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How does gender of the household head affect market participation of smallholder maize farmers? Evidence from Ethiopia and Kenya

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Abstract

Gender parity is a major issue for successful participation in agricultural markets among rural households in sub-Saharan Africa. Critical knowledge gaps remain on how to ensure gender equity so that opportunities for market participation are inclusive, equitable and broad based. This paper analyses the effect of gender of the household head on market participation among 2189 and 613 smallholder maize farmers in Ethiopia and Kenya respectively. Using an ordered probit model supplemented by counterfactual analysis where male headed households (MHHs) were the advantaged group, this study finds that in Ethiopia, female headed households (FHHs) were twice as likely to be net buyers of maize than MHHs. When endowments were equalized, the returns effects showed that FHHs would still be 69% more likely to be net buyers of maize than MHHs. When returns were equalized, the endowment effects showed that FHHs would still

be less likely to be net sellers than MHHs by a 17-percentage point margin in the Ethiopia sample. In the Kenya sample, even though the endowment and return effects were detectable and made FHHs worse off, no major gender differences were observed *ex ante*. We conclude that gender market participation analysis should be location specific. Further, in addition to ensuring equitable access to resources, inclusive markets will also require policies that focus on removing disparities not readily observable in typical household surveys and analyses.

Keywords: Ethiopia, Kenya, gender, market participation, ordered probit, endowment and return effect

JEL codes: Q12, Q18

1. Introduction

For agrarian households, those whose primary activity is crop production, the ability to participate in agricultural markets especially as net sellers is a strong indicator of the potential for achieving economic progress. Therefore, the role of market participation for increasing income and poverty reduction of small holder farmers cannot be exaggerated. The concept of market participation derives from the basic notion of specialization as the best means of achieving division of labor, economic efficiency and income growth. This (specialization) depends on two fundamental preconditions. First, that markets exist to facilitate specialization and exchange. Second, that households have the capacity to engage with markets. Therefore, the promise of markets can only be achieved if households have the means and incentives for such participation, and if it is lucrative, broad based and equitable (Barrett 2008).

Despite the importance of inclusive markets as the shapers of incentives and capacities for households, there is limited evidence on what determines market participation for some segments of rural populations and not for others. Specifically what policies can be identified to ensure that market participation in rural areas is as broad as possible? In this paper we examine a critical issue of inclusiveness as determined by gender in ensuring broader market participation among rural households.

A fundamental question that arises with regards to empirically determining gender effects on market participation is whether gender is simply an intercept shifter or whether heterogeneous effects imply that when studying gender differences, the gender variable can actually be seen as a slope shifter. It has been reported that gender differences in observed characteristics and "returns"[1] to those characteristics make the identification of gender effects difficult by just using a gender dummy variable. However, failure to distinguish between the causal effect of gender and the artefacts of implied heterogeneity in econometric analysis could lead to misleading policy prescriptions. For example, if gender is simply an intercept shifter (and no more), then simply leveling the playing field with regard to resource access (and other enabling factors) will rectify the gender gap in terms of market participation or technology adoption. If other factors come into play such that even if both male and female headed households are on an equal footing there remain productivity and other performance differences, then policy attention should go

[1] By "returns" we mean that even if FHH and a MHHs are similar in all respects, the outcome (market participation) can be different because the scope for profiting from, say, credit access can be less for a FHH which faces other unseen obstacles.

beyond simply increasing resource allocation to women (for example). Such interventions could include strategies to improve women's managerial abilities, educational programs to change social norms (that limit women's participation in markets) and increase women's bargaining power, paying attention to resource quality differences between men and women and similar measures.

In many social science studies, the recognition of group heterogeneities is fairly common (Manski 1995; Winship and Morgan 1999; Heckman 2005). However these (heterogeneous) effects do not seem to be captured in agricultural technology and market studies where gender effects are analyzed using (mostly) dummy variables (Kassie, Ndiritu and Stage, 2014). Merely having a dummy variable (such as in a pooled regression framework) can imply that gender has only a parallel shift effect (which is always the same irrespective of the values taken by other covariates that determine market participation, (see Kassie, Ndiritu and Stage, 2014).

