INTELLIGENT DESIGN OF INDEX INSURANCE CONTRACT: INSURED CREDIT FOR MALI COTTON FARMERS

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Stakeholders and current situation

- An initiative of Planet Guarantee
  - Grant from ILO to conduct a feasibility study (Jan to Sept 2009)
  - Proposal for a pilot project submitted to ILO Nov 2009

- Feasibility study:
  - Area based yield index or a satellite based index?
    - Analysis done by Michael Carter
  - Discussion with Swiss Re, Allianz Africa, Kafo Jiginew (Malian MFI) to guarantee their participation in the pilot

- Current situation
An index insurance for Mali Cotton farmers

- Three indexes considered:
  - Area yield based index at district level (DARBY)
  - Satellite-based Index (SBI) using vegetation cover and estimated rainfall data
  - A Hybrid Index that combines DARBY and SBI

- For the same area, ARBY implies less basis risk.
- But if satellite images have finer resolution then SBI may imply less basis risk than DARBY.
A DARBY index insurance for Mali Cotton farmers

- Data: 3 year panel (2000-2003) of 165 households in 13 villages

  - DARBY explains 70% of household yield variation, SBI explains 64%

  - DARBY > SBI (no difference in cost)

- Three steps to design the contract:
  - Estimate the probability structure for DARBY
  - Propose a contract
  - Price it
Designing DARBY

- **Data:**
  - 32 cotton growing districts / 6 years of data

- Analysis done for 3 districts
District-level Time Series Data for Average Yield

(Selected Districts Only)

Year

District-level Average Yields, kg/hectare

Bla
Bougouni
Yanfolila
Designing DARBY

- The probability structure for DARBY
  - Fit a Weibul probability function to the data
    (allowing the distribution to differ by district)

\[
\begin{align*}
  a_d &= a_0 + a \bar{y}_d \\
  b_d &= b_0 + b \bar{y}_d
\end{align*}
\]

y: yield
a’s and b’s: parameters to be estimated
d: district
The contract:

\[ p_{idt} : \text{payment received by hh i in district d at time t} \]

\[ S_d : \text{strike point} \]

\[ y_{dt} : \text{average yield in district d} \]
Designing DARBY

Area Yield Contract for Bla District

Low Productivity Zone: 812 kg/hectare

- **Standard, Single Strike Point Contract**
  - Pure Prem: 14 kilos/Ha
  - Prob of Pay: 15%

- **Dual Strike (80% & 90%)**
  - Pure Prem: 18 kilos/Ha
  - Prob of Pay: 28%

- **Estimated Probability Function**

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Insurance Payouts per Hectare (in Kilos of cotton)

Area Yield Index
Designing DARBY

- The trade-offs in choosing a strike point:
  - Higher strike-point = higher and more frequent pay-offs but higher premia
While the stated objective of the initiative is to protect farmers, the insurance contract is signed with the MFI to insure her cotton portfolio in some specific areas.

⇒ Ensure the minimum scale that Swiss Re requires to step in

□ It specifies how the farmer’s liability is reduced when insurance payments are made.
Insuring the MFI rather than directly for farmers:

- Reduced uncertainty about amount exposed (advantage for the insurance company)
- No individual subscription: lower cost of distribution
- One contract: lower cost of administrating claims
- For farmers credit contract interlinked with insurance

ADVANTAGES
Insuring the MFI rather than directly farmers:

- Farmers’ information about the product: no advertisement necessary for subscription, need make sure their liability is reduced.

- Ensuring appropriate MFI’s behavior when payments are made:

  → MFI has no incentive to decrease farmers’ debt when it receives insurance payments.

- Compulsory when credit is taken.
Expected impacts of the project

- Financial markets impacts:
  - Reduction of risk of lending to cotton producers: Increase in loan supply? Decrease in loan costs?
  - Reduction of risk of borrowing to grow cotton: Increase in loan demand?

- Household level impacts:
  Reduction of risk exposure of cotton growers: Stimulation of investment, increase in productivity? Increase in income and reