

Title: Gauging the productivity gap in Africa: Matching the potential from natural endowments with outcomes from household surveys

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Abstract: Agricultural production is critical for both food security and economic development in many developing countries. The Green Revolution and Gene Revolution of the last half century have ensured steady increases in the global food supplies and lifted millions from poverty and the threat of famine. But will there be scope to continue? Natural endowments, such as the quality of soils, weather and water availability ultimately set the stage for agricultural productivity. Still, many obstacles stand between the potential from modern high-yielding varieties and outcomes from the farming practices households employ. In this paper, we compare calculations of potential productivity, taken from expert opinion and agrological models and observations of yield taken from household surveys. We examine the spatial patterns of gap between actual and potential and discuss underlying determinants.

To support this analysis, we draw on a large number of geo-referenced household surveys, using both the spatial and temporal dimension to integrate with a variety of additional datasets. Crop suitability, soil properties, terrain and climate are used to characterize the landscape at each survey site. Using time series of climate (CRU TS v3 and NOAA CPC RFE) and vegetation (AVHRR and MODIS-based NDVI), we derive indices measuring variability and deviation from the norm for a specific agricultural season relevant to each survey dataset.

The household survey datasets used in this analysis were collected from the early 1990's through 2009. The surveys are representative of different agro-ecological zones across Africa and parts of Asia. It is expected that the variety of agro-ecological systems, varying quality of the datasets and different resolutions of the spatial datasets will pose a challenge, but will at the same time enhance the relevance of the results.

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