Mainstreaming gender sensitivity in cash crop market supply chains

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Mainstreaming gender sensitivity in cash crop market supply chains[1]

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Abstract: This paper considers the impact of gender specific constraints on the production and marketing of cash crops. Cash crop production differs from general agricultural production in that it entails engaging in output markets to make sales. This in turn requires reliable access to these markets, and has implications on the necessary scale and quality of production. Assessing the nature of female involvement in cash crop production is important, not just because it differs from the production of other crops, but because cash crop production holds significant potential as a means by which rural households can improve their welfare. Through a combination of review and original data analysis, this paper stresses the point that women are equally productive as men and receive equal prices to men, when they farm with the same resources and sell their crops in the same way. However, our review and analysis shows that women rarely have similar access to assets and markets as men and this has a non-trivial impact on production and marketing of cash crops. These gender inequalities in resources result in different levels of participation, methods of production and modes of marketing cash crops, and bear consequences for women's potential outcome in the cultivation of these high value crops.

***Key words*:** gender, women, agriculture, cash crops, cocoa, coffee, Ghana, Uganda

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Introduction and rationale

This paper reviews the impact of gender specific constraints on the production and marketing of cash crops, which--in our discussion--are defined as those crops which are grown primarily for marketing rather than for household consumption. A rich literature illustrates the existence of structural socio-economic barriers for women's ability to access land, markets, education and networks which often add more time pressure on the complex workload of women in rural areas. Moreover, several studies have explained how these constraints impact women farmers' uptake of lower levels of input use and their lack of technology adoption (The World Bank et al., 2009; Morrison et al., 2007; Doss, 2001; Quisumbing, 1994).

Our specific research interest is to consider the impact of such constraints on cash crop production. We dwell less on the often reported finding that, *all else equal*, productivity outcomes are usually equal across male and female farmers: and instead direct our attention to the fact that *all else is usually not equal*. These gender inequalities in resources result in different levels of participation, methods of production and modes of marketing cash crops, and bear consequences for women's potential outcome in the cultivation of these high value crops.

Cash crop production differs from general agricultural production in that it entails engaging in output markets to make sales. This requires reliable access to these markets, and has implications on the scale and quality of production (Fafchamps 1992 and Key et al., 2000). In a number of contexts "cash" crops also differ from "food" crops in that social norms dictate that they traditionally imply more male involvement in some of the decision making, production and sale processes. Evidence suggests that female participation in cash crop markets is often lower than male participation (The World Bank et al., 2009) As an example, women only represent 20 percent of cocoa farmers in Ghana (Vigneri and Holmes, 2009), and female headed households are significantly less likely to farm coffee than households headed by men in Uganda.

This paper specifically looks at the constraints women face when they do participate in cash crop markets, through a combination of review and original data analysis. We also examine the root causes of these constraints, whether they arise as a result of discrimination in input and output markets for cash crops themselves, or as a result of constraints in assets and other resources.

Assessing the nature of female involvement in cash crop production is important, not just because it differs from the production of other crops, but because cash crop production holds significant potential as a means by which rural households can improve their welfare. Farm incomes and productivity in cash crops can be higher in the presence of well-developed channels for procuring inputs, accessing credit and marketing the crop. There are also important indirect effects of cash cropping on productivity of other household activities such as food cropping.

The paper begins with a literature review that analyzes the major constraints women face in cash crop production, particularly focusing on discussing the literature that identifies the constraints women face in accessing input and output markets. Two case studies will then be presented that provide some empirical evidence on these constraints. The first case study on cocoa farmers in Ghana focuses on constraints women cocoa farmers face in accessing input markets, particularly accessing labor and non-labor inputs and the effect this has on their choice of production technology. The second case study on coffee in Uganda highlights the differential nature of sale transactions made by male and female farmers. In the final section we conclude and present recommendations to increase the access of women to cash-crop markets.

Our discussion begins with an important distinction between different definitions of women farmers. The case of women who head households (i.e. female-headed households) and women in households headed by men are different. In many of the papers we reviewed, and in one of the case-studies we present (coffee in Uganda), comparisons between female and male headed households are the basis for the discussion on the differential access of men and women to cash crop markets. However, access also differ between adult women and men in the same household (households usually headed by men) as clearly shown in research on Ghana (Udry et al., 1995), pastoralist communities (Doss and McPeak, 2005), and one case-study discussed (cocoa in Ghana). When considering cash crop participation of women within a household, issues of intra-household bargaining become important (for example women may end up producing subsistence crops due to an "implicit" agreement within the household).

Literature review

The defining feature of cash crop production is that it entails engaging in output markets. This in turn depends on the ability to produce at scale, to achieve quality, and to secure low costs of transacting in markets. Before turning to the literature on the constraints women may face in each of these areas, we briefly set out a conceptual framework as to why these factors are important.

i. As two seminal studies show (Fafchamps, 1992 and Key, et al., 2000), scale becomes important for cash crop production as a result of (i) the price risk inherent to exchanging cash crops for cash and cash for food, and (ii) the fixed costs involved in transacting with markets: Engaging in the market as a net seller of one crop implies engaging in the market as a net buyer for other crops. As Fafchamps (1992) argues, food price volatility that results from poorly integrated food markets can make being a net buyer of food quite risky. This is compounded by any price volatility that may exist in the cash crop price. Fafchamps (1992) shows that this risk causes the observed empirical relationship between farm size and cash crop production: it is only those households that are able to achieve food security first that choose to engage in cash crop production.

ii. Key et al. (2000) present a model which identifies the impact of transaction costs on a household's production and marketing decisions. A defining characteristic of this model is that it distinguishes between two types of transaction costs--proportional and fixed. Proportional transaction costs are affected by anything that contributes to the unitary cost of participating in the market, such as transportation or bagging. Fixed transaction costs include things such as searching for a buyer, negotiation and bargaining over the terms of the transaction. They show that whilst both are important in determining whether a household decides to be a net- buyer or net-seller of a given commodity, fixed transaction costs are important in setting a minimum size of the transaction. For quantities smaller than a given amount, undertaking the fixed costs of marketing does not pay. This is quite different to production in which few economies of scale have been identified (in fact a number of studies have found decreasing returns to scale, e.g. Barrett, 1996). As a result, achieving scale in production is often important for engaging in cash crop production.

In addition, for some cash crops, such as fruit and vegetables produced for export market, there are quality requirements that need to be met to ensure market access. As presented in World Bank (2007) fresh and processed fruits and vegetables, fish and fish products, meat, nuts, spices, and floriculture account for about 47 percent of the agricultural exports from developing countries. The continued growth of these high-value exports will require efficient value chains, particularly domestic transport, handling, and packaging, which make up a large share of the final costs. Moreover, modern procurement systems for integrated supply chains and supermarkets with stringent food-safety standards raise concerns about how to ensure small farmers' participation in high-value agricultural products markets.

The concept of transaction costs is also useful when it comes to assessing the ease with which households and individuals can access markets. Households are nearly always able to physically access some output market for their crops, but when the costs of doing so are prohibitively high we can think of the household or individual having limited market access.

The costs of transacting vary with the type of market channel and the crop being sold. For example, crops that are highly perishable carry higher timing and coordination costs, higher transportation costs and higher search costs (tomatoes and bananas) than crops that can be easily stored (maize and coffee). Sometimes the same crop can have quite different transaction costs based on different aspects of its market. For example mangos sold in rural retail markets do not have the same requirements (and associated transaction costs) for SPS (Sanitary and Phytosanitary Standards) testing as mangos sold to European supermarkets. For a given crop and market, Fafchamps and Hill (2005), Chowdhury (2002) and Roberts and Key (2005) show that both the market price and transaction costs a farmer faces will vary with the way in which farmers choose to make a sale: whether the farmer sells at the farm-gate or travels to an output market (Fafchamps and Hill, 2005), whether they sell on contract (Roberts and Key, 2005), and whether they sell processed or unprocessed goods.

