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<http://dx.doi.org/10.1016/j.worlddev.2014.06.017>

Caught in a Productivity Trap: A Distributional Perspective on Gender Differences in Malawian Agriculture

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Summary. — Our study provides a nationally representative analysis of the gender gap in agricultural productivity in Malawi. We decompose the gap, for the first time, at the mean and selected points of the agricultural productivity distribution into (i) a portion driven by gender differences in levels of observable attributes, and (ii) a portion driven by gender differences in returns to the same set of observables. We find that while female-managed plots are, on average, 25% less productive, 82% of this mean differential is explained by differences in observables, mainly due to high-value crop cultivation and household adult male labor inputs.
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Key words — Malawi, gender, agriculture, productivity, decomposition methods

“Children shrieking at play; and women bent double—most with infants slung on their backs—hoeing the corn and beans; and the men sitting in the shade stupefying themselves on chibuku, the local beer, or kachasu, the local gin.”

Paul Theroux, *Dark Star Safari: Overland from Cairo to Cape Town* (2002)

“While a great deal has been learned about what works and what does not when it comes to promoting greater gender equality, the truth remains that progress is often held back by the lack of data or adequate solutions to the most ‘sticky’ problems.”

The World Bank World Development Report 2012 *Gender Equality and Development*

1. INTRODUCTION

Globally, 1.4 billion people, or one quarter of the population of the developing world, live in extreme poverty, and an additional 1.2 billion live in moderate poverty. The analysis of regional contributions to global poverty indicates that although sub-Saharan Africa represents only 12% of the world population, it accounts for 27% of the global poor, and that poverty in sub-Saharan Africa is being reduced at a much slower pace than elsewhere (Chen & Ravallion, 2008).¹ Aggregate agricultural growth has been documented to bring disproportionate gains to the poorest in the developing world.² In sub-Saharan Africa, nearly 75% of the extreme poor reside in rural areas, and 91% of the rural extreme poor are estimated to participate in agriculture. As smallholder agriculture is the predominant form of farm organization in the region (FAO, 2009), smallholder agricultural productivity growth has been identified as a key driver of poverty reduction and increased food security.³ In targeting sustainable poverty gains through smallholder-based agricultural growth, national development plans across sub-Saharan Africa have emphasized the reduction of gender differences in agricultural productivity. Most recently, FAO (2011) asserted that if female farmers had the same access to productive resources as men, they could increase yields by 20–30%, which could increase total agricultural output in developing countries by 2.5–4% and lift 100–150 million people out of hunger. Increased productivity among female farmers is also often argued to result in double-barreled payoff: (i) poverty alleviation through positive

impact on overall smallholder productivity growth, and (ii) improved development outcomes for the next generation.⁴

Although the estimates of gender differences in agricultural productivity (henceforth referred to as the gender gap)⁵ across sub-Saharan Africa range widely from 4% to 40%, the majority cluster around 20 to 30%. The studies that compare productivity outcomes on female- vs. male-managed plots across and within households provide further support for the presence of systematic and persistent gender differences in agricultural productivity in the region (Akresh, 2005; Alene, Manyong, Omanyang, Mignouna, Bokanga, & Odhiambo, 2008; Gilbert, Sakala, & Benson, 2002; Goldstein & Udry, 2008; Moock 1976; Oladeebo & Fajuyigbe, 2007; Peterman, Quisumbing, Behrman, & Nkonya, 2011; Quisumbing, Payongayong, Aidoo, & Otsuka, 2001; Saito, Mekonnen, & Spurling, 1994; Tiruneh, Testfaye, Mwangi, & Verkuijl, 2001; Udry, 1996; Vargas Hill & Vigneri, 2011). The major reasons for the observed gender gap have been identified as gender differences in (i) access to and use of agricultural inputs, (ii) tenure security and related investments in land and improved technologies, (iii) market and credit access, (iv) human and physical capital, and (v) informal institutional constraints affecting farm/plot management and marketing of agricultural produce.⁶ Regardless of whether the comparisons are made across or within households, the common thread across the relevant literature is that the gender gap disappears or diminishes significantly once the researcher controls for the factors discussed above.

*This study is the first output of a research program on Gender and Agriculture in sub-Saharan Africa that is led by the World Bank Living Standards Measurement Study (LSMS) team, and is funded by the International Fund for Agricultural Development (IFAD) and the World Bank Research Support Budget. The authors would like to thank Solomon Asfaw, Hans Binswanger, Calogero Carletto, Asif Islam, Donald Larson, Ramón López, Paul Winters, Benjamin Wood, the seminar participants at the American University (Washington, DC), and the participants at the Fourth Wye City Group Conference on Statistics on Rural Development and Agriculture Household Income (Rio de Janeiro, Brazil) for their comments on earlier versions of the paper. Final revision accepted: June 11, 2014.

Despite what could be perceived as a well-established evidence base on the extent and proximate causes of the gender gap across sub-Saharan Africa, the overwhelming majority of empirical studies on the topic have used data from small-scale surveys that were limited in terms of geographic coverage, topic, or attention to intra-household dynamics (or, in some cases, all three). With the exception of Akresh (2005), none of the above-referenced papers rely on nationally representative survey data. The dearth of nationally representative, methodologically sound data collected in heterogeneous settings across sub-Saharan Africa has in turn inhibited the computation of externally valid, rigorous estimates. Our study seeks to start filling this gap by providing a nationally representative analysis of the gender gap in Malawi, using a different econometric approach than existing studies.

