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Food security and index-based agricultural insurance in sub-Saharan Africa: Case analysis

Social Protection and Climate change in the SADC 2030 Agenda for Sustainable Development
End hunger, achieve food security and improved nutrition and promote sustainable agriculture

SDG Indicator 2.1.2 - Severity of food insecurity

The Food Insecurity Experience Scale (FIES) produces a measure of the severity of food insecurity experienced by individuals or households, based on direct interviews

- 9.2% of the world population, exposed to severe levels of food insecurity in 2018
- An additional 17.2%, have experienced food insecurity at moderate levels (Read more on the State of Food and Agriculture (SOFI) 2019 report).

**THUS: Required = Increase agricultural production by 50% (est.) by 2050 to meet the needs of a growing population.**

*Food security = when one has physical, social and economic access to sufficient, safe and nutritious food to meet one’s dietary needs*
Facts on Agriculture in Africa

Contributes a 15% of Africa’s GDP (annually)
Employ more than 65% of its workforce

80% of all farms (SSA) are smallholder farmers, contributing up to 90% of the production

Demographically broadest economic sector crucial in socioeconomic development

YET, 70% is at subsistence farming level
Agriculture production-related risks

Farmers, ag practices
Land, soil, biodiversity
Bugs, diseases, weeds

Market & policy-related risks
Markets, prices
Supporting environment
Severe weather
Drought, excess rain
Coping mechanisms

<table>
<thead>
<tr>
<th>Formal</th>
<th>Ex-post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social assistance</td>
<td>Mutual aid</td>
</tr>
<tr>
<td>Cash transfer</td>
<td>Reallocation of labor</td>
</tr>
<tr>
<td>Sale of valuable assets</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Informal</th>
<th>Ex-ante</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffer stock accumulation of crops/liquid assets</td>
<td></td>
</tr>
<tr>
<td>Fertilization, irrigation, resistant varieties</td>
<td></td>
</tr>
<tr>
<td>Plot/crop diversification, intercropping</td>
<td></td>
</tr>
<tr>
<td>Diversification of income source</td>
<td></td>
</tr>
<tr>
<td>Crop sharing arrangements</td>
<td></td>
</tr>
<tr>
<td>Avoiding exposure to risk</td>
<td></td>
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<tr>
<td>Informal risk pool</td>
<td></td>
</tr>
</tbody>
</table>
Coping mechanisms

- Farmers, ag practices
- Land, soil, biodiversity
- Bugs, diseases, weeds

- Technology, Crop Management

- Market & policy-related risks
  - Markets, prices
  - Supporting environment

- Severe weather
  - Drought, excess rain

- Policy, Infrastructure, Market rationalization

- Insurance
Insurance as a form of social protection

Social protection frameworks help citizens meet their basic needs, and protect them from deprivation through various instruments, one of which is social insurance.

“However, only 27% of the world’s population enjoys access to comprehensive social security systems, whereas 73% is covered only partially or not at all (ILO, 2014).”

Without insurance, families face severe financial shocks when they experience a major loss— for example, crop failures, flood/draught, or livestock deaths. THEN, they deplete all their resources dealing with these shocks, rendering them vulnerable to falling further into poverty.

“Only 28% of the labour force worldwide is potentially eligible for benefits (contributory or non-contributory) under existing legislation, should they become unemployed.”
Need or importance of crop insurance

- Reduction in losses
- Compensation for losses
- Improves financial position
- Increase in morale & productivity
- It creates business opportunities
- Relationship between corporate sector & farmers
- Rural development
- Reduction in poverty
IT IS ESTIMATED THAT THERE ARE ~100+ AGRICULTURE INSURANCE SCHEMES THAT ARE BEING TRIED ACROSS THE DEVELOPING WORLD

PROFILED AGRICULTURE INSURANCE SCHEMES BY REGION

- AREA YIELD
- WEATHER INDEX
- SATELLITE INDEX
- INDEMNITY
- COMBINED

INSIGHTS

- Regions with a strong background in public welfare have seen multiple indemnity-backed insurance schemes such as in Latin America, Europe and Central Asia.
- Lack of suitability of indemnity-based insurance schemes in countries in Asia and Africa has led to pilots of weather and satellite index being tried.
- Area yield, has generally been an expensive product and has seen limited global uptake.

Source: ISF 2018
Index-based agricultural insurance

- An index insurance contract pays out based on the value of an “index”, not on losses measured in the field.
- An index is a variable that is highly correlated with losses and cannot be influenced by the insured.

