# What does cost-benefit analysis say about agriculture?

Background

# Agricultural Economics

- The aim of almost all agriculture and livestock interventions is to increase agricultural yields, food supply and/or farm profits
- Primarily assess the additional value of crops or livestock produced against the incremental costs of generating the additional farm output

# Agricultural Economics – costs and benefits

- Costs are typically fixed and variable costs incurred by farmers, and value of inputs provided to farmers for free or subsidized
- Other potential costs
- Externalities
  - **Soil degradation**
  - **Water pollution**
  - **Greenhouse gas emissions**
- Transaction Costs
  - **Negotiation and contracting**
  - **Transportation and logistics**
  - **Quality verification and certification**

- Benefits are mainly measured as
  - **Improved income for farmers**
  - **Productivity and efficiency gains**
- Further benefits could stem from
  - **Environment**
  - **Market development and trade expansion**
  - **Food security and price stability**

# Agricultural Economics - efficiency

- In general, agriculture-focused BCAs tend to yield FAIR benefit-cost ratios.
- This outcome largely results from agriculture being predominantly a private enterprise, where benefits and costs are mostly borne by individual farmers or businesses.
- Consequently, private-sector actors are strongly incentivized to adopt interventions that are most profitable
- The remaining BCRs are likely to yield market level returns, which are generally between 1-2, hence the FAIR ratings.
- This finding may seem counterintuitive to policymakers who view agriculture as a critical sector with substantial potential for growth and productivity gains.
- However, both perspectives can simultaneously hold true: agriculture may indeed be central to the economy, producing large absolute benefits when improved, but at a correspondingly high cost, resulting in relatively modest benefit-cost ratios.

# Copenhagen Consensus has commissioned 48 CBA studies

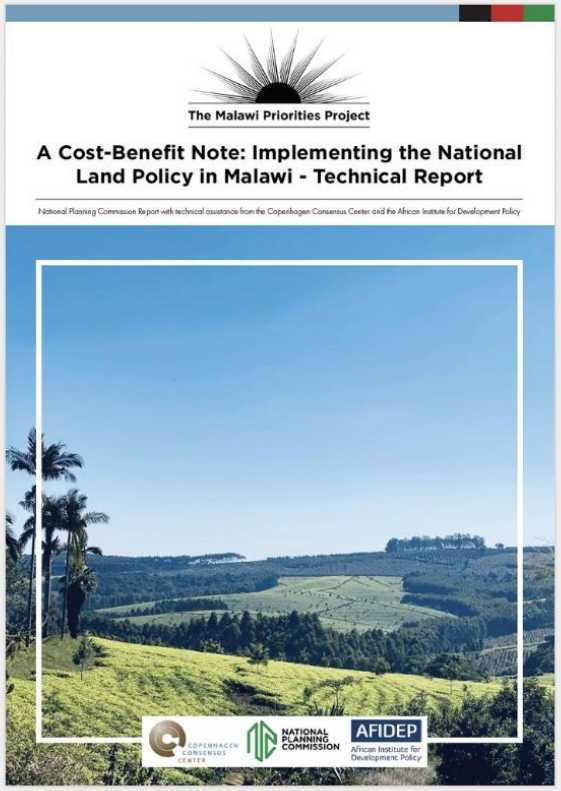
Global, regional and country-specific

# Efficiency: Results from Copenhagen Consensus, same range as in literature

| Ghana Priorities | BCR |
|---|---|
| Land titling program | 91 |
| Hybrid maize seed subsidies | 3.6 |
| Increase mechanization through tractor services | 2.8 |
| OPV maize seed subsidies | 2.3 |
| Build warehouses to reduce post-harvest losses | 1.8 |
| Revamp irrigation schemes | 1.5 |
| Revamp rail network for rural transport | 1.5 |
| Feeder roads for rural transport | 1.2 |
| Fishing licenses and Aquaculture | 1.2 |

