase and transport of coffee husks for mulching (26 percent of total costs).

Hired labor performed between 25 percent and 50 percent of the weeding and farmers also hired labor for mulching, planting, and harvesting. The introduction of more labor intensive management practices therefore significantly increased expenses on hired labor, especially for weeding. In terms of land expenses, farmers observed that favorable and stable pineapple prices had provided the means and the incentive to expand their plantations. Farmers had also substituted pineapple as their major cash crop in place of coffee and cooking banana, both of which suffered from disease. They had also intensified the practice of mulching with coffee husks in response to their improved income from pineapple, although few could afford to apply the recommended amounts.

3.3 Gender division of work

Scheme participants generally regarded pineapple-growing as a male activity in terms of both labor and income, while women were supposed to concentrate on food production. In line with this perception, men put more work than women into almost all pineapple-farming activities, including the most time consuming ones – planting, weeding and harvesting (Table 2). Women

did most of the work in the collection, carriage, and sorting of the fruits. Men and women had different perceptions of their respective labor inputs, however. In particular, the male focus group did not recognize the role of women in fruit collection and carriage.⁴ In the few cases where a married woman had her own pineapple farm, she would assist her husband on ‘the family’ pineapple farm, but not vice versa. Women’s relatively low efforts in pineapple farming are related to the fact that high pineapple revenues (see below) enabled most farmers to hire labor for the most time-consuming activities (weeding and planting).

Table 2—Division of work in pineapple farming by Biofresh scheme members (percentage of activity done by labor category)

Assessment by male focus group			
Activity	Men	Women	Hired labor
Planting	33	33	33
Weeding	50	25	25
Harvesting (cutting the fruit)	100	0	0
Collect and carry the fruits	0	0	100
Sorting fruits in homestead	30	70	0

Assessment by female focus group				
Activity	Men	Women	Hired labor	Rank (total use of time)
Planting	75	25	0	1
Weeding	37	13	50	2
Harvesting (cutting the fruit)	100	0	0	3
Collect and carry the fruits	0	100	0	No rank
Sorting fruits in homestead	50	50	0	No rank
Selling the pineapple	100	0	0	No rank

Source: Focus group interviews in Luwero district, October 2006.

The focus group interviews also revealed that women’s work in pineapple is closely related to the intercropping of pineapple with food crops. Women mainly contribute to weeding during the first one or one and a half years, when maize and beans are grown between the rows of the young pineapple plants. During this period, women do about three-quarters of the weeding work. Later, as the pineapple canopy develops and less space is left for food crops, weeding is mainly performed by men and hired laborers.⁵

3.4 Effects on food production

All focus groups maintained that food production has not declined after scheme entry. Also, the fact that food purchases ranked only five in the use of pineapple incomes (see later) suggests a high average level of food self-sufficiency among the farmers, with the majority of food purchases being higher-value food items like meat, fish, sugar, tea, and cooking oil. The interviews also revealed that household self-sufficiency of food staples was a dominant strategy and a strong norm in both districts. That said, banana wilt disease had substantially reduced production of the traditional food staple, cooking banana, in both districts, but farmers had

⁴ These differences in perception may be due to differences between the two focus groups in the assessment of the role of hired labor in different farming activities.

⁵ Mature pineapple fields are intercropped with banana, coffee, cassava, and papaya, although these crops generally cover very small areas of the plantations.

responded by replacing banana with other food crops, including maize, sweet potatoes and cassava.

Labor and land effects

The existence of several mechanisms related to land and labor utilization can help explain how farmers have maintained their levels of food production while expanding pineapple production. First, demands from pineapple farming on women's labor have been limited by two factors: a relatively strict sexual division of labor has limited the ability of men to draw on women's labor for this purpose. Another reason may be that pineapple was introduced as a cash crop at a time when women had more influence over their own labor, in contrast to coffee, which has been grown in the study area for more than fifty years. Moreover, high pineapple revenues have allowed farmers to hire-in labor, as noted above.

Secondly, competition for land between pineapple and food crops has been mitigated by three factors. First, while farmers have reinvested pineapple incomes in buying or renting land for pineapple, they have also acquired land for food crops – buying land was the second most common use for pineapple income. Secondly, pineapple yields were very high, thereby reducing land occupation. Finally, food crops were intercropped with pineapple. We emphasize that these mechanisms only work effectively on a relatively small scale; hence, if all farmers in the study areas were to expand pineapple production as much as organic farmers have done, local food production would likely suffer.