Our econometric approach is based on an estimation strategy that has been utilized extensively in labor economics since the seminal studies of Oaxaca (1973) and Blinder (1973), most notably in the analyses of the gender wage gap, union wage gap, and growing wage inequality. Specifically, we decompose the average difference in agricultural productivity between male-managed and female-managed plots into (i) the portion that is driven by gender differences in levels of observable attributes (i.e., *the endowment effect*), and (ii) the portion that is driven by gender differences in returns to the same set of observables (i.e., *the structure effect*). To our knowledge, this is the first time this method has been applied to understanding the gender gap in agriculture.

Complementing this aggregate decomposition analysis, we provide a detailed decomposition of the mean gender gap, identifying the contribution of each observable covariate toward the endowment and structure effects. While detailed decomposition results are based on correlations and cannot be interpreted as estimates of underlying causal parameters (Fortin, Lemieux, & Firpo, 2011), they document the relative quantitative importance of each factor in explaining the mean gender differential. This in turn facilitates further analysis to identify the causes of differences in key factors contributing to the gender gap so that the emerging insights could inform the design of policy interventions addressing the gender gap at its roots.⁷

The second contribution of our study relates to the application of the decomposition methodology to distributional statistics beyond the mean through the use of recentered influence function (RIF) regressions. Since key contributors toward the gender gap might differ across farmer subpopulations of varying productivity levels, the RIF decomposition is a useful tool for tracing out the heterogeneity in constraints faced by farmers with different gender and productivity profiles, and thus, tailoring better targeted policies that are underlined by analyses that move beyond the “average” male *vs.* female farmer. Toward this end, we carry out (i) the aggregate decomposition of the gender gap at each decile of the agricultural productivity distribution, and (ii) the detailed decomposition of the gender gap at the 10th, 50th, and 90th percentiles. The paper also discusses the changes in the shares of endowment and structure effects as part of the aggregate decomposition, and the variations in the contributions of key factors toward the endowment and structure effects at selected percentiles.

Finally, the multi-topic and national-representative nature of our household survey data represents the third contribution to the literature on the gender gap in sub-Saharan Africa. The availability of geo-referenced household and agricultural plot locations also allows us to create synergies with geographic

information system (GIS) data for the purpose of incorporating relevant geospatial variables into the modeling efforts.

There are five key findings from our study. First, on average, female-managed plots in Malawi are 25% less productive than those that are managed by males. Second, 82% of the mean gender gap is explained by the differences in observable covariates, i.e., the endowment effect. The direct pay-off to addressing market and institutional failures that affect men and women differentially is economically significant: ensuring that female plot managers have similar years of schooling and apply similar levels of non-labor agricultural inputs, including inorganic fertilizer, pesticides/herbicides, and improved and/or export crop varieties could reduce the mean gender gap by 50%. Deficiencies on female-managed plots regarding household adult male labor input and access to agricultural implements are other key factors exacerbating the gender gap. Third, the remaining 18% of the mean gender gap is mostly explained by gender differences in *returns* to (i) household adult male labor input and inorganic fertilizer application, which have significantly lower positive effects on the productivity of female-managed plots, and (ii) the child dependency ratio, which has a highly significant and negative effect on the productivity of female-managed plots, in contrast to no effect on the productivity of male-managed plots. Fourth, the gender gap increases significantly across the agricultural productivity distribution: the differential stands at 22% and 37% at the 10th and 90th percentile, respectively. Finally, we find that the gender gap is explained predominantly by the endowment effect in the first half of the agricultural productivity distribution, with the endowment effect still explaining close to 90% of the gender gap at the median. Above the median, however, the contribution of the endowment effect toward the gender gap declines steadily such that the structure effect culminates in explaining 34% of the gender gap at the 90th percentile.

The rest of the paper is organized as follows. Section 2 presents a review of the evidence on the gender gap in sub-Saharan Africa. Section 3 provides an overview of the Malawian context, and describes the data. Sections 4 and 5 present the mean decomposition methodology and the results from the mean decomposition, respectively. Likewise, Sections 6 and 7 present the RIF decomposition methodology and the results from the RIF decomposition, respectively. Section 8 offers concluding remarks and expands on the policy implications of our findings.

2. GENDER DIFFERENCES IN AGRICULTURAL PRODUCTIVITY IN SUB-SAHARAN AFRICA: REVIEW OF EVIDENCE

The studies that investigate the gender gap in sub-Saharan Africa are quite heterogeneous in terms of the type of data and the estimation strategies that they use. The existing literature broadly features two strands. The first strand is composed of studies that conduct their analyses at the household-level and do not link plot-level outcomes to the identity of the managers and/or owners within study households. The second strand is composed of a handful of empirical studies that use plot-level data linked to individual managers within study households. Across these strands, the relevance and applicability of the results for policy have been limited due to shortcomings in terms of questionnaire design, empirical methodology, and/or sample representativeness. “The inconclusiveness of gender research due to either methodological or data limitations obscures the policy and programmatic recommendations that emerge from gender productivity analysis, and do

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