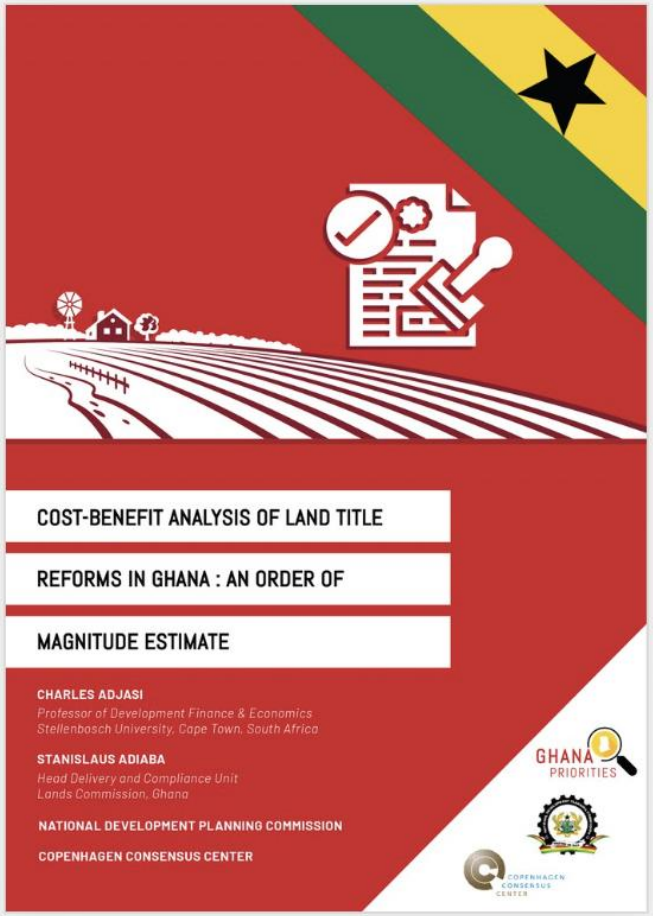
| Malawi Priorities | BCR |
|---|---|
| Land titling reform | 73 |
| Agricultural commodity exchange reform | 16 |
| Re-orientate extension workers to provide irrigation support to smallholder farmers | 3.3 |
| Climate smart agriculture | 3.0 |
| Promotion of PIC bags | 2.9 |
| Fishing in turns (day-of-week restrictions) | 2.8 |
| Crop diversification and intercropping | 2.0 |
| Fisheries infrastructure at Chipoka | 1.9 |
| Poultry outgrower model for value add in soybean sector | 1.3 |
| Credit guarantees for agro-processors | 1.1 |
| Removal of maize export ban | 1.1 |
| Solar-powered irrigation financing schemes for estate farmers and farmer organizations | <1 |
| Replacing illegal fishing nets | 0.9 |

# MALAWI




| Intervention | BCR | Beneficiary Group | Cost | Benefit |
|---|---|---|---|---|
| Land Titling Reform | 73 Excellent (100% economic benefits) | Population residing in 3.2 million ha of rural and 1.5 million ha of urban land | Upfront MWK 64,920 million for land tilting, demarcation and adjudication<br><br>Ongoing MWK 2,700 million per year district offices and TLMA offices | Increased economic benefits (land tenure security, access to credit, transaction cost reductions) valued at MWK 6,425,313 million |

# GHANA



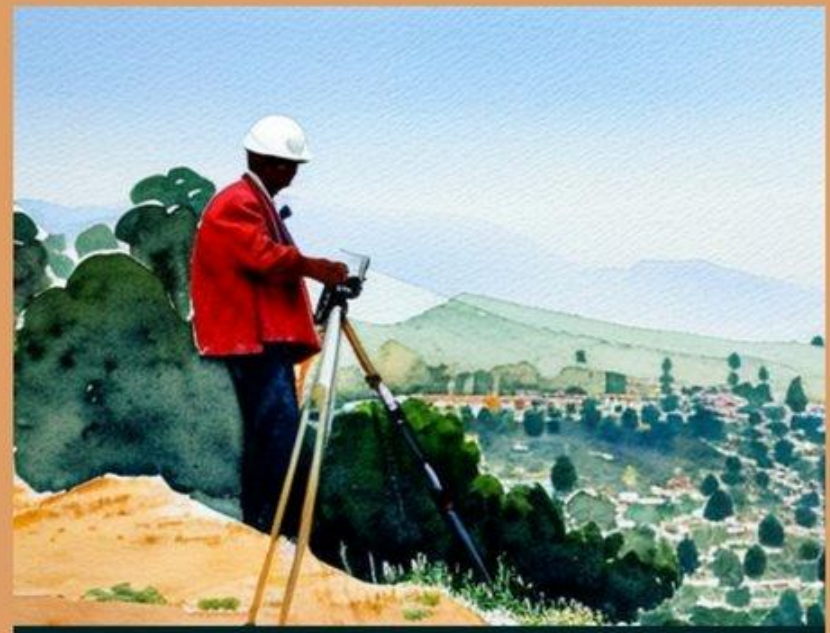

## BCR SUMMARY TABLE

| INTERVENTION | COST (GH¢ MILLIONS) | BENEFIT (GH¢ MILLIONS) | BENEFIT-COST RATIO |
|---|---|---|---|
| Survey and documentation of 170,657 square kilometres of land at a 25% success rate. | 942 | 86,123 | 91 |