Technology and investment effects

Participation in the Biofresh scheme had positive investment and technology spill-over effects on food crop farming. As mentioned, farmers invested part of their pineapple income in land and hired labor; a (small) portion of these investments were directed at food crops. A female focus group ranked investment in food production five out of five, while a male focus group reported that more cash was invested in food crop farming than in coffee (the other major cash crop). In terms of technology, farmers applied some of the organic methods promoted by the scheme to food crop farming, in particular soil and water conservation (e.g. the use of animal manure and mulch) and intercropping.⁶

3.5 Effect on household food security and expenditures

Pineapple revenues

The gross pineapple revenues earned by the scheme members averaged US\$ 3,835,500 (US\$ 2,148) per household in 2005, equivalent to 92 percent of all crop sales, according to the household survey. All focus groups agreed that the scheme participants had experienced a large increase in pineapple revenues in recent years, due to expanded production and higher and more stable prices. The scheme has had a significant and positive effect on both volume and price, but regional demand growth for conventional pineapple is likely also to have played a role.

⁶ These benefits notwithstanding, none of the focus groups had observed an improvement in food crop yields, possibly due to the recent introduction of these practices and the confounding effects of other factors, particularly rainfall.

Income earned by women

In only six of the 34 households in the Biofresh scheme did a married woman operate her own pineapple plot that allowed her to earn a personal income from pineapple (aside from the cases where the household had a female head). Moreover, these women received a relatively small share of the pineapple orders allocated to the household by the scheme. Other demands on women's time, particularly food production and domestic work, were cited as reasons why few women planted their own pineapple. Women were occasionally allowed to sell pineapple from the family field, but most of their personal farm income came from the sale of food crops (maize and beans), other cash crops (coffee and vanilla), livestock, and livestock products, in that order. Women had generally not experienced a reduction in their personal income as a result of scheme entry.

Use of pineapple revenues

Men exercised a high degree of control over the income earned from the family pineapple plot, while divorced and widowed women enjoyed the same control as male household heads. In households with male heads, the income is recognized by both genders as belonging to the husband, who is expected to take care of all household expenditures. As a rule the husband must give a small part of the pineapple income to his wife for her personal needs such as clothes, hairdressing, make-up, and medicine.

Each focus group ranked the household expenditures financed from pineapple revenues. The ranks given by each group were then converted into scores and aggregated for all four groups. Based on these scores an overall ranking was made. Children's education was consistently given the highest rank and achieved the maximum score. The second most important expenditure was investment in pineapple farming – land, hired labor, and fertilization. House construction and livestock purchases ranked three and four, while food purchases ranked five.

It is interesting to observe the dominance of longer-term investments in these expenditures, and the fact that two of the top four expenditure categories represent farm investments. The expenditure rankings of each focus group (Table 3) reveal the types of farm investments made: hired labor, farming tools, and food production in general. Food purchases were consistently given a low rank indicating a high level of food self-sufficiency among scheme members. The male focus groups were further asked how they have spent the *additional* income earned from pineapple since joining the scheme (for men in Luwero this is the ranking shown in Table 3). High priorities were again given to education (including private schools), house construction, and farm investment. Farmers had also increased expenditures on personal transportation (by *boda boda* motorcycle taxi) and mobile phone communication, inducing others to engage in these businesses.

Men and women had similar perceptions of how the revenues from the family pineapple plot were used (Table 3). This suggests that women were generally well aware of how these revenues were spent, even if they had little formal control over household expenditures and did not always agree with the prioritization made by their husband. Women in male-headed households who earned personal pineapple incomes typically spent them on general household needs (school fees, school uniforms and clothes), hired labor in food production, and personal needs.

Table 3—Ranking of the use of pineapple revenues by households in the Biofresh scheme

District	Men's ranking		Women's ranking	
	Item	Rank	Item	Rank
Luwero ¹	Education	1	Education	1
	House construction	2	Land purchases	2
	Buy land / expand pineapple field	3	Livestock purchase	3
	Buy livestock	4	House construction	4
	Savings to go to Mecca	None	Invest in food production	5
	Mistresses	None		
Kayunga	Education	1	Buy land / expand pineapple field	1
	Buy land / expand pineapple field	2	Education	2
	Medical care	3	Clothes	3
	Social responsibility	4	Buy livestock	4
	Hire labor for pineapple production	5	Household commodities	5
	Clothes	6	Food	6
	Farming tools	7		
	Food	8		
	Money for wife's upkeep	None		

¹ Men in Luwero ranked the additional income earned from pineapple since conversion.

Source: Focus group interviews, October 2006.

4. Organic Arabica Coffee in Kapchorwa

4.1 Scheme characteristics

The Kawacom Arabica coffee scheme was certified to organic standards in 2000-01 and had 3,870 members in 2006, equivalent to 62 percent of all farmers in the scheme area. Women headed 7 percent of member households. The scheme is situated on the northern slopes of Mount Elgon in Kapchorwa district. Farms are located in a contiguous area at 1,650–2,150 meters above sea level. The area was chosen due to its favorable agro-climatic conditions and because the then dominant buyer in the region had only a weak presence. Each farmer had on average a total farm size of 1.1 hectares, grew 650 coffee trees on 0.26 ha, and produced 198 kg of organic dry parchment Arabica coffee. Scheme participants realized on average a yield of 1369 kg of parchment coffee per ha.

The scheme enrolled all coffee farmers (except for those who opted out) living within a physically continuous areas. The scheme employed locally-based staff trained to provide organic extension services and operated through 'contact farmers' selected from local community leaders. A limited range and number of inputs were provided free or at cost. Kawacom buys all the coffee offered for sale by the scheme members during the main season if the coffee meets the scheme's quality criteria. In 2005, 715 tons of organic coffee was procured, representing 73 percent of scheme members' total sales by volume. The price premium was about US\$ 300 or 15 percent over the prevailing price in the Mount Elgon area.

4.2 Effects on farm management and production costs

Coffee management practices and production standards

Arabica coffee is mainly grown in highland volcanic areas characterized by cool and moderate temperatures (18° to 24°C, at around 2000 meters above sea level) (Carr 1993). Arabica coffee yields realized by East African smallholders are commonly far below those achievable with available technologies. For example, Kenyan smallholders in the 1980s had an average yield of

605 kg clean coffee per hectare, compared to 2,000 kg/ha realized by the best estates (ibid, 32). The technologies and practices that are most likely to increase yields among smallholders are reducing the competition from tall intercrops (notably banana) ; reducing weed competition; efficient control of pests and diseases; providing additional nutrients with organic or mineral fertilizers; appropriate and efficient pruning; and replanting and infilling with better planting material (ibid, 43). The choice of harvesting and on-farm processing and storage techniques are also decisive factors of coffee quality in terms of bean size, appearance, aroma and taste attributes, and moisture content (Griffins 2001; Wrigley 1988). These techniques include selective picking of only ripe cherries; timely pulping (removal of the soft flesh of the ripe cherries from the coffee bean) and subsequent fermentation (removal of the mucilage before drying), sun drying on a dry and clean surface to a moisture content of 11-12 percent (Griffins 2001), and storage under dry and clean conditions.

Scheme members are required to follow certain farm management and processing practices, specified in a contract issued to each farmer by Kawacom. These practices follow the standards for organic certification or are practices known to improve the physical quality of coffee beans in terms of moisture content, appearance, size, and aroma. Kawacom accepts only fully processed 'parchment' coffee, i.e. coffee beans whose pulp has been removed through wet-processing and subsequent fermented and sun dried to a moisture content of 13 percent or below. Drying must be done on a clean surface and black pods and extraneous matter removed. The most common reasons for rejecting coffee offered for sale by a grower are excessive moisture and foreign matter content.

Kawacom employed six different means to enable or induce farmers to meet scheme standards: i) technical training and provision of related demonstration sites; ii) limited input provision; iii) farm inspections to control for contract violations and to give individual advice on how to improve performance; iv) a policy of rejecting of all sub-standard and (suspected) non-organic coffee, enforced through controlling bean quality and origin at the time of purchase; v) a price premium for organic coffee; and vi) a procedure for evicting from the scheme farmers who consistently or grossly violated project standards and rules.

Kawacom promoted a variety of organic and good farming practices through training and inspections. These included improved spacing and intercropping, use of cover crops, mulching, application of compost and animal manure, soil and water conservation, bio-pesticides, coffee replanting and gap filling, coffee tree stumping and pruning, shade management, selective picking of cherries, and tree planting. A higher level of precision in existing processing methods was also encouraged. According to Kawacom staff, these standards and efforts had resulted in significant improvements in the quality attributes of the coffee that the scheme had procured from its members since it was established, in particular:

- Lower moisture content;
- Better appearance – coffee was cleaner and black pods were removed by the farmer before delivery, making factory milling cheaper;
- A lower incidence of bad smell, caused by over-fermentation and poor drying;
- Favorable 'cup' characteristics – strong flavor, strong body, and high acidity;
- A higher out-turn from factory milling and sorting (82 percent compared to 77 percent for non-scheme coffee).

