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What Determines Gender Inequality in Household Food Security in Kenya? Application of Exogenous Switching Treatment Regression

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Summary. — This paper explores the link between the gender of a household head and food security in rural Kenya. The results show that the food security gap between male-headed households (MHHs) and female-headed households (FHHs) is explained by their differences in observable and unobservable characteristics. FHHs' food security status would have been higher than it is now if the returns (coefficients) on their observed characteristics had been the same as the returns on the MHHs' characteristics. Even if that had been the case, however, results indicate that FHHs would still have been less food-secure than the MHHs due to unobservable characteristics.

Key words — gender, food security, inequality, exogenous switching treatment regression, Africa, Kenya

1. INTRODUCTION

In this paper, we study the food security of male- and female-headed households, using rich household- and plot-level data collected in rural Kenya. More specifically, we aim to answer the following questions: Are female-headed households more likely than male-headed households to be food-insecure, and, if so, why? Using better data and more advanced econometric techniques than previously applied to this problem, we are able to disentangle the effects of different types of gender inequalities in agriculture to a greater extent than was possible in the past.

Gender equality has been a key aspect of many development projects in the recent past. This is because gender inequalities and a lack of attention to gender in agricultural development have contributed to lower productivity, higher levels of poverty and under-nutrition (FAO, 2011; Quisumbing, 2003; World Bank, FAO, & IFAD, 2009). The 2012 World Development Report entitled *Gender Equality and Development* warns that the failure to recognize the roles of men and women—and the differences and inequalities between them—poses a serious threat to the effectiveness of agricultural development strategies (World Bank, 2012).

In many countries in Africa, there has been a significant increase in the percentage of female-headed households (FHHs) in recent years. Among the main causes are the deaths of male heads, family conflicts and disruption, male migration for work, women deciding not to marry, changes in women's roles, and increased empowerment of rural women; these have all increased the importance of women as the breadwinners for their households (IFAD website [1]). In this study, we define households as FHHs if they belong to either of the following categories: *de jure* FHHs (if they are run by single, widowed, divorced, or separated women) and *de facto* FHHs (where there is a husband who is not physically present, because, e.g., he is working elsewhere).

FHHs are usually disadvantaged in terms of access to land, livestock, other assets, credit, education, health care, markets, and extension services (Odame, Hafkin, Wesseler, & Boto, 2002; Quisumbing, 1995; World Bank, 2001). Access to land is not just a question of land size, but also of soil quality. Women's isolation from the public arena, greater time scarcity, and lack of mobility limit their access to markets in various ways (FAO, 1988). For instance, women usually have less information about prices, rules, and rights to basic services. Moreover, distance from the market may limit the ability to sell or purchase in the market in the absence of adequate transport facilities; thus, differences between FHHs and MHHs in access to transportation will also matter. Some of these gender differences

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may be the result of events that made the household a FHH in the first place—such as financial distress following the death of the male head of the household, forcing his widow to sell assets, as well as the associated loss of household labor linked to the loss of a productive household member—but many differences are linked to various forms of gender inequality. Less education is often provided for female than for male children, such that female heads of households will have less education than their male counterparts in other households (Meinzen-Dick *et al.*, 2010; Quisumbing, 2003). Moreover, legal and social traditions surrounding the subdivision of assets tend to favor males at the expense of females, such that, when assets are allocated after a death or a divorce, female farmers will tend to receive fewer and lower-quality assets than their male relatives, e.g., less productive or smaller plots of land, or fewer and less productive livestock.

In addition, inequalities prevail in the form of less secure tenure; gender differences in access to extension services, through which many innovations are channeled; rationing out of credit markets; greater difficulty accessing other productive inputs; and other subtle forms of social and cultural inequality linked to social perceptions about the proper roles of women and about their perceived lack of suitability as farmers (Githinji, Konstantinidis, & Barenberg, 2011). This has implications for technology adoption, food security, and access to markets. Women's access to land, livestock, education, financial services, agricultural extension services, technology, and rural employment has the potential to boost their productivity and generate gains in agricultural output, food security, economic growth, and social welfare (FAO, 2011; Meinzen-Dick *et al.*, 2010). Even if some of the inequalities were to disappear, however, various forms of inequality linked to social norms might well remain, and could continue to cause worse outcomes for FHHs.

