Lessons from Piloting Weather Index Insurance

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Outline

- Weather index insurance
- Insuring Farmers
  - Drought insurance in Malawi
  - Flood insurance SE Asia
- Lessons
- Climate change and insurance
- Conclusions
Agricultural Risks …

• … are pervasive
  – Weather (*variability, extremes*)
  – Price (*domestic, international*)
  – Biology (*pest, disease*)
  – Labor (*illness, injury, death*)
  – Logistical (*storage, transport*)
  – Regulatory/Policy

• Strategies to manage risk
  – ex ante vs. ex post
  – Formal vs. informal
  – Market, community, policy
## Informal Strategies

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<tr>
<th>Household Level</th>
<th>Community Level</th>
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<td><strong>mitigating risk</strong></td>
<td><strong>sharing risk</strong></td>
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<td><strong>ex ante</strong></td>
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<td>Reduced consumption</td>
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<td>Informal credit</td>
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# Formal Strategies

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<th>Publicly Provided mitigate / transfer / absorb risk</th>
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<td>Cash transfer</td>
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<td>Waiver of crop loans</td>
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Layers of Insurance

Layering Drought Risk and Responsibilities

- Public
- Market failure
- Market insurance
- Risk retention
- Household

Type of risk transfer

- Social
- Micro
- Mutual
- Market
- Re-insurance

Value of Assets

- Small
- Large

Source: UNFCCC

Source: WB 2006, ARD
Agricultural Insurance Market

- Low penetration in developing countries
- Mostly multi-peril crop insurance
- Weather index insurance as a potential solution for developing countries
- Many weather index insurance pilots: first time access to agricultural insurance

Source: PartnerRe 2008
Why weather index insurance?

• Traditional crop insurance is challenging
  – Difficult to deliver in smallholder economies
  – Costly individual loss assessments

• Weather risk is correlated
  – Drought, widespread flooding
  – Difficult to manage financially
  – Needs reinsurance (diversification)

• Index-based weather insurance:
  – Weather observations as proxies for yield (loss in production, quality)
    • No need for loss assessments
    • Lower administrative costs
    • Less technical complexity
    • Objective and timely
    • Only works well for spatially correlated risks
    • Reinsurable
  – Protection for farmers or actor in agric. production system
Simple Insurance Contract

- Three-phase deficit rainfall weather insurance contract
- Indexed to a local weather stations
- Pioneered by Indian insurance company ICICI Lombard in 2004
- Several pilots in Africa, Asia, Latin-America (WB/CRMG and others)

Deficit Rainfall (mm) ➔ Payout ($) ➔ Deficit Rainfall (mm) ➔

PHASE 1
Sowing & Establishment

PHASE 2
Growth & Flowering

PHASE 3
Yield Formation to Harvest

Dekadal Cropping Calendar*

Sowing Window & Dynamic Start Date

* Cumulative rainfall per dekad is capped to prevent excessive rainfall impacting the phase-wise total
Experience in Malawi

• 2004, National Smallholder Farmers Association of Malawi (NASFAM)
  – Grow Malawi groundnut market
  – Quality seeds: reliable yields; lower disease risk; export
  – Farmers needed financing

• Problem: drought risk and high loan defaults
  – 2004/2005 drought: recovery rates 50-70%
  – Government and donor lending program discontinued
  – Two microfinance institutions stopped lending to agric.

• Objective: Insurance to mitigate drought risk for farmers, with win-wins …
  – Secure access to finance and inputs
  – Protects both producer and loan provider from weather risk
  – Allowing banks to expand lending portfolios
  – Opportunity for NASFAM to expand its operations
  – Opportunity for insurers to re-enter rural markets

• Excellent weather data; dense weather station network
Malawi Pilot 2005-2006

- Loans to cover seed, insurance premium and interest:
  - Opportunity International Bank of Malawi
  - Malawi Rural Finance Corporation

- Policies:
  - Insurance Association of Malawi (seven companies)
  - Premium: 6-7%, Max Payout per farmer: loan size given by bank

- Seed & Product Distribution by NASFAM
  - Groundnut (2005), Groundnut & Hybrid Maize (2006)

