The Role of Index Insurance in Agricultural Risk Management

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To feed a growing and increasingly affluent world population, it is necessary to modernize farming and close yield gaps.

This calls for comprehensive strategies to cope with risk.

Risk expands when you intensify, and in the face of resource overuse and climate change.

Risk is absorbed differently depending on the frequency of shocks and the severity of loss.

Adapted from Hazell, 2009
Types of risk

**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
Solutions

**Production-related risks**
- Farmers, ag practices
- Land, soil, biodiversity
- Bugs, diseases, weeds

**Technology, Crop Management**

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

**Policy, Infrastructure, Market rationalization**

**Severe weather**
- Drought, excess rain

**Insurance**
Weather insurance

→ Traditional approaches discredited, fiscal cost excessive, abuse potential high

Index-based products (combined with crop models where applicable) eliminate:

- Need for loss adjustment on the farm
- Moral hazard
- Adverse selection

Challenges:

- Financial literacy
- Cost to farmer
- Administrative costs
- Weather data
- Triggers and design
- Basis risk
- Aggregation, distribution
- Commercial partnerships
- Retention

Minimize premium by:

- Lowering uncertainty in the probability function
- Keeping models simple (less misinterpretation!); testing them for accuracy
- Designing products, triggers that represent risk correctly
- Encouraging risk management (agronomy, crop choice, timings)
- Finding right risk off-taker
Key questions need to be asked and answered – about agriculture in the target region, modelling and the insurability of risk (slides 7 to 10)
Weather insurance model

Is there a need for a weather solution?

1. Historic analysis
2. Future projection
3. Current weather correction
4. Monte Carlo simulation

Data quality
Data manipulation
Modelling
Solution

Need

Biological data
Crop
Yield history
Trigger
Sensibility check
Weather station
Yield correction
Backtesting
Probability function
Statistical model
Pricing model

Geophysical data
Satellite
Weather history

1. Historic analysis
2. Future projection
3. Current weather correction
4. Monte Carlo simulation

Source: Following M. Lal (IRI)
Premium model

1. Estimation of loss that can be carried by farmers
2. Calculation of risk for greater loss

Source: Following M. Lal (IRI)
Lowering uncertainty

**Utilization of the correct probability density function**
- Normal distribution models may miss the point
- Extreme weather events favor a left or right leaning distribution
- Changing climate patterns increase the probability of a multi-peak function

**Selecting the wrong model can result in a wrong premium**
- In the lower figure, the distribution of drought risk is shown with a left peak (el Niño years); both normal functions reproduce the wrong probability

**Reducing uncertainty in the model tested by Monte Carlo methods lowers need for high margins**
Modelling occurrences correctly

Weather perils are challenging to model; their probability varies according to seasons, weather patterns (el Niño) and long-term trends (climate change)

Recognizing and implementing these dimensions correctly is complex

Important to use appropriate insurance model set-up to capture true risk

- Use the same bucket size for similar solutions
- Limit the number of different insurance types to reduce confusion
- Define simple triggers that cause pay-out

Below: An overlay of blocks reduces the risk of missing a true event – good

Above: Because a block only starts every 5 days, the start time of the block is significant and influences the insurance – not good
The practical dimension

What the Syngenta Foundation for Sustainable Agriculture and its partners are doing – how we provide for scalability and growth (slides 12 to 17)
Syngenta Foundation’s insurance activities

Mission: Develop and implement agricultural insurance products for smallholder farmers

• Started as Kilimo Salama in 2009 with 185 maize farmers in Kenya
• Serves as an insurance intermediary doing product development, contract pricing and monitoring
• Provided for insurance of 294,390 smallholder farmers in 2014 (through June), in Kenya and Rwanda (Tanzania soon to be launched)
• Main product: drought insurance, linked to agricultural credit by MFI used for fertilizer and improved seed
• New products linked to quality inputs and registration/pay-out via mobile networks

→ ACRE Ltd launched in June 2014 as an insurance surveyor
ACRE’s role as a risk surveyor

**Re-insurers**
- Pricing, re-insurance

**Primary Insurer**
- Carries primary risk
- Policy documentation
- Claims payment

**Partners: Agribusiness/ Banks/ MFI’s/ NGOs/ Mobile Operators**
- Take out insurance on behalf of farmers
- Advance the premium
- Inform individual farmers
- Disburse compensation

**Headquartered in Nairobi**
- Product development

**Local offices (Kenya, Rwanda as of 2013)**
- Marketing and distribution
- Financial education
- Data collection

Income from operating margin charged on premium
Any profits re-invested in the company
All regulated entities as per local Insurance Acts

**Farmers**
- Access services including insurance
## Current product portfolio

<table>
<thead>
<tr>
<th>Crop Covered</th>
<th>Risk Covered</th>
<th>Ag Package Covered</th>
<th>Target Farmer</th>
<th>Distribution Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize, Beans, Potatoes, Sorghum &amp; Millet</td>
<td>Weather and Yield cover</td>
<td>Ag-Credit for Inputs &amp; Training</td>
<td>0.5 acres</td>
<td>![logo]</td>
</tr>
<tr>
<td>Maize and Beans Seed</td>
<td>Weather and Yield cover</td>
<td></td>
<td>5-1000 acres</td>
<td>![logo] ![logo] ![logo]</td>
</tr>
<tr>
<td>Coffee/ Tea</td>
<td>Weather cover</td>
<td></td>
<td>1- 200 acres</td>
<td>![logo]</td>
</tr>
<tr>
<td>Livestock</td>
<td>Animal mortality</td>
<td>Value of animal and veterinary care</td>
<td>Owns 2-3 dairy cows</td>
<td>![logo] ![logo] ![logo]</td>
</tr>
<tr>
<td>Maize</td>
<td>Germination of hybrid seed</td>
<td>Seed bag</td>
<td>1 acre = 8 bags of seed</td>
<td>![logo] ![logo] ![logo]</td>
</tr>
<tr>
<td>Wheat</td>
<td>Weather cover</td>
<td>Ag-Credit for input package</td>
<td>+200 acres</td>
<td>![logo]</td>
</tr>
</tbody>
</table>
Replanting Guarantee

- Insurance in the bag
- Opens bag on planting, finds card inside
- SMS unique code to short code
- Get farm location from SMS and monitor satellite imagery for that location
- Replanting Guarantee SMS unique code to short code
- M-Pesa
- Compensation sent to Farmer via M-Pesa
- Farmer can replant and harvest the same season
- Germination fails after 21 days without rain
Growth stats 2009-2014

- **March 2009**: Syngenta Foundation launches the first pilot and the project collects first 18 ksh of premium
- **2010**: Our first 8,000 farmers Ag-credit insurance
- **2011**: Our first 20 contracted farmers through an Agribusiness
- **2012**: Expanding to Rwanda with 20,000 farmers after 2 seasons
- **June 2014**: 294,360 Farmers insured
- **2013**: Expansion through satellite

**Agricultural Investments insured (USD)**
- 2009: 5,430
- 2010: 640,933
- 2011: 2,653,776
- 2012: 6,303,897
- 2013: 25,406,317

**Premium Paid (USD)**
- 2009: 543
- 2010: 64,093
- 2011: 243,069
- 2012: 506,817
- 2013: 1,174,399

**Farmers Insured**
- 2009: 185
- 2010: 11,727
- 2011: 23,615
- 2012: 86,429
- 2013: 187,466
What next?

You guessed it: Global roll-out, with partners, step by step
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