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Socio-economic factors influencing productivity of cassava farmers in E. Africa

Paul Mwebaze

Contributed presentation at the 60th AARES Annual Conference,
Canberra, ACT, 2-5 February 2016

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Socio-economic factors influencing productivity of cassava farmers in E. Africa

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05 February 2016

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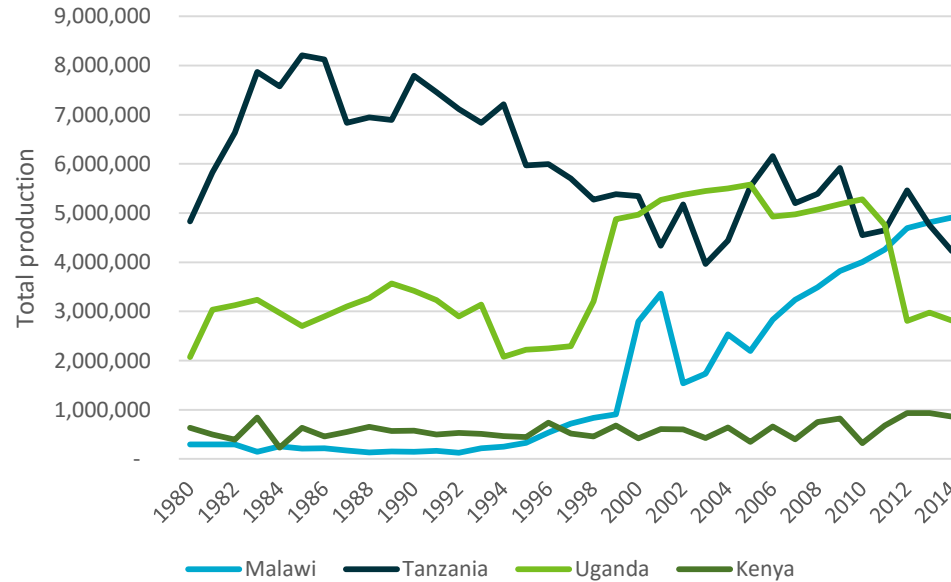


Introduction

- World production of cassava is about 250 million tonnes (FAO, 2015)
- Africa contributes 55% of global supply
- Major staple crop contributing greatly to food security in Africa
 - About 200 million people in East/Central Africa depend on cassava
- Cassava yields in Africa are the lowest in the world (10 t/ha compared to 26 t/ha in India)



Cassava production in East Africa



Source: FAOSTAT (2015)

The problem being addressed?

- The whitefly (*Bemisia tabaci*)
- Vector of significant viruses
- Cassava brown streak disease (CBSD)
- Cassava mosaic disease (CMD)
 - Production losses in East and Central Africa estimated as high as 47%, equivalent to more than US\$ 1.25 Billion per year (Legg et al., 2009)



Research questions

- What is the present status of cassava production/productivity in Uganda, Tanzania and Malawi?
- What is the current adoption rate of improved cassava production technologies?
- What is the economic impact of the whitefly on smallholder farmers?



Methods

- Literature review
- Questionnaire development
 - Pre-survey workshops
 - Pilot surveys
- Farmer surveys using multi-stage random sampling procedures
 - A total of 800 farmers interviewed in Uganda and Malawi
- Economic models
 - Gross margin analysis
 - Stochastic production frontier
 - Tobit adoption model

