

# **Market Discrimination, Market Participation and Control over Revenue: A gendered analysis of Cameroon's cocoa producers**

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## **Abstract**

Using micro level data from Cameroon this paper applies the theories of intrahousehold bargaining to models in which farmers decide whether to take up cocoa marketing on their own or to rely on others. Depending on their decision, sharing rules are shaped within the household on who controls what proportion of the proceeds. We make precise the idea that market participation by female farmers provides them with higher bargaining power and thus higher control over the proceeds. Our data, however, indicate female farmers market participation is hindered by existing price discrimination which in turn reduces their intrahousehold bargaining. We find if farmers are marketing their produce individually, male farmers could reap higher benefit than female farmers by negotiating a higher price. Consequently, market participation by female farmers is discouraged as they decide to hand over marketing to a male in the family in order to generate higher revenue from cocoa sell. This reduces their control over the proceeds as the individual involved in marketing could now claim a share in the revenue. Alternatively, instead of individual marketing, when farmers and essentially the male farmers adopt collective marketing strategy benefit accrued remains same across all gender; and female market participation along with their control over the proceeds is improved.

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## **1 Introduction**

A fundamental issue in microeconomics, as it pertains to Development Economics, is how to model household behaviour, when systematic differences in preferences exist. Undoubtedly household decisions, such as, who works for how many hours, how to generate income, and who receives how much of household resources are strongly influenced by intrahousehold decision making and have crucial implications for individual welfare. Clearly, household members with higher bargaining power have more influence on decision making than members with less bargaining power. Therefore, intrahousehold bargaining<sup>1</sup> and intrahousehold outcomes have generated huge interest among researchers and policy makers. Two important conclusions that this strand of literature derives are first, women who are found to have less access to household resources, such as resources allocated in health; education and access to land, than their male counterpart also have lower bargaining power (Thorsten, 2002; Udry et al, 1995; Chiappori, 1988, 1992; Browning & Chiappori, 1998; Klasen, 1998). Second, causal association between bargaining and household decision making

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<sup>1</sup>Intrahousehold bargaining models are characterized by intrahousehold cooperation status. A typical cooperative bargaining model of marriage begins with a family consists of only two members: a husband and a wife. Individual agents whose utility depend on their consumption of private good, bargain with each other and depending on their relative bargaining strength family demand is determined. Non-cooperative bargaining models were developed from cooperative models when 'dissatisfaction' was introduced in the marriage models. If agreement is not reached between spouses, then the payoff received is represented by the utilities associated with divorce or a non-cooperative equilibrium within marriage, which are often known 'threat point' (Manser-Brown, 1980 and McElroy-Horney, 1980, 1990, Chiappori, 1992 and Browning & Chiappori, 1998). Recent empirical tests of prediction of household models have shored up evidence supporting the theoretical claims of both-cooperative and non-cooperative bargaining models. For example, Browning and Chiappori (1998) concluded in favor cooperation as their results showed Pareto efficiency is reached in the household and all cooperative gains are realized, while Jones's (1983) research in Cameroon and Udry's (1996) analysis of multi-plot farming systems in Burkina Faso suggest that spouses forego substantive opportunities to make cooperative gains.

flows both ways. Unequal access to resources affects bargaining and then lower bargaining power causes lesser access to household resources by women (Basu, 2006).

Economic variables that are often thought to be important for individual bargaining are income and labor supply. Higher labor supply and thus higher income render higher economic status and bargaining power (Basu, 2006, Chiappori et al., 2002). Therefore, the persistence of a gender gap in intrahousehold bargaining could be attributed to gender gaps in income and asset (Rocheleau & Edmunds 1997; Rose & Hartmann 2004). Furthermore, the difference is even starker in rural economies where family and community norms regarding the accumulation and transmission of wealth are important to determine the within-household wealth allocation. Under these customary norms in most rural communities production systems favor male over their female counterparts in terms of access to productive resources, such as land, which then translates into lower productivity and income levels for female headed farm units (FAO, 2011; IFAD, 2011; Quisumbing & Pandolfelli, 2010; World Bank, FAO, & IFAD, 2009).

