Building a Resilient and Sustainable Agriculture in Africa

Chris Barrett, Cornell University
African Economic Conference 2016
December 5, 2016, Abuja, Nigeria

Poor but efficient revisited: Innovations needed
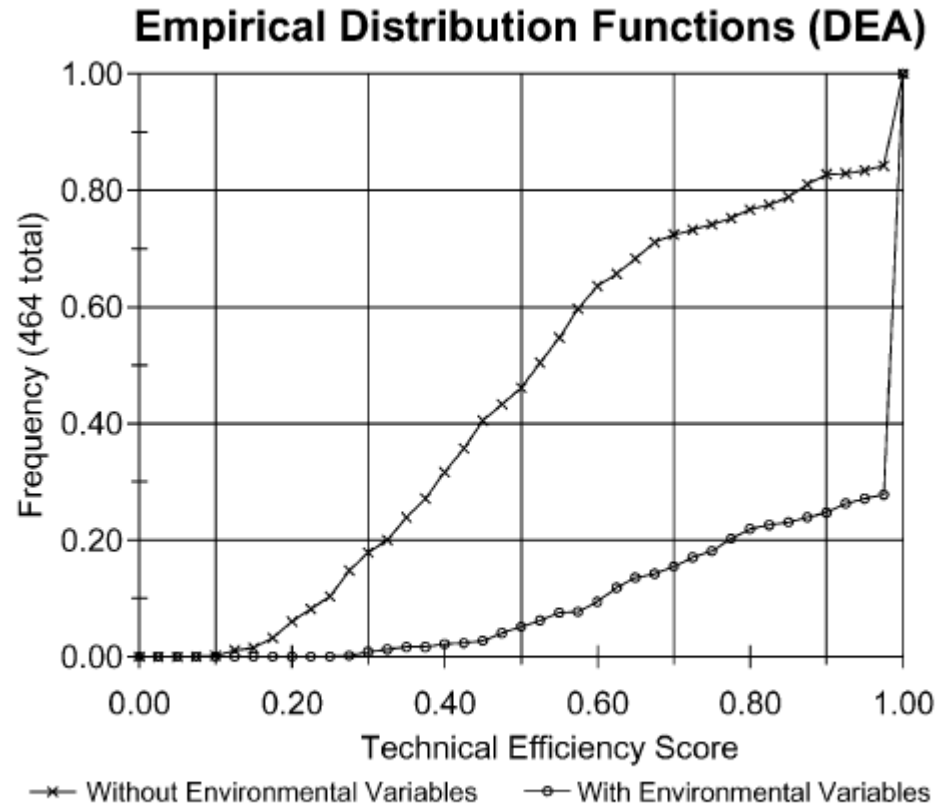

Empirical Distribution Functions (DEA)

Fig. 2. Distribution functions for estimated plot-specific technical efficiencies.

Observations of smallholder inefficiency often reflect failure to control for variation in natural conditions uncontrollable by farmer.