Traditional crop and livestock indemnity products

- Named peril crop insurance (e.g. hail)
- Multiple peril crop insurance (yield guarantee)
- Revenue insurance (yield and some price protection)
- Livestock mortality insurance

Index-based products

- Weather-based index products
- Satellite-based index products
- Area yield index products
- Livestock index products
Weather Index Insurance

- Indemnifies farmers against deemed crop losses due to adverse weather incidence
- Assess loss based on the changes in a weather index over a pre-specified period of time at a particular weather station.
- Payouts based on pre-defined triggers on specified weather parameters
- Appropriate for highly correlated weather risks
  - excess and deficit rainfall
  - excess and deficit temperature.

Weather Parameters

- Rainfall
  - Deficit rainfall, Excess rainfall, Consecutive Dry/ Wet Days, Number of rainy days
- Temperature
  - Maximum Temperature (heat)
  - Minimum Temperature (frost)
  - Mean temperature, daily chilling units
- Relative Humidity
- Wind
  - Speed
- Disease proxy
  - Combination of rainfall, temperature & humidity
Rationale for Index-based Insurance

Traditional crop insurance for smallholder economies is extremely challenging
  Many constraints for traditional products based on individual loss assessments
Agricultural production suffers from covariant risks (e.g. drought)
  Needs reinsurance
Risk management products adapted to developing countries could increase access to, and reduce cost of, agricultural credit
Index-based weather insurance:
  Avoids the need for loss assessments
  Lowers programme costs and technical complexity
  Objective and timely
  Reinsurable
Can it work...

Can weather index based insurance cost-effectively mitigate the increasingly impacts of climate risk on food insecurity?
## Applications and experience

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro level</td>
<td>Weather-indexed insurance for smallholder farmers, intermediated through institutions with rural outreach</td>
<td>India, Nicaragua, Malawi, Ukraine, Thailand</td>
</tr>
<tr>
<td>Meso level</td>
<td>Weather-indexed portfolio hedge for rural financial institutions that lend to poor farmers</td>
<td>India</td>
</tr>
<tr>
<td>Macro level</td>
<td>Weather insurance or weather-indexed contingent credit line for governments or international organizations that provide safety nets for the poor</td>
<td>Ethiopia, Kenya, Malawi, Mexico</td>
</tr>
</tbody>
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**Index insurance experience to date**

- Main application has been for drought risk at Micro level
- Pilot scale implementation in several countries
- Private sector scale-up of micro level only in India
## Applications and experience

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Policy-holder</th>
<th>Project name</th>
<th>Instrument</th>
<th>Scale</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>2001</td>
<td>Participants in government seed program</td>
<td>AgroBrasil</td>
<td>Area-based yield index</td>
<td>15,000</td>
<td>Government pays 90% of premium</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>2007</td>
<td>Teff and bean farmers</td>
<td>HARITA</td>
<td>Rainfall index</td>
<td>300</td>
<td>Ongoing</td>
</tr>
<tr>
<td>India</td>
<td>2007</td>
<td>Potato farmers under Pepsico contract</td>
<td>Pepsico</td>
<td>Temperature and humidity index</td>
<td>4000</td>
<td>Ongoing</td>
</tr>
<tr>
<td>India</td>
<td>2004</td>
<td>Smallholders</td>
<td>AIC</td>
<td>Rainfall, temperature index</td>
<td>1,000,000</td>
<td>Government premium subsidy; ongoing</td>
</tr>
<tr>
<td>Kenya</td>
<td>2009</td>
<td>Smallholders</td>
<td>Rockefeller</td>
<td>Rainfall index</td>
<td>500</td>
<td>Pilot stage</td>
</tr>
<tr>
<td>Kenya</td>
<td>2009</td>
<td>Maize and wheat smallholders</td>
<td>Kilimo Salama</td>
<td>Rainfall index</td>
<td>200</td>
<td>Pilot stage</td>
</tr>
<tr>
<td>Malawi</td>
<td>2008</td>
<td>Maize, tobacco farmers</td>
<td>MicroEnsure, others</td>
<td>Rainfall index</td>
<td>2500</td>
<td>Initially maize, moved to tobacco; ongoing</td>
</tr>
<tr>
<td>Millennium Villages (Kenya, Ethiopia, Mali)</td>
<td>2007</td>
<td>Smallholders</td>
<td>Millennium Villages</td>
<td>Rainfall and satellite-based greenness index</td>
<td>1000</td>
<td>Premiums paid by MVP; not continued</td>
</tr>
<tr>
<td>Mongolia</td>
<td>2006</td>
<td>Herders</td>
<td>IBLIP</td>
<td>District-average livestock losses</td>
<td>5000</td>
<td>Ongoing</td>
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<tr>
<td>Nicaragua</td>
<td>2008</td>
<td>Smallholders</td>
<td>World Bank</td>
<td>Rainfall index</td>
<td>200</td>
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<td>Rwanda</td>
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<tr>
<td>Tanzania</td>
<td>2009</td>
<td>Smallholders</td>
<td>MicroEnsure</td>
<td>Rainfall index</td>
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<td>Ongoing</td>
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<tr>
<td>Thailand</td>
<td>2007</td>
<td>Smallholders</td>
<td>BAAC</td>
<td>Rainfall index</td>
<td>400</td>
<td>Ongoing</td>
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Sources: Hellmuth et al., 2009; Vargas-Hill and Torero, 2009; Burke, de Janvry and Quintero, 2010
Challenges