Stochastic production frontier model

$$Y_j = f(X_j, \beta) \exp(v_j - u_j) \quad (1)$$

$$\ln y_j = \beta_0 + \sum_i \beta_i \ln x_{j,i} + \frac{1}{2} \sum_i \sum_k \beta_{i,k} \ln x_{j,i} \ln x_{j,k} + v_j - u_j \quad (2)$$

$$u = z\delta + w \quad (3)$$

Where: Y_j is the cassava output produced by farmer j ,

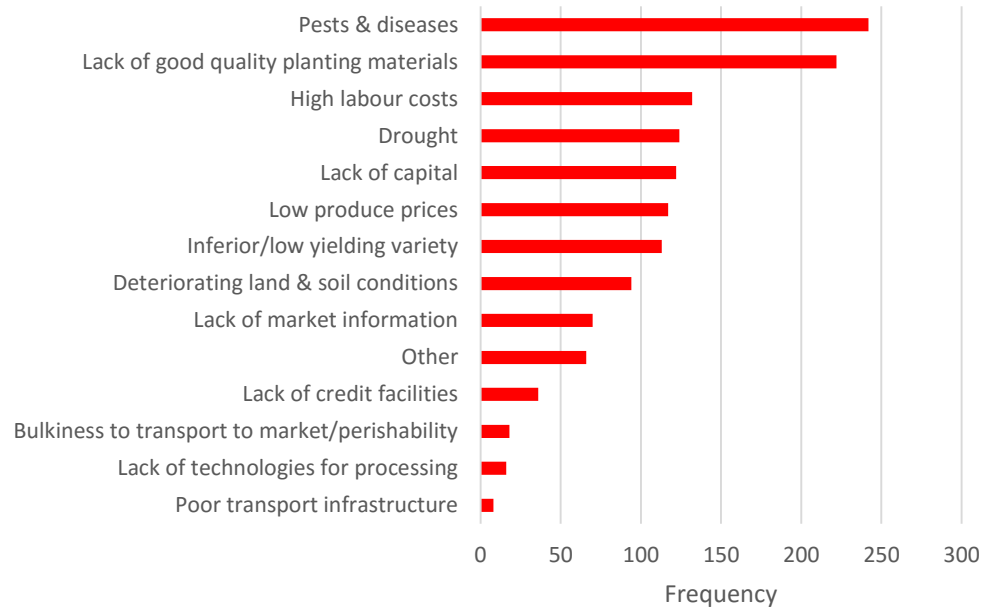
X_j is a vector of inputs,

V_j is the stochastic error term, $N(0, \sigma v)$;

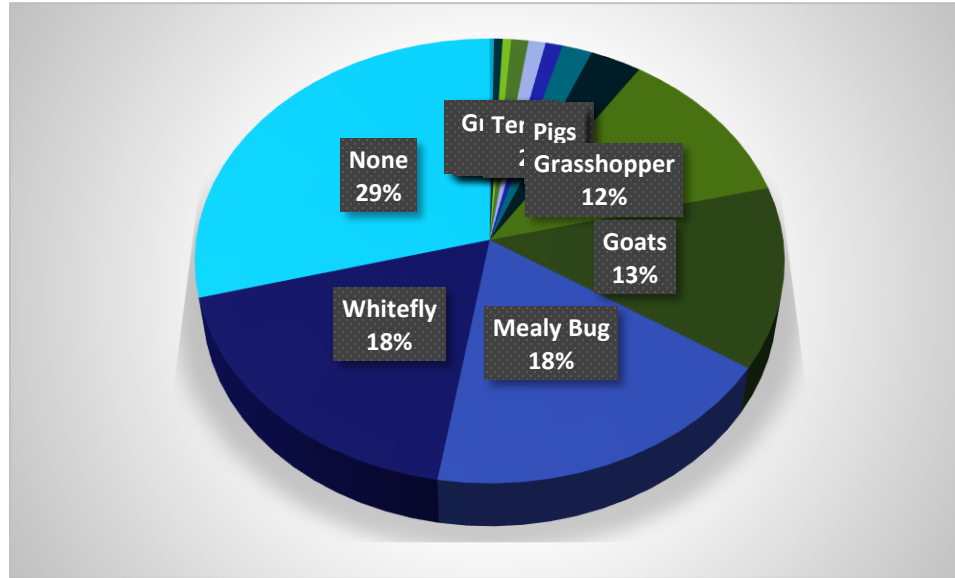
U_j represents technical inefficiency of the farmer j . Z is a vector of farmer-specific variables which influence the farmers efficiency and ω is a matrix of random error terms, $N(0, \sigma^2 w)$

