Maize Yield and Crop Area Allocation among Tanzanian Farmers

Margaret Beetstra & Katie Panhorst Harris, Evans School Policy Analysis and Research Group

EVANS SCHOOL OF PUBLIC POLICY & GOVERNANCE
UNIVERSITY of WASHINGTON

RESEARCH OVERVIEW

This exploratory data analysis is part of a long-term project examining the **pathways between staple crop yield (a proxy for agricultural productivity) and poverty reduction** in Sub-Saharan Africa.

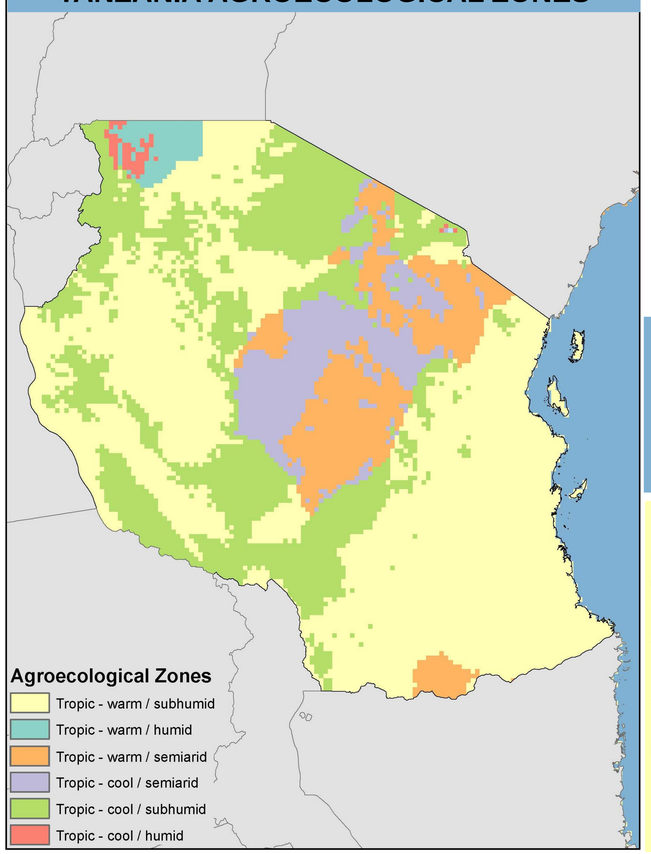
Previous EPAR research identified a high level of year-to-year change in crop portfolios by farmers, as well as large-magnitude changes in cultivated area, particularly for smallholders. This implies that farmers may be open to changes in crop mix influenced by development interventions targeting certain crops. By examining how farmers respond to changes in crop yield, we provide evidence on how farmers are likely to respond to a yield-enhancing intervention that targets a single staple crop such as maize.

Two alternate hypotheses we examine are: as yields increase, do farmers maintain output levels but change the output mix to switch into other crops or activities, or do they hold cultivated area constant to increase their total production quantity and therefore their own consumption or marketing of the crop?