So far, economic studies addressing gender gaps in agricultural productivity and income have mostly been catering around inequalities in access to production resources, such as unequal access to credit, fertilizer, pesticides, land etc. (Udry, 1996; Fletschner, 2009, Zwartveen, 1996). Inequalities arising in the post-harvest period due to different factors, such as information asymmetry (Fletschner & Mesbah, 2011, Chowdury, 2006; Ngimwa et al., 1997), have been investigated less. Such inequalities not only impose serious barrier to equal market participation and income opportunities for female farmers but eventually also affect their intrahousehold bargaining. To address this gap in the literature we use micro level data from Cameroons' cocoa producers to examine the causes of unequal market participation by male and female farmers and its impact on intrahousehold bargaining. Cameroon's cocoa production provides us with a unique platform to address the research objective as unlike Asia, in African countries, such as in Cameroon, agricultural production is often managed and controlled by male and female farmers separately. Decision-making authority with respect to cultivation on these plots rests with individual household members; cultivation expenses are paid by the individual; and income from the plot is attributed to that individual (Duflo and Udry 2004). This enables us to investigate marketing activities and resulting income inequalities by farmer's gender.

The contribution of the study is threefold. Based on a survey with 1031 cocoa farmers in Cameroon, we first attempt to investigate the cause of unequal market participation by male and female farmers; second we estimate the impact of market participation on intrahousehold bargaining; and third, in this junction, we also explore the role of collective marketing in improving female market participation. Our data shows that though female farmers manage cultivation individually, marketing of cocoa mostly rests in the hands of men. This however is not true for male farmers who usually control both the production as well as the marketing. By investigation of the cocoa marketing structure in Cameroon we found that one of the plausible factors that could explain lower market participation by female farmers is price discrimination. We find that female farmers who participate in marketing are receiving significantly lower price than the participating men. Consequently, revenue received by participating female is much lower than participating male indicating that income opportunities are higher if a man takes over the marketing. In our research area, we find a large number of women relying on male members from the family for marketing their produce. We argue that such unequal market participation could have negative implications for female intrahousehold bargaining as by not taking up marketing on their own they forgo certain degree of control over the cocoa proceeds and the individual undertaking the

marketing could claim a share in the revenue. However, one has to account for the net benefit arising from higher revenue opportunities and lower control over the proceeds due to non-participation. Finally, our estimation shows that villages with better access to collective marketing could bring down the gender disparity in market participation by lowering the existing price discrimination. In other words, if male farmers increase their participation in collective marketing, price received remains same across all members removing the gender gap in prices which in turn encourages female to take part in marketing.

Against this background we examine two hypotheses (1) market participation by female farmers is positively associated with collective marketing but negatively influenced by price discrimination (2) market participation impacts control over cocoa revenue positively, where control over revenue is measured by proportion of revenue controlled by the farmers individually. An important point to note here is for farmers who do not participate in marketing, our data show that the task is then mainly carried out by another family member. Based on this observation we formulate our hypothesis that lower market participation leads to lower intrahousehold control over the proceeds as the individual who does marketing could claim a share in the proceeds

The paper is organized as follows. Section 2 provides a brief description of the study context; and discusses the data; section 3 provides a description of the estimations strategy; section 4 discusses the results; and section 5 concludes the paper.

## **2 Study context**

### **2.1 Cocoa Market**

The organization of cocoa marketing in Cameroon is characterized by the interactions between licensed buyers, buying agents<sup>2</sup>, Common Initiative Groups (CIGs)<sup>3</sup> (who often present themselves as producers' organization) and producers' organizations (PO)<sup>4</sup>. Licensed buyers are mostly based in the cities and buy cocoa in large quantities. They hire buying agents who are sent out with purchase money to deal with the local producers and buy cocoa at a price previously fixed by the licensed buyers (this price is generally comparable with the international price). Buying agents often have long-standing relationships with farmers and offer them pre-harvest financing for input purchases and collect cocoa at the farmgate to resell

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<sup>2</sup> Buying agents work for a licensed buyer and are paid in commission.

<sup>3</sup>After the liberalization in 1994 government withdrew all financial support and farmers found it difficult to procure fungicides and pesticides from the private suppliers and as a result many of them started to look for alternative source of agricultural activities. Under such a scenario government and many non-governmental-organizations (NGOs) started to encourage cocoa farmers and traders to organize themselves under a 'common initiative groups' (CIGs) to promote welfare through bulk marketing. Formation of CIGs helped to reduce transaction costs and price paid to the producers increased. In 1997, world cocoa prices started to recover and the revival of market price brought back many farmers again to cocoa production (Duguma et al. 2001).

<sup>4</sup>After liberalization, in the Centre region the former state cooperatives disappeared. POs primarily grew up with support from development projects such as the Sustainable Tree Crop Program based at the IITA. According to Folefack & Gockowski (2004), 40% of the cocoa producers in the Centre are members of a PO. In the Southwest, the former cooperatives (such as the Southwest Farmer Cooperative Union based in Kumba) were placed in the hands of CIGs. In the absence of projects supporting producers' initiatives, no POs have been able to emerge in the Southwest.

it to the licensed buyers. Licensed buyers purchase either directly from farmers<sup>5</sup> or from the agents and transport the cocoa in large quantities to the buying centers, where it is sold to exporters. Producers can market their cocoa either individually or collectively through POs and CIGs. Cocoa cultivation in Cameroon is a small scale business with plantation ranging between 2-5 hectares. Most farmers are members of CIGs or POs. By becoming members of such groups they could leverage the benefits of collective action, in terms of easier access to fertilizers and pesticides, regular contacts to government extension officers and exchange of knowledge and better price opportunities.

In case of collective marketing these groups sign contracts with buyers, identify those members who have cocoa for sale and then sell the total amount of cocoa collectively to the buyer. Thus, in the case of collective sales, CIGs and POs act as procurement organizations for buyers (Folefack & Gockowski, 2004; Gockowski, 2008). However, cocoa sales do not figure high on the priority list of all CIGs. Many CIGs focus on the protection of farmers' rights, organization of extension visits for their group to obtain information on new farming techniques and on the promotion of farmer-to-farmer assistance by creating farmers' networks. However, most of the small holders live in remote villages; are not well connected with the market; and often lack sufficient knowledge about the market prices. As a result, some of these farmers are exploited by buying agents who tend to behave opportunistically by offering lower prices than the market prices. In order to protect the farmers from such deceptions, some CIGs<sup>6</sup> might decide to intervene to organize a collectively sale to promote farmers bargaining situation. Again, since most of the farmers cannot afford pesticides and fertilizers, they receive credit from the buyers to buy chemicals during the production phase. At harvest, buyers collect cocoa for an amount they estimate to be commensurate with the value of the amount of credit. In such situations, farmers have a lower bargaining position due to their repayment obligations.

Hence, collective action not only facilitate better access to marketing channels; secure access to new technologies, and tap into high value markets, allowing them to survive in international agribusinesses (Stockbridge et al., 2003), additionally, there is evidence that collective action can help smallholders reduce barriers to entry into markets by improving their bargaining power with buyers and intermediaries (Thorp et al., 2005; Kherallah et al., 2002)

## **2.2 Empirical Data**

The empirical basis of the analysis is primary data which was collected from six major cocoa producing subdivisions in Southwest and Center Cameroon, namely Ngomedzap, Boumyebel, Obala, Mbangassina, Bokito and Kumba. The survey was conducted between October and November in 2007. In the first stage, twelve communities were selected randomly from six sub-divisions. Subsequently, within these twelve communities, 53 villages and 1031 respondents were selected randomly. In total, 227 female farmers and 804 male farmers participated in the survey. All survey participants are members of Common Initiative Groups (CIGs). The villages are small (500 - 5000 inhabitants), yet, they differ in many characteristics. Villages in Kumba and Mbangassina are mainly composed of migrants, who

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<sup>5</sup> Since cocoa is small holders' sector and farmers sell cocoa mostly in small quantities, buying agents are the primary buyers for them who collect cocoa in large quantity and sell to the licensed buyers who are mostly located in cities.

<sup>6</sup> In this study we considered farmers only with CIG memberships.

are more market-oriented and less concerned with land accumulation than their indigenous counterparts. Women in these communities are more engaged in commercial activities that require them to leave their homesteads. Villages in Bokito, Boumyebel, Ngomedzap and Obala are mainly composed of indigenous people who are less market oriented. Women in these communities are involved in small income generating activities, but unlike the women in Kumba and Mbangassina, they generally carry out their activities at home and generate considerably lower earnings.

### 3 Estimation strategy

This section provides our estimation strategy explaining determinants of market participation and impact of market participation on control over proceeds in a well-specified econometric model. Particularly we are interested in impact of price discrimination and collective marketing on market participation and impact of participation on share of cocoa revenue controlled by the farmer herself.

The model we estimate is:

$$S_{ij} = \alpha + \beta P_{ij} + \gamma X_{ij} + e_{ij} \dots (1),$$

$$P_{ij} = \pi_0 + \pi_1 z_{ij} + \pi_2 X_{ij} + e_{ij} \dots (2)$$

Where,  $ij$  is  $i$ -th farmer in  $j$ th village;  $V_j$  are the village fixed effects;  $S$  is the measure of control over proceeds;  $P$  is market participation dummy and  $X$  is a set of exogenous controls,  $z$  is the instrument for market participation.