If FHHs are hampered by factors that can be leveraged by policy (e.g. poor credit access) then that type of information can be used to rectify gender biases in credit access for example. However, factors that are not necessarily amenable by agricultural policies (e.g. socio-cultural norms) can also affect gender disparities in market participation, perhaps even undermining these policy initiatives. These factors include (among others), social connections, subtle discrimination, lower social status that may affect personal aptitudes and confidence and other inhibitory social factors. The contribution of such factors needs to be quantified and understood so that remedial measures taken. This is important to lay the foundation for the success of agricultural sector and market policies aimed at achieving inclusive markets.

The contribution of this paper is therefore to empirically analyze the extent to which differences not accounted for by observable endowment factors can explain different market participation outcomes. This has important policy implications. For instance, if even after FHHs receive equal access to resources, their market participation outcomes are still worse than that of their MHH counterparts, then policy research and implementation should shift toward efforts to identify, understand and rectify the sources of these disparities not observable in typical household surveys; in addition to making sure than men and women have equal access to resources. Do FHHs tend to be in a particular market participation categories compared to their MHH counterparts after controlling for resources and other explanatory variables? Or given specific characteristics associated with MHHs and if similar features that characterize MHHs

were imposed on FHHs (as a counterfactual technique), will they retain their market participation positions or will they look more like MHHs now (in terms of their maize market positions)? We adopt exogenous ordered probit model regression supplemented by counterfactual analysis to understand factors that influence market positions/participation and unravel the contribution of observed and unobserved characteristics of FHHs and MHHs (e.g. managerial ability, social norms, resource quality difference, and differential access to services) to differences in maize market position/ participation.

2. Literature overview and problem statement

The analysis of market participation of rural agrarian households, whether as buyers or sellers of inputs and outputs has largely focused on factors dealing with infrastructure, institutions and incentives that have prevented broad based market participation (Kheralla et al. 2002; Jayne et al. 2003; Gregory and Bumb 2006). In fact a number of studies during the decade of the 2000s (following a period of market reforms in the 1990s) showed that while agricultural sector reforms had somewhat increased private sector participation in input-output markets, overall agricultural sectors in SSA had registered only marginal progress towards commercialization (Kheralla et al. 2002).

On the methodological front, the literature analyzing market participation has since Goetz (1992) used models of selectivity to account for factors that affect the discrete decision to participate in agricultural markets and the degree to which the households participate (such as purchase or sales volumes). Goetz (1992) was one of the first studies that looked at the issue of the discrete choice distinguishing this initial decision from that of the, the continuous extent of market participation decision (i.e., transaction volume). Key, Sadoulet, and de Janvry (2000) on the other hand used a censoring model (with an unknown censoring point) to estimate structural supply functions and production thresholds for Mexican farmers' participation in the maize markets. Bellamare and Barrett (2006) studied a similar phenomenon accounting for the fact that unobserved factors that affect both the decision to participate in livestock markets among Kenyan pastoralists also affect the decision on the number of livestock to sell as well as the policy implications of the sequential nature of the decision making process. Overall the literature on household market participation has therefore focused on two empirical issues. One, the issue of selectivity and endogeneity (self-selection into markets) and the realization that factors which affect such self-section also explain the extent of market participation (volumes of sales and

purchases). Secondly, the issue of fixed and variable transaction costs in determining market participation has found much attention recently. A major contribution in that line of literature is the role of idiosyncratic transaction costs that determine differential market participation outcomes among households in the same geographic location. The latter issue is at the core of whether markets will be inclusive or not (de Janvry, Fafchamps and Sadoulet 1991).

3. Conceptual framework: Gender and market participation

In terms of net positions in maize market participation, we categorize households into autarkic, net seller and net buyer.. Households who choose to produce all of their maize consumption or those who end up buying and selling equal amounts of maize during the agricultural calendar can be regarded as autarkic. Those who produce some but do not have enough marketable surpluses so that purchases are more than sales can be regarded as net buyers and those who sell more than they buy can be regarded as net sellers.

While these categories may not map one-to-one into distinct welfare categories (e.g. it cannot be assumed *a priori* that net buyer households have the worst welfare indicators), it is reasonable to expect that in largely low income environments where maize is the predominant income activity and given that our sample was purposively selected to include only maize growing households for whom maize and legume crops constitute a major economic activity, being in net buyer position can be hypothesized to reflect a weaker welfare position in terms of income or consumption. This will be true if the household is predominantly agrarian with no alternative wage earning opportunities apart from growing maize.