Although there is considerable literature on the relationship between gender and agricultural productivity and technology adoption in sub-Saharan Africa, gender gaps in food security have received far less rigorous empirical attention.[2] Our paper, therefore, contributes to the literature in several directions. Firstly, we consider the household's own perception of food security, which provides a better assessment of the food security situation throughout the year. The use of subjective measures, including self-reported poverty (see e.g., Deaton, 2010, who argues for the wider use of self-reported measures from international monitoring surveys) and people's subjective perceptions of their economic welfare (see e.g., Ravallion & Lokshin, 2002, who used subjective economic welfare measures in Russia), is a growing field. Our paper represents an application of such subjective measures of food security.

Secondly, unlike earlier studies (e.g., Mallick & Rafi, 2010) that used pooled regression, with a gender dummy indicator variable used in the regression, we use an exogenous switching treatment regression approach, which allows us to identify the effects on food security of different inequalities and different forms of discrimination against women. We disentangle different inequalities in this fashion and, in particular, apply impact evaluation methodologies in the context of gender impact on food security. Finally, we use plot-level data, which makes it possible to control for plot characteristics that have a direct impact on crop production and, hence, affect food security.

The next sections present selected empirical literature on gender differences and their implications for Kenyan agriculture and for food security. In Section 3, we describe the exogenous switching treatment regression (ESTR) approach that we use to evaluate the impact of gender on food security. Section 4 covers the data, the variables, and the descriptive statistics. The empirical results and discussions are found in Section 5. Section 6 concludes the paper with discussions on policy implications.

2. GENDER INEQUALITY AND FOOD SECURITY

(a) *Analyzing gender inequality*

Due to various forms of inequality, FHHs in rural areas are often more vulnerable than MHHs and more prone than the latter to be affected by food insecurity and the non-monetary aspects of poverty. For example, cultural restrictions on women's ability to fully participate in food production activities in some of the poorest areas of South Asia have left them particularly vulnerable in times of economic crisis (Agarwal, 1994; Kabeer, 1990). Babatunde, Omotesho, Olorunsanya, and Owotoki (2008) conducted a gender-based analysis of vulnerability to food insecurity in Nigeria and found that FHHs were indeed more vulnerable than their MHH counterparts. Ndirangu, Sachs, Palm, and Deckelbaum (2013), comparing the food security status of HIV-affected and -unaffected households in western Kenya, found that FHHs tended to be more vulnerable to food insecurity than MHHs. Quisumbing, Haddad, and Pena (2001), using household survey data set for 10 developing countries, find no statistically significant higher incidence of poverty among FHHs in two-thirds of those countries. Among the exceptions is Bangladesh, where FHHs have consistently higher poverty among the bottom third of the population.

Although inequality of women is acknowledged in the literature, little rigorous work has been done to disentangle the various forms in which such inequality is manifested, particularly as regards their impact on food security. Earlier studies typically used a binary gender indicator to capture all impacts. Thus, for instance, Mallick and Rafi (2010) used a pooled regression, where they assume that the same set of covariates have the same impact on the probabilities for MHHs' and FHHs' food status, so that gender shifts only the intercept and not the slope of the coefficients. Their study found no significant differences in food security between MHHs and FHHs among the indigenous ethnic groups in Bangladesh.

However, women face different forms of inequality. Some of these forms of inequality can be captured easily in surveys: smaller or lower-quality plots belong in this category, as do lower levels of education, and both are likely to affect agricultural productivity and food security. Day-to-day inequality—such as greater reluctance on the part of input providers to provide credit to FHHs compared with MHHs for fertilizer purchases, less scope for FHHs to borrow money or to buy food on credit, or differential extension advice from extension officers (Doss, 2001)—can also affect food security, but may not be captured in a specific survey. Thus, even if the observed variables are similar for a FHH and a MHH, the outcome may be different because the scope for profiting from, say, a larger plot may be less for a FHH which has less access to fertilizer and extension advice.

Moreover, gender differences exist in the share of resources allocated to food. For example, Mackenzie (1998) and Heyer (2006) found that female farmers in Kenya tended to focus on producing food rather than cash crops. FHHs focusing on food crop rather than cash crop production to a greater extent than MHHs may reduce overall FHH income further, but it might also, to some extent, reduce the food security impact of their having fewer productive resources available to them. FHHs might then have a better food security status and/or