OLS estimates of  $\beta$  are likely to be biased due to unobserved variation in  $e_i$ . The direction of bias is given by two elements: the relationship between the omitted variable and the outcome variable which is control over income; and its relationship with the variable of interest, i.e. market participation. Lower participation by female farmers in marketing suggests that some gender specific factors must be affecting female participation decision which might also affect the outcome variable. In particular, consider the case where female bargaining power that influences control over income as well as participation decisions. If bargaining correlates positively with control over income as well as with participation decisions,  $P_{ij}$  from equation (1) biases the OLS estimates since part of the estimated effect of participation on control can be attributed to female bargaining. Again, endogeneity could arise also from measurement error due to selection issues. Female farmers could self-select into not participating in marketing because of factors such as, lower negotiation skill, lack sufficient information etc. (Fletschner & Mesbah, 2011, Chowdury, 2006; Ngimwa et al., 1997). Therefore we must account for the endogeneity (from omitted variable bias and selection bias) using proper estimation strategy. We will utilize instruments (IVs) to account for the omitted variable bias and selection bias.

The instrument we use in our study is percentage of male farmers in a village who sell collectively through CIGs. We base our IV on the hypothesis that higher is the proportion of male farmers involved in collective marketing the lower will be the price discrimination. This happens because our data shows that price discrimination in our set up arises when male farmers choose to sell individually and negotiate higher price. This price is higher than the price received by female farmer who sell individually and price receive by all farmers in collective marketing (see Table3). In other words, our data shows that male farmers are

receiving higher price by opting for individual marketing which creates price discrimination in two directions. First, price received through collective marketing is significantly lower than that received by individual marketing. Second, price received by female farmers (marketing collectively or individually) is significantly lower than price received by male farmers individually. Since price opportunities are higher for male farmers outside collective marketing, for generating higher income rational choice by female farmers would be to handover the task to men. However, if in some villages male participation in collective marketing is higher, price received by farmers would not differ by gender. Consequently, in these villages female market participation should be higher than that in villages where price discrimination is rather stark due to more men opting for individual marketing. Therefore, increase in male participation in collective marketing should increase female market participation by reducing the gender gaps in prices. Quantitative evidence supporting this argument will be discussed in the following section in details.

This leads us to the question if economic opportunities for male farmers are higher outside the farmers' group why some are choosing to market collectively while the others are deciding not to do so. One possible explanation could be that one of the reasons why farmers opt for collective marketing is to establish better price contracts with buying agents. The most inventive and ambitious farmers from these groups can then be expected to facilitate such contracts with agents outside the group; negotiate for higher price and then benefits are reaped equally by everyone in the group. This is consistent with several institutional theories (Tirole, 1996; Wade, 1985) which says cooperation is successful when payoff from cooperation is higher. This certainly is not our case as we find that for men cooperative payoff is rather lower than non-cooperative payoffs. Therefore, lack of success of these farmers group could be attributed to failure of few economic agents (male farmers) to cooperate. In other words, farmers who are able to generate higher prices, despite their group membership are choosing to ride individually<sup>7</sup>. This on the other hand, creates non-cooperation within the group resulting in a lower welfare gains for those who decides to cooperate. From development literature there are two possible explanations of such inefficient outcomes for collective action. First, groups could successfully pursue their economic goals if they devise effective institutional arrangements that correctly structures the individual incentives faced by the group members; equitably distribute the cost and thus promotes cooperative behavior in the group (Kenworthy, 1997). These traits mostly relates to effectiveness of group functioning. Second, one should distinguish between participation and effective participation. In our case we find evidence that some participating farmers are not really participating effectively in organizing collective marketing. These farmers however are the ones whose involvement would have led to the success of collective marketing (Bianchi, 2002).