The costs of transacting also vary considerably across individuals. Empirical studies of market participation have underlined the importance of proximity to a rural market in determining whether farmers participate in it, but whilst a household's proximity to market is

the most obvious source of heterogeneity in transaction costs across individuals, other characteristics of the household are important in how much they decide to sell (Goetz, 1992; Key et al., 2000; Bellemare and Barrett, 2005; and Holloway, Barrett and Ehui 2005). In a given location we can expect transaction costs to vary substantially across individuals with different assets, such as individuals with mobile phones versus those without and individuals with transport compared to those without. Skills and human capital characteristics - such as a capacity for contract negotiation - will also impact the cost of transacting, as will social capital (the number of buyers and sellers one knows, and the ethnicity or caste of the individual).

In the following subsections we assess what constraints women face in producing and accessing cash crop markets. That is, we analyze the constraints women face for increasing the sales of their produce, to achieve quality, and to secure low costs of transacting in markets. We discuss access to land and labor (important determinants of scale), purchased inputs (important determinants of quality and quantity), and access to markets. We note that there are a number of comprehensive reviews carefully analyzing the gender biases among women farmers (see Quisumbing and Pandolfelli, 2009; The World Bank et al., 2009; Morrison et al., 2007; Doss, 2001; Quisumbing, 1994), therefore, the emphasis in this paper is its focus on and discussion of the constraints that relate to scale, input and output market access.

In focusing on these issues we dwell less on the well-known finding that, all else equal, productivity outcomes are usually equal across male and female farmers (e.g. Quisumbing 1996), instead we direct our attention to the fact that all else is usually not equal. Inequalities in resources result in different levels of participation, methods of production and modes of marketing for men and women.

Male and female crops

One frequent distinction made in the literature is that cash crops and export crops are male crops, while subsistence crops are female crops (e.g., Koopman, 1993; Kumar, 1987, and; Randolph and Sanders, 1988). Evidence suggests that men may take over production and marketing, even of traditional women's crops, when it becomes financially lucrative to do so (The World Bank et al., 2009). A standard explanation for the division of crops by gender is that women are responsible for feeding the family and thus grow subsistence crops. On the other hand, men are responsible for providing cash income and to this end they grow cash and export crops (Doss, 2001).

Doss (2002), using empirical data from Ghana, argues that we cannot divide crops into those grown by men and those grown by women. Although men are more heavily involved in cash crop production, women are involved in the production and sales of all of the major crops in Ghana. However, their data indicates that there are gender based cropping patterns in Ghana. Many crops are disproportionately grown by men or women, depending on the ecological zone and the method of defining the farmer.

It is also important to note that social norms as they relate to women's and men's crops change over time. There are a number of examples of crops or commodities that started in the women's domain but became controlled by men as they were commercialised (Kasante et al., 2001; Doss, 2001; Lilja and Sanders, 1998, and; Von Braun and Webb, 1989). However, this is not always the case. Saito et al., (1994) noted that traditional patterns of intra-household rights and obligations may change in response to evolving social and economic circumstances and migration of men in search of more remunerative activities elsewhere. Saito et al. (1994) found that the gender-specific nature of African farming was disappearing as women were growing high value crops, taking on tasks traditionally performed by men (such as land clearing), and making decisions on the daily management of the farm and household.

It is difficult to know whether women grow lower-value subsistence crops because social norms dictate the types of crops they can grown, or because social norms constrain access to land, the availability of labor, access to extension and credit, or access to output markets (Doss, 2001). However, in this literature review, and in the case studies presented, we primarily consider the constraints social norms place to access these important resources for cash crop production. This helps us deal with the fact that crops are not easily divided into male and female crops, and that the nature of crops changes over time.

Constraints to producing at scale: access to land and labor

A primary factor of production—land—is often more constrained in female headed households and also for women in households headed by men. A rich literature reports that regardless of how access to land is gained, female-headed households tend to have smaller landholdings than households headed by men (Morrison et al., 2007; Doss, 2001). In addition, women's landholdings may be less fertile and more distant from the homestead (Doss, 2001). However, direct empirical evidence on the gender-disaggregated effects of land on the probability of producing cash crops has not been conducted. Still, we note that a number of studies have found that households with smaller plots of land are less likely to engage in cash crop production (Fafchamps, 2003 and Fafchamps, 1992) and this can be partly understood by the need for scale.

Having smaller plots thus disadvantages women. Additionally, women who do access cash crop markets often cultivate smaller plots of land (Vigneri and Holmes, 2009) which has a bearing on the type of fixed marketing costs it makes sense for them to incur. This may in turn have a knock-on effect on the type of marketing channel chosen when the time comes to market their crops.

Limited land ownership also has indirect effects on ability to produce cash crops. First, it inhibits the production of cash crops given that land ownership provides collateral for securing access to credit and credit is important in ensuring the use of purchased inputs for cash crop production (see Ghana case study below). Second, since careful studies show that tenure insecurity impairs investment incentives (Morrison et al., 2007), the higher tenure insecurity faced by women results in lower investment incentives for women compared to

men. Goldstein and Udry (2005) provide some evidence of this. They find that individuals in positions of power in the local political hierarchy have more secure land rights and, as women are rarely in positions of power, they face more insecure property rights.

A second primary factor of production—labor—is also often more constrained in female headed households and also for women in households headed by men. Labor availability depends on the amount of household labor that can be mobilized for agriculture and on the labor that can be hired in local labor markets. Female-headed households may have less access to labor because they include fewer men and may have fewer resources for hiring non-family labor. Within male-headed households, women who manage agricultural activities may also have difficulty in mobilizing labor due to social constraints.

An important constraint for women labor is the time burden imposed by domestic tasks. As presented by Blackden and Wodon (2006), there is an important gender division of labor among various agricultural tasks. Women are primarily responsible for food processing, crop transportation, and weeding and hoeing, while men do most of the land clearing. This is inevitably a limiting factor in the amount and quality of time women can allocate to look after their farms. Moreover, women in poor households face particularly serious time constraints because of their various livelihood activities and childcare responsibilities (Quisumbing and Pandolfelli, 2009). Paolisso et al. (2002), by evaluating the effect of the Vegetable and Fruit Cash Crop Program in Nepal, found that men and women spend roughly the same average time in cereal and livestock production; however, women spend more time caring for children under five years of age, while men spend more time in fruit and vegetable production. Von Braun and Webb (1989) also found that the adoption of new technologies in Gambia led to increased work on communal plots for both men and women, with relatively larger increases for women than men.

Differential access to labor not only has the potential to reduce the scale of production, it can also decrease the efficiency of production. Udry (1996) found that lower productivity on female plots compared to male plots within households is because labor and fertilizer (manure) tended to be more intensively applied on men's plots. Similarly, Holden, Shiferaw, and Pender (2001) found that female-headed households in Ethiopia have lower land productivity due to insufficient access to male labor and oxen, and low substitutability among factors of production.

It is worth noting that land and labor constraints may change over time and may also be impacted by participation in cash crop markets. Quisumbing et al. (2004a) found that in Ghana's Western region women's active participation in cocoa production has challenged and changed the norms by which women usually acquire land. Land is being transferred from husband to wife if the wife helps the husband establish cocoa fields. In this same case, the adoption of labor intensive cocoa farming increased the demand for women's labor in Ghana (Quisumbing et al., 2004a).[2]

[2] The positive impact of this increased demand of labor need to be discussed since it may cause an increase in the total working hours of women.

Constraints to quality: input use and technology adoption

The application of fertilizer and sprays, the use of new varieties of seeds, and adoption of improved technology (management practices) can all increase the scale of production. Adoption of these inputs and practices can also increase access to high value cash markets in which quality of produce is a significant factor in gaining access. Access to credit, extension, and networks of adopters often determine whether a household uses such inputs (Sunding and Zilberman, 2001; The World Bank, 2007; Bandiera and Rasul. 2006; Conley and Udry, 2005, and; Doss et al., 2003).