Preliminary results from Malawi

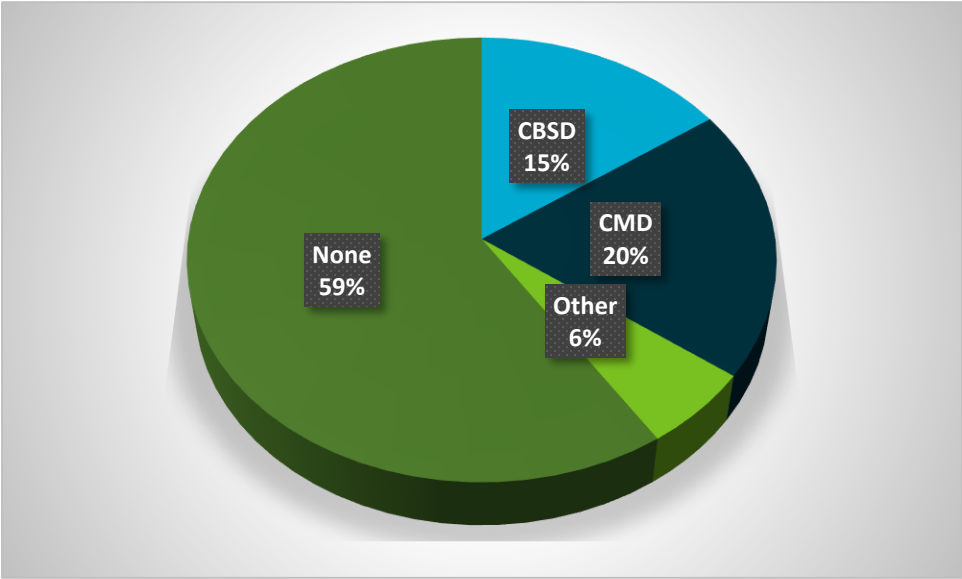
- What are the main constraints you face in producing cassava?



What pests of cassava do you actively manage for?

