Food security and farm revenues among scale-size farmers in Malawi (under changing climate, population growth and landuse options)

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Introduction

- Despite technological advancement many are still food insecure and impoverished (NSO, 2012 and FAO, 2015)
- Climate change and high population growth (3.2% per annum) will exacerbate the low welfare of smallscale farmers (80% of Malawi population, IFRI 2010)
- Though population is estimated to triple by 2050 (NSO, 2012) investments in reproductive health services (60% unmet demand) may avert this population boom (Bremer, 2012)
- In view of climate change and population growth

Research questions

- Which technology investments guarantee both food security and poverty eradication?
- How do different policy scenarios affect food security and poverty eradication?

Methods

Crop biophysical modelling

- Climate data: Statistical downscaling using self organized maps from WRIPO GCM under RCP 8.5
- Crops analysed: maize, cassava, rice, sweet potatoes, soybeans, groundnuts, beans, soybeans, tobacco, cotton, sugarcane, sunflower and paprika

Study regions

- 190 agro-ecological zones in Malawi

Partial equilibrium model

- Poverty eradication ratio (PER) = \[ \sum_{i} Q_{i} \times \left( \frac{P_{i} - P_{0}}{P_{0}} \right) \]
- Min. food req (Kreq) = \[ \sum_{i} Q_{i} \times \left( \frac{P_{i} - P_{0}}{P_{0}} \right) \]

Soils data:

- FAO and Malawi Department of Agricultural Research Services datasets
- Technologies analysed: subsistence, conservation agriculture, agroforestry (Acacias albida), optimal fertilisation, intensive irrigation

Policy scenarios:

- BAU: Base optimised
- Market investments
- Reproductive health services
- Subsidies

National data:

- Resource endowments
- Market data

Results and discussion

1: What are the optimal technological investments levels?

![Technology investment levels](image)

- Optimal investments (base optimised) guarantee food security and marginally eradicate poverty (green line)
- Until 2030 incomes are 1.5 times (PER) above poverty threshold value
- BAU scenario presents high persistent of poverty throughout (red line)

2: What benefits do we get under optimal investments?

- At optimal investments, all scenarios guarantee food security and eradicate poverty until 2035
- Investment in rural markets (RGC) and farmer associations have 2.5 time (PER) income levels above poverty threshold value
- Investments in reproductive health services, increase the potential of base optimised to eradicate poverty by a factor of 2
- Crop area expansion does not reduce poverty levels from base optimised (red, blue lines)

3: What effect do policy scenarios have?

- Despite future climate and population effects, right technological investments would still guarantee food security and poverty eradication
- Agricultural markets investments offer best baits to achieve food security and eradicate poverty
- Provision of reproductive health services can be a powerful climate adaptation option
- Expansion of crop land has negligible effect on poverty reduction within the study period

Conclusions

References:


Fig 1: Malnutrition and poverty levels (World, SSA and Malawi)

Poverty levels as measure of farm revenues

Effects of different policy scenarios on poverty levels

![Effects of different policy scenarios on poverty levels](image)