Ex: Ivorien rice farmers – median falls on PPF w/ control for soils, rain, pests, etc. vs. 52% w/o (Sherlund, Barrett & Adesina *JDE* 2002)
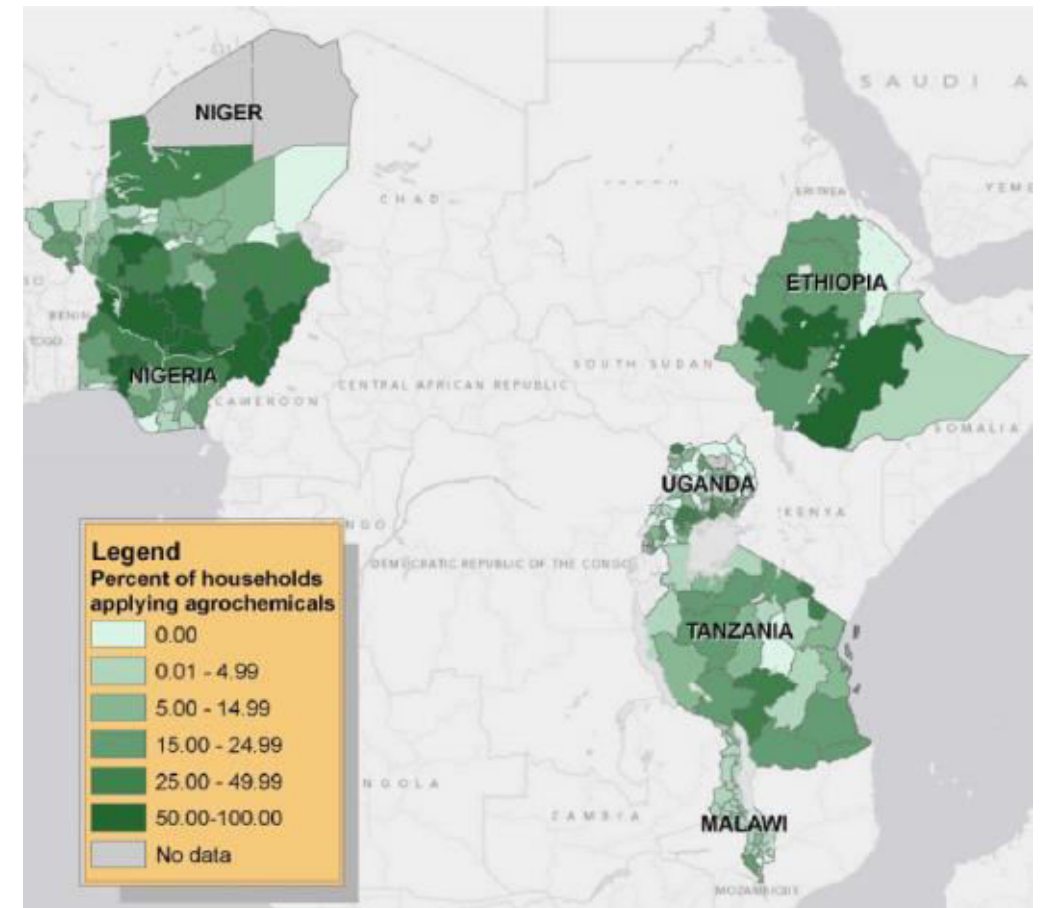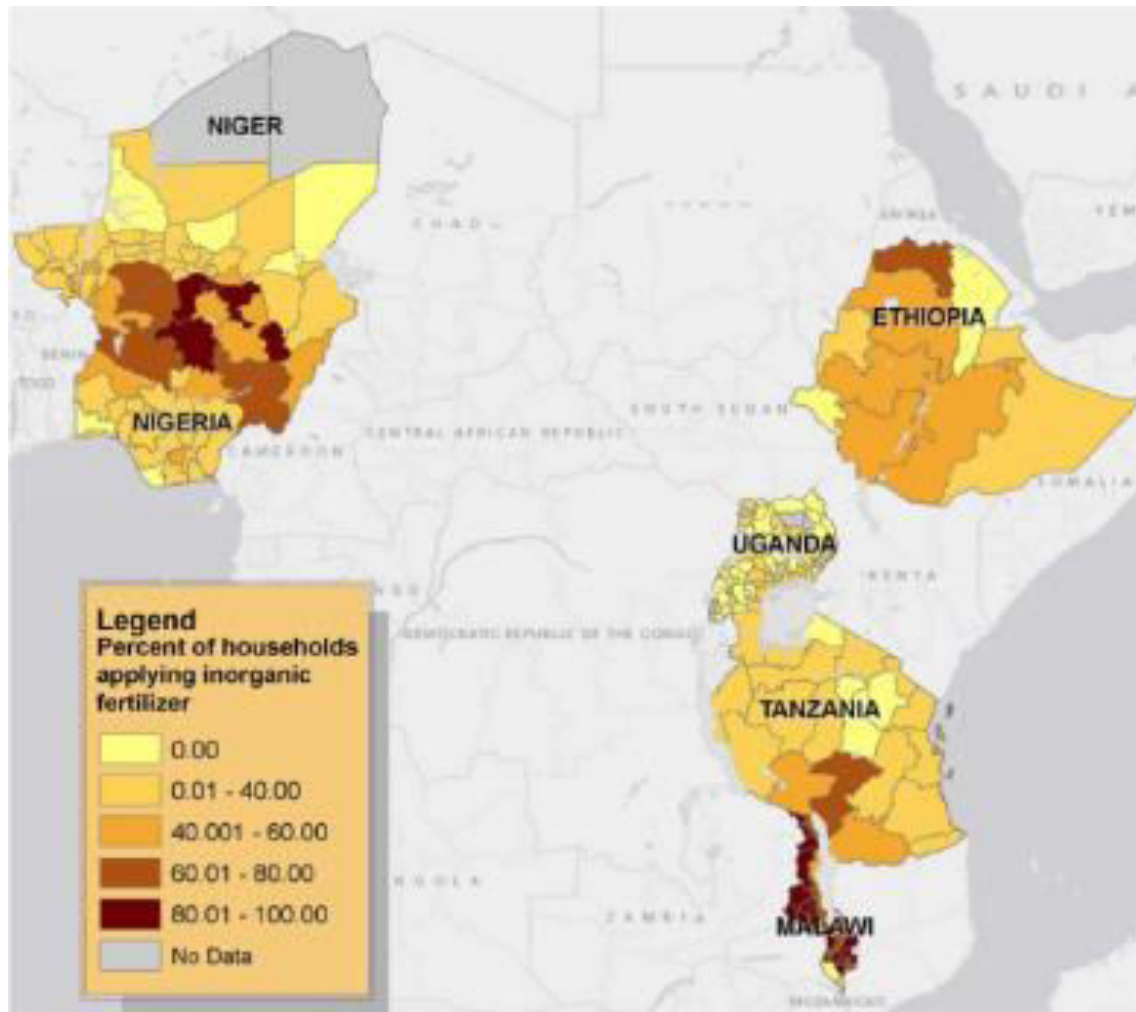
Smallholders are poor but efficient.