Changes in coffee management, yield and costs

All focus groups from the Kawacom Arabica coffee scheme observed a general improvement in the level of management of coffee production since scheme entry, due in large part to intensified and more precise execution of a wide range of already known practices, both in farming (tree and land management) and processing. Few entirely new practices had been introduced. Two out of three focus groups observed that these improvements had led to an increase in coffee yield per area or per tree. This perception is confirmed by the econometric analysis reported in Bolwig, Gibbon and Jones (2009), which found that both scheme participation and the use of organic practices *per se* had a positive effect on yield per coffee tree, controlling for other factors, including selection bias.

A female group ranked all coffee farm management and processing practices according to how much time the family spent on them (Table 4). They observed that changes had occurred in all these practices and that increased labor inputs in weeding constituted the biggest change. A male group similarly ranked coffee farm management practices, and also found increased weeding to be the most significant change. Two male focus groups ranked changes in harvesting and processing practices after scheme entry, finding that improved drying had caused the most extra work, followed by sorting, pulping, and selective picking of ripe berries. These groups also observed that the main change in labor use was in processing, as opposed to in farming. This perception may be related to the fact that men generally spend little time in the coffee field, and it contradicts the women's ranking described above.

Table 4—Changes in coffee management practices after entry into the Kawacom scheme

Management practice	Rank by female focus group¹	Rank by male focus group²	Change in practice after scheme entry
Weeding	1	1	More frequent: 4 to 5 times a year, compared to 2 times earlier. Clean weeded fields were emphasized by field officers during the inspections.
Harvesting	2	Not considered	Selective picking of ripe berries. It takes longer and more hired labor is used.
Drying	3	Not considered	Longer period of drying: 10 days during the rainy season and 4 days in dry weather. Coffee sold outside the scheme (or before scheme entry) is only dried for one day, and is not sorted or washed.
Sorting	4	Not considered	Better sorting: it takes one day to sort one bag.
Mulching	5	3	More time devoted to spreading banana leaves out on the ground (before the leaves were just left on the ground where they were cut).
Apply animal manure	6	2	This is a new practice introduced by the scheme.
Pulping	7	Not considered	The scheme introduced the practice of sieving.
Washing	8	Not considered	Better washing.
Carrying coffee	9	No rank	Women carry the coffee to the scheme's buying point or central store (non-scheme middlemen buy coffee at the farm gate).
Soil & water conservation	No rank	4	More and better-maintained water channels.
Stumping	No rank	5	More use of hired labor.
Pruning	No rank	6	More use of hired labor.

¹ According to total amount of time spent by family labor in activity.

² According to the magnitude of change experienced. The ranking concerned only land and coffee tree management and did not consider harvesting and processing activities.

Source: Focus group interviews in Munaria Parish, October 2006.

Finally, it is noteworthy that many of the changes just described were not required for organic certification but concerned practices that tend to enhance coffee yield and bean quality. This is

related to the fact that farmers used no or little synthetic inputs before scheme entry, and it suggests that organic certification of smallholder coffee production is achievable in Uganda without substantial changes in the management of organic materials.

All focus groups agreed that the changes in coffee management had increased the cost of coffee production, in terms of family labor inputs, hired labor and land acquisition. The focus groups did not discuss costs related to processing (family and hired labor, pulping fees and drying sheets, and sales (transportation), but these are also likely to have increased in view of the above discussion.⁷ According to the household survey, in 2005 each coffee farmer spent on average US\$ 47,800 (US\$ 26), or US\$ 184,556 per hectare, on coffee production (variable costs, excluding the cost of family labor). Hired labor was the biggest single cost item, accounting for 69 percent of variable costs, followed by inputs and equipment (29 percent of variable costs) and sales expenses (2 percent of variable costs).

The women interviewed observed that scheme entry had substantially increased their labor efforts in almost every aspect of coffee production – weeding, manure application, harvesting, processing, and transportation – and that this had increased their total amount of farm work. The men likewise found that they now spend more time on coffee, although this was denied by the women. All interviewees also noted an increase in the use of hired labor, mainly for weeding, but also in harvesting, pruning, and stumping. They also observed an increase in wage rates in the order of 40-70 percent, as higher prices enabled farm workers to demand higher wages. Finally, farmers have increased investments in land for/with coffee since the scheme was established, incentivized by better and more secure coffee prices. They also observed a doubling of the cost of farm land since around 2000, and a quadrupling of the cost of land already planted with coffee.