- Participants:
  - NASFAM clubs
  - 2005: 900 farmers, 4 weather stations, sum insured $35,000
  - 2006: 1710 farmers, 5 weather stations, sum insured $110,000

- Payout from insurance company directly to the bank
- No Payouts: farmers benefit from higher value production
Malawi Pilot Outcomes

• Achievements
  – Unlocked credit for smallholders
  – Access to high yielding seeds and fertilizers
  – Generated high-level of interest from banks

• But… programme discontinued in 2007
  – Side-selling leads to non-weather related defaults
  – Nascent agricultural supply chain, many non-weather problems
  – Banks stopped lending to groundnuts in 2007, so no need for insurance
  – Stand alone product had no takers

• 2007 onwards: focus on established agricultural supply chains, e.g. tobacco
  – Economies of scale and critical diversification for insurers
  – Tie-in with emerging contract farming relationships in Malawi

• Since 2007: working with 3 banks and 2 contract farming companies
  – 2600 farmers insured in 2008, portfolio size of $3 million
  – Currently limited expansion due to lack of local weather stations
  – Access to reinsurance market since 2007
  – Working at farmer and risk-aggregator (bank) level
  – Developing off-the-shelf products: cotton, tea, soybeans, paprika
  – Mainstreamed in 2009 WB Agricultural Development Programme Support Project
Experience: Floods in SE Asia

- Demand for insurance solutions for agricultural floods risk
- Feasibility of flood index insurance
- Feasibility studies in Thailand, Vietnam

Relative economic losses due to flood

Source: WB 2006, Disaster Hotspots

Recent floods

Agricultural extent
Agricultural Flood Losses

- High at local level
- Difficult to estimate globally
- Example Philippines (palay)

Source: Lotsch et al. forthcoming
Feasibility Studies

- **Thailand**
  - Bank for Agriculture and Agricultural Cooperatives (BAAC)
  - Pilot site: Muang Petchaboon district
    - Feasibility study 2007-2008
    - Local BAAC branch
    - 2-3 cycles of rice/year
    - Pasak river valley, natural flow regime, little engineering
    - Decent data: Telemetric system, Thai Met Dept., Royal Irrigation Dept.

- **Vietnam**
  - Vietnam Bank for Agriculture and Rural Development (VBARD) and MinFin Dept. of Insurance
  - Dong Thap Province, lower reaches of Mekong River
  - ‘Business interruption insurance’ for extreme flooding

- Focus on flood plain inundation (not flash floods)
Modeling floods

- Too much water... where and when ...?
Modeling Flood Risk

- A lot more technical work and data is required to model flood risk (compared to drought risk)
  - Topography
  - Hydrology
  - Land use
  - Infrastructure
  - Satellite data
  - Location of farmers
  - … and more …
Harness Satellite Remote Sensing

- Readily available, cheap, in-country capacity
- Validate flood model output, monitor floods
- Use as basis for compensation

Modeled Flood Depth and Extent

'Observed' Flood Depth and Extent
Organizing Flood Insurance

- Group farmers based on homogenous flood risk (based on modeling)
- Loss assessment supported by remote sensing

Organisational Structure for Micro level Flood Insurance

Stakeholder Steering Committee → Insurer(s) → Technical Support Unit → Remote Sensing Agency → External Technical Assistance → Extension and Training for farmers

- Distributor (e.g., MFI, Farmer Co-operative)
- Reinsurers
- Farmers in defined flood risk zone

**Key issue:** grid resolution?

**Grid for enrolment and flood measurement**

**Floodplain zoning**

- "High Risk" Pricing Zone
- "Medium Risk" Pricing Zone
- "Low Risk" Pricing Zone

5 4 3 2 1

**River**

**OPTION 2**

Organizing Flood Insurance
Flood Feasibility Study Findings

• Delineating flood risk is challenging
  – Direct and indirect damage
  – Different types of flood risk, not all can be modeled
  – Agricultural assets (crops) change over time (season)
• Comprehensive/complex modeling needed
  – Flood models (even simple models are relatively complex)
  – Different, heterogenous data sources (not just rainfall …)
  – Remote sensing helps ‘calibrate’ flood models and assess flood impact, but requires technical capacity
• Flood insurance is difficult to operate
  – Floods are localized, can be mitigated, farmers know risk factors
  – May require mandatory enrolment, voluntary schemes problematic
  – Zoning necessary
  – Financial management difficult: valuation of damages is time-sensitive
• It can be done, but requires some ‘heavy lifting’
  – Technical capacity
  – Stakeholder coordination
  – Training, education, trust building: banks, insurers, reinsurers, farmers etc.
  – Investment in data
  – Broader risk management framework (risk reduction!) is essential
• (Re-)insurers interested
Limitations of Weather Index Insurance