# Land tenure security

## LAND TENURE SECURITY

HALFTIME FOR THE SUSTAINABLE DEVELOPMENT GOALS



## BEST INVESTMENTS FOR THE SDGs

**EXCELLENT BENEFIT COST RATIO: 21**

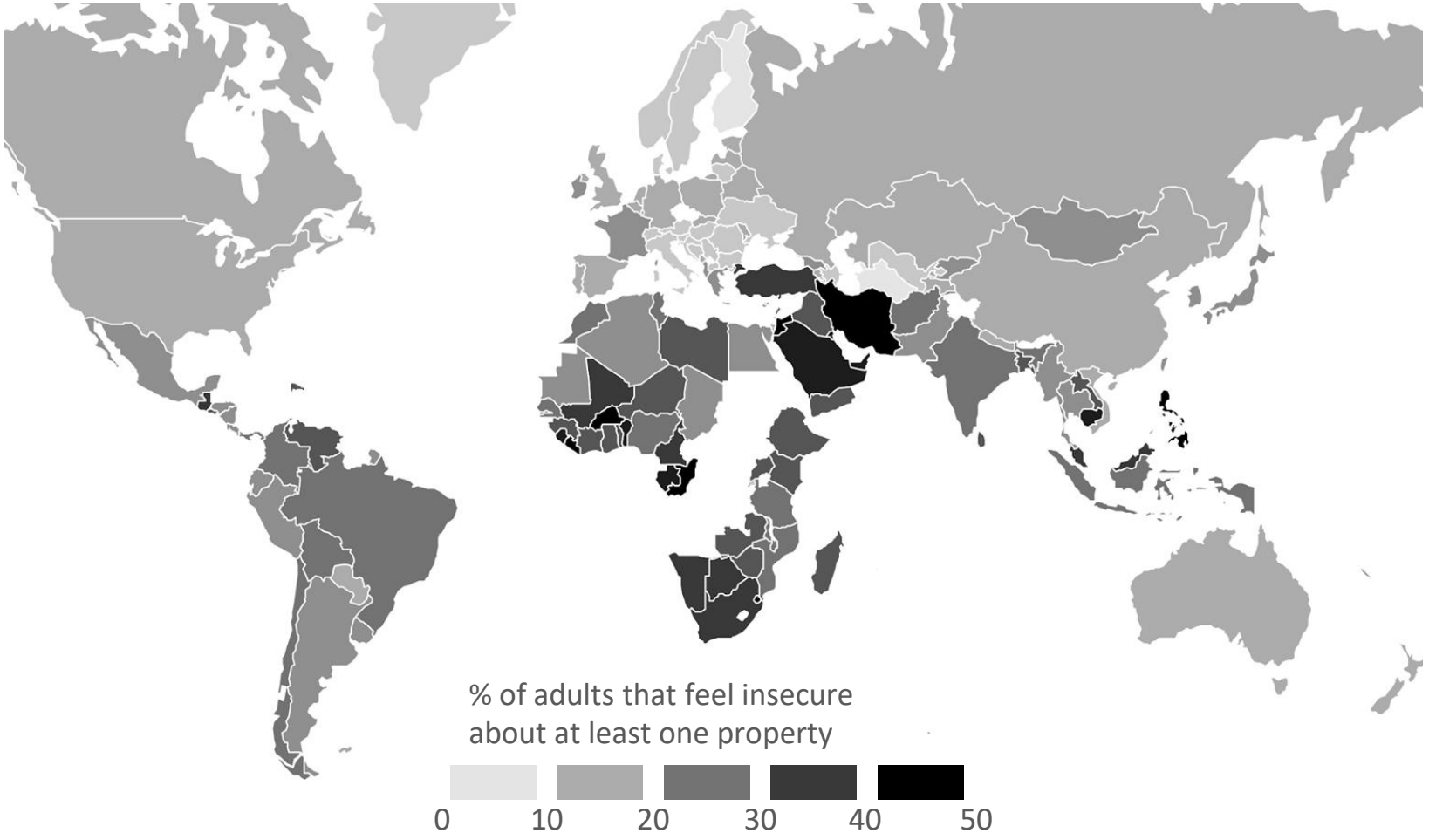
### Investment

Urban and rural **land registration**, **digitizing land registries** to improve efficiency and transparency, **strengthening institutions and systems** to resolve land disputes and manage expropriations over a ten-year implementation period, and land administration operations and land records maintenance over 30 years.

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# Levels of perceived tenure insecurity across all properties.