4.3 Gender division of work

Focus group interviews strongly suggest that women do most of the work in coffee production, and male and female groups largely agreed on the proportion of family labor contributed by each gender to each activity (Table 5). The main exception was weeding; the men argued that due to their superior physical strength they contribute more to this activity than women, while the women contended that men only do 20 percent of this work. Going by the women's perceptions, women perform 50 to 90 percent of all work in the field, depending on activity, and 50 to 100 percent of processing and transportation. The only activities dominated by men are storing and selling.

Women were strongly engaged in work that fitted their traditional roles in other parts of life, such as head load carrying, collection (manure), and washing (pulped coffee beans). Activities such as drying that required a constant presence on the farm were also largely carried out by women and constrained their already limited mobility. Interestingly, many of the processing tasks require close cooperation between husband and wife, who each take on roles that often correspond to established gender norms (see Table 5). For example, the husband normally operates the hand pulper while the wife collects the water and sieves the beans.⁸

Because coffee plantations are considered the exclusive property of men (only men inherit and buy land in the scheme area), men make the major management decisions in areas such as

⁷ Bolwig, Gibbon and Jones (2009), using a descriptive statistical analysis, found that Kawacom scheme members had significantly higher expenses per household on coffee sales (transportation), equipment and inputs (dominated by processing activities) and hired labor than did a control group of non-scheme members.

⁸ Other examples of such complementarities in work are mulching, animal manure application, and soil and water conservation.

planting, pruning, harvesting, and hiring of labor. They also enjoy exclusive control over the coffee revenues. These aspects make the role of women, except that of the few female household heads, resemble that of an employee with a discretionary salary. The buying system introduced by the scheme has had gendered effects on the control over coffee revenues. Coffee is sold to Kawacom in public at buying posts or the central store, as opposed to in private when coffee is sold to middlemen at the farm gate. This makes the women's exclusion from the receipt of revenue more noticeable, especially since they always carry the coffee to the place of sale (Table 5, last row). On the other hand, the issuing of sales receipts by Kawacom has increased the transparency of the amount of revenues received (see below).

Table 5—Sexual division of work by Kawacom scheme members

Activity	Share of work done by women (%) ¹		Comments
	Women's perception	Men's perception	
Weeding	80	40	The men observed that they turn the soil while weeding to facilitate planting of intercrops, and that they 'dig deeper' than women.
Mulching	50	70	The husband harvests the banana leaves, and the wife collects and spreads the leaves.
Animal manure application	50	70	The husband digs the hole for the manure around the coffee tree and the wife collects and applies the manure.
Soil and water conservation	50	0	The husband digs the new water channels, and the wife maintains them by emptying them of soil (de-silting).
Harvesting	50-70	50	The women observed that men want to monitor the quantity and quality of the harvested beans.
Carrying the coffee beans	90	70	The women carry the coffee to the homestead and to the place of pulping.
Pulping	50	50	The wife collects the water and assists in machine operation, and the husband operates the machine.
Washing	100	100	The women observed that 'this is a woman's job'.
Drying	70-90	70	The women are at home monitoring the drying of the coffee beans.
Sorting	50-80	50	The wife and children mainly do this work, but the husband assists them because he wants to get the coffee ready for sale quickly.
Storing	n/a	30	The men said that they have the main responsibility for storing.
Carrying coffee to place of sale	90-100	70	The women observed that they carry the coffee to the point of sale and then return home with the empty bags.
Selling the coffee	0	0	The women observed that their husbands did not allow them to take part in the selling of the coffee; they were required to carry the coffee to the point of sale and return with the empty bags. They felt humiliated by this practice.

¹ The total amount of work done by women and men adds up to 100% as the contributions of children and hired labor were not considered in the ranking.

Source: focus group interviews in Kapchorwa district, October 2006.

In conclusion, the standards imposed or encouraged by Kawacom have caused the households to increase their efforts in a range of management practices for which women provide most of the labor. Scheme participation appears to have significantly increased women's work effort in coffee production, while the effect on male labor has been weaker. This analysis was confirmed by the focus groups. They also observed that, to a limited extent, the additional labor demands were met by hired labor, especially for weeding.

4.4 Effects on food production

The general conclusion from the focus group interviews is that food production has decreased, in part due to the expansion of coffee on land previously used to grow food, and in part because

of increased population pressure from already-high levels. Other causes cited were declining soil fertility, affecting mainly maize, and increased disease in cooking banana crops. The most important food crops grown in the study area were, in order of importance: cooking banana, maize, cocoyam (in the lower-lying areas), Irish potatoes, vegetables, beans, sweet potatoes and climbing yams.

Labor and land effects

Increased labor inputs by women in coffee production from already high levels could translate into reduced food production, for which women are mainly responsible. The women observed that they spend about two-thirds of their farm labor time on coffee and one-third on food production. Women have two labor peak periods. The first occurs from March to May, when coffee is weeded and food crops are planted and weeded. The second peak is from September to November, when coffee is weeded and harvested and food crops are harvested, planted, weeded, and harvested. Yet all focus groups agreed that women do not spend less time in food crop farming as a result of their increased efforts in coffee farming. Instead, they have increased the total amount of time spent in farming at the expense of off-farm work, domestic chores, and/or leisure. The men mainly experienced a reduction in leisure time and an improvement in time management. Where labor in food crops had been reduced, this was the result of reduced acreage (see below) or to disease (banana wilt).

Land is very scarce in the scheme area, as indicated by a small average farm size (1.1 ha) and visual evidence of high land use intensity. In this context, scheme entry and the general increase in coffee prices since 2002 have affected food crop farming mainly through a reallocation of land resources in favor of coffee, according to focus group interviews. When coffee was planted on new land, this was mainly at the expense of a reduced acreage of maize (both a food staple and a cash crop), and its intercrop, sweet potatoes.⁹ There has also been a noticeable reduction in the production of cooking banana, the main staple in the area and a key income source for women. Banana is often intercropped with coffee, so when coffee plantations were replanted and the shade from banana leaves reduced (as recommended), less space became available for banana. Wilt is the most important threat to banana, however, which has spread in the area since 2004, wiping out most plants as it advances. The effect of the scheme on beans, a key source of protein, is ambiguous. The general increased scarcity of land for food crops has led farmers to abandon mono-cropping of beans, but reduced weed infestation in coffee (promoted by the scheme) has enabled farmers to intercrop beans with coffee.

Technology and investment effects

There were positive technology and investment spill-over effects from organic coffee to food crop farming. Farmers applied several of the organic and good farming practices promoted by Kawacom to their food crops – the use of animal manure on vegetables, maize and banana, the construction of water trenches on steep land, and better weed control – and found that this had increased yield per area. A small part of the coffee revenues were invested in food crop farming – men invested in maize farming (seeds, fertilizers, hired labor, and rented land), while women rented land and bought seeds for vegetable production.

⁹ Three comments are warranted here. Because maize is both a cash crop and a food crop, the effect on household food self-sufficiency of the reduced acreage has only been partial. Second, some farmers have compensated by planting maize on rented land outside the scheme area. Third, because of declining soil fertility and a shortage of organic material, maize producers rely increasingly on chemical fertilizer, reducing the viability of maize as a food staple for own consumption.

4.5 Effect on household food security and expenditures

Coffee revenues

According to the household survey, the gross coffee revenue earned by the scheme members averaged US\$ 566,000 (US\$ 3,176) per household in 2005 (US\$ 2,185,328 per hectare coffee planted), equivalent to 83.3 percent of all crop sales and 39.7 percent of total household revenue (see footnote 2 on how this was calculated). The same survey showed that 84.2 percent of members had experienced an increase in coffee income since entering the scheme, while only 2.6 percent had seen their income reduced. Furthermore, 85.1 percent of members found that their income from coffee had become more stable.¹⁰ These improvements in the size and stability of coffee revenue were confirmed by all focus groups, the groups also observed that the improvements had positively influenced household food security.

Income earned by women

The female focus groups observed that women's sale of food crops was generally minor compared to their income from other sources¹¹ and that the money they earned from food crop sales had generally diminished. Women no longer sold cooking banana and sweet potatoes because of reduced output (in the former case due to wilt and in the latter case because of a reduction in maize acreage intercropped with sweet potatoes). Only widows with children and some divorcees operated their own coffee farms, but no married women were reported to do so. The latter sold small amounts of coffee (in raw or wet form) from the family farm 'to buy salt' and food. Women's individual incomes were much smaller than those controlled by men. The female focus groups asserted that coffee farming had priority over their personal income-generating activities and that coffee farming together with their other responsibilities left them with little time to earn individual incomes. They also observed that coffee revenues were never invested in their personal businesses. All this suggests that women's increased effort in coffee farming has occurred at the expense of their access to personal income.