A recent review of the literature that assesses the use of fertilizer, sprays, and new varieties of seeds (Peterman et al., 2010) shows that whilst rates of adoption tend to be lower for women than for men, in more than half of the studies reviewed it is differences in human capital, access to credit, extension and networks that explains these differences. Once these factors are controlled for, in multivariate regression analysis, gender differences disappear. In some cases gender differences remain, but overall the evidence appears to suggest that many of the constraints to access inputs and adopt new technologies are not related to the characteristics of the input or technology per se but instead originate in other markets that are relevant for the adoption decision, such as land, labor, credit, and information (Morrison et al., 2007). Gladwin (1992) found that the critical factors that significantly limit fertilizer application are lack of access to credit and cash, not the sex of the farmer. However, since female farmers have less access than males to credit and cash, they apply less fertilizer, and obtain lower yields and incomes as a result. Doss and Morris (2001) found that women's and men's differentials in planting improved varieties of maize were explained by women's and men's different access to complementary inputs, especially to land and extension services. Once those inputs were controlled for, the sex of the farmer was no longer statistically significant in explaining adoption decisions. Quisumbing (1994) found that farmers with larger areas cultivated and higher values of farm tools are more likely to adopt new technology. To the extent that women farmers may have less education, less access to land and own fewer tools, they may be less likely to adopt new technologies.

It appears from the evidence that women farmers who are also household heads may be affected more by the constraints on input access and technology adoption. Croppenstedt et al. (2003) found that female-headed and male-headed households of equal factor endowments do not differ in their adoption and intensity of fertilizer use; however, female-headed households are generally at the lower end of the endowment distribution and any differences are driven by this fact. Doss and Morris (2001) found that female farmers residing in male-headed households in Ghana are just as likely to adopt new technologies as male farmers, while female farmers in female-headed households are less likely to adopt than male farmers, ceteris paribus. The reason seems to be that female-headed households tend on average to be smaller than male-headed households and have lower incomes[3].

[3] However, as stated by Doss and Morris (2001), it is difficult to disentangle the causal relationships among these factors. To the extent that household size and composition affect productivity, female-headed households

When considering access to cash crop markets, it is the unconditional differences in input use and technological adoption between men and women that are important as it is the ability to produce high-value crops that counts. Quisumbing and Pandolfelli (2009) argued that women farmers may be better able to adopt high-value crops that do not require large initial investments or asset ownership, since women's access to credit is more constrained than men's.

Human Capital

Most of the available evidence suggests that education (usually defined as formal schooling or literacy) is an important additional determinant of the decision to adopt new technologies (as well as of the decision to adopt new technologies early) since it increases the ability of the individual to process relevant (new) information (Morrison et al., 2007). As suggested by Morrison et al. (2007), to the extent that women are less educated than men, they are more likely to delay adoption or to forgo it entirely. The adoption of new technologies is important for accessing cash crop markets since these markets often require better quality products.

Since cash crops may require a higher level of technology adoption, the low ability of women farmer to process relevant and new information might also constraint their access to cash crop markets. The importance of own-schooling for adoption is probably greater in the case of female-headed households, where the potential for positive education spillovers to other household members (male members) is reduced (Morrison et al., 2007). Doss and Morris (2001) found in their Ghana study that female farmers in male-headed households tend to have less formal schooling than male farmers, and that female farmers in female-headed households have even less. Similarly, Croppenstedt et al. (2003) found that very few female-headed households are literate, and virtually none have four or more years of formal schooling.

Credit

A farmer's ability to obtain credit is often correlated with land tenure and agricultural productivity (see for example, Hoff and Stiglitz, 1990; and Bell, 1990). Following Doss (2001), where some land is titled, it may be difficult for a farmer whose land is not titled to obtain credit, a common circumstance for many smallholders. Credit may also be tied to the lender's perception of the farmers' ability to repay the loan. In this regard, to receive credit farmers have to prove their ability to produce a marketable surplus, which is in turn associated to the type and size of the land they work. Therefore, to the extent that women have less quality land, and are perceived as producing more for home consumption and less for the market, they may have a harder time obtaining credit when these criteria are employed. In addition, institutional bias towards providing financial services to the head of the household owning title deeds discriminates against women who are not head of the household (Vigneri and Holmes, 2009).

Extension Services

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will be less productive. Reverse causality may also apply: a household may be female-headed because the farm had low productivity and the male head left to find better opportunities.

Agricultural extension services are an important instrument for the provision of information on new technologies and crops (Anderson and Feder, 2003; Evenson, 2001, and; Doss and Morris, 2001). However, extension services often fail to reach female farmers, in particular female-headed farming households (Doss and Morris, 2001; Quisumbing, 1994, and; Saito et al., 1994); even though, female farmers often indicate a strong demand for such services (Saito et al., 1994). However, Doss and Morris (2001) argue that the differential pattern of extension contact by gender may have less to do with gender per se and more to do with the fact that extension agents tend to approach farmers who are relatively better-off in terms of access to and/or endowments of land, labor, and capital (both human and financial), and who might already have a history of adopting technological innovations. To the extent that women are under-represented among these better-off farmers, the more likely extension agents are to overlook them in their extension programs.

Networks and Information

Learning about a new technology and its use from other farmers in the community (via imitation or information exchange within social networks) has been shown to be an important determinant of the adoption decision (Morrison et al., 2007). Conley and Udry (2010) found that farmers in Ghana are more likely to have information links with other farmers of the same gender, clan, and age, and that these links were important for technology diffusion. Similarly, Weir and Knight (2000) found that 88 percent of adopters indicated that their decision was influenced by somebody of the same gender. To the extent that female farmers have less-extensive or poorer-quality information networks, knowledge transfer through these networks are more likely to be impaired (Morrison et al., 2007).

Since cash crop may require a higher level of information to adopt improved crops, new technologies or inputs, and obtain prices information, the reduced access to information by women might constraint their access to cash crop markets. The importance of information constraints is probably greater in the case of female-headed households as suggested by Saito et al. (1994) who noted that extension agents often prefer to talk to women in male-headed households rather than those in female-headed households. Thus, a bias might not simply be based on gender, but also on status and household structure.

Accessing output markets

As noted at the beginning of this section, the costs of transacting in output markets vary considerably across individuals. Physical distance from markets is important, but so is access to transport assets, or sources of market information (radios, mobile phones, personal relationships with traders). Skills and human capital characteristics - such as a capacity for contract negotiation - will also impact the cost of transacting.

Research in the United States (Fu et al., 1988; Edelman, et al., 1990, and; Fletcher and Terza, 1986) has shown that farmer characteristics influence farmers' choice of sale mechanism. They find that the profile of producers associated with newer forms of market organisation largely coincides with the expected profile of early adopters of new methods and technology

(i.e. relatively more educated, diligent information seeking, and willingness and ability to take risks). Fafchamps and Hill (2005) find that for coffee farmers in Uganda, wealthy farmers are less likely to sell at the market if they are selling a small amount, but are more likely to sell at the market the higher the quantity sold reflecting their greater ability to pay for public transportation to the nearest market. They also find that owning a bicycle is a significant determinant of transporting coffee to the nearby market.

A number of studies have shown that farmer characteristics determine whether or not they enter contracts. Warning, Key and Soo Hoo (2005) suggest there is less access for smaller farmers to contracts, as do Balsevich et al. (2003) who found that in Costa Rica 80 percent of the volume of vertical arrangements comes from medium and large-scale producers and packers (p.1149). However, Warning and Key (2002) find that rich and poor farmers have equal access to contract farming arrangements in Senegal, and it was found that smallholders in Indonesia, unlike in Latin America, are integrated into the modern value chain (Chowdhury et al., 2005).

To the extent that female farmers have differential levels of wealth, ownership of bicycles, knowledge of trader networks, and access to market information we can expect differences in the extent and nature of their transactions in output markets. Additionally, the higher the fixed costs of transacting, the larger the scale of production is required. Female farmers also face many gender-specific constraints for accessing cash crop output markets as presented by Morrison et al. (2007). These constraints include: (i) physical harassment by market or health officials when the high cost of permits leads women to market their wares outside market boundaries; (ii) time burdens that constrain women from seeking the best prices for their output; (iii) marital conflict if fluctuating prices lead a husband to believe that his wife is withholding money from him because she brought home more money on previous trips to the market. In addition, women's farmer groups are less successful than men's groups both at searching for and accessing new output markets for their existing products and at pursuing new products under contract arrangements, because men are more likely to be approached for their products by agricultural companies or other chain actors who wrongly assume that men are the primary producers in the household (Barham and Chitemi, 2009).

