Weather & Agri Risk Solutions for Emerging Markets

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Weather’s impact on farmers...

- Majority of population in many emerging market economies engaged in agriculture. Farmers and the agricultural industry face financial risk from yield variability due to weather – mainly drought.

- Many farmers depend upon pre-financing against their future revenue streams for seed, fertilizer, and other agro chemical products.

- Crop failure due to adverse weather can have devastating consequences for farmers.

- Protecting rural income against adverse conditions can help alleviate poverty.
.. and in the agro-value chain

- Food processing companies need to purchase commodities on spot markets in case of a bad harvest.

- Agro chemical companies are exposed to weather-related fluctuations in the demand for their products & services; additionally they are exposed to the farmers credit risk.

- Insurance capacity for agricultural risk is limited or lacking.
Weather Risk Solutions: Available risk transfer products

- **Agricultural Insurance** (Named Perils, Multi-Peril Crop Insurance)
  - based on actual loss sustained
  - **ultimate client perspective**
    - positive: no basis risk
    - negative: costs for monitoring & claims settling (incl. in pricing)
  - **risk taker perspective**
    - negative: moral hazard
    - adverse selection costs for monitoring & claims settling

- **Parametric Products** (insurance & derivatives)
  - based on third party data (weather or area yield)
  - **ultimate client perspective**
    - positive: fast claims settling
    - negative: basis risk
  - **risk taker perspective**
    - positive: no moral hazard
    - no impact of individual farming practice
    - little costs for monitoring & claims settlement
Agro sector stakeholders targeted

**Ag-business value chain**

- Farmer
- Retailer
- Processor
- Bank / Insurance
- Input Supplier
- Distributor

- Decreasing risk of farm yield shortfall
- Increasing risk of overall production shortfall

**Indemnity based & parametric**
Product range – Agro

**Production Side**

- **Crops**
  - Hail, drought, flood, excessive rainfall, etc.

- **Livestock**
  - Accident, fire, BI, epidemics, diseases

- **Aquaculture**
  - Windstorm, algae bloom, pollution, epidemics, diseases

- **Forestry**
  - Fire, windstorm, snow pressure

**Market Side**

- Commodity price fluctuations
  - (MPCI in USA and Canada only)

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1) subject to best farming practice and well established loss adjustment procedures

2) subject to exchange traded commodity prices

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The production risk is likely to increase because of:

- Climate change (Influence on event frequency / intensity)
- Rising quality requirements
- Stricter rules regarding input use
- Growing mobility of people and movement of animals or plants and their products

The market risk is likely to rise because of:

- Trade liberalization in Agriculture
**Product range – Weather**

<table>
<thead>
<tr>
<th>Type:</th>
<th>Drought insurance/ Precipitation put</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td>weather station WMO # XXXXX</td>
</tr>
<tr>
<td>Inception:</td>
<td>variable*</td>
</tr>
<tr>
<td>Maturity:</td>
<td>130 days after Start</td>
</tr>
<tr>
<td>Att. Point/Strike:</td>
<td>16.3mm (70% of average)</td>
</tr>
<tr>
<td>Tick:</td>
<td>Rs 630 per mm rain shortfall</td>
</tr>
<tr>
<td>Limit:</td>
<td>Rs 6,300 per hectare</td>
</tr>
<tr>
<td>Premium:</td>
<td>Rs 950 per hectare</td>
</tr>
</tbody>
</table>

*mainly parametric*
Weather Risk Solutions: Developing a weather structure

- **Identify** weather exposure to farmer / agro sector by defining a parametric weather index.

- **Quantify** impact of unseasonable weather to costs and revenues by expressing profit variability as function of above weather index.

- **Structure** a weather risk transfer by discussing the amount of risk you / your client is able to cope with.

- Execute a contract by negotiating terms and conditions for your structure with a interested risk taker.
Weather Risk Solutions: Example – Maize Production

- Structure – covers the risk of too little rainfall (shortfall) in the period from sowing to maturity

- Rainfall index – weighted sum of rainfall during each growing phase

<table>
<thead>
<tr>
<th>growing phase</th>
<th>duration</th>
<th>weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>sowing/establishment</td>
<td>20 days</td>
<td>4%</td>
</tr>
<tr>
<td>vegetative</td>
<td>30 days</td>
<td>16%</td>
</tr>
<tr>
<td>flowering</td>
<td>20 days</td>
<td>26%</td>
</tr>
<tr>
<td>yield formation</td>
<td>40 days</td>
<td>52%</td>
</tr>
<tr>
<td>ripening</td>
<td>20 days</td>
<td>2%</td>
</tr>
</tbody>
</table>

- Sowing date is defined by the first 10 days after beginning of historical plant date (e.g. Oct-Dec for India) with aggregate rainfall greater than 30mm*

- Growing phases, durations, and weights are determined from Food and Agriculture Organization (FAO) maize water requirements studies.

Conceptual Term sheet

- Type: Drought insurance/ Precipitation put
- Location: weather station WMO # XXXXX
- Inception: variable*
- Maturity: 130 days after Start
- Att. Point/Strike: 16.3mm (70% of average)
- Tick: Rs 630 per mm rain shortfall
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Weather Structure I: Multilaterals/NGOs (Ethiopia)

- **Donors (USAID)**
  - **Premium Contributions** to **Reinsurer**
  - **Trigger: Rainfall Index**
  - **WFP**
  - **Distributors**
  - **Farmers**

**Insured:** UN organization with responsibility for emergency food relief which aims at smoothing the volatility of own operations

**Insurance on farmers behalf; disbursement to smallholders upon insurance payments**
Weather Structure II: Smallholders (Malawi)

- **Micro-Lenders** (e.g. Opportunity International Bank)
  - loan
  - Groundnut Farmers
  - seeds
  - Farmers Association (NASFAM)
  - production output

**Trigger:** Rainfall Index

- Insured: Smallholder farmers that are hence able to borrow against insurance
- Farmers transfer loan partly to NASFAM in return for seeds and to insurance companies for weather cover
- NASFAM guarantees to buy harvest at fixed price, loans can be paid back either through income from harvest or insurance
Swiss Re Initiatives in the Indian Weather Market

- First deal in 2004 with Basix (microfinance institution) for Castor and Groundnut crop in Mehbubnagar, Andhra Pradesh against deficit rainfall covering 1,500 farmers
- Since then 36 fac R/I contracts closed; reinsured 272,590 policies
- Offers a viable alternative to the traditional crop insurance market and has the potential to extend beyond the agriculture sector up into the corporate end-user market
- Currently working on solutions for Agro Input companies, Wind Farms, Tea Plantations, hydro power projects, Sugar Production, Salt Production, various crops and vegetables, contract farming etc
Swiss Re has dedicated team & resources for business development in emerging markets, hence can offer technical assistance with product set up and structuring.

Latest project with NGO as counterparty deals with innovative weather derivative structure in Africa (index being a combination of meteo data, satellite data and results from crop modeling to minimize basis risks).

Currently Swiss Re actively collaborates and partners with multilateral institutions, micro-finance networks, farmers cooperation, SMEs and local NGOs.

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