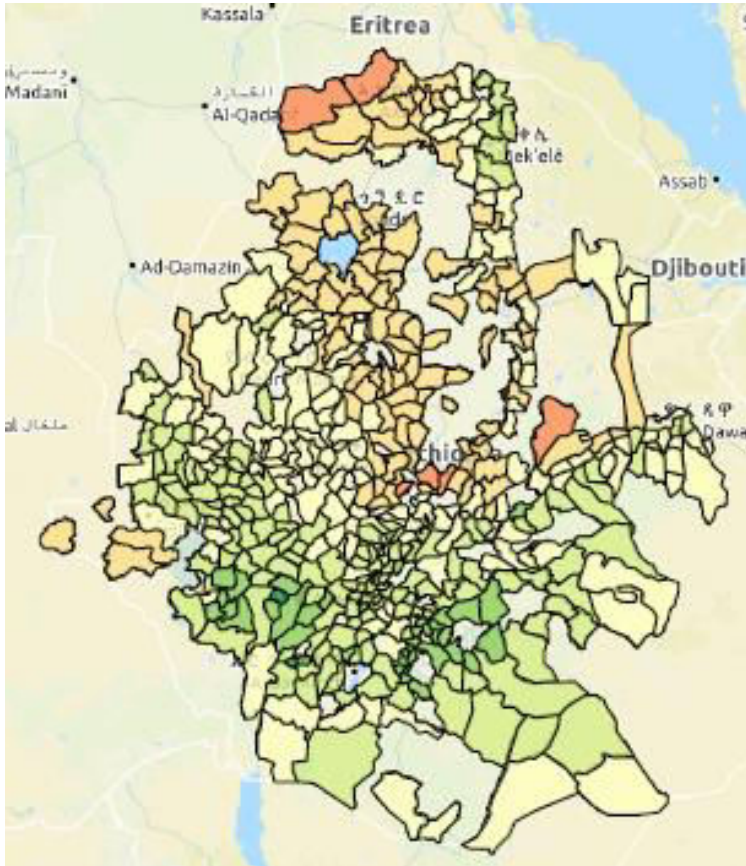Need markets, policies and technologies that make productivity gains feasible/profitable.