#### **4 Descriptive Statistics**

We present descriptive statistics of individual characteristics by gender in Table 1. Results show that while overall 78% of the farmers in our sample are married, marriage rates are significantly higher for male farmers. This can be attributed to the fact that usually when a woman gets married, production of cash crops, such as cocoa, remains in the domain of her husband. Our data further suggests that female farmers are significantly less educated than

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<sup>7</sup> Previous studies also found evidence of correlation between group success and gender composition of groups. Barham and Chitemi, 2009 showed that groups with a greater ratio of male to female leaders are more likely to improve their market situation. Female-only groups are clearly often disadvantaged compared to their male counterparts as women lacks sufficient time to spend on searching for market opportunities because family responsibilities. This is compounded by the fact that women do not have the same socio-political networks as men, which hinders their access to new resources and services that could lead to new market opportunities.

male farmers: while 64% of men have completed primary education only 37% of women have done so. Interestingly, though significantly less number of female inherits land, they hold more land title than men. This might reflect that females, holding land titles are more involved in cash cropping than female without land title. Moreover, 40% of the female farmers in our sample are not marketing their cocoa themselves, whereas only 4% of the male farmers delegate the marketing to somebody else. Control over income is measured as the share of the cocoa revenue controlled by the individual farmer. Results of t-tests of gender difference show that the average share of income controlled does not differ significantly between male and female farmers. Finally, the average price received by cocoa producers varies substantially and significantly across gender. On the average, male farmers receive 811 FCFA, whereas female farmers receive only 570.44 FCFA. This provides some evidence that gender-related price discrimination may exist in the cocoa market.

**Table:1 Descriptive Statistics of Individual Characteristics by Gender**

	Mean			t-stat
	All	Female	Male	
Share	0.46 (0.23)	0.47 (0.22)	0.45 (0.23)	-0.76
Gender(Female=1)	0.22 (0.41)			
Market Participation	0.88 (0.32)	0.61 (0.49)	0.96 (0.2)	16.10
Extension service	0.42 (0.49)	0.28 (0.45)	0.46 (0.5)	5.04
Age of the plant	41.30 (2.78)	35.88 (1.44)	42.82 (3.53)	1.03
Age	49.58 (12.83)	50.3 (10.97)	49.39 (13.32)	-0.94
Household Size	7.02 (4.32)	6.32 (3.21)	7.23 (4.57)	2.81
Primary Education	0.58 (0.49)	0.37 (0.48)	0.64 (0.48)	7.35
Less than Primary	0.36 (0.48)	0.6 (0.49)	0.29 (0.46)	-8.88
Married	0.78 (0.42)	0.37 (0.48)	0.89 (0.31)	19.18
Land Title	0.16 (0.37)	0.26 (0.44)	0.13 (0.34)	-4.42
Inherited Land	0.75 (0.43)	0.61 (0.49)	0.79 (0.4)	5.64
Non farm activity	0.25 (0.43)	0.21 (0.41)	0.26 (0.44)	1.63
Area	4.84 (5.19)	4.52 (5.04)	4.94 (5.24)	1.05
Price	757.93 (30.02)	570.44 (30.86)	811.06 (37.30)	3.34

CIG	0.27 (0.44)	0.23 (0.42)	0.28 (0.45)	1.43
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Table 2 shows the share of income controlled by market participation status and gender. We find that farmers who are participating in the market, in general, seem to have slightly higher control over the income gained, however, the difference between market participants and non-participants is not statistically significant. Yet, in the case of female farmers the control over income is significantly higher in the case of market participants. This indicates that for female farmers, market participation is positively associated with their intra-household bargaining power.

**Table2: Share of Income Controlled by the Farmers by Participation and Gender**

	All	Participant	Non-participant	Participant-Nonparticipant	t-stat
All	0.46	0.46	0.44	0.02	1.08
Male	0.45	0.45	0.43	0.02	0.56
Female	0.47	0.48	0.44	0.04	<b>1.64</b>

Table 3 presents further interesting evidence on price discrimination in cocoa market and how collective marketing could eliminate such discrimination. The results allow us to make four distinct observations. First, irrespective of the marketing channel and farmers' market participation status, female farmers receive significantly lower prices than male farmers, on the average. Second, price discrimination occurs when female farmers are participating (i.e. undertaking their own marketing) and instead of collective marketing choosing to sell individually. Third, such discrimination is absent in collective sales, even if the female farmer is choosing to participate in marketing. Fourth, in regions male does not participate in collective marketing gender gap in prices are significant whereas in regions where male do not take part this gap becomes insignificant.