Finally, as stated before, men may also appropriate crops for which women are traditionally responsible once they enter the market economy and become profitable.

Case Study: Producing cocoa in Ghana

This section presents an important example of how gender barriers in cash crops production affect the productivity outcomes of women cultivating cocoa in Ghana. This case study is indicative of the constraints in input use reviewed in section 2.3.

In a country like Ghana which is well on track to achieving Middle Income Status by 2015, and where cocoa farmers represent a decreasing share of the rural poor, women remain a minority of the population of smallholders growing the tree crop, and continue to share on uneven terms the economic benefits of this internationally traded crop. Using original data

for a period of observed production expansion that occurred between 2002 and 2004, this section offers insights on how male and female cocoa farmers raised the land productivity on their managed farms given their different levels of inputs use.

Background on cocoa in Ghana

The cocoa sector of Ghana is reputedly considered an engine of growth for the country's economy. Exports generate revenues which are second only to gold (in 2005 alone cocoa beans and cocoa products jointly accounted for about 28 percent of total exports). Since 2001 a significant share of the country's agricultural productivity gains has been generated by the export crop (World Bank 2008), with official production figures more than doubling between 2001 and 2003 alone. Cocoa accounts for 10 percent of total crop and livestock production values (World Bank 2007), contributing to 28 percent of agricultural growth in 2006 - up from 19 per cent in 2001 (Breisinger et al., 2008).

Unlike most other countries producing the crop, Ghana's cocoa marketing system remains partly liberalized, combining elements of a market-based system with strong state regulation (Laven, 2007 and Fold, 2008). There are a proliferation of private buying companies who purchase cocoa directly from the farmer, but the producer price is fixed by the state marketing board (Cocobod), which exercises a regulatory role in the internal market and retains full control on all exports. As prices are fixed, farmers choose between different private buyers based on a variety of non-price criteria (cash, reputation, loans, free inputs, and equipment).

At the micro level, cocoa provides livelihoods for over 700,000 smallholders. Cocoa, a perennial tree crop with a life-cycle of twenty-five to thirty years, is characterized by a production technology requiring the use of working capital mainly to hire labor for clearing and weeding the land, and to purchase chemicals for controlling the spread of pests and diseases.

The key productive assets are land and labor. Changes in the mode of land acquisition have taken place in Ghana since the mid-1980s where an intestate law was introduced to allow individuals to leave parts of their cultivated land in inheritance to both their spouse and children. Quisumbing et al. (2004b) report that in Ghana's Western region land is now transferred from husbands to wives and children as gifts in return for the time spent to establish men cocoa fields. Once this land is given it cannot be taken away by other family members, and this has partly contributed to increasing women's bargaining power in the sector.

Labor employed on cocoa farms, the second pivotal input to production, is clearly gender differentiated by farming tasks. While male labor is essential for clearing and tree felling, female labor is used for less physically demanding tasks such as weeding and harvesting. Asymmetric divisions of labor in the household however, also mean that women are required to allocate a substantial amount of time to domestic chores. Extensive responsibilities in the household, combined with demands for working on husband's land or farming activities,

limit the time women spend on their own productive economic assets, or it means they work many more hours a day than men (Baden et al., 1994 and Sarpong, 2006).

Table 3.1: Average weekly hours spent on domestic chores by gender

	Fetch Wood + Water	Cleaning	Cooking	Errands	Child Care	Elderly + Sick Care	Other	Total HH	Total Work	Total
Women	1.27	1.32	8.04	1.01	5.12	1.46	0.13	26.06	36.72	***62.78***
Men	0.48	0.40	1.24	0.93	2.83	0.40	0.98	10.22	38.55	***48.77***

Source: author calculation from GLSSV (Ghana Living Standards Survey)

Table 3.1 above gives an illustration of such time imbalances by looking at intra-household activities and employment commitments among women cultivating cocoa.[4] The evidence is clear, female farmers spend on an average week up to 1.5 more time on domestic work than their male counterparts, and on average up to 29 percent more time than men working between household duties, and farm and non-farm employment. This will inevitably be a limiting factor in the amount and quality of time they can allocate to look after their cocoa farms, a point to which we return below.

As for the non-household labor hired in, annual labor is a comparatively cheaper way to maintain a farm, as payment can be deferred until harvest (Masdar, 1998). Yet, the precarious state of farmers' finances means that many have become reluctant to enter into such contracts, and it is daily wage contracts that are the most frequently used. However, hiring labor outside the household requires availability of cash which farmers are in general very short of. As will be shown further below, women farmers are often more cash constrained than their male counterparts, with this implying that they are likely to face a more stringent constraint on this key resource, unless they are able to source it from other household members.

There is, however, another type of non household labor known as *nnoboa* groups. These are labor exchange groups, which are typically used more frequently by poorer farmers who cannot afford to pay cash to obtain needed farm labor. There is an important difference in labor deployment strategies between male and female farmers: male farmers generally tend to use more *nnoboa* labor while female farmers rely more on wage labor. This is because female farmers cannot obtain male labor through *nnoboa*, for which men and women form separate

[4] The information is drawn from the fifth round of the nationally representative Ghana Living Standards Survey and was matched for comparability to the data employed in the rest of the case study by looking at the same three regions (Ashanti, Brong Ahafo, and Western), and using the same definition of cocoa farmers (see discussion in data section below).

groups. Farmers need male labor for strength-demanding tasks such as tree felling, consequently, female farmers in the lower wealth ranks who have no other means of procuring male labor, have to rely on wage or annual labor.

Data

The dataset used in this case study is the Ghana Cocoa Farmers Survey (GCFS). This was first collected in 2002, and had a follow up visit in 2004 which generated the two year panel described below.

The GCFS covered a diverse range of instruments on land use, inputs, production, and marketing choices (Teal et al., 2006). The original sampling frame for the 2002 baseline survey was the 1999 Ghana Living Standard Survey (GLSS), from which a representative cross section of cocoa farmers was identified and compared with the production records of the cocoa marketing board (Cocobod). This combined sampling methodology generated a representative geographical coverage in the survey, which was carried out in the three most important areas of production - Ashanti, Brong Ahafo and Western (Vigneri, 2005).

An important feature of the GCFS is the definition of cocoa farmers used. These were identified by the individuals managing all aspects relating to cocoa production: the amount of inputs used (land, labor and non-labor), the share of land allocated to the cultivation of the tree crop, and the final choice of who to sell production to on the market; but were not necessarily the owner of the land.

Characteristics of female and male managers

Cocoa has traditionally been considered a 'men's' crop: because of the high returns it generates and the intensity of the labor use requirements, male farmers have always featured as the dominant gender in the composition of the cocoa farming population. More recently, however, with the progressive individualization and commercialization of land rights (Quisumbing et al., 2004b), cultivating cocoa trees has become a more gender balanced farming practice in that women are also able to acquire land rights, and in so doing to manage their own farms and to retain control of the income generated by their sales.

Cocoa production is particularly good for female farmers for two reasons: i) it can provide women a more secure way to gain rights to land; and ii) it provides economic security as it is known to represent over 75 percent of income to its smallholder producers (Teal et al., 2006; Vigneri, 2005).

Table 3.2 below describes the gender profile of farmers across the two rounds of the GCFS, pointing to a number of differences in how men and women engage in the production of the crop.

The first feature in the sample is that it predominantly includes owners of land (on average 84 percent in 2002 and 89 percent in 2004). This is the case for both male and female farmers,

and largely mirrors the ownership status of smallholders observed in larger representative samples of cocoa farmers' population.

A clear distinction separates the gender profile of farmers: women are older and markedly less educated than their male counterparts. They produce less cocoa on systematically smaller farms. They are noticeably more cash constrained,[5] apply lower levels of fertilizer and insecticide, and use less agricultural equipment.

This evidence confirms the existence of important gender inequalities in the use of productive resources. However, the one indicator in which male and female cocoa farmers do not show any statistically significant difference is land productivity: the levels observed are comparable across gender groups.

The second half of the table further highlights the differences in the composition of labor on male and female farms, the labor to land ratios and labor productivity. In both years women employ more household labor than men on each unit of farm land. What is interesting, though, is the use of hired labor on the intensive margin and its productivity (output per unit of hired labor input) observed on women controlled farms which are comparable to the figures observed on male managed farms. Moreover, in 2004 the productivity of hired labor on women managed farms is almost double that observed on land controlled by male farmers.

