Traditional **crop insurance** for smallholder economies is often **not viable**

- High monitoring and administrative costs
- Adverse selection due to asymmetric information
- Moral hazard
Traditional credit supply systems for smallholders are also commonly undermined by drought (or floods)

- High monitoring and administrative costs
- Side marketing
- Political interference

Key Question

Can weather insurance be used to reduce lending risks to smallholder farmers?

*Insure loan repayment in the event of crop failure*
Design an alternative, efficient and cost-effective crop insurance program that can be easily reinsured and distributed to individual smallholder farmers.

WHAT IS WEATHER RISK PROTECTION?

Financial protection based on the performance of a specified weather related index in relation to a specified trigger (*micro and macro*)

**Malawi micro weather insurance model**
- *Weather index = rainfall x crop growth model*
- *Trigger = decline in crop production associated with:*
  - i. Not enough rain for crop establishment
  - ii. Not enough (or too much) rain for crop growth and flowering
  - iii. Not enough (or too much) rain at yield formation (e.g. grain fill)
**Three-phase crop growth scenario** calibrated to a simple crop water-balance model, cross-checked against historical yields, to minimize farmer Value-at-Risk

- **PHASE 1**: Sowing & Establishment
- **PHASE 2**: Growth & Flowering
- **PHASE 3**: Yield Formation to Harvest

**Cropping Calendar**

Final Insurance Payout = min (Max Payout, Phase 1 + 2 + 3 Payouts)

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**Requirements for implementation (1)**

- Reliable weather stations with good enough historical data (e.g. 30 yrs) to evaluate rainfall risk
  - Within 20-30 km of each farm insured (ie high density)
  - With reliable daily data feed

- Well defined crop growth models based on water satisfaction index
Requirements for implementation (2)

- Regulatory and legal system underlying the insurance contract

- Sustainable links with reinsurance industry
  - due to covariant risks (e.g. drought)

Distribution of Rainfall stations in Malawi
# Weather Insurance Portfolio in Malawi

<table>
<thead>
<tr>
<th>Crop Season</th>
<th># Farmers</th>
<th>Sum Insured</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/06</td>
<td>892</td>
<td>$40,000</td>
<td>groundnut &amp; maize</td>
</tr>
<tr>
<td>2006/07</td>
<td>1800</td>
<td>$110,000</td>
<td>groundnut &amp; maize</td>
</tr>
<tr>
<td>2007/08</td>
<td>605</td>
<td>$308,000</td>
<td>Tobacco</td>
</tr>
<tr>
<td>2008/09</td>
<td>2606</td>
<td>$2,543,345</td>
<td>Tobacco</td>
</tr>
<tr>
<td>2009/10</td>
<td>766</td>
<td>$712,521</td>
<td>Tobacco</td>
</tr>
<tr>
<td>2010/11</td>
<td>10,500</td>
<td>$4,500,000</td>
<td>Tobacco (maybe cotton, tea...)</td>
</tr>
</tbody>
</table>

* By Weather Insurance Task Force members

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## Lessons Learned (or hypothesized) 1

There are 2 major risks to agricultural credit supply

- Rainfall
- Avoidance of loan repayment (ie with side marketing)

1. Success is more likely with a single channel marketing system encompassing stop orders on loan liabilities

- Loan repayment was too low for groundnut and maize
Lessons Learned (or hypothesized) 2

2. Portfolio insurance may be more practical than insuring each individual farmer
   - Tobacco companies and banks divide the premium cost
   
[though this remains subject to debate]

3. It takes time to build the capacity for contract design in the insurance industry
   - Close links are needed with crop modelers
   - Develop capacity to define appropriate premiums
   - Links with international reinsurance market

Lessons Learned (or hypothesized) 3

4. Insurance regulations may only be adjusted when a major drought occurs, and one or more companies face difficulty covering their liabilities.

5. Leadership of the Insurance Association of Malawi is valuable, but ultimately the product must be competitively offered by individual insurance companies.

[profitable to date, but long term payoffs are difficult to judge]
6. Rainfall index insurance covers only one set of production risks

[needs to be linked with complementary strategies for reducing risks - e.g.
- hail, fire, theft insurance;
- improved reliability of marketing chains
- More efficient credit supply and monitoring (e.g. biometrics, credit bureau)
- resilient agronomic practices]

VISION FOR MALAWI: Next 5 YEARS (1)

- Strengthen capacity of local insurance industry to:
  - Design contracts
  - Evaluate and set appropriate premiums
  - Manage reinsurance requirement

- Review and strengthen capacity of regulatory systems

- Expand coverage in the tobacco sector
  - With more rainfall stations *(to be purchased & managed by?)*
Expand coverage to additional crops
  - Cotton, tea, coffee, sugar, maize…
    (Link with growing interest in contract farming?)

Reduce premiums or reduce interest rates on agricultural loans to account for lower risk

Expand market enough to be of competitive interest to reinsurers