Making Index Insurance Work for the Poor

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“It is odd that there appear to have been no practical proposals for establishing a set of markets to hedge the biggest risks to standards of living”.

Some examples

- **USA**: Case-Shiller housing price futures, agriculture derivatives etc.

- **Mexico**: Natural disaster relief fund FONDEN has purchased index insurance for large earthquake risks (based on Richter Scale earthquake magnitude) and has issued a CAT bond.

- **Philippines**: Typhoon index insurance, based on distance of farmer from central path of a typhoon, wind speed and coverage amount.

- **Indonesia**: Insurer Asuransi Wahana Tata offers flood insurance that pays off if water levels at a particular gauge rise above a “trigger” level.
Index insurance

- An insurance policy where payouts are linked to a publicly observable index:
  - E.g. (i) Rainfall in a nearby rain gauge; (ii) commodity price; (iii) aggregate crop yields, (iv) satellite data on vegetation (NDVI).

**Key advantages of index insurance:**

- Cheap to calculate payouts. No need for household to even file a claim. Minimizes transaction costs.
- Payouts can often be calculated and distributed quickly.
- Mitigates moral hazard / adverse selection (e.g. farmer can’t influence index).
Index Insurance

Key drawbacks:

- It covers one type of risk, producers may be exposed to many, that may be more relevant in certain contexts
  - Price risk
  - Supply chain risk
- Basis risk...
Index Insurance

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<tr>
<th>Correlation</th>
<th>Rainfall</th>
<th>Rainy day (1=Yes)</th>
<th>Payout Amount</th>
<th>Payout dummy (1=Yes)</th>
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<tbody>
<tr>
<td>0.293</td>
<td>0.340</td>
<td>0.148</td>
<td>0.302</td>
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Outline of today’s talk

1. Primer on (rainfall) insurance
2. Demand of insurance
   i. Micro (Individual)
   ii. Meso (Financial Institutions / Producer groups)
   iii. Macro (Governments)
3. Impact of insurance
4. Design and Market Dynamics
5. Conclusions
Outline of today’s talk

1. **Primer on (rainfall) insurance**

2. **Demand of insurance**
   i. Micro (Individual)
   ii. Meso (Financial Institutions / Producer groups)
   iii. Macro (Governments)

3. **Impact of insurance**

4. **Design and Market Dynamics**
Insurance Product Example (Phase II: Narayanpet 2006)

Insurance splits monsoon into three phases:
(i) Sowing
(ii) Podding / flowering
(iii) Harvest

Payouts in each phase based on cumulative rainfall in the phase (each is 35-45 days)

- 1st trigger (100mm)
- 2nd trigger (40mm)

Payouts for each phase:
- 1st phase: 900 Rs
- 2nd phase: 2000 Rs

2nd trigger [corresponds to crop failure]

rainfall during phase
How often does the insurance policy pay out?

Source: Gine, Townsend and Vickery (AJAE, 2007)
How expensive is it relative to actuarial value?

Expected payouts relative to premia, based on historical rainfall data:

- **Andhra Pradesh**: 20%-50%.
- **Gujarat**: 50-57%.

Point of comparison: US auto and homeowner insurance:

- Payouts for these products are 65-76% of premia. (Source: Best’s Aggregates and Averages).

**Why do Indian payout ratios appear lower?**

- High operating costs compared to low value of each policy.
- Same story for other financial products (Cull et al., 2009)
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Demand for rainfall insurance in AP (micro level)

- **Total Number of Policies**
- **Total Number of Policyholders**

The diagram shows an increasing trend in the total number of policies and policyholders from 2003 to 2009, with a sharp increase in 2008.
Demand for Insurance in India

- Farmers Insured (millions): Y-axis
- WBCIS (Yellow), mNAIS (Green), NAIS (Brown)

The graph shows the increasing demand for insurance in India, particularly in the years 2010/11 and 2012/13, with a significant rise in the number of farmers insured.
Demand for Insurance (micro level)

- **View #1: Price is the key constraint.** Perhaps the product is just too expensive to be attractive.
  - Could reflect transactions costs, lack of scale economies, high loading factor.
  - Insurance will be attractive if it improves risk management relative to the existing range of ex-ante and ex-post coping mechanisms:
    - Informal: Income smoothing, borrowing and saving, transfers from relatives and friends
    - Formal: Other government social protection programs (NREGA, etc)
  - But, even when offered at subsidized rates (positive NPV), demand is not universal.
Demand for Insurance (micro level)

- **View #2: Non-price frictions are important.** Holding price fixed, other barriers significantly reduce insurance demand:
  - Liquidity constraints
  - Complexity
Demand of insurance products from BASIX in AP, India