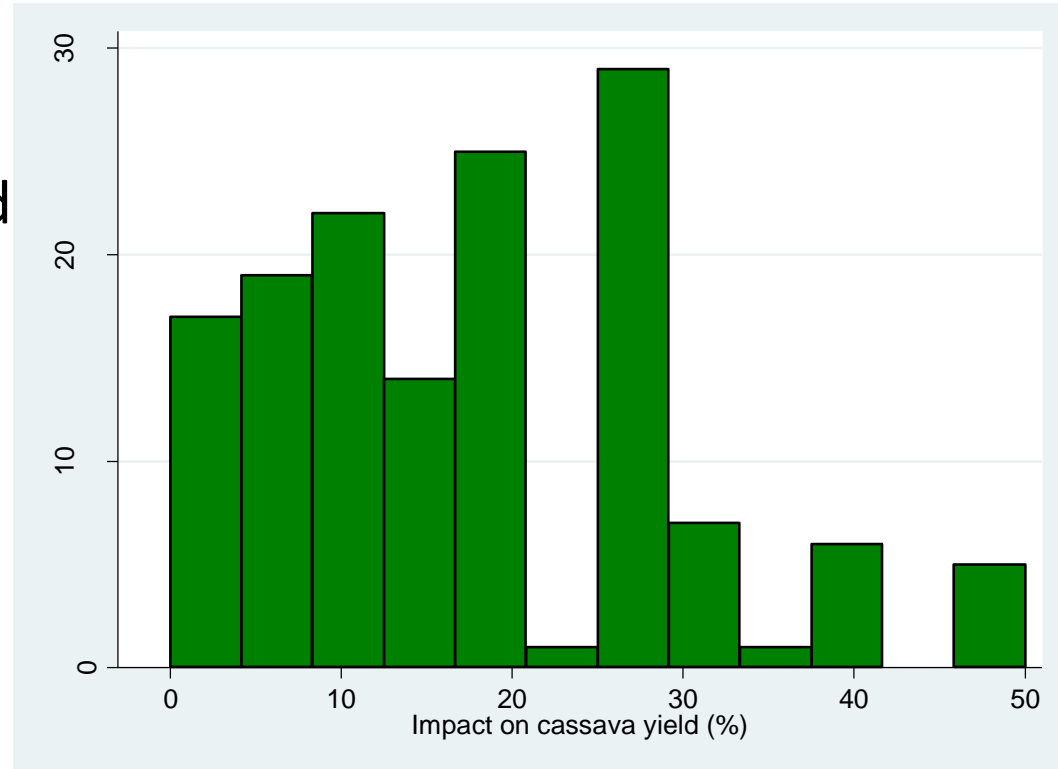


What diseases do you actively manage for?



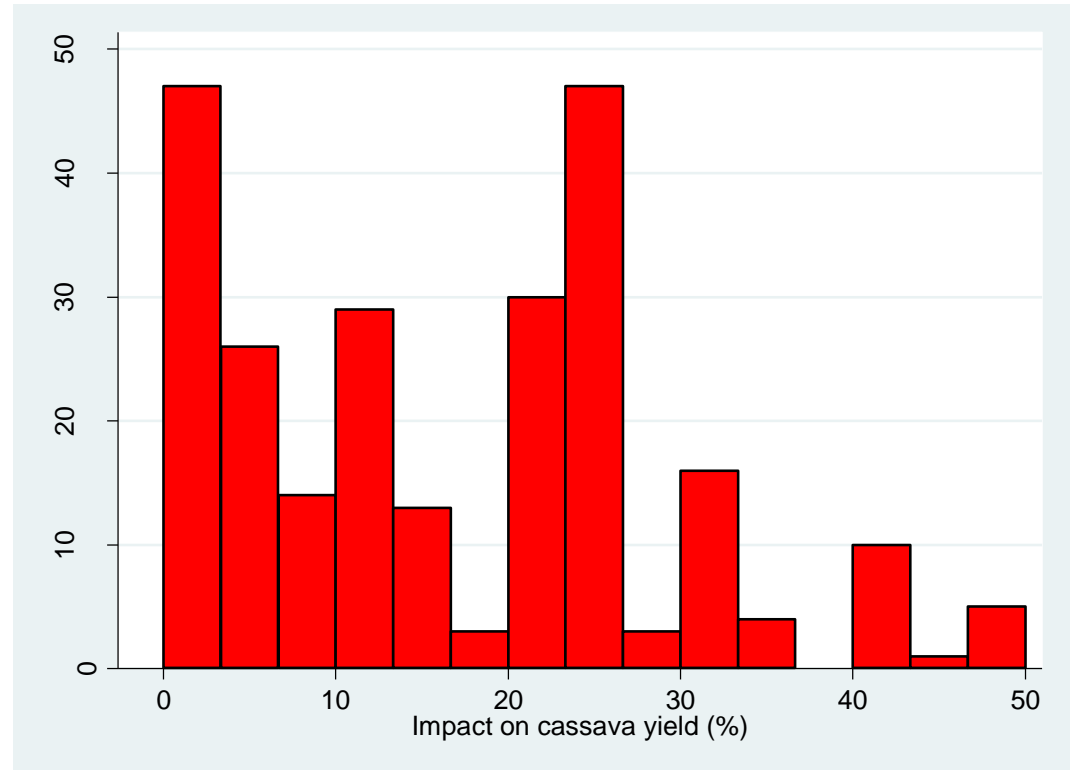
Farmers perception of whitefly impacts

- Do you think you could estimate the impact of the whitefly on your household
 - Yes: 43%
 - No: 57%
- What is the impact of the whitefly on cassava yields?