The market participation decision can be construed as a choice decision akin to that in technology adoption (see Barrett, 2008). This is because there are different options for producing a subsistence (commercial) crop by the household. One is self-production and alternatively, the household can grow a different crop (diversify into other crops and produce some of their maize requirements and buy the rest). Therefore just like the case with technology adoption, gender equity is an important issue for market participation, not least because of the potential equity losses that can happen if the playing field for technology adoption or market participation is tilted against one group (most likely women). It has been well documented that lack of gender parity can undermine the best efforts at achieving broad based economic progress (Quisumbing, 2003, World Bank, 2012).

Generally, market participation requires more than a household receiving the right incentives (such as "getting prices right") but as a precondition, households need to have access to technologies, assets and public goods (infrastructure, agricultural extension) in order to produce marketable surpluses. However, due to factors beyond these categories, it is possible to observe that within the same geographic locale, even if infrastructure and other public goods are present, some households will self-select out of markets and remain trapped in subsistence modes of production. This leads to skewed market participation where only those able to surmount these unfavorable circumstances can afford some level of market participation. This is how market participation can lack inclusiveness.

4. Econometric framework: Measuring gender market participation gap

This paper adopts an exogenous ordered probit regression model supplemented with counterfactual analysis to understand the causes of market participation gaps between FHHs and MHHs. We use concepts borrowed from the program evaluation literature to do this. Specifically, we decompose market participation/position gap into the portion of gender differences between both groups that is explained by the levels or quantity of observable characteristics (the level effect) and the portion of the gender based gap that is driven by differences in the returns to these characteristics (returns effect). The returns effects emanate from unobserved heterogeneity caused by factors such as market failures, institutional and other social constraints that change the effectiveness of characteristics for FHHs/MHHs in enabling them to participate in markets. An ordered probit model is appropriate because the decision to participate in maize markets can be naturally ordered into three categories (as we do here, the lowest category being net buyers).

The exogenous switching regression models assuming a gender treatment variable can be specified as:

$$\begin{cases} M_1 = \beta_1 X_1 + \varepsilon_1 \\ M_0 = \beta_0 X_0 + \varepsilon_0 \end{cases} \quad (1)$$

Here M indicates the *i*th household market positions/participation outcome variable (autarkic, net buyer or net seller); the 1 and 0 subscript indexes MHHs and FHHs, respectively. The X is a vector of observable household characteristics affecting market positions; and β are the associated coefficients/returns (prices for characteristics), and ε the error term.

Equation (1) is used to produce counterfactual market positions/participation and decomposes gender market positions gap into the portion of the gender gap that is explained by differences in the levels or quantity of observable covariates/characteristics (quantity or level effect) between both groups and the portion of the gender gap driven by differences in the returns to these covariates/characteristics (returns/prices effect). Following Kassie, Ndiritu and Stage (2014), and borrowing concepts from the wage decomposition and the impact evaluation literatures, the following conditional expectations for each market participation position are computed from equation (1) in the actual and counterfactual scenarios:

$$E(M_1|g = 1) = \beta_1 X_1 \quad 2(a)$$

$$E(M_0|g = 0) = \beta_0 X_0 \quad 2(b)$$

$$E(M_0|g = 1) = \beta_0 X_1 \quad 2(c)$$

$$E(M_1|g = 0) = \beta_1 X_0 \quad 2(d)$$

Where g is a gender variable which is equal to 1 for MHHs and 0 for FHHs and the dependent variables (M) are as defined previously. Equations 2a and 2b are the actual MHHs and FHHs expected probabilities of market positions observed in the data, respectively. These are predicted market participation among MHHs and FMHs, after fitting the ordered probit model on the FHHs and MHHs sub-sample. Equations 2c and 2d represent the "counterfactual" expected probabilities of market positions for MHHs and FHHs, respectively. The counterfactual is what the market positions of FHHs would have been if the returns to their observed characteristics had been the same as the current returns to MHHs' observed characteristics, and vice versa.