[5] By which we identify all farmers who do not have a bank account

Table 3.2: A gender profile of cocoa farmers

	Survey yr	Women	Men	Total	*Stat. significant differences*
Sample size		75	353	428	
Age farmer	2002	54.17	50.40	51.06	
	2004	56.17	52.40	53.06	
Education Farmer (N. yrs.)	2002	3.75	7.25	6.64	
	2004	3.24	7.08	6.41	
Share of smallholders who own cocoa farm	2002	93	82	0.84	
	2004	96	88	0.89	
Kg cocoa produced	2002	860	1,364	1,276	***
	2004	1,040	1,855	1,712	***
Farm size (ha)	2002	4.93	6.54	6.26	***
	2004	5.43	7.93	7.49	***
*Yields (kg cocoa/ha)^*	2002	154.44	185.33	180.18	
	2004	182.52	213.84	205.92	
Share of farmers cash constrained	2002	59	39		***
	2004	60	36		***
Kg fertilizer	2002	14.42	28.35	25.91	
	2004	145.96	286.54	261.91	***
Percentage of farmers using fertilizers	2002	0.12	0.08	0.09	
	2004	0.37	0.50	0.47	
Lt Insecticide	2002	6.53	12.93	11.81	
	2004	4.82	10.04	9.13	***
Percentage of farmers using insecticide	2002	45.83	49.60	48.94	
	2004	99.92	99.95	99.94	
*Real value ag. Equipment^*	2002	65,000	97,000	92,000	
	2004	54,348	86,957	79,710	
Total person days on cocoa	2002	251.93	342.16	326.35	
	2004	618.47	736.35	715.69	
Tot lab productivity (Kg cocoa/tot person days)	2002	6.66	9.33	8.86	
	2004	2.72	4.40	4.10	
HH person days/ha	2002	43.83	20.64	24.70	***
	2004	102.24	85.88	88.74	
HH lab productivity (Kg cocoa/hh days)	2002	23.25	33.05	31.44	
	2004	4.61	8.14	7.53	***
Hired person days/ha	2002	38.23	36.16	36.52	
	2004	70.20	61.16	62.74	
Hired lab productivity (Kg cocoa/hired days)	2002	16.12	18.88	18.41	
	2004	23.53	12.42	14.23	***

Notes: Authors' calculations from the Ghana Cocoa Farmers Survey, 2002 and 2004 rounds. *** Indicates that the gender differences in the starred indicators are statistically significant at the 1 percent level. ^ These are median values reported in place of the mean values to counter the effect of outliers in the distribution of these variables.

This would suggest the existence of a gender difference in the allocative efficiency of productive inputs, a point to which we return in greater detail in the empirical section below.

The third feature of the descriptive statistics is the use of fertilizer. Between 2002 and 2004 both female and male cocoa farmers increased the amount of fertilizer used by a factor of nine. Adoption rates, however, have not risen at par across gender groups. The percentage of women using fertilizer has gone up by 25 percentage points, whilst that of men has increased by 42 percentage points. This is a remarkable difference which indicates the persistence of substantial gender differences in the access to and use of productive inputs.

Production in female and male managed plots

We now look at how female and male smallholders produce their cocoa to test for differences in the factor proportions used on their managed farms, and test for the existence of gender difference in the efficiency of production. Table 3.3 presents the results from estimating an intensive production function by fixed-effects (FE) model, first pooling the sample across gender groups, then disaggregating the estimation between female and male managed farms. Columns 4 and 5 are comparable estimations where the labor variable is disaggregated between the household and labor component.

Three important observations stand out from the regression results. First, the inverse relationship (as expressed by the coefficient of land) is consistently negative and statistically significant across all regressions, suggesting that – once all other productive inputs are controlled for – production outcomes are higher on smaller plots.[6]

Second, columns 2 and 4, and 3 and 5, explore the variation in yields between men and women managed farms for comparable specifications of the production function. The regression results show the elasticity of yield to land (the speed with which yield falls as land size increases) on women controlled farms is 16 to 27 percent higher than that observed on men controlled farms which, given we have not rejected constant returns to scale for any of these models, would point to the existence of gender differences in the use of factors proportions. However we note that this difference is not significantly different.

Third, labor is the only variable input with a positive and significant contribution to women's yields. In columns 2 and 3 this variable is aggregated between its household and hired component and its estimated coefficient shows that a 10 percent raise in total labor contributes to a 1.7 percent increase in yields on female-managed plots. The size of the elasticity of labor on yields on male managed cocoa farms is – on the other hand - marginal and statistically not significant.

[6] We also note that the same qualitative results were obtained after estimating the model for female farmers against a sub-sample of male farmers managing the same size of cocoa farms as the sampled women. This additional step was taken as observed differences could be driven by the different distribution of the land variable between gender groups in the original sample.

Table 3.3: Yield regressions - Fixed effect model

	(1)	(2)	(3)	(4)	(5)
Dep. Var is: kg cocoa/ha	**Full sample**	**Men**	**Women**	**Men – disag. lab**	**Women – disag. lab**
Cocoa farm size	-0.45***	-0.44***	-0.60**	-0.41***	-0.68***
	(0.10)	(0.11)	(0.23)	(0.12)	(0.23)
Person days/ha	0.01	-0.00	**0.17***		
	(0.04)	(0.04)	(0.09)		
HH person days/ha				0.06	0.04
				(0.04)	(0.07)
Hired person days/ha				-0.02	**0.09***
				(0.03)	(0.05)
Kilos fertiliser/ha	0.04	0.06	-0.05	0.06	-0.04
	(0.09)	(0.11)	(0.13)	(0.11)	(0.14)
Litres insecticide/ha	0.16**	0.17**	0.17	0.15**	0.26
	(0.07)	(0.07)	(0.17)	(0.07)	(0.17)
Real value equip/ha	0.05*	0.07**	-0.06	0.07**	-0.05
	(0.03)	(0.03)	(0.05)	(0.03)	(0.05)
Rainfall	0.72***	0.59**	1.49**	0.58**	1.44**
	(0.22)	(0.24)	(0.64)	(0.24)	(0.66)
Farm quality controls*	YES	YES	YES	YES	YES
Constant	-3.10	-3.90	-5.86	-1.11	-8.14
	(3.31)	(3.92)	(6.79)	(3.90)	(8.19)
Observations	795	658	137	658	137
Within group sample size	428	353	75	353	75
R-squared	0.27	0.25	0.50	0.26	0.50

Notes: All variables are in logs. Dummy variables to control for farmers not using inputs (fertilizer, insecticide, agric equipment) where used in all regressions but are not reported. Robust standard errors are in parentheses. Statistical significance levels are marked as follows: * significant at 10%; ** significant at 5%; *** significant at 1%. ^ non-logged variable. *These include dummies for farms which have been treated against pests, as well as the mean age of all cocoa farms managed by the same individual.

In columns 4 and 5 we further tease out this result by disaggregating labor input to show that it is hired labor which brings a positive and significant contribution to yields on female-managed plots (with a 0.09 elasticity coefficient). To examine this further we breakdown of the labor employed on male and female managed cocoa farms (Table 3.4).

Table 3.4: Labor employed on male and female managed cocoa farms

Person Days Employed			
survey		Female MCF	Male MCF
2002	HH men	56.12	38.63
2004		75.17	186.05
Δt		0.34	3.82
2002	HH women	28.40	47.68
2004		75.63	78.18
Δt		1.66	0.64
2002	HH child	9.68	8.49
2004		11.15	11.48
Δt		0.15	0.35
2002	Annual	16.12	43.97
2004		56.01	59.81
Δt		2.47	0.36
2002	Daily wage	130.85	168.10
2004		226.08	274.55
Δt		0.73	0.63
2002	*Nnoboa*	10.76	35.04
2004		39.87	26.18
Δt		2.71	-0.25

Source: Ghana Cocoa Farmers Survey, 2002 and 2004 rounds.