**Table 3: Price Received by Male and Female Farmers**

	Male	Female	t-stat
All	811.06	570.43	<b>3.34</b>
Participants	813.82	526.51	<b>3.13</b>
Non-Participation	760.66	624.74	0.75
t-stat	0.27	1.51	
Selling through CIG	682.38	584.92	0.76
Not selling through CIG	862.7	556.48	<b>3.43</b>
t-stat	<b>2.16</b>	0.37	
Participants selling through CIG	682.07	538.64	0.73
Participants but not selling through CIG	867.64	522.02	<b>3.27</b>
Non-Participants but selling through CIG	699.44	620.03	0.41
Non-participants and not selling through CIG	770.29	624.79	0.6
Villages without male farmers selling through CIG	1098.91	627.57	<b>2.78</b>
Villages with male farmers selling through CIG	644.23	542.65	1.63

Note: Participation=1 implies farmer is participating in marketing and 0 implies non participation; CIG=1 implies collective marketing , 0 implies individual marketing

On the basis of these results our identification strategy is formulated to control for the



endogeneity of market participation decision. Table 3 shows participating female farmers, selling individually or collectively, receive similar prices (no significant difference). However, when male farmers are choosing to sell individually, they are gaining significantly higher price than their female counterparts. Therefore, price discrimination in a region could be explained by male absence in collective marketing, and as discussed before this then discourages female market participation either individually or collectively. This is shown in Table 4: female market participation is significantly lower in villages where male do not take part in collective marketing.

**Table 4: Effect on Male Participation in Collective Marketing on Market Participation**

	All	Male	Female
Villages without male farmers selling through CIG	0.86	0.94	0.52
Villages with male farmers selling through CIG	0.90	0.97	0.65
Difference	0.04	0.03	0.13
t-stat	<b>-1.9</b>	-1.26	<b>-1.96</b>

Therefore, as mentioned before we use proportion of male farmers involved in collective marketing as instrument. This seems to be a plausible factor explaining lower market participation rate by female farmers and the reasons are as follows. The instrument in our set up is built on the assumption that when price discrimination is absent or minimum; market participation by female farmers would increase. We measure price discrimination at the village level and argue that when average price received by male and female farmers vary significantly in a village, it would signal the existing price discrimination and discourage female participation. Since price discrimination could not be used as an IV because of its correlation with the omitted variables (such as female autonomy, bargaining) we rather rely on external causes of price discrimination for instrumenting participation. In our case the price discrimination is caused by lack of male participation in collective marketing, especially by those who are receiving higher price moving independently and causing gender gap in price received. Therefore, proportional male participation in collective marketing in the village is used as instrument to proxy for price discrimination.

## 5 Accuracy of Self-Reported Share

One concern with the data is measurement error due to the self-reported nature of share of proceeds controlled by the farmers. This information could be biased by enumerators' characters such as their gender, age. Especially if a female respondent is interviewed by male enumerators they might not correctly state their own share. While we do not have information on the individual characteristics of enumerators, we can break down our data by enumerator to explore whether significant differences exist in the reported shares. We constructed dummy for each enumerator and tested for the share differences by each of these dummies. If there has been any bias in reporting the shares of cocoa proceeds controlled by respondents for any the enumerators, these tests should reveal that. Table 5 reports the probability value of the t-tests, which show almost no evidence of bias in self-reported shares (control over proceeds) by farmers.

Enumerators	H0: [Share(Male)-Share(Female)=0]	p-value of differences
1	0.86	0.67
2	0.10	0.54
3	0.97	0.37
4	0.66	0.56
5	0.46	0.8
6	0.16	0.6
7	0.69	0.2
8	0.76	0.22
9	0.01	0.31
10	0.56	0.12
11	0.35	-
12	0.11	0.12
13	0.61	0.17

Note: \* Comparable groups are not available

## 6 Results

### 6.1 Market participation

Estimation results of linear probability model of market participation are shown in Table 6. We regress market participation on a set of exogenous controls. We find that according to all models female farmers are significantly less likely to participate in marketing. Compared to male farmers, female farmers have 33% to 22% less probability of market participation than that of men. In the first two models marriage do not exert any significant impact on participation, though when interacted with gender it appears with a significant negative coefficient: married women have 22% lesser probability of market participation than married men. While age in model one does not have a significant effect, including a squared term in model two reveals that participation increases with age, although at a decreasing rate. Interestingly land inheritance, in first two models, has negative coefficient, but as we included interaction terms between gender and land title and gender and marital status inheritance appears with a negative coefficient. This is opposite to our expectation that inheritance provides higher bargaining which in turn increases the probability of market participation. One possible explanation for the negative coefficient of inheritance could be that when we control for gender centric heterogeneities, intrahousehold bargaining norms on market participation become salient. In other words, *ceteris paribus* when land is inherited from family, control over the cocoa farming and marketing does not rest only with the farmer but also with other family members lowering farmer's decision making power on market participation choice. Furthermore, household size is significant and positive in model one; however, the effect turns insignificant as we include more controls in model two and three. Additionally we find evidence that education is critical for market participation. Compared to farmers with higher education levels, farmers who only completed primary education have a

5% lower probability and farmers who have even less than primary education have a 9% lower probability to participate in the market.

**Table 6: Linear Probability model (Dependent Variable : Market Participation Dummy)**

	<b>Model1</b>	<b>Model2</b>	<b>Model3</b>
Gender	-0.332*** (0.067)	-0.343*** (0.065)	-0.222*** (0.078)
Age	-0.001 (0.001)	0.011** (0.006)	0.008 (0.005)
Age sq		-0.000** (0.000)	-0.000* (0.000)
Household Size	0.005* (0.003)	0.004 (0.003)	0.004 (0.003)
Married	-0.069 (0.047)	-0.076 (0.048)	0.003 (0.039)
Primary education	-0.052* (0.028)	-0.050* (0.029)	-0.047* (0.027)
Illiterate	-0.101** (0.039)	-0.096** (0.041)	-0.087** (0.039)
Land title	-0.033 (0.036)	-0.033 (0.036)	-0.025 (0.035)
Inherited land	-0.053 (0.032)	-0.054 (0.032)	-0.057* (0.033)
Land title*Gender			-0.028 (0.101)
Married*Gender			-0.224** (0.104)
Area		0.001 (0.003)	0.000 (0.003)
Non farm activity		-0.004 (0.026)	-0.002 (0.024)
Extension service		0.001 (0.020)	0.006 (0.020)
Constant	1.099*** (0.065)	-0.136 (0.152)	0.355** (0.169)

Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1; Village dummies are included

## 6.2 Control over Revenue

Table 6 provides estimation results of instrumental variable analysis with endogenous participation choice. The first three models in Table 6 report the estimation results for the pooled sample and the last three models consider only female farmers.

**Table 7: Instrumental variable analysis with endogenous participation with share of revenue controlled as dependent variable**

Participation	All			Only Female		
	0.676***	0.503**	-4.791	0.125*	0.241	0.273*

	(0.261)	(0.229)	(3.160)	(0.066)	(0.148)	(0.154)
Participation*Gender			5.540*			
			(3.226)			
Gender	0.207**	0.068	-4.991			
	(0.100)	(0.084)	(3.060)			
Age	5E-05	-0.002	-0.003	-0.001	3E-04	0.001
	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Age_sq		2E-05				
		(0.000)				
Household size	-0.003	-0.001			-0.007	-0.008
	(0.003)	(0.002)			(0.009)	(0.009)
Married	0.017	-0.046	0.104		0.094	0.092
	(0.040)	(0.034)	(0.102)		(0.074)	(0.079)
Primary	0.065**	0.052*	-0.171	0.211***	0.219***	0.228***
	(0.032)	(0.027)	(0.160)	(0.027)	(0.039)	(0.033)
Illiterate	0.070**	0.045	-0.251	0.207***	0.218***	0.224***
	(0.036)	(0.029)	(0.205)	(0.046)	(0.058)	(0.058)
Land title	0.053**	0.038**	-0.056	0.079***	0.064**	0.052*
	(0.022)	(0.018)	(0.109)	(0.029)	(0.032)	(0.031)
Area	-0.001	-2E-04	-0.003	-0.003	-0.002	-0.001
	(0.002)	(0.002)	(0.007)	(0.003)	(0.004)	(0.004)
Land title*Gender		0.030				
		(0.048)				
Married*Gender		0.161***				
		(0.060)				
Non farm activity	-0.004	-0.008		-0.034	-0.040	-0.061
	(0.022)	(0.017)		(0.048)	(0.051)	(0.054)
Extension service	-0.010	-0.011		-0.078*	-0.111**	-0.107*
	(0.021)	(0.021)		(0.041)	(0.054)	(0.059)
Inherited land			0.072	0.002	0.004	0.002
			(0.046)	(0.034)	(0.042)	(0.041)
Age of plant			-0.00005			-0.002
			(0.000)			(0.001)

**Excluded instruments:**

% of Male Selling Collectively in Village	Yes	Yes	Yes	Yes	Yes	Yes
% of Male Selling Collectively in Village*Gender	No	No	Yes			

**F test of excluded instrument:**

First stage with participation as endogenous	14.49	18.32	6.55	16.07	7.48	8.64
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First stage in participation\*gender as endogenous 13.52

