# Agriculture and Rural Development in Africa: Some Researchable Questions

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## **Outline**:

- Why agriculture? A *prima facie* case for taking rural development seriously.
- Three researchable questions what would be the impact on sub-Saharan income levels of:
  - > A Green Revolution (*i.e.*, increase in agricultural TFP)?
  - A major increase in the fraction of cropland under irrigation?
  - > A significant expansion of road and transport networks.
- Conclusions

Why agriculture?

- For most countries in Africa, agriculture accounts for very large shares of GDP and employment.
- This is true even relative to other countries at comparable income levels.

#### Labor force in agriculture



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#### Share of GDP in agriculture



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#### Sectoral relative productivity



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#### Sectoral relative productivity, time series vs. African cross-section



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- ⇒ Lots of people in Africa are working in a sector that is extremely unproductive by standard measures.

Some general questions

- Why is this happening?
  - Are these stylized facts real, or just an artifact of flawed data?
  - If real, what are the underlying causes and the proximate causes?
  - Many possible explanations, much previous research.
- Suggests, however, that growth and development literatures need to take seriously issues of structural transformation and agricultural development.

What can the growth literature offer?

- Some ability to consider "big" questions and counterfactuals, in the absence of nicely structured natural experiments.
- Clearly identified channels of causation, even for long-term impacts.
- General equilibrium and dynamic effects.

**Researchable Question #1: The Impact of a Green Revolution** 

- Africa has lagged far behind other regions in agricultural technology.
  - Little colonial research investment, especially on food crops.
  - Limited potential for technological borrowing or spillovers from advanced countries, due to differences in crops and agro-ecosystems. (See Pardey *et al.*)
  - Poor decisions (*ex post*) by donors and international research community. (For example: deliberate choice to avoid research on maize hybrids; overemphasis on veterinary biotechnology...)

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Figure 2: Maize Yields, 1961-2003



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#### Modern Varieties as Share of Area: Maize



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- Low investment and low spillovers have led to very low knowledge stocks, as estimated by Pardey and co-authors.
- ⇒ What would be the impact of an increase in the level of agricultural technology; e.g., to the level of developing Asia?

**Researchable Question #2: Irrigation** 

• Africa has remarkably low levels of irrigation, compared to other developing countries.

#### Irrigated land as percent of total agricultural land



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- Africa has remarkably low levels of irrigation, compared to other developing countries.
  - Lack of water supply can reduce mean levels of output.
  - Susceptibility to (negative) supply shocks; potentially large in magnitude.
- Most experts see irrigation as technically feasible in many parts of Africa, although there are some non-trivial difficulties.
- Complementary with spread of varietal technologies and fertilizers.

- ⇒ Macroeconomists should know something about the benefits of reducing economic fluctuations and increasing productivity.
- ⇒ Effects are likely to be dynamic; reducing risk and increasing productivity are likely to lead to investment.
- ⇒ Need to take seriously environmental externalities and other

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**Road Density and Income Levels** 



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- Many parts of Africa face extraordinarily high transport costs.
- Agricultural inputs and outputs face high marketing margins.
- Important for domestic and international trade.
- $\Rightarrow Macro models should be able to analyze the benefits of reducing these price wedges.$
- ⇒ Effects within agricultural markets should also spill into labor and capital markets, among others.
- ⇒ Again need to consider a range of externalities: environment, health, conflict, etc.

### **Road networks**

- To give an example, DR Congo is reported to have just over 1,700 miles of paved roads in an area one-fourth that of the United States.
- By contrast, Massachusetts has about 35,000 miles.
- ⇒ Widely cited data suggest that bulk transport costs in sub-Saharan Africa average more than three times the level of India and about seven times the level in US.
- ⇒ Costs half as much to move maize from Duluth to Dar es Salaam as to bring it from rural Tanzania.

Fertilizer Use and Road Density





Total fertilizer consumption per unit of land

## Conclusions

- We may not know (and may never resolve) the root causes of poverty in Africa, but we can ask well-defined questions about possible interventions.
- Micro researchers have generated enormous body of knowledge on development successes, with much progress in recent years.
- Some questions may not lend themselves well to analysis with the micro toolkit; macro researchers would benefit from hearing about those ideas that seem important but cannot be satisfactorily addressed with micro tools.