Cornell Business

But heterogeneous uptake of innovations

LSMS-ISA data show that uptake of modern ag inputs varies markedly, w/n and among countries. (Sheahan & Barrett, *FP* in press)

Likely reflects heterogeneous returns

Recent studies find spatially heterogeneous returns to inputs due to soils, water, market prices:

Suri (*EMTRA* 2011) –
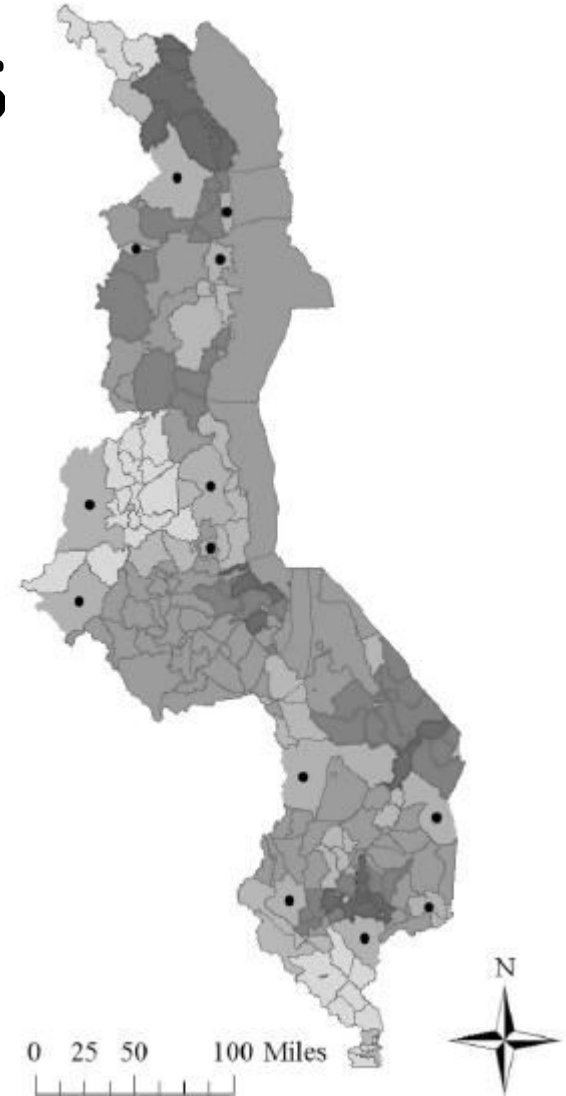Kenya hybrid maize seed

McCullough et al. (WP 2016) -
Ethiopia fertilizer

Burke et al. (*AgEcon* 2016) -
Zambia fertilizer

Harou et al. (*JAfrEcon* in press) -
Malawi fertilizer

https://www.ag-analytics.org/AgRiskManagement/EthiopiaGeoApp

Why? Nature affects profitability

Ag input productivity commonly depends on pests, soils, temperature, water:
Example: Soil degradation in Kenya Marginal returns to fertilizer application low on degraded soils; and poorest farmers are on the most degraded soils. Soil degradation also feeds a striga weed problem that discourages uptake ($7bn/yr in crop losses).