• Covers only *one* type of production risk (i.e. weather)
  – Deficit/excess rainfall, high/low temperatures
  – Only inundation flooding in case of floods
  – Other risks not covered

• “Basis Risk”
  – Potential mismatch of insurance payouts and actual losses
  – Index only proxies, not as accurate as field assessment
  – Less data = more basis risk
  – The more localized the impact (e.g. flood), the higher
  – “Perceived” basis risk: losses due to other perils

• Requires training and capacity building
  – Insurers, distribution channels, farmers etc.
  – Needs regulatory approval, adjustment to framework

• It’s a commercial product
  – Limited use for ‘non-commercial’ clients
Lessons Learned - Technical

• Works for weather risk that can be faithfully indexed
  – Not chronic (frequent) risk
  – Spatially correlated risk
  – Manageable micro-climates (drought)

• High quality data is necessary!
  – 20-30 years of daily QC-ed data, few gaps, near real-time
  – Sufficiently dense network to start piloting and show potential

• Favourable regulatory framework

• Technical requirements are necessary, but not sufficient
Lessons Learned - Operational

• Local ownerships, strong partners and partnerships, incentives
  – A “win-win” strategy for all stakeholders
  – Sustainable base for capacity building and training

• Existing/functioning agricultural supply chains
  – Non-weather risks are managed/reduced
  – Delivery channels to farmers
  – Linkages to finance, inputs and other services
  – Critical for farmer clients not yet fully commercial
  – Often a better product for risk aggregators (banks, contract farming) than individual farmers

• When retailing directly to farmers, keep it simple

• Piloting critical (several seasons)
What I didn’t talk about …

• Index insurance (or similar instruments) to transfer aggregated risk
  – Weather derivatives
  – Risk pooling and Reinsurance
  – Similar concept, but different objectives, counterparts, markets …
  – Different modeling

• Protection for Governments
  – Malawi weather (drought) derivative (2008)
  – Protect/finance safety net operations (Ethiopia) during drought
  – CCRIF (storms, seismic), business interruption, liquidity risk, similar initiative in Pacific
  – Index-based livestock insurance (Mongolia)
  – several others w/in WB and elsewhere …

• Rapid financing is crucial to avoid longer-term (economic) losses, index product can help
Climate change and insurance

- ‘Stationarity is dead’
  - “Climate is what you expect, weather is what you get” no longer applies
- Agriculture becomes riskier
- Roles for insurance:
  - Protect against catastrophic events
  - Signal risk through price
  - Provide cash to adapt (after event)
  - Promote new (adaptive) technology
Index Insurance and Climate Change

• Uncertainty
  – reduces willingness of insurers?
  – increases cost/premiums?
  – requires subsidies?

• Providing layers of protection
  – Public private partnership for catastrophic risk
    • Reduces ‘catastrophe loading’ of premiums
  – Private sector insurance for more frequent risk
    • Signal risk through price

• For insurance to play a role, donors/govt. can:
  – Perform risk assessments and reduce risk systematically, and promote insurance where appropriate
  – Support risk education
  – Invest in data infrastructure and information systems
  – More research needed for some perils (e.g. flood)
Conclusions

• Weather insurance in developing countries is *feasible*

• Weather insurance is not a panacea
  – Enhance existing agricultural supply chains and businesses
  – Can support expansion of rural finance and agriculture
  – Risk management framework is crucial

• Technical hurdles are surmountable
  – Investment in data and weather infrastructure
  – Promote best practice for contract design, insurance and reinsurance
  – Regulatory framework

• Operational hurdles can impede scalability and sustainability
  – product delivery, linkages to finance
  – Local ownership
  – Project mainstreaming

• Some perils are difficult to insure at the farm level, e.g. flood
  – Macro level more appropriate

• Insurance cannot replace irreplacable things