Use of coffee revenues

Men in Kapchorwa made decisions unilaterally on the use of the income from coffee and other economic activities (except in the case of women's personal incomes discussed above). In other words, the husband bought what he thought was needed in the household and spent the rest as he wished, occasionally giving his wife money for specific purposes. Women were not supposed to question their husband on the use of cash income and only few men regularly shared such information with their wives. Interesting in this context is that some of the interviewed women said that their husband showed them the sales receipts issued by Kawacom and that the introduction of these receipts had improved transparency in the household economy.

The focus groups ranked household expenditures according to the amount of coffee revenue spent on each type of expenditure, and the resulting rankings were then aggregated into an overall ranking (Table 6). Most revenues were spent on school fees, followed by food purchases and hiring labor for coffee farming. Looking at the ranking of cash expenditures on different kinds of food (Table 7), we observe that food items grown by the farmers (maize, vegetables,

¹⁰ The questions were phrased thus: "How has your income from coffee changed since joining the coffee project?" and "How has the stability of your coffee income changed since joining the coffee project?"

¹¹ Women earned individual incomes from a variety of petty activities: brewing local beer (*komek*), sale of pancakes and doughnuts (*mandazi*), sale of charcoal and fuel wood, hiring out labor, petty trade in maize, and the sale of small surpluses of food (mainly the green leafy vegetable *sukumawiki*). Only men reported selling maize and beans.

and beans) feature among the top ranked items, although most money was spent on 'non-essential' foods. This indicates that the households were generally not self-sufficient in food staples, but neither were they heavily dependent on the purchase of staples – one of the female focus groups estimated that 20 percent of household income was spent on food. The interviewed women seemed to value household food security slightly higher than did the men. Some women felt that their husband did not prioritize food purchases and that they often had to quarrel with him to do so. When asked how they would prioritize household expenditures if given the power to do so, a female focus group gave food purchases a (hypothetical) second rank, while the two male groups ranked actual food purchases three and four respectively.

Table 6—Ranking of use of coffee revenues by households in Kawacom scheme

Item	Ranking by focus group ²				Overall ranking ¹
	Men 1	Women 2	Men 2	Women 1	
School fees	1	1	1	1	1
Buy food	4	3	3	2	2
Hire labor for coffee	2	4	4	7	3
House construction and maintenance	7	2	8	3	4
Buy clothes & shoes	5	5	10	6	5
Medical expenses	3	- ³	5	4	-
Buy livestock	6	-	9	8	-
Drinking alcohol	-	-	7	5	-
Invest in business	-	-	2	-	-
Household utensils & furniture	-	6	-	-	-

¹ The ranks given by each focus group were converted into scores using these rules: rank 1–2 = 1, rank 3–4 = 2, rank 5–7 = 3, rank 8–9 = 4, rank 10 and above = 5. The average score was then computed for each item, and the overall rank assigned.

² Focus group codes: Men 1 = Kapkwirok parish ('small farmers'), Men 2 = Munaria parish ('large farmers'), Women 1 = Munaria parish, Women 2 = Kapkwirok parish.

³ "-" indicates that no rank was assigned.

Source: Focus group interviews in Kapchorwa district, October 2006.

Table 7—Ranking of cash expenditures on different food items by households in Kawacom scheme

Food item	Ranking by focus group ¹			Overall rank
	Men 1	Men 2	Women 1	
Sugar/tea	5	1	1	1
Maize flour	1	5	-	2
Cooking oil	4	3	2	2
Vegetables	2	4	5	3
Rice	-	6	4	4
Meat	-	7	3	4
Salt	3	-	-	-
Beans	-	2	-	-
Fish	-	9	-	-
Bread	-	10	-	-
Wheat flour	-	8	-	-

¹ See notes to Table 6.

Source: Focus group interviews in Kapchorwa district, October 2006.