While the limited number of observations in this case study does not allow to conduct further regression analysis on the 'labor' effect that we find, this table provides some indications. We note a striking feature of how male and female cocoa farmers have increased the labor deployed on their farm over the period of increased expansion. Male farmers increased the input from male members in their households by almost a factor of four and increased other sources of family and hired labor more moderately (between 35-64 percent), even decreasing their use of *nnoboa* labor. Female farmers substantially increased the amount of female household labor as well as all three components of hired labor. In particular increases in annual and *nnoboa* labor—the sources of hired labor less subject to cash constraints—were large (247-271 percent).

In sum, the Ghana case study on women farming cocoa provides three important lessons about gender differences in high value cash crops. First, while women farmers remain a minority group among smallholders engaged in the cultivation of these crops, there are some clear signals that the conditions underlying this imbalance are changing. The progressive, more individualized evolution of land rights - which is observed in cases such as the

Ghanaian one discussed above – provides some clear if not common illustrations of the benefits from relaxing important barriers historically faced by women farmers in securing privileges over the farms they manage which – consequently – strengthen their control over the cash income generated from marketing the crops they grow. Secondly, and in line with what is known in the literature, female-managed farms are as productive as male-managed ones. In fact the data shows that, if anything, female farmers became more productive than their male counterparts at a time of expansion in the sector as a whole. Thirdly, and more importantly for the general thrust of this paper, we have shown that the 'all else equal' statement in the available empirical evidence on comparable productivity outcomes observed on male and female managed farms conceals important differences in how women access productive inputs. In the case of cocoa we have shown that female farmers were able to increase the hired labor component and in doing so, increase their productivity. However, they do so by increasing use of a particular type of non-household labor (nnoboa) that is not subject to cash constraints. They also do not sufficiently increase their use of non-labor inputs – again possibly as a result of serious cash constraints and this implies their use of labor intensive, low-tech production technologies.

Case Study: Marketing coffee in Uganda

In this section we present data on coffee transactions for 300 coffee farmers in the central and western districts of Uganda. A quarter of the households in the sample are female headed, and this analysis presents data on the differences in coffee production and harvesting, access to market information, the nature of coffee market transactions between male and female headed households. We first provide some background information on coffee production and marketing in Uganda, and describe the data collected.

Background on coffee in Uganda

Uganda is a land-locked country blessed with fertile soil, sufficient rainfall and plentiful natural resources. As peace established itself after years of civil war Uganda experienced substantial growth. With growth came reductions in urban and rural poverty, both as a result of increased agricultural productivity and increased sources of off-farm income (Appleton, 2001a; Appleton, 2001b). Poverty fell from 56 percent in 1992 to 31 percent in 2006, resulting in part from increased returns to agricultural production and in part from growth in off-farm income. Poverty remains high in rural areas, particularly areas in the north and east which have not traditionally been large areas of coffee production.

Coffee is Uganda's largest export good, comprising 26 percent of export earnings in 2000/2001, and providing direct and indirect, partial employment to an estimated 5 million people (Bank of Uganda, 2001; Kempaka, 2001). Robusta coffee accounts for nearly 90 percent of Uganda's coffee production with the remainder being Arabica, grown in highland areas in the East, on the slopes of Mount Elgon, around the Rwenzori Mountains in the West, and in the West Nile. Robusta is predominantly grown in lowland areas in central and south western Uganda. Like so much commodity crop production in low income countries,

production of coffee is concentrated amongst small-holder farmers. In Uganda, coffee is usually intercropped with staple crops - often matooke (a banana-like staple), beans, sweet potatoes and maize. The production technology is basic. Few farmers use purchased inputs such as fertilizer or pesticides, and few use of modern farming methods such as irrigation.

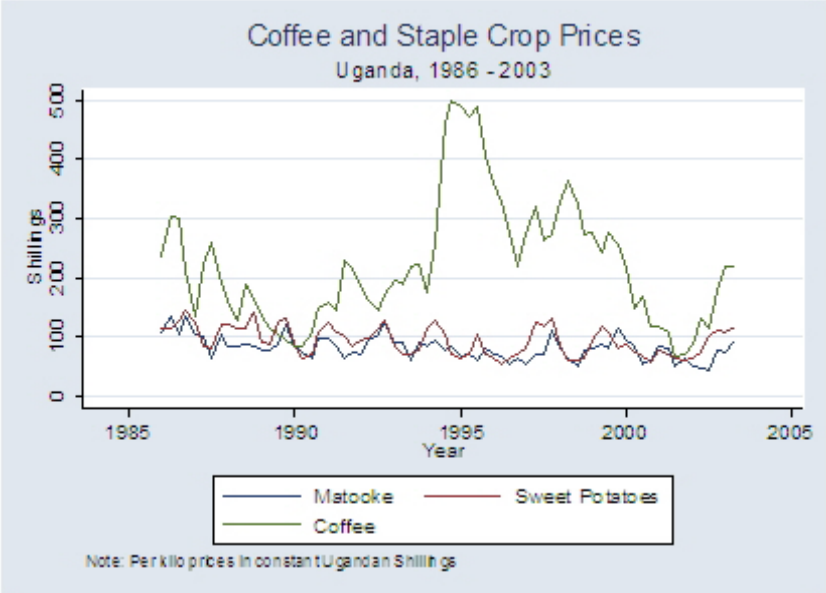
In comparison to other crops that Ugandan coffee farmers have available to them to grow, coffee is a relatively profitable crop. The Uganda Coffee Development Authority (UCDA) provides some estimates of the costs of growing coffee, which can be used to estimate the return to coffee production for an average farmer.[7] For traditional Robusta the costs of production are low, amounting mainly to labor and land costs. The UCDA study calculated 100 days of man labor were needed to produce 1,000 kilos of kiboko from one hectare of land. Using the UCDA study and estimates of the rental price of land per hectare from Deininger and Mpuga (2002), the per kilo cost of production comes to about 190 shillings per kilo.[8] The average price for a kilo of unmilled coffee since coffee market liberalization at the end of 1991 is 30 cents (in 2001 prices), which suggests a return of $197 per hectare. To compare this to the return from growing other crops, the return to matooke production is estimated using information in Bibagambah (1996). The average yield of matooke is 2,300 kilos per hectare, with a value of $182 per hectare.[9] Very little labor maintenance is needed for matooke - only about 35 man days per hectare per year, which suggests the return to a hectare planted with matooke is $150. However, although the average price of coffee since coffee market liberalization is 30 cents, there is a large degree of variation in this price as Figure 4.1 shows - much more so than for other crops. Prices during the year in which data was collected were much lower than average: the median price recorded for a kilo of unmilled kiboko was 16 cents which would imply a per hectare return of $57.89.

[7] The data used comes from sensitivity studies conducted by UCDA throughout 2001 in which farmers in Masaka, Bushenyi and Kiboga regions of Uganda were interviewed.

[8] The cost of man labor was estimated at $0.80 per day. The cost of inputs (which were unspecified) were $15.80. The cost of land was not factored into the UCDA analyses, but Deininger and Mpuga (Deininger and Mpuga 2002) state the rental price per hectare to range between $1.84 and $5.80 for the regions of Uganda sampled in the UCDA survey.

[9] In 2001 matooke is sold at an average price of $0.80 for a ten kilo bunch.

Figure 4.1: Coffee and staple crop prices 1986 – 2003



Source: Henstridge 1997, (UCDA and UBOS data)

In 1992 the export and domestic marketing of coffee was liberalized. The market for coffee is one of the most liberalized in the world, with few regulations or barriers to entry at any point in the marketing chain. Farmers usually make individual sales at the farm-gate to small traders who tour the countryside on bicycles or motorcycles and act as aggregators either for bigger independent traders or for exporters and their agents. The majority of Ugandan producers sell their coffee in the form of dry cherries locally known as kiboko which are then milled (the cherry is separated from the husk) by the traders who buy the coffee. Milled coffee of average quality is referred to as fair average quality (FAQ) coffee.[10] Sometimes farmers sell their coffee at the nearest market and mill the coffee themselves before selling it. There is considerable competition reported at the primary marketing level, and so farmers should have little problem selling their coffee at competitive market prices.