Using these conditional expectations, the expected market positions/participation outcome differences are derived. The FHHs expected probabilities of market position (indexed

by the extra *c* subscript) ($M_{c0} - equation\ 3$) due to differences in returns is obtained by subtracting 2d from 2b, that is, the difference of the counterfactual expected probabilities of market position for FHHs (2d) and their actual expected probabilities of market position (2b), ,

$$M_{c0} = E(M_1|g = 0) - E(M_0|g = 0) = X_0(\beta_1 - \beta_0) \quad (3)$$

This is the market position gain that FHHs would experience if they had the same characteristics as they do now, but the same returns to those characteristics as MHHs have now. It indicates the proportion of market position that is not explained by observable gender differences in the various characteristics (returns effects). This measures market position variation due to gender inequalities and unobserved heterogeneity (as explained previously). Similarly, the difference of the actual expected probabilities of market participation (2a) for MHHs and their counterfactual expected probabilities of market position (2c) gives their average probabilities of market positions (M_{c1}) expressed below:

$$M_{c1} = E(M_1|g = 1) - E(M_0|g = 1) = X_1(\beta_1 - \beta_0) \quad (4)$$

Again this is the market position loss/gain that MHHs would experience if they had had the same characteristics as they do now, but had had the same returns to their characteristics as the FHHs have now. Equations (3) and (4) are equivalent to the average treatment effect on the untreated (ATU) and on the treated (ATT), similar to the impact evaluation and wage decomposition literature where MHHs (FHHs) have their coefficients/ returns to characteristics switched with those of FHHs (MHHs) as a mechanism for counterfactual analysis.

The market position gap due to differences in observable characteristics or the levels effect (LE) is given as the difference between 2a and 2d when MHHs market position function is used and 2c and 2b when the FHHs market position function is used. The levels effects (LE) show, respectively, what the market position gap would have been if all households had had the current MHHs returns or characteristics (weighted by β_1) and the current FHHs returns to the observable characteristics (weighted by β_0). In wage decomposition lingo, equation 5a and 5b represent the explained part of the gender market position gap.

$$LE_1 = E(M_1|g=1) - E(M_1|g=0) = \beta_1(X_1 - X_0) \quad 5(a)$$

$$LE_0 = E(M_0|g=1) - E(M_0|g=0) = \beta_0(X_1 - X_0) \quad 5(b)$$

Following the gender wage decomposition literature, the total market position gap (MPG) as contributed by the levels and returns effect is given as follows using the MHHs net market position function. *MPG* can also be decomposed using FHHs market positions but here we focus on MHHs function as the objective of any intervention is to move the FHHs market positions to MHHs market position trajectory.

$$MPG_1 = \beta_1(X_1 - X_0) + X_0(\beta_1 - \beta_0) \quad (6)$$

This equation will provide the relative importance of characteristics and returns differences to total market position gap.

5. Data sources and sampling procedure

The empirical analysis uses household- and agricultural production and marketing data which was collected in 2010/11 as part of a major research program in Kenya and Ethiopia. In Ethiopia, the survey was carried in areas that have been established as the major maize-legume based farming regions in the country. The regions from which these data came were the SNNP[2], Benshangul and Oromiya. Typically multi-stage sampling methods were used to identify survey households. In the first stage nine districts were selected purposively based on the importance of maize and the associated agro ecology. The data used here came from a total of 39 districts and a total of 2189 households were randomly selected from the area of survey.

In Kenya, the largest unit of sampling was a district (now called counties since the time of the survey). A total of five districts were selected, two districts were from western Kenya region (Bungoma and Siaya) and three districts from eastern Kenya region (Embu, Meru South and Imenti South). Each of the regions were assigned an equal number of sample households

[2] Southern Nations, Nationalities and Peoples region

(300 each). The distribution of households across the respective districts (counties) in each region was based on the number of households per district (proportionate sampling) as determined from the most recent government household census at that time. Similar to the process used in Ethiopia, a multi-stage sampling was used to select various administrative units (divisions, locations, sub-locations, and villages) as the sampling clusters. The total sampling units were 30 divisions (17 selected from western Kenya and 13 selected from Eastern Kenya. The reason for the multi-stage sampling was to achieve sample representativeness based on the relative population sizes in the maize growing regions of eastern and western Kenya.

Summary descriptive statistics

Table 1 reports the variables that were used in the ordered probit model. Generally FHHs appear to have less land, fewer livestock and other assets. First we categorized households into autarkic, net seller and net buyer categories. In both countries, FHHSs appear to have distinctly less education as well. Nevertheless, and interestingly so, FHHs in both Ethiopia and Kenya samples appear to be less credit constrained by about 10 and 5 percentage points respectively. It is not possible to explain this apparent advantage of FHHs from these data but it could relate to this being due to many female household heads (as may be true of women generally) that they have access to informal credit such as ROSCAs[3]. We however cannot confirm this from these data. Female household heads tended to be older in Kenya but not by much in Ethiopia. In terms of household size, FHHs tended to be smaller households compared to MHH. The significance of these differences are further discussed in the results section.

<Table 1 here>

Table 1also shows the categorization of FHHs by whether they were such as *de jure* (widowed, divorced, separated or never married) or *de facto*, those who had spouses but their spouses were away for any number of reasons (work, extended travel, illness or incapacity). Given the social norms of household headship, men assume headship of households both when they have a spouse and when they do not. From this perspective, household headship by women often connotes unfavorable circumstances. This can be deduced from the last three rows of Table 1 where among FHHs in Ethiopia (Kenya), 74% (72%) are *de jure.* Among MHHs, only 2.2%

[3] Rotating Savings and Credit Associations

(4.1%) have no spouse (for the same reasons as *de jure* FHHs). While it would be an important contribution to distinguish between the market participation of *de jure* and *de facto* FHHs, the numbers in each category are too few to enable the estimation of a three-level ordered probit model.

Table 2 provides evidence that most of the differences observed between FHH and MHHs are actually statistically significant. This lends weight to the implementation of gender of the household head as a treatment variable. It also supports the prediction that these differences may explain a large part of the any maize market position gaps between MHHs and FHHs. In fact Table 2 shows that in several cases in both Ethiopian and Kenyan sample, for FHHs, there were significantly lower educational attainments, smaller farm sizes, less livestock and fewer non-livestock assets.

6. Empirical Results:

6.1 Determinants of market positions

The average marginal effects (AMEs)[4] recovered from the ordered probit model (Table 3) show that except in the Ethiopia sample, the larger the household size, the less likely the household was to be in a net seller and more likely it was to be in the net buyer and autarchic positions suggesting diminished opportunities for sellable surplus in larger households. The same result is true for the age of the household head except for FHHs in Kenya. Where the impact of was significant (MHHs in Ethiopia and Kenya), those households who reported crop and livestock farming as the main activity were more likely to be net sellers and autarchic. Larger farm size was associated with being in the net seller market categories for MHHs in Ethiopia and FHHs in Kenya. Greater livestock ownership was positively associated with being in the net seller and negatively with being in the net buyer and autarchic market positions except for FHHs in the Ethiopia sample (where the effect was not significant). More non-livestock assets were significantly associated with a higher probability to be in the net seller and negative for net buyer market positions for MHH in both countries. This is probably because asset ownership increases the likelihood of using inputs including manure through relaxing liquidity constraint and risk

[4] The coefficient estimates of the ordered probit model are placed in Appendix A. In this section we discuss the results using average marginal effects because these are more specific in showing the differential impacts of the covariates on the three market participation categories. The sign of the coefficient estimates only gives a summary of the direction of impact while the average marginal effects are specific for each category.

aversion behavior of smallholder farmers. Consistent with higher numbers of MHH who reported credit constraint, the probability of being in a net seller market positions was reduced with presence of credit constraint for MHH in both countries and no significant effect for FHH and the probability for MHH being in a net buyer or autarchic position was positive with the presence of credit constraint. Membership in farmer based organizations was significantly and positively associated with being in net seller market positions for MHH in Ethiopia. In the Ethiopian sample (but not in Kenyan sample), having friends or relatives in leadership positions in various organizations had positive effects on being in net seller positions for MHHs. Having relatives outside the village who the household could rely on for help was also positively associated with being in the net seller and negatively with being in net buyer positions for FHHs in Ethiopia.