Marenya & Barrett *AJAE* 2009
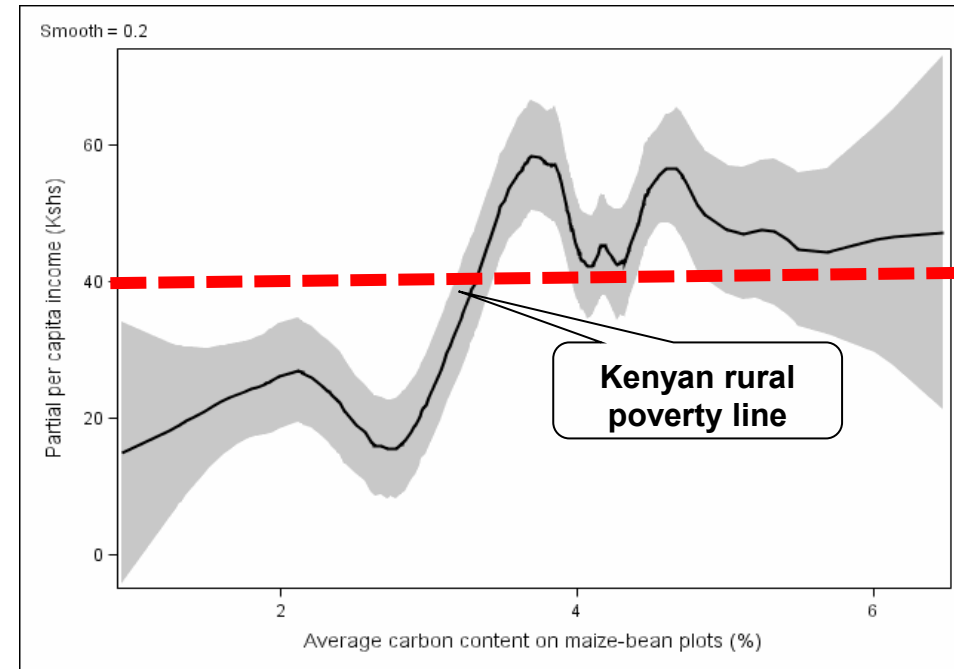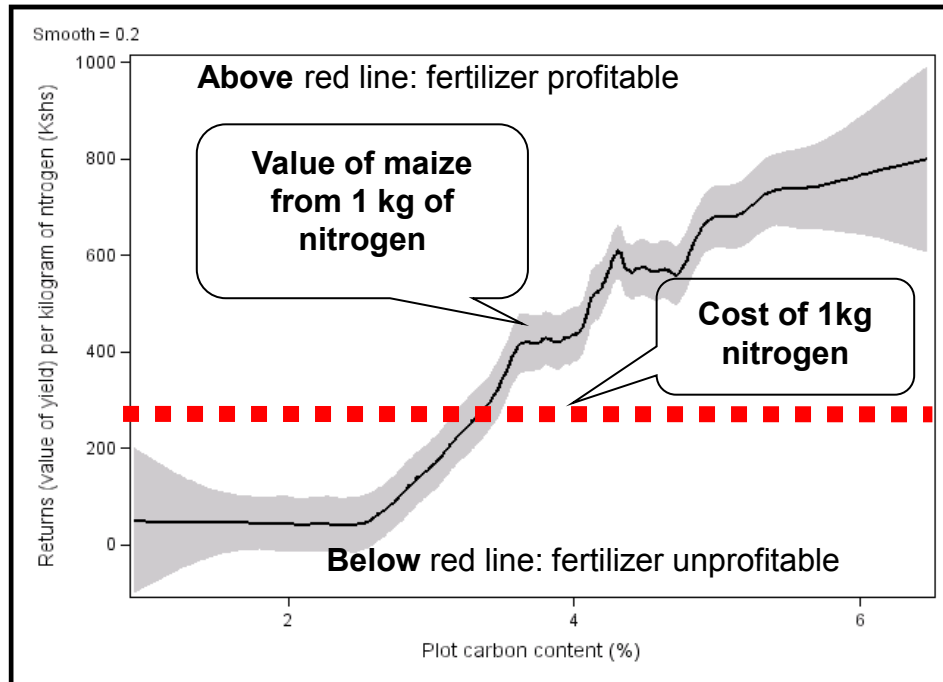
As does market access and prices

Transport costs and reliable access to intermediaries drive input/output prices Omamo (*AJAE* 1996)