Data

In early 2003 three hundred coffee farming households were sampled from the 1999 national household survey and revisited with a survey asking many of the same questions (thereby creating a small panel) plus additional questions on the coffee sales made in the last year. The households surveyed came from five districts—Bushenyi, Kayunga, Luwero, Masaka and Mukono—that together comprise half of Uganda's Robusta coffee production. Almost one in four of the households surveyed were female headed (23 percent). These female headed households largely comprise widowed women (68 percent) but also include unmarried,

[10] Well looked-after, healthy trees produce a ratio of 0.6 Kg of Fair Average Quality (FAQ) coffee cherries for 1 Kg of kiboko, while old and diseased trees produce kiboko with a lower ratio that can reach as low as 1:0.4.

separate and divorced women. In nearly all cases the respondent was the head of the household, as the survey enumerators were directed to speak to someone who was knowledgeable about the production and marketing of the crop. And this was the household head.

Whilst detailed data on the nature of coffee sales was collected, there was no question that asked who it was that made the sale. We make the assumption that in male-headed households it was the male head that made the sale, and in female headed households it was the female head. The analysis in the proceeding sections thus relies on a comparison of male and female headed households. Whilst this is, in general, an imperfect proxy in this context it is an appropriate approximation (although still an approximation), as coffee sales are in general handled by the head of the household.

Characteristics of female and male headed households

Table 4.1 compares basic characteristics of female and male headed households. We see that there are a number of basic differences between these households. Female-headed households have less labor, land and coffee trees than male headed households. In particular the difference in the mean size of land owned and thus the number of coffee trees owned is substantial. To determine whether this is driven by outliers we also compare the median of these two variables. The median value of land owned by male headed households is 4 acres and the median number of trees is 200, Compared to 3 acres and 100 trees for female-headed households. A Pearson Chi-squared test shows that the null of equal medians can be rejected at 1 percent degree of significance for both variables.

Female headed households also tend to have lower levels of wealth and lower levels of education. Women household heads also tend to be older, given many women head a household once their male partner has died. As a result of these basic differences in scale, liquidity and human capital we may expect crop choice, production methods and access to markets to be quite different for male and female headed households.

Table 4.1 also presents some information on the nature of coffee production. First we note that women plant proportionately fewer trees—15 percent of the trees women plant are too young to produce compared to 23 percent of trees owned by male-headed households. This may be as a result of the lower level of wealth (and perhaps liquidity) that female headed households have access to: planting coffee entails no coffee income for three years as the trees mature, and this can be a prohibitive cost for poor households (Hill, 2008). The share of labor allocated to coffee production and the proportion of trees harvested are comparable between these two types of households, as is the yield per tree (counting only those trees in production). However, because female-headed households farm on a much smaller scale than male-headed households, the quantities sold by women are much smaller than the quantities sold by men. Transactions made by female headed households are 47kg on average compared to 151 kg for men. Again we also compare the median values of quantities sold. The median quantity (of FAQ equivalent) sold by women is 32.4kg and 54kg for men. A Pearson Chi-

squared test shows that the null of equal medians can be rejected at 1 percent degree of significance.

Table 4.1: Basic characteristics of female and male headed households

	Female-headed households	Male-headed households	T-test
Working age household members	3.1	3.7	-2.41**
Total household days spent farming	466	573	-2.54**
Land owned (acres)	3.6	6.2	-2.72***
Coffee trees owned	189	650	-2.59***
Proportion of trees…			
in productive stage of life	0.84	0.77	2.50***
too young to produce	0.15	0.23	-2.43***
Log of asset wealth	7.05	7.68	-4.08***
Education	2.8	6.4	-6.02***
Age	57	50	3.29***
Share of labor spent on coffee	0.36	0.34	0.56
Proportion of productive trees harvested	0.83	0.81	0.50
Quantity harvested (kg, total)	47	151	-2.89***
Quantity harvested per tree (kg)	1.35	1.52	-0.51

*Note: ***: Diff. significant at 99%; **: Diff. significant at 95%; *: Diff. significant at 90%.*

Marketing patterns of female and male headed households

Few studies have assessed differences in market access and marketing patterns of male and female households. We use the marketing focus of this survey to provide some information on this point. In Table 4.2 we present results comparing the access to and use of markets by female headed and male headed households. First, we compare the physical distance of female and male headed households to markets. Whilst there is no difference in the location of the households (both are equidistant from sales markets), accessibility to these markets differs as a result of differences in bicycle ownership. Women are much less likely to own a bicycle than men and as a result the time taken to travel to market will on average be much higher for women than for men.

An important aspect of market access is access to market information. Respondents were asked whether they received price information from anyone in addition to the trader who purchased their coffee. For just under half of the households interviewed price information was received from someone in addition to the buyer of coffee, and little difference was observed between male and female headed households on this front. However, it does appear as though female-headed households have less access to trader networks than male-headed households. Respondents were asked whether or not they knew the name of the person that had bought their coffee, and were asked to name the buyer when they did; 54 percent of male households were able to name the trader who had purchased their coffee, whilst only 42 percent of female headed households were able to (see Table 4.2).

We are ultimately interested in whether these, or other differences, between female and male headed households result in different use of market channels. Data on this is reported in the bottom panel of Table 4.2. As discussed in section 4.1 the usual mode of selling coffee consists in farmers drying their Robusta and making sales of unmilled Robusta (kiboko) at the farm gate. Some farmers elect to transport their coffee to market in return for receiving a higher price, and in addition a few farmers will choose to mill their coffee once at the market before selling it (for an additional premium). We see that there is no significant difference in the proportion of households that dry their coffee before making the sale. However substantial differences in the proportion of women that travel to sell their coffee and in the proportion of women that mill their coffee before sale are observed. In 15 percent of the transactions made by male-headed households the coffee is sold at the nearby coffee market, this proportion is less than half (7 percent) for the transactions made by female-headed households. An elite 3 percent of transactions were for milled coffee, and these transactions were all made by male-headed households.

From these descriptive statistics we can conclude that female-headed households sell smaller quantities of coffee (as a result of owning fewer trees and producing less coffee) and engage in less value addition (transporting to market, milling) than households headed by a male. We now proceed to use the analysis of choice of market channel presented in Fafchamps and Hill (2005) to explore the determinants of gender differences in choice of marketing channel.

Table 4.2: Access and use of markets by female and male headed households

	Female headed households	**Male headed households**	**T-test**
Transportation to sales market			
Distance to coffee market (miles)	11.1	10.8	0.17
Ownership of bicycle (number owned)	0.19	0.68	-6.02***
Access to market information			
Received price info from other than buyer	0.42	0.47	-0.73
Knew name of buyer of coffee	0.42	0.54	-2.19**
Marketing channels used			
Proportion of sales of dry coffee	0.83	0.85	-0.49
Proportion of sales at the market	0.07	0.15	-2.07**
Proportion of sales of milled coffee	0.00	0.03	-1.96*

*Note: ***: Diff. significant at 99%; **: Diff. significant at 95%; *: Diff. significant at 90%.*

Fafchamps and Hill (2005) present a model and empirical evidence that shows the choice of market outlet (farm gate or market) is determined by the quantity of coffee being sold, the time it would take a household to transport that coffee to market (determined by the distance of a household from the market and whether or not a household owns a bicycle) and the wealth of the household. A household's wealth proxies both the opportunity cost of time for transporting the coffee, and the ease with which a household can access the liquidity that may be needed to transport large quantities of coffee or to transport coffee over large distances (both of which would require paying for bus transportation or hiring a truck). As such the

impact of wealth varies with the amount of coffee being sold and the distance of an individual from market.

Table 4.1 and Table 4.2 highlighted that a number of these determinants of market choice vary between female and male-headed households: female-headed households are poorer, sell smaller quantities of coffee and are less likely to own bikes than male-headed households. Any or all of these differences could drive the gender differences we observe in choice of market channel. To determine the relative importance of these factors we re-estimate the Fafchamps and Hill model, adding in a dummy that takes the value 1 if the household is headed by a female. Results are presented in Table 4.3. In the first column we show the simple gender difference in the probability of selling at the market and the farm-gate. This difference is significant at 5 percent. In the final column (column 6) we estimate the full model including the gender dummy. Once distance, quantity and wealth are included there is no significant difference in the way female and male-headed households market. Gender differences thus arise as a result of differences in these other characteristics.

