

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

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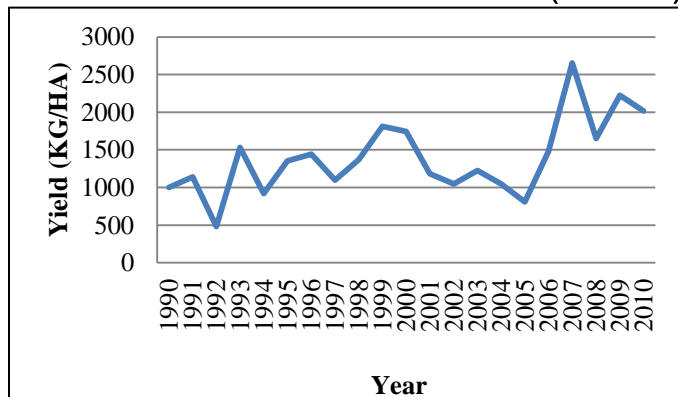
### Summary

The vast majority of households in Malawi are involved in agriculture, and improving agricultural productivity - particularly for women, who tend to attain lower yields than men - could lead to significant poverty reduction and improvements in gender equality. This study asks two main questions: (1) Exactly how great are the differences in agricultural productivity between men and women in Malawi? And (2) How much of the gender gap is explained by differences in levels of agricultural inputs vs. differences in returns to these inputs? We trace the varying constraints faced by farmers at different levels of productivity, as well as at average productivity - a level of analysis that is crucial for designing effective interventions aimed at bridging the gender gap. We find that on average, female-managed plots are 25 percent less productive than plots managed by males. Further, the gender gap widens significantly as agricultural productivity increases. More than 80 percent of the mean gender gap is explained by differences in levels of agricultural inputs, suggesting that addressing market and institutional failures underlying these differences could have direct economic benefits.

### AGRICULTURAL PRODUCTIVITY AND GENDER IN THE MALAWIAN CONTEXT

Agriculture is critically important to both Malawi's economy and to its social fabric. The sector accounts for 31 percent of Gross Domestic Product, and 84 percent of Malawian households own and/or cultivate land. The majority of farming households practice subsistence agriculture, and their living standards are directly affected by the inconsistent agricultural performance that Malawi has seen over the last two decades. These impacts are especially acute for the poorest households.

#### Malawi Annual Maize Yield Estimates (1990-2010)



Source: FAOSTAT

Agricultural growth has been shown to particularly benefit the poorest in the developing world.<sup>1</sup> Poverty in Malawi is especially widespread among female-headed households, suggesting that investing in agricultural growth has benefits both for poverty-reduction and for gender equality. Yet systematic gender differences persist in agricultural productivity across Sub-Saharan Africa, mostly due to differences in (i) access to and use of agricultural inputs, including improved technologies; (ii) tenure security and related investments in land; (iii) market and credit access; (iv) human and physical capital; and (v) informal institutional constraints affecting farm/plot management and the marketing of agricultural produce.<sup>2</sup> Addressing these gender differences could result in tremendous productivity gains. In "The State of Food and Agriculture 2010-2011: Women in Agriculture," the United Nations Food and Agriculture Organization (FAO) reports that if female farmers had the same access to

<sup>1</sup>Ligon and Sadoulet (2008) document that a one percent rise in agricultural GDP results in six percent income growth for the lowest income decile of the population.

<sup>2</sup> Cultural roles that are assigned to males and females regarding domestic duties and gender segregation in crop production (i.e. staple vs. cash crop cultivation, high-yielding vs. low-yielding variety cultivation, etc.) could be thought of as informal institutional constraints.

productive resources as men, they could increase yields by 20-30 percent, which could increase total agricultural output in developing countries by 2.5 to 4 percent and lift 100 to 150 million people out of hunger.

Previous studies looking at the gender gap and agricultural growth rely largely on data from small-scale surveys, and are limited in terms of geographic coverage, topic, or attention to intra-household dynamics (or, in some cases, all three). Our study is the first output of a two-year research program on Gender and Agriculture in Sub-Saharan Africa. The program is primarily based on the data generated by the Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) initiative<sup>3</sup>, which is funded by the International Fund for Agricultural Development (IFAD) and the World Bank Research Support Budget. It contributes to a small but growing body of nationally representative and methodologically sound data collected in varied settings across Sub-Saharan Africa.

## DATA

This study uses data from the Third Integrated Household Survey (IHS3), collected from March 2010 to March 2011 by the Malawi National Statistical Office, with support from the LSMS-ISA initiative.<sup>4</sup> The IHS3 data covers 12,271 households. The full sample consists of 16,372 plots, 26 percent of which are managed by women.