Robust standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1; Village dummies are included

In the pooled sample estimation, model 1 and 2 show positive and significant impacts of participation on farmers control over the proceeds. Gender appears with positive and

significant coefficient in Model 1, however, in Model 2 when interaction of gender and marriage dummy is included, significance of gender disappears and the interaction appears with significant and positive coefficient. Marriage dummy exerts not significant impact indicating marital status does not have significant impact on men. However, from the coefficients of marriage dummy and interaction between gender and marriage dummy we find that marriage has 11 percentage point (significant at 5%) impact on women. Furthermore, comparing the impact of marriage on men and women we find marriage provides significantly (at 1%) higher control over income to women than to men by 16 percentage points. In Model 3 we include interaction between participation and gender and estimated impact of participation on control over income (calculated from the coefficients of participation and the interaction terms) is 75% which is significant at 5% level. Similarly, estimated impact of gender on control (calculated from the coefficients of gender and the interaction term) is 55% which is significant at 1% level. For education dummies in Model one and two we find they are positively impacting farmers control over the revenue. Additionally we find that in first two models of pool sample estimation that holding land title could increase control over income by 5%. Therefore, land rights provide higher control and thus higher bargaining power. One of the factors constraining the Cameroonian cocoa sector is the fact that a significant number of the cocoa trees have reached the end of their productive lives (Dada, 2007). To control for cocoa quality therefore we use age of the cocoa trees which however does not have any impact on control over income.

For female farmers we find the results on participation, education and land title remain consistent with the pooled sample estimation and these variables are all appearing with positive and significant coefficients. Depending on model specification market participation increases control over proceeds by 12 to 27 percentage points. Education dummies are all significant and are having larger impact than that in the pool sample. Surprisingly, extension service is having negative impact on control over income of the female farmers. This might indicate that socio-economic and cultural norms might limit women's participation in extension meetings, essentially when women have lower literacy or schooling rates than men. In order to understand the training materials therefore it is often a common practice that men instead of the women take part in the meetings which in turn equip men with a higher bargaining power on sharing the cocoa revenues.

## **7 Conclusion**

This paper examines participation of female farmers in agricultural commercialization and its impact on intrahousehold bargaining. We argue that during the last few decades agricultural commercialization has introduced significant changes in global agro-food systems and provided better income opportunities to farmers in developing countries. However, the benefits are not equally reaped by everyone, such as by female farmers. Commercialized cropping has been increasingly including female farmers in cash cropping, but when we look at the integration of female farmers in the supply chain, we find minimum female participation. Using data from Cameroon we find that a large number of female farmers are producing cocoa which is a major cash crop of the country, but very few of them take up the marketing activities. In other words, while male farmers are producing as well as marketing their own produce, female farmers participate only in production and not in marketing. Consequently, family members who help her in marketing could then claim a share in the revenue, reducing her own control over the sharing decision. Therefore, we argue that market participation provides higher bargaining power in deciding the sharing pattern in the household and renders higher control over the proceeds.

In our analysis we identify male participation in collective marketing as a factor explaining significant gaps in male and female market participation in cocoa markets in Cameroon. We make the argument that lower male participation leads to significant gender discrimination in price received by farmers which then discourages female market participation. Essentially, such discrimination occurs because men with better marketing abilities despite their membership with CIGs decide to sell individually. These farmers however are the ones whose participation in collective marketing would have generated price opportunities significantly higher than that under individual bargaining. We do not find similar evidence for female farmers: Individual and collective marketing do not generate different prices for female farmers. This also indicates incomplete integration of female farmers with commercialized agriculture. Some of the conjectural arguments for such outcome could be that access to market information is limited for female farmers, network possibilities are better for men; women lack sufficient negotiation skill in price settlement. These then create a gender gap in price received inhibiting female market participation who might decide to handover marketing to men to generate higher revenue. Conversely, price discrimination is likely to be lower in regions where male participation in collective marketing is higher than those with lower male participation. Therefore, in the estimation of impact of market participation on share of cocoa revenue controlled by farmer herself we use proportion of male farmers selling collectively in village for instrumenting market participation. Estimation results confirm that the instrument has significantly positive impact on market participation and market participation influences control over revenue positively. We run our estimation for pool sample as well as only for female and find similar effects of participation on control over income. Thus our study establishes two major conclusions. First male participation in collective marketing has positive impact on female market participation. Second market participation renders higher control over the proceeds.

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