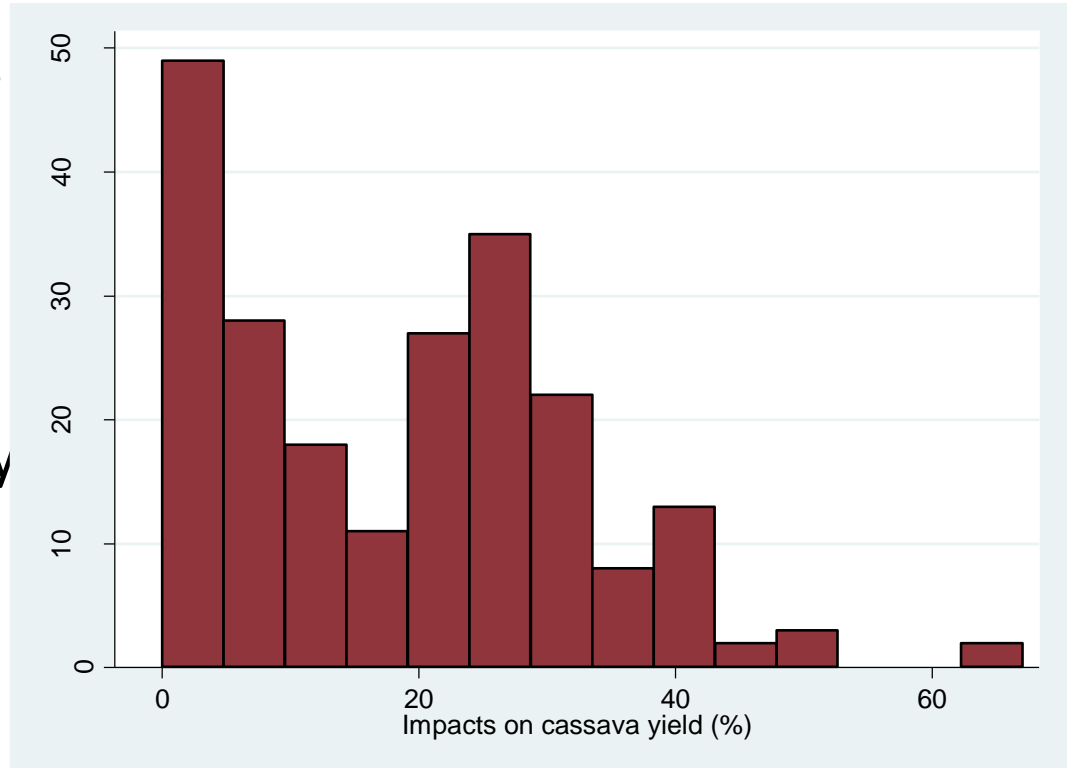
Farmers perception of CMD impacts

- Do you have CMD in your fields?
 - Yes: 67%
 - No: 33%
- What is the average reduction in income from CMD?



Farmers perception of CBSD

- Do you have CBSD in your cassava fields?
 - Yes: 57%
 - No: 43%
- What is the average reduction in income that you get from CBSD?



Cost and returns from improved cassava (Malawi)

	1 hectare, US\$
Total revenue (TR)	\$2,234
Variable costs	
Cassava cuttings	\$56
Fertilizer	\$30
Labour	\$492
Transportation	\$42
Miscellaneous	\$40
Total variable cost (TVC)	\$661

Source: Field surveys, Malawi, 2015

Cost and returns from cassava (cont.)