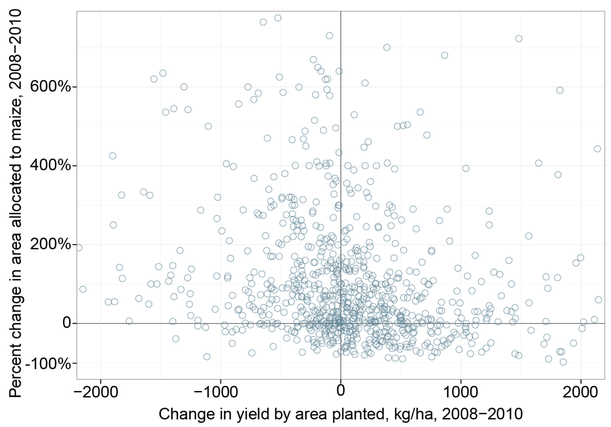
METHODS & DATA

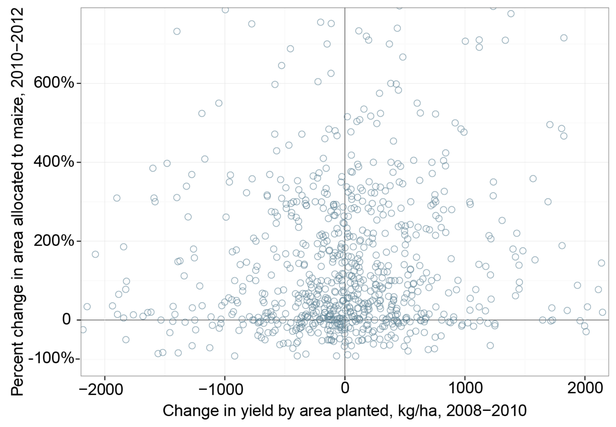
This poster explores relationships among the dependent variable, land area allocated to maize, and key explanatory and control variables to be used in upcoming regression analysis. Data are from the Tanzania National Panel Survey, part of the World Bank's Living Standards Measurement Study - Integrated Surveys on Agriculture. HarvestChoice data was used to create the map.

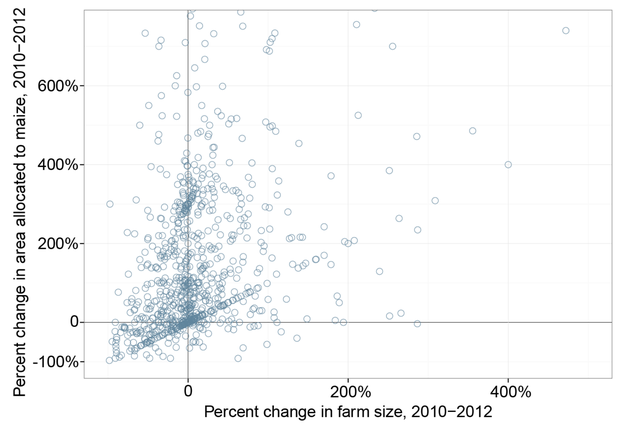
TANZANIA AGROECOLOGICAL ZONES



RELATIONSHIP OF CHANGE IN MAIZE YIELD WITH CHANGE IN CROPPING AND FARMING AREA





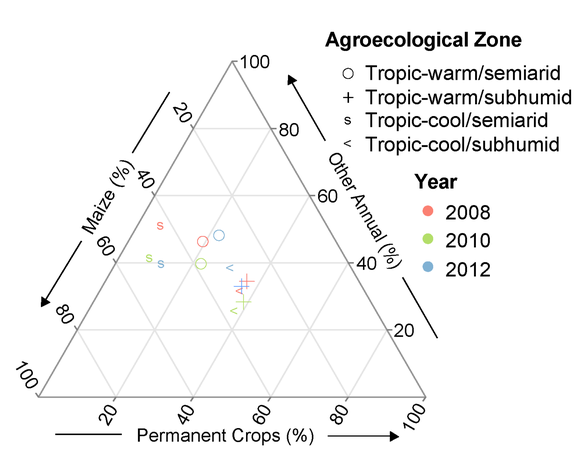


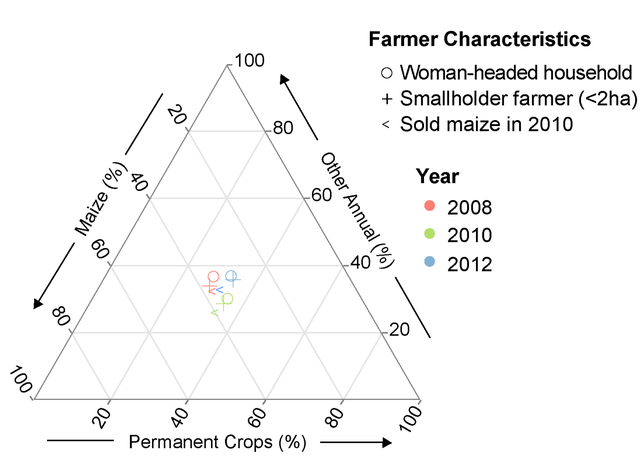
How does yield change relate to change in area allocated over the same time frame? The households plotted in the top left quadrant of the graph increased maize area between 2008 and 2010, and experienced a lower yield in 2010 than in 2008. Households in the lower right quadrant experienced the converse.