- Blue line: livestock
- Red line: weather
Payouts relative to premia
Demand for Insurance (micro level)

- **View #2: Non-price frictions are important.** Holding price fixed, other barriers significantly reduce insurance demand:
  - Liquidity constraints
  - Trust
  - Education
Demand for Insurance (micro level)

- **View #2: Non-price frictions are important.** Holding price fixed, other barriers significantly reduce insurance demand:
  - Liquidity constraints
    - Increase in take-up of 34% (130% of baseline probability of purchase).
  - Trust
    - Endorsement by trusted third party increases take-up by 11% (41% of baseline probability).
  - Education
    - No effect on take-up (or knowledge!)
Pilots around the world...
Pilots around the world... that have scaled up
Demand for Insurance (meso level)

- **Advantages:**
  - Reduced Transaction costs
  - Crowd in Informal Insurance
  - Perceived as a win-win
    - Culture of Repayment?
    - Take-up?
      - Uninsured loan: 33.0%
      - Insured loan: 17.6%

- **Disadvantages:**
  - Lack of awareness (especially if compulsory or not made salient)
Demand for Insurance (macro level)

- Advantages
  - Allows for risk transfer
  - Governments can use weather hedges to help protect budget deficits.
    - After a natural disaster, relief aid and social protection programs are likely to increase and revenues are likely to fall.
    - Mexico’s CADENA program
  - Some countries may find it cheaper than accessing capital markets directly
    - Caribbean Catastrophe Risk Insurance Facility (CCrif)
    - Mexico’s CAT bond
Demand for Insurance (macro level)

- Disadvantages
  - Index insurance at the macro level may be expensive
  - Moral Hazard...
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Impact of Insurance (Micro level)

**Figure**: Fraction of farmers who had planted cash crops by different points during 2009 monsoon season: difference between treatment and control group.

**Figure note**: Left and middle vertical lines show period during which field experiment was implemented. Right vertical line shows Kartis in which period of insurance coverage ended.
Impact of Insurance (Micro level)

- Wealth doesn’t seem to matter but effects are largest among more educated farmers

- Effects are driven by “ex-ante” behavior

- **Consistent with...**
  - Karlan et al. (2013): Insurance increases total investment
  - Mobarak and Rosenzweig (2013): Indian farmers switch to riskier varieties of rice
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Design of Products

Can farmers effectively evaluate products?

- Evaluate willingness to pay for **four** policies

- (1) Actual policy designed for their geographical area
  - E.g., Anantapur Phase II, premium 110. Pays Rs. 1,000 on exit.

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- (2) mm deviation. Reduce the amount paid out per mm from 10 to 5
  - =>Reduces expected value from 44 to 22
Actual Contract in Anantapur

- **payout for phase**
  - (1000Rs)
- **exit** (0 mm)
- **strike** (30 mm)
- **rainfall during phase**
Actual Contract in Anantapur

- Payout for phase:
  - (1000Rs)
  - (300Rs)
  - (150Rs)

- Rainfall during phase:
  - Exit (0 mm)
  - Strike (30 mm)
  - Rainfall during phase
Experimental Design

Can farmers effectively evaluate products?

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- (2) mm deviation. Reduce the amount paid out per mm from 10 to 5
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- (3) Higher Exit. Pay Rs. 1,000 if rainfall between 0 and 5 mm
  - =>Raises expected value from 44 to 110
Actual Contract in Anantapur

- Payout for phase
- Exit (0 mm)
- Strike (30 mm)
- Rainfall during phase

- (1000 Rs)
- (300 Rs)
Insurance Design (Example contract)

- **payout for phase**
  - (1000Rs)
  - (250Rs)

- **exit** (5 mm)
- **strike** (30 mm)
- **rainfall during phase**
Experimental Design

- Evaluate willingness to pay for **four** policies

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Experimental Design

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- (2) mm deviation. Reduce the amount paid out per mm from 10 to 5
  - Reduces EV by Rs 22, reduces WTP by Rs. 13
  - Affects payouts in moderate states of world

- (3) Higher Exit. Pay Rs. 1,000 if rainfall between 0 and 5 mm
  - Raises EV by 66, raises WTP by 11
  - Payout occurs in ‘worst’ state of the world

- (4) Basis Risk. Real policy, but written on distant rainfall station
  - No effect on expected value (in expectation)
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Conclusions

- Holistic Approach
- Farmer-driven design
- Target beneficiary?
Conclusions

- Holistic Approach
  - Yes but tension between awareness and compulsion

- Farmer-driven design
  - Distinction between needs and wants

- Target beneficiary?
  - Smallholder farmers are perhaps the hardest entry point for an effective risk-management policy