International Consortium on Applied Bioeconomy Research
ICABR 2019
RAVELLO
JUNE 4 - 7

KNOW WHAT YOU SOW:

THE COST OF SEED TYPE MISIDENTIFICATION IN TANZANIA

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Introduction

- Agricultural productivity in Sub-Saharan Africa (SSA) remains far below other developing regions (ERS, 2019, World Bank, 2019).
- Increases in output and total factor productivity (TFP).
- Use of improved seeds in Eastern Africa is still low (Smale et al, 2013).
- Farmers misidentify seed (Wossen et al., 2018, Wineman et al., 2018).
- Inputs allocations related to perceived adoption status.
- Purpose of this work is to estimate the cost of misidentification.

Model

- Estimation of a semi-translog maize yield production function (TL):

$$y_i = a_0 + \sum_{j=1}^{4} b_j x_{ij} + \frac{1}{2}\sum_{j=1}^{4} c_{jj} x_{jj}^2 + \sum_{j=1}^{4}\sum_{k>j}^{4} c_{jk}\, x_{ij} x_{ik} + \sum_{j=1}^{4} d_j \dot{x}_{ij} + e w_i + \sum_{j=1}^{2} f_j s_{ij} + v_i - u_i$$

- Stochastic Frontier Approach (SFA).
- Battese and Coelli (1995) specification for Technical Efficiency (TE)
- Cost of seed misidentification (CSM):

$$CSM_i = \underbrace{\frac{y_i}{TE_i}}_{\text{Potential Yield}} \cdot \underbrace{\left(\overline{TE}^{id} - \overline{TE}^{mis}\right)}_{\text{Efficiency Differential}} \cdot \underbrace{p_{maize}}_{\text{Price of Maize}}$$

$$CSM_i = \frac{1{,}375}{.47} \cdot (.55 - .45) \cdot \$0.25 = \$73$$

Data

- Our sample consists of 803 observations on maize yield, inputs used, reported and actual type of seed, and farmer's characteristics.

- 2016 Varietal Monitoring for Realized Productivity and Value in Tanzania Baseline Survey (Tegemeo).

- DNA fingerprinting tests were performed on sampled seeds (DArT & MARI).

Study area – Tanzania (Wineman et al., 2018)

Data (cont.)

- Seed type misidentification:

Percentage		Reported	
		Local	Improved
DNA test	Local	True negative 14.11%	False positive 15.22%
	Improved	False negative 12.75%	True positive 57.92%

- Efficiency variables: education, age and gender of primary decision maker, household has accessed to extension services or has cell phone, farm size and proportion of crop value sold.

Results

- On average, farmers are producing 50.6% of the potential output.
- Farmers that misidentified the type of seed planted are less efficient than those that correctly identified it.

Average technical efficiency		Reported	
		Local	Improved
DNA test	Local	True negative 0.505	False positive 0.461
	Improved	False negative 0.474	True positive 0.530

Results

- False negative farmers are, on average, .038 points less efficient than true negative farmers.
  - This represents a loss of $26.2 per hectare (~8% of its income).
- False positive farmers are, on average, .063 points less efficient than true positive farmers.
  - This represents a loss of $51.2 per hectare (~13% of its income).
- Education of the Primary DM and share of the crop sold are positively related with efficiency.
- Size of the farm is negatively related with efficiency.

Conclusions

- We quantify the loss in yield and revenue related to the technical inefficiency that arises from seed type misidentification.
- Farmers that fail to identify the type of seed they use have a revenue loss per hectare of $26 - $51, or between 8% and 13% of their income .
- Education of the Primary DM and share of crop sold have positive effect on efficiency, while size of the farm has a negative effect.
- These estimates give us a lower bound measure of the potential gains of policies that promote correct identification.

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Thank you

Please direct comments or questions about this research to Federico Trindade at Federico.epar@gmail.com.

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