Changes in household expenditures since scheme entry

The focus groups were asked to assess changes in household expenditures since scheme entry. All groups observed that food security had improved because the higher coffee revenues

had increased their ability to cover the household food deficit through food purchases. One indication of this was a reduction in (or elimination of) the length of the ‘hunger period’ in June–July when both food stores and cash reserves often run empty. It was less clear if there had also been a general improvement in the quality of food consumed due to the increased food expenditures, but households definitely bought more dried fish (*mukene*) than before. The interviewees had observed several other changes in consumption since the Kawacom scheme was established. Many had purchased iron-sheet roofs and some were sending their children to private schools and boarding schools, and many more children attended secondary school. Farmers were also investing in small shops, other petty businesses, and livestock. There was also a noticeable increase in the consumption of alcohol.

5. Conclusion

The central conclusion from the study is that the establishment of these two export-oriented certified organic contract farming schemes did not reduce household food security for scheme participants. Rather, it improved food security as higher revenues from certified organic crops enhanced households’ capacity to access food through the market. This income mechanism (the first possible mechanism discussed in the Introduction) was on average strong enough to cancel out the negative effects of resource diversion away from food production where these negative effects were present (the second mechanism), even where certified revenues were relatively modest (for coffee). In both cases we also found evidence for positive, albeit modest, technology and investment spill-over effects on food production (the third mechanism). Finally, we found no evidence of a decline in yield (the fourth mechanism) for either cash or food crops as a result of organic conversion. This could be related to the fact that neither crop experienced serious pest problems and that few synthetic inputs were used prior to conversion. On the other hand, overall crop management has clearly improved as a result of the adoption good agricultural practices promoted by the schemes, and to a lesser degree of the adoption of organic practices.

On this background, and considering that the econometric studies of the two schemes, as discussed in the Introduction, showed significant crop revenue gains from scheme participation and found no negative effects on total household income, we can conclude that the schemes have led to an overall reduction in poverty among the participating households. It was beyond the scope of this study to assess in quantitative terms the contribution to this welfare outcome from organic certification, contract farming, and the adoption of organic farming techniques. Instead we summarize below the magnitude, causes, and context for each scheme:

The pineapple case was characterized by high levels of food self-sufficiency, and scheme entry had not led to reduced food production. This was due mainly to the fact that the expansion of pineapple farms and their improved management occurred through additional investments in land and hired labor, rather than through the diversion of key household assets (land and female labor) away from food crops. These dynamics were a product of large and increased pineapple revenues (related to both scheme participation and a growing local market for pineapple), which allowed households to cover their calorie needs as well as purchase higher-value foods such as meat and sugar. Also, competition for land between pineapple and food crops was mitigated by large average farm size and by very high pineapple yield per area. Large farm size indicates that there were few poor households among the scheme participants, a confounding factor that was not controlled for by the study.

In the case of coffee, scheme entry seemed to have led to a decrease in food production, mainly due to the expansion of coffee on land previously grown with food crops (especially maize and sweet potatoes) in a context of very small average farm size. The planting of new coffee plantations was induced by the security of the market and the organic price premiums

offered by the scheme. But a range of other factors unrelated to scheme participation had also contributed to reduced food output, notably the general rise in coffee prices, increased land scarcity, and plant health problems. In a smaller way, specific coffee management changes promoted by the scheme impacted food production *within* coffee plots: improved weed management enabled farmers to intercrop beans with coffee, while gap-filling and shade management reduced the space for cooking banana. Scheme membership had also induced households to increase the time spent in coffee production. This was in a context in which women supplied the major part of the labor for both coffee and food crop farming and where few could afford to hire much additional labor. Women's farm labor inputs had consequently increased, increasing their total work burden and reducing their access to cash income. They nevertheless found that these 'costs' were more than outweighed by the increase in household coffee earnings, part of which were used to buy food. Indeed, higher coffee incomes had increased food security in an area where few households had enough land to be food self-sufficient. Econometric analyses reported elsewhere (Bolwig et al., 2009) suggest that the increase in coffee income was realized through the receipt of an organic price premium (for which compliance with quality standards was critical), as well as through improvements in coffee yield (realized in part through the adoption of organic techniques).

Finally, gender relations were a critical factor for these welfare outcomes, and women generally had much less control over the benefits from scheme participation than did men, while often carrying an equal or larger share of the labor and management burden. The distribution of the benefits and costs of participation was much more skewed against women in the coffee scheme than in the pineapple one. First, gender relations were generally more equal in the pineapple scheme area, giving women better access to crop revenues and men less command over their labor for pineapple growing. Pineapple farmers also earned much higher revenues than did the coffee farmers. This allowed them to hire more labour, thereby relaxing the demand on women's time, and to acquire new land rather than converting land with food crops.

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