How does yield change relate to change in area allocated in the next time period? Farmers who experienced a maize yield increase between 2008 and 2010 are shown on the right half of the graph. Most chose to increase area allocated to maize in the 2012 growing season. Farmers whose maize yield decreased are split between increasing and decreasing maize area in 2012.

How does change in area allocated to maize relate to change in total area cultivated? Notably, most changes in maize area appear to be changes at the extensive margin as opposed to changes in allocation of existing area cultivated, corresponding to increasing (top right quadrant) or decreasing (bottom left quadrant) total household area cultivated.

CROP AREA ALLOCATION AS A PROPORTION OF TOTAL LAND AREA, 2008-2012





How do crop portfolios vary by agro-ecological zone? Tanzania has four primary agro-ecological zones, which vary in climate and growing conditions. Farmers in cool semiarid zones grow more maize and less permanent crops than other farmers in the sample, while those in sub-humid zones grow more permanent crops.

How do crop portfolios vary among subgroups of interest? Farmers who sold maize tended to have more land under maize compared to other crops. Woman-headed households tended to have more other annual crops. Interestingly, all these groups had less land under maize as a percent of the total in 2012 than in 2008 or 2010.

KEY TERMS

Maize yield is a measure of land productivity, calculated by dividing the household's total maize harvest weight (kg)by the total area planted with maize (ha).

Smallholder farmers are owners and renters who farm a relatively small land area, defined here as two ha or less.

Annual crops are planted and harvested every year, while **permanent crops** (including tree and fruit crops) have longer growing cycles.

Farmers can change crop allocation at the **extensive margin** by increasing their total land area, or at the **intensive margin** by switching area from other crops.

DISCUSSION & FUTURE RESEARCH

Most farmers in the sample whose maize yield increased between 2008 and 2010 chose to increase the area they allocated to maize in 2012. This may indicate that farmers do desire to increase their total maize output and their maize yield, a common assumption within international development. Yet many farmers whose yield declined also increased the area they allocated to maize, suggesting that other factors also influence crop mix. Within the sample, it appears that most changes in maize area are quite large in magnitude and often happen at the extensive rather than the intensive margin. Future analysis will examine the relationship between change in farm size and change in maize area separately for farmers who increased maize yield in the previous cycle.

Crop portfolios within the sample seem to vary more by agro-ecological zone than by type of farmer. This indicates that crop portfolios may be determined more by climactic and growing conditions than by farm or farmer characteristics. The year-to-year variation in crop mix is an interesting departure for future research, particularly since the average proportion of area allocated to maize was lower in 2012 than in previous years. Here, crop area proportions are taken over the sum of all planted area, even though this is known to overestimate the area planted to permanent crops, because of a lack of suitable alternatives given how the data are reported.

EVANS SCHOOL POLICY ANALYSIS AND RESEARCH GROUP (EPAR)

EPAR uses an innovative student-faculty team model to provide rigorous, applied research and analysis to international development stakeholders. Established in 2008, EPAR was the first University of Washington (UW) partnership to provide ongoing rigorous, applied research and analysis to the Bill & Melinda Gates Foundation. Learn more: *http://bit.ly/EPAREvans*

Poster contents drawn from this primary source: Anderson, C.L., Beetstra, M., Biscaye, P., Harris, K.P., & Reynolds, T. (2016). Maize Yield and Crop Area Allocation among Tanzanian Farmers. *EPAR Working Paper # 326.* Evans School of Public Policy and Governance, University of Washington.

Research Symposium / May 20, 2016