	1 hectare, US\$
Fixed costs	
Depreciation on farm tools @10%	\$10
Depreciation on land@5%	\$20
Total fixed cost (TFC)	\$30
Total cost (TVC+TFC)	\$690
Gross margin	\$1,574
Net farm income (TR-TC)	\$1,549
Benefit: cost ratio (TR/TC)	3:1

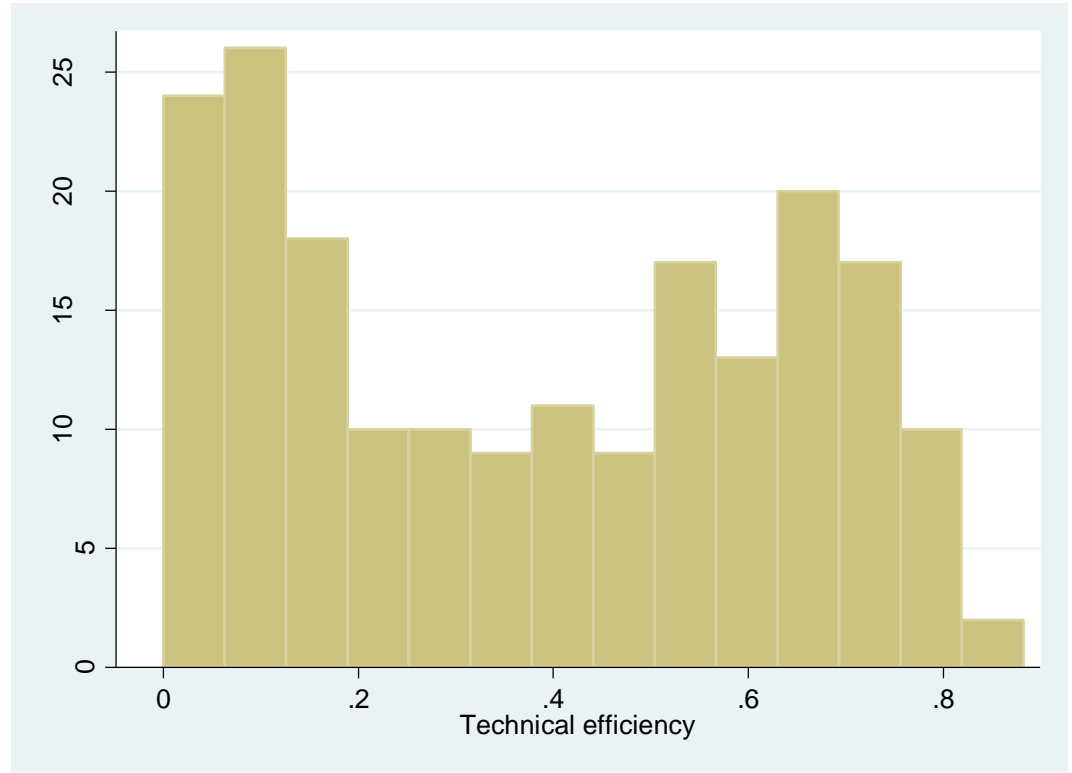
Source: Field surveys, Malawi, 2015

Stochastic production frontier (Malawi)

	Coefficients/s.e.	t-ratio
Constant	9.98 (0.58)***	7.02
Area planted	0.61 (0.12)***	8.73
Labour	0.47 (0.11)***	4.33
Cassava cuttings	0.32 (0.06)***	5.11
Fertilizer and other agrochemicals	0.42 (0.19)***	2.11
Sigma-squared	2.96 (0.47)	
Gamma (γ)	0.89 (0.20)***	
Log-likelihood function	-345	
LR Statistic	82.11	

Mean technical efficiency

- Mean technical efficiency is low at 0.4
- Cassava farmers in Malawi not making the best use of inputs
- Results suggest significant room for improvement



Summary

- Productivity of smallholder cassava farmers is undermined by the whitefly and associated diseases
- Improved cassava varieties generate a good rate of return
- Mean technical efficiency is low and farmers are not making best use of inputs
- Our results are consistent with other studies (e.g. Alene et al., 2013)
- Field trials?



Acknowledgement

- Funding from the Bill & Melinda Gates Foundation through the University of Greenwich
- Local Staff from NACCRI/Uganda
- Local staff from DARS/Malawi
- Enumerators from IFPRI
- CSIRO project members



Thank you

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