Table 4.3: Determinants of choice of market channel

	(1) Simple gender difference	(2) Gender difference controlling for distance to market	(3) Controlling for bike ownership	(4) Controlling for quantity	(5) Controlling for wealth	(6) Full model
Female household head	-0.437	-0.420	-0.206	-0.104	-0.369	-0.024
	(0.196)**	(0.205)**	(0.226)	(0.224)	(0.219)*	(0.257)
Distance to market		-0.021	-0.019	-0.017	-0.169	-0.184
		(0.007)***	(0.007)***	(0.007)**	(0.078)**	(0.061)***
Bike dummy			0.484			0.350
			(0.181)***			(0.222)’
Log (quantity sold)				0.500		-1.596
				(0.133)***		(0.418)***
Residual for quantity				-0.290		1.086
				(0.146)**		(0.569)*
Log (wealth)					0.035	-1.494
					(0.104)	(0.347)***
Log (quantity)*log (wealth)						0.299
						(0.068)***
Residual for quantity * wealth						-0.189
						(0.089)**
Distance * log (wealth)					0.023	0.025
					(0.011)**	(0.009)***
Constant	-1.014	-0.562	-0.981	-2.658	-0.863	7.262
	(0.078)***	(0.146)***	(0.230)***	(0.598)***	(0.750)	(1.974)***
Number of observations	489	489	489	486	489	486
Wald Chi-squared	4.98**	4.54***	5.80***	7.32***	3.94***	6.35***
Pseudo R-squared						

Note: District and season dummies included from column (2) on, but not shown
Standards errors in parenthesis.
****: Variable significant at 99%; **: Variable significant at 95%; *: Variable significant at 90%; ‘: Variable significant at 85%*

In columns 2 to 5 we separately include distance to market, ownership of bike, quantity and wealth to identify which factors render the gender dummy insignificant. Whilst physical distance to market does not explain the gender difference, owning a bike does. Once the number of bikes owned is included, the gender dummy is no longer significant. The quantity of coffee marketed is also an important determinant of the gender difference in marketing channel. Wealth reduces the significance and magnitude of the gender dummy, but a gender difference still remains even when controlling for differences in wealth. It thus appears that gender differences in marketing are largely explained by the fact women market smaller quantities of coffee and do not own bicycles. Before concluding we discuss the ultimate impact of gender on the price received. Female-headed households receive a lower price for coffee than men. On average women received 14 cents per kilo of kiboko whilst men received 15 cents. However this is entirely explained by the difference in marketing channels. Table 4.4 shows there is a significant difference between female and male headed households when only district and month dummies are included (column 3). However column 4 shows there is no gender difference in the price once we control for how they sell. This is an important point, as it reflects the fact that the main constraint women face is in accessing marketing channels that allow value addition, rather than facing any discrimination in the marketing channel in which they are engaged.[11]

Table 4.4: Price received

	FHH	***MHH***	***T-test***	***T-test controlling for marketing channel***
Price received (US$ per kilo)	*0.14*	*0.15*	*-1.67**	*-0.09*

Note: Both t-tests include district and month of sale dummies

Conclusion

This paper contributes to the understanding of the gender barriers underlying the generally recognised finding that women in cash crop farming achieve comparable outcomes to men farmers *all else equal*. The analysis is done by reviewing a rich body of evidence which points to the fact that *all else is usually not equal*, in the modalities for accessing land, education, inputs for production and market information. These gender barriers are considered in the case of cash crops as these are known to carry a higher income potential than food crops given their market destination, and the high requirements on minimum quality standards and scale of production.

The first half of the paper describes a menu of constraints faced by women producing and marketing these crops on equal terms to men:

[11] It is worth noting that Table 4.4 presents data on gross returns. Households that engage in value addition incur costs of time, fuel costs (if applicable), and milling fees that reduce will reduce the overall price differential reported. Given we do not have data on time spent marketing we cannot estimate the net return.

- The size of land cultivated is often smaller and the rights over land are difficult to establish;
- Labor on women's farms is scarce—women are severely time constrained owing to the numerous intra-household chores they are responsible for and can often rely on fewer male household members--and women face difficulties in purchasing waged labor;
- Formal education achievements are systematically lower;
- Access to credit is reduced and hindered by lack of collateral and because of social norms which often select them out of available credit schemes;
- Information on new crop varieties and market conditions, and access to trader networks is often not good, limiting female farmer's ability to make the best informed decisions on production and sales.

In describing the sources of such constraints we point to the fact that women cultivating cash crops face a problem of *interlocked* barriers in accessing different productive resources. By this we mean that it is often their initial condition of owning less land for these crops, and of being less informed about how best to produce and market their harvest that hinders access to credit to purchase inputs. This in turn reduces the total amount of crop they harvest, which can make it unattractive to sustain the costs of market transactions.

The second section of the paper then illustrates a number of key findings about women farming two high value exportable cash crops--cocoa in Ghana and coffee in Uganda--using original data collected by the authors. From the gender specific information available in these data, we draw a number of suggestive conclusions. First, we reiterate a point largely documented in the existing literature: women are just as productive as men and receive just as high prices as men when they farm with *equal* resources and sell their crops in the *same way*. Second, rarely do women have similar access to assets and markets as men and this has non-trivial implications for how they produce and market the cash crops.

In the Ghanaian case, limited access to liquidity for purchasing inputs induces women farmers to adopt sub-optimal production technologies (that are labor and land using; the two factors which are more costly/scarce to farmers).

In the Uganda case study, the low quantities marketed, and lack of access to bicycles constrain female farmers to marketing channels that have very low transaction costs, but also lower prices.

While we acknowledge that our conclusions are based on two very specific crops and contexts (both cocoa and coffee are traditional perennial export cash crops, quite different in nature from newer cash crop markets, such as cash crop production for domestic markets, or horticulture or flower exports), we are able to draw three context-specific recommendations from this analysis.

1. In contexts in which food crop markets are characterised by poor integration and relatively high price volatility, scale in production will be an important determinant of whether or not individuals produce cash crops, disproportionately affecting female

farmers that produce at a smaller scale. Both improving women's access to land, and encouraging better integration of food markets through improved roads, increased mobile networks (to reduce trader search costs) will enable women to engage in cash crop production.

2. In marketing channels characterised by high fixed costs of transacting, scale in marketing is required, again disproportionately affecting female farmers for whom this is more difficult. Whilst this would be addressed by increasing the scale at which female farmers can produce, it could also be addressed by enabling a female farmer to market at scale by combining their harvest with that of other farmers. Interventions that strengthen female farmers groups, or marketing groups to which female farmers can belong, will allow women to access marketing channels with high fixed costs, such as transporting produce to the nearby market. Such interventions could include group leadership training, financial management training, training group leaders on how to find buyers, or introducing local buyers to female marketing groups. Directly reducing transaction costs specifically faced by women—in the Uganda case by encouraging female use of bicycles to be more socially acceptable—is also essential.
3. When purchasing quantity or quality enhancing inputs is difficult, female farmers may compensate by increasing resources which do not require upfront payment in cash such as labor. Whilst such substitution may be possible (even if costly) to produce for some markets, other markets which require a certain seeds to be purchased, or certain sprays to be applied may not allow for this. Improving access to credit (through contract farming targeted at female farmers, improved access to microfinance for women, or female savings schemes and credit associations) and extension becomes even more important in ensuring cash crop production in these situations.

Further work in assessing the patterns and underlying determinants of female engagement in a wide variety of cash crop markets is needed to better identify the most appropriate interventions. This will require piloting some suggested interventions and evaluating their impact to better determine how best to achieve access to inputs, lower transaction costs and scale in production and marketing. This work should be done in a way that allows us to better understand the intra-household dynamics at play when cash crop markets develop, something that we were not able to fully address in this paper.

Finally, this paper has shown the merit of conducting such work: cash crop production can be highly profitable and women produce and market cash crops just as effectively as men, but are often constrained in doing so. Left unaddressed, these gender inequalities generate important missed opportunities for rural poverty reduction strategies.

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