Fuel prices have a big impact on food prices due to infrastructure deficiencies (Dillon & Barrett *AJAE* 2016)

Burkina Faso school feeding program and cowpeas (Harou et al. *WD* 2013) – trader seasonality, market access and bulking
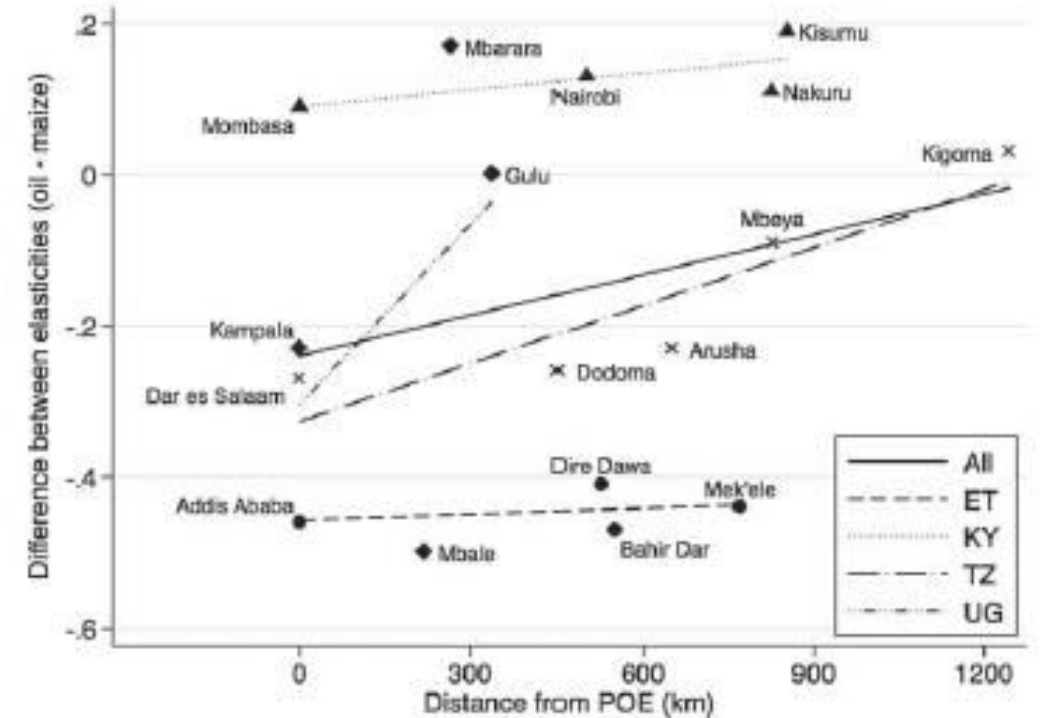

Figure 4. (Elasticity of local maize to global oil) – (Elasticity of local maize to global maize) plotted against distance from POE

Key implications

1. Context matters

- Best technologies vary … one size fits all approaches fail

- Physical/institutional infrastructure drive incentives:
  - ICT to close information gaps (example: ECX)
  - Roads, reduced (formal/informal) trade barriers

- Need more attention in ag R&D to _adaptation_ to agro-ecological niches
  - Requires adequate local applied scientific research capacity
  - Investment in soils and water and essential … ag-env't win-win
  - Requires companies with incentive to invest in adaptive research: workforce quality, reliable IP protection, commercial finance access

Cornell Business

Key implications

2. Bundled approaches often needed

- Multiple constraints often bind (nested or simultaneously)
  - Second-limiting factors can stifle gains from new technologies (e.g., Bt cotton in China)
- Success of BRAC ultra-poor programs (Bandiera et al. WP 2016, Banerjee et al. *Science* 2015)
- Often need to address natural resources conservation, market access, and modern inputs simultaneously
  - Contract farming can help leverage private capital: e.g., sugar farms in Kenya; vegetables in Madagascar

Cornell Business

Thank you for your interest and comments!