<Table 3 here>

6.2. Gender market positions gap

Ethiopia sample:

In the Ethiopia sample the clearest differences were seen in the net buyer and net seller positions. The actual and predicted average probability of being a net buyer household among FHHs was twice that of the MHHs (cells *a* and *b* in Table 4). As for the autarchy and net seller positions, FHHs were slightly also more likely (at 35%) to be autarchic than MHHs (32.3%) and less likely to be net sellers (36.8%) compared to MHHs (53.8%). Comparing these actual values may be misleading without taking into account differences in both observed and unobserved characteristics of MHHs and FHHs. Taking into account these, the results in Table 4 show that FHHs market positions improved when their characteristics had the *same returns* as those of MHHs (see difference between cells *b* and *d* in the Ethiopia panel of Table 4 which gives the *returns effects*). If FHHs characteristics had the same returns as MHHs (cell *d*), the probability of their net buyer positions decreased by nearly 5-percentage points from 28.2 % to 23.6%, suggesting a slight improvement in autonomous maize supply situation. However, contrary to our expectation, the returns effects for the autarchy position showed that given the same returns as MHHs, the probability of FHHs in the Ethiopian sample of being autarchic increased from 35% to 37.9%. Finally, the returns effects for the probability of being in a net seller position

FHHs would modestly increase from 36.8% to 38.5% if they had MHH returns to their DRM endowments[5].

With regard to the *levels effects* for the Ethiopia panel of Table 4, comparing cells *a* and *d* shows that when the only difference between FHH and MHH is in their endowments, (both FHH and MHH have similar returns but each group *retains* their observed characteristics), the rate which FHHs would be net buyers still be 69% more than that MHHs to be net buyers of maize (i.e. 14% and 23.6% for MHH and FHH respectively). The endowment effect in autarchy and net seller positions shows FHHs would be 37.9% to be autarchic compared to 32.3% for NHHs and 38.5% to be net sellers compared to 53.8% for MHHs.

<Table 4 here>

Kenya sample:

Table 4 also reports market position gaps for the Kenya sample in the lower panel. The differences in predicted probabilities among MHH and FHHs in the Kenya sample are much smaller than those in the Ethiopia sample not exceeding 1-precentage point difference in any market position category. In fact these small differences show that FHHs in the Kenya sample were on average less net buyers and less autarchic than the MHHs by about half percentage point in either case. The returns effects (moving from cell *b* to *d* in Table 4) shows that the returns of MHHs would make FHHs in the Kenya sample to be even more net buyers from 34% to 42.6% and less net sellers from 52.6% to 42.2% than MHHs. The levels effects, when both FHH and MHH have similar returns but each group *retains* their observed characteristics, the FHHs would be more net sellers at 42.6 % than MHHs (at 33.6%). The levels effect also shows that FHHs would be less likely to be net sellers (at 42.2%) than the MHHs (51.4%). There were no significant effects for the autarchic maize market position.

In the Kenyan sample, the levels and endowment effects show a worsening of the gap between the FHH and MHH households (with FHHs faring being worse off) when FHHs acquired the endowments or the returns of MHH when compared to the baseline predicted probabilities as reported in the *a* and *b* cells of Table 4 (Kenya panel). From these results, it is possible to deduce that in the regions of Kenya studied, FHHs appear to have strong returns to

[5] Although this result for the autarchy position is not significant.

their DRMs enabling them to participate in maize markets almost head to head with their male headed counterparts.

Comparing endowment and returns effects:

In the Ethiopian sample, even though the returns effects shows that if FHHs had the same endowments as MHHs their market positions would improve (become less buyers, more autarchic and more net sellers), the market participation gaps were not closed (compare the gap between cells a and b in the baseline scenario and the gap between cell *a* and *d* after FHH are assigned MHH coefficients). The same can be deduced from the impacts emanating from returns effects. Recall from the discussion in the empirical section that, in this context, the returns effects capture the differences between FHH and MHH that were not observed in the sample. Comparing the endowment and returns effects across the three market anticipation positions in Ethiopia sample suggests that the returns effects account for about 30% of the total (i.e. endowment plus returns effects) in the net seller and net buyer positions. In the Kenya sample the endowment effects and coefficient effects are almost of the same order of magnitude, suggesting that both would contribute 50% of the total effects.