- Lack of sufficient and reliable data
- Technically complex products
  - Lack of customized products
  - Gaps in insurance delivery mechanism
  - Climate Change & Seasonal Forecasts
  - Unrealistic expectation – high frequency pay-outs to sustain interest
  - Yield estimates prone to manipulation risk
- Inadequate realisation of need for insurance
- Lack of knowledge on insurance
- Issues of financial literacy
- Low uptake
Specific examples

**Crop, weather or rainfall insurance**

Slow on the uptake (with contributory premiums being paid by farmers) in developing nations.

Being insured against crop failure encourages smaller farmers to cultivate higher-return, higher-risk cash crops, which is essential to breaking out of vicious poverty traps.

- **Ghana**: farmers who received rainfall index insurance cultivated more land and spent 13% more on fertilizer and labour than those who received just cash
- **India**: farmers were 12% more likely to plant cash crops and increased the amount of land devoted increased the amount of land devoted to cash crops by about 27%

**Livestock insurance**

Several factors hinder the uptake of livestock insurance = high operational costs, difficulties in verification of claims, high insurance premiums, and lack of awareness about insurance products.

- **Ethiopia and Kenya**: the Index-Based Livestock Insurance product was developed. Uses remote sensing to generate a vegetation index and correlate it with livestock losses associated with fodder shortages.
- **India**: researchers and private insurance provider = conduct a randomised evaluation of its Android-based application that digitises the marketing, enrolment and claim settlement process of a livestock product.
Overall Lessons

Lessons learned in agricultural insurance

- Technically demanding and sometimes infeasible or costly
- There is no universal insurance product
- Public-private partnerships are needed for agricultural insurance
- Devil is in the detail
- Insurance is only one component of risk management
- Practice may differ from theory
- Innovations will be key enablers of the next growth frontiers. Technologies like the use of drones, soil sensor indices, Blockchain and Artificial Intelligence technologies
- New non-traditional distribution systems open up new markets, e.g. seed companies, development organizations i.e. the World Food Program
- Governments play a key role in stimulating demand either through introduction of subsidy programs or creation of an enabling environment for business growth by implementing enabling policies, supporting distribution systems, and awareness creation.
Governments support to address challenges – How...

Data
- Collect
- Audit
- Manage

Outreach
- Link to social safety nets
- Link to credit
- Premium subsidies
- Awareness building

Risk Financing
- Public sector reinsurance
- Promote coinsurance pool

Financial support

Support product design and development
- Product development and pricing (short run)
- Technical support for insurers (long run)

Enabling environment
- Institutional framework
- Legal framework
- Consumer protection
Insurance is a valuable instrument to provide protection against shocks

There is no “one size fits all” insurance option; there are different agricultural insurance products that are appropriate for different cases.

Opportunity to embed weather insurance into larger development projects and lending

An integrated approach is needed linked to other rural services
Natural linkage to improved availability of agricultural credit

Insuring against agricultural production risks is challenging. Many preconditions for successful implementation do not exist in developing countries.

It is important to define the role of the private and public sectors, taking into consideration the social and commercial objectives of insurance and the fact that they may be inconsistent.

Strong, quantifiable relationship, must exist between weather risk and yield loss in order to establish the index on which the contract will be based.

Relatively low administrative costs and does not face moral hazard issues.

Climate adaptation and role of insurance

Insurance plays a supportive but not a leading role; not a substitute for climate adaptation measures

More research is needed to determine factors that can assist in understanding complex markets and refining products so that they perform better – User surveys, market research and academic studies will help provide the insights that can help build some much-needed insurance products.
Promissing Times ahead BUT...
References


• Burke, Marshall, Alain de Janvry, and Juan Quintero. 2010. “Providing index-based agricultural insurance to smallholders: Recent progress and future promise.” University of California at Berkeley.


THANK YOU!

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