## METHODOLOGY

Our econometric approach applies a decomposition methodology that has been widely used in labor economics, starting with studies by Oaxaca (1973) and Blinder (1973), to understand the gender gap in agricultural productivity. We look at the average difference in agricultural productivity (defined as total value of output per hectare) on male- and female-managed plots, and determine how much of the gender gap is driven by differences in:

- i. Levels of observable inputs or attributes, such as the education level of the plot manager, the amount of inorganic fertilizers and other inputs, the use of male household labor, etc. We refer to the impact of these combined factors as the *endowment effect*,
- ii. Returns to these inputs or attributes, such as the monetary return that a farmer earns from applying one kilogram of fertilizer to her/his plot. We refer to the impact of these combined factors as the *structure effect*.

Thus, the study seeks to quantify not only the difference in productivity between women and men, but also the relative contributions of key inputs and returns to these inputs (based on correlation, not causation). Identifying the factors driving the gender gap is crucial for informing policy interventions aimed at addressing the gap at its roots.

The study moves beyond the comparisons of male vs. female farmer at average levels of productivity, and breaks down the key factors driving the gender gap at different points in the agricultural productivity distribution. Since farmers at different levels of productivity may face different constraints - or similar constraints but to different degrees - we try to tease out the contributions of key factors towards the gender gap at the low, mid- and high-end of the agricultural productivity spectrum.

## FINDINGS

On average, we find that female-managed plots in Malawi are 25 percent less productive than plots that are managed by males. The endowment effect explains 82 percent of this gender gap. In particular, female managed plots are constrained by:

- (i) Lower use of inorganic fertilizer;
- (ii) Lower use of household adult male labor;
- (iii) Lower production of high-value export crops;
- (iv) Restricted access to agricultural tools.

Female plot managers try to compensate for the lower levels of household adult male labor with higher levels of household adult female labor, as well as household child and exchange labor, but this is not enough to overcome the differences in productivity. This labor difference especially disadvantages

<sup>3</sup>The LSMS-ISA initiative is a household survey program, established by a grant from the Bill and Melinda Gates Foundation, to provide financial and technical support to governments in Sub-Saharan Africa to design and implement nationally representative, multi-topic panel household surveys with a strong focus on agriculture ([www.worldbank.org/lms-isa](http://www.worldbank.org/lms-isa)).

<sup>4</sup>The IHS3 data and documentation are publicly available through the LSMS-ISA website.

female farmers because they also tend to have lower access to labor-saving agricultural devices.

The remaining 18 percent of the gender gap - the structure effect - is driven by differences in returns to the use of household adult male labor, and the application of inorganic fertilizer. Not only do adult males in the household spend less time on female-managed plots, but their labor contribution is less productive than on male-managed plots. One reason for this may be that female plot managers provide less supervision compared to male plot managers, possibly due to having other household responsibilities. Indeed, our study found that a greater child dependency ratio<sup>5</sup> decreases the productivity of female-managed plots but has no effect on male-managed plots. This points to childcare responsibilities falling primarily on women, preventing them from providing as much time and energy supervising labor as male plot managers, who do not experience the same limitations.

In terms of inorganic fertilizer use, female farmers not only apply lower levels of this input, but the fertilizer that they do apply does not yield as many benefits. A knowledge gap along gender lines may account for a relatively less efficient usage of fertilizer by female farmers, but more research is needed to determine this conclusively.

Finally, our analysis shows that the gender gap widens as agricultural productivity increases. While the gender gap in Malawi is 25 percent at mean productivity, it ranges from 22 percent at the 10<sup>th</sup> percentile of the agricultural productivity distribution, to 37 percent at the 90<sup>th</sup> percentile. At the same time, the returns to inputs decrease progressively for female farmers but not for male farmers, meaning that the structure effect explains more and more of this gender gap at higher productivity levels. One possible explanation is that even as female farmers use higher levels of productive inputs, they are less effective at determining the combinations of inputs that

result in the greatest yields, and thus experience lower returns than men.

## NEXT STEPS

Our findings suggest that a large and significant difference in the levels of inputs is the central factor behind the gender gap, particularly for farmers at lower levels of agricultural productivity. On male-managed plots, higher levels of household adult male labor and area under export crop cultivation widen the gender gap, while household and childcare responsibilities restrict the time that female plot managers can dedicate to farming. Effective policies to counteract these effects include providing female farmers with the support to adopt high-value crops and to access inorganic fertilizer, seeds from improved varieties, and labor-saving agricultural tools. Ensuring that female plot managers have similar years of schooling as men 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 percent. In addition, policies need to address the underlying constraints that lead female farmers to experience lower returns to inorganic fertilizer use and to household adult male labor. However, further research is needed to determine why these inequalities in time use, as well as access and returns to agricultural inputs, continue to persist.

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<sup>5</sup>The child dependency ratio is defined as the number of household members below the age of 10 divided by the number of household members aged 10 years and above.