Why the differences between Ethiopia and Kenya? The muted differences in Kenya may find explanation in factors that that can be understood within the different contexts in these two countries. In Ethiopia, the percentage of FHHs for whom agricultural production was a primary activity for the household head was 68% (it was 98% for MHHs). In Kenya the percentage of FHHs who reported agricultural activities as the main occupation of the household head was 94% (compared to 69% for MHHs). If agricultural activities are dominated by MHHs in Ethiopia, then FHHs may have the propensity to be net buyers because access to agricultural resources and ability for autonomous production may be limited for the FHHs forcing them to rely on markets to acquire subsistence maize supply. In Kenya, women contribute 53% of the labor force compared to 23%in Ethiopia (Table 5). It is possible that the observed lower participation in agricultural production by women in Ethiopia is what translates into lower participation as net sellers of maize and more as net buyers[6].

[6] A caveat to this argument is that these labor data for women's labor contribution were computed as an average across all household types (MHHs and FHHs). This suggests that women's labor utilization in agriculture is likely to be higher if only FHHs sub samples were considered.

<Table 5 here>

These results have several implications for research and development policy. The first implication is that the impacts of gender are context specific (Quisumbing, 2003). In this study we find that there are clear gender differences in terms of maize market position for MHH and FHHs in Ethiopia sample but the situation is somewhat less straightforward in the Kenya sample. The larger gaps between MHH and FHHs (with MHH having better market positions) in Ethiopia appear to coincide with women's lower labor contribution in agriculture compared to Kenya where FHHs rely more on agriculture and women seem to generally contribute higher amounts agricultural labor.

Second, the results suggest the need for more incisive social science analyses that unearth factors and conditions that are difficult to observe in statistical surveys but which can be as powerful as (or even more powerful than) some of the common (and easy to observe) explicators of gender and other social differences in agricultural production and markets. Expanding these frontiers might call for more qualitative analyses but also expanding the econometrics of gender analyses. Models that focus on unearthing heterogeneous effects akin to those found in studies of labor market participation and of wage differentials should be applied more frequently in gender research in agriculture (see Blinder 1973; Oaxaca 1973; Jenkins 1994; Appleton, Hoddinot and Krishnan 1999).

Finally these results also show that where they exist, closing the gender gaps in market participation will require a two pronged approach of closing the endowment gap between the two household types in terms of resources and other enablers of market participation. The second element in closing the gender gap will involve quantifying and identifying the sources of these returns gap with a view to rectifying them. Factors no hitherto observed, but which determine the effectiveness of the resources available to FHHs (e.g. managerial skills, entrenched gender roles etc) should be given due attention. Social education and other reforms may be needed to address these issues.

7. Conclusions

This paper looked at the factors that may underlie differences in maize market participation based on the gender of the household head using data from Ethiopia and Kenya. In

particular we sought to identify the treatment effects of being a male headed household by using counterfactual analysis to determine the effect of the gender of the household head as determined by differences in demographics (e.g. educational attainment), resources (e.g. farm size), market access (travel time to market) and social network (number of relatives that they could rely on). The results showed that the gender market positions gaps were relatively larger in Ethiopia than Kenya with the results for Ethiopia showing that FHHs were (in relative terms) twice as likely to be net buyers and 32% less likely to be net sellers of maize than MHHs. The treatment effects for the Ethiopian sample showed that being a MHH was to reduce probability of being net buyer and increase the probability of being net seller. If FHHs had the same returns and/or same levels of endowments (resources, social and human capital), their market positions would significantly be improved. In the Kenyan sample, there were only very slight differences between MHH and FHHs market position as observed from the sample with the exception that FHHs were slightly likely to be less autarchic. Greater participation in and reliance on agriculture among FHHs in Kenya appear to be a factor in this.

The main implication of our results is that to the extent that observed differences in resources and other social network variables explain differences in market participation; to that extent policy and programs should correct for these differential opportunities. Specifically, because these differences are accompanied by heterogeneities (in this case returns effects), then policy focus should shift toward more socially-oriented reforms to remove entrenched disparities not observable in typical household surveys. This should be in addition to making sure than men and women have equal access to resources. Lastly, we suggest expanding the analysis of gender equity to include methods such as those found in the labor economics and wage differentials literature to capture these gender heterogeneities and other issues of selectivity but this time within agriculture and rural development.

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