# Land registration, average number of procedures, time it takes in days, and costs in percent of property value

| Region | Procedures | Days | Costs |
|---|---|---|---|
| East Asia + Pacific | 5.5 | 71.9 | 4.5% |
| Europe + Central Asia | 5.5 | 20.8 | 2.7% |
| Latin America + Caribbean | 7.4 | 63.7 | 5.9% |
| Middle East + North Africa | 5.4 | 26.6 | 5.6% |
| OECD | 4.7 | 23.6 | 4.2% |
| South Asia | 6.9 | 107.8 | 7.0% |
| Sub-Saharan Africa | 6.1 | 51.6 | 7.3% |

# Rural land registration - costs and benefits

| | | |
|---|---|---|
| | Land registration | $2.5 |
| | Digitization and courts | $0.9 |
| | operations | $21.5 |
| | **Total costs** | **$24.9** |
| | | |
| | **Total benefits from higher productivity** | **$454** |
| | **BCR: 18** | |

*Note: Costs and benefits are discounted at 8% per year.*

# Urban land registration - costs and benefits

| | | |
|---|---|---|
| | Land registration | $1.8 |
| | Digitization and courts | $0.6 |
| | operations | $3.6 |
| | **Total costs** | **$6.1** |
| | | |
| | **Total benefits from more valuable housing** | **$183** |
| | **BCR: 30** | |

*Note: Costs and benefits are discounted at 8% per year.*

# Rural: Technical deep dive

# Effects on rural households

- Systematic evaluations of land tenure programs showing
  - **Increased agricultural output (40% on average)**
  - **Increased household welfare (15% on average)**
  - **Additional benefits (not monetized): schooling, nutrition, credit access, reforestation**
- The CBA uses the 15% income increase

# Baseline Data and Parcel Estimation

- Derived from LSMS-ISA data (Deininger et al. 2017)
  - **Rural population: 666.8 million**
  - **Rural households: 96.6 million**
  - **Average parcels per agricultural household: 2.2**
  - **Total rural parcels: 212.6 million**
  - **Registered share: 14%**
  - **Unregistered parcels: 182.8 million**

# Registration Costs

- Low-value parcels (90% of unregistered rural land)
  - **Cost: US$ 10 per parcel**
  - **Method: aerial/satellite imagery**
  - **Total: US$ 1.65 billion**
- High-value parcels (10% of unregistered rural land)
  - **Cost: US$ 20 per parcel**
  - **Total: US$ 366 million**
- Communal land registration:
  - **30 countries x US$ 30–40 million**
  - **Total: US$ 1.05 billion**

# Digitization and Institutional Strengthening

- Digitization
  - **44 countries × US$ 20 million**
  - **Total: US$ 880 million**
- Institutional strengthening
  - **48 countries × US$ 20 million**
  - **Total: US$ 960 million**
- Land administration
  - **Operations & Maintenance over 30 years discounted at 8%**
  - **Total: US$ 64 billion**

# Cost benefit ratio

- Present value of total benefits
  - **US$ 396 billion**
- Present value of total cost
  - **US$ 21.7 billion**
- Benefit cost ratio
  - **18**

# Urban: Technical deep dive

# Effects on urban households

- Property values
  - **Market value represents the value of housing consumption and future cash flow derived from the property**
  - **25% increase in value on average for properties with secure titles**
- Estimate of benefit from urban land title security
  - **Population-weighted housing prices from 20 largest Sub-Saharan African countries**
  - **Average housing price (assumed to have titles) x 20%**

# Baseline Data and Parcel Estimation

- No continent-wide data exist.
  - **The paper constructs estimates using: Nairobi (90% registered) and Dar es Salaam (20% registered)**
- Assumptions:
  - **Half of SSA cities resemble Nairobi, half resemble Dar es Salaam**
  - **Slums = 100% unregistered**
- Total: 68 million
  - **Unregistered (non-slum): 30.6 million**
  - **Slum parcels: treated separately**

# Registration Costs

- Non-slum parcels:
  - **30.6 million parcels**
  - **Cost: US$ 25 per parcel**
  - **Total: US$ 765 million**
- Slum regularization:
  - **48 countries**
  - **Cost: US$ 30 million per country**
  - **Total: US$ 1.44 billion**

# Digitization and Institutional Strengthening

- Digitization
  - **44 countries × US$ 20 million**
  - **Total: US$ 880 million**
- Institutional strengthening
  - **48 countries × US$ 20 million**
  - **Total: US$ 960 million**
- Land administration
  - **Operations & Maintenance over 30 years discounted at 8%**
  - **Total: US$ 64 billion**

# Cost benefit ratio

- Present value of total benefits
  - **US$ 237 billion**
- Present value of total cost
  - **US$ 5.3 billion**
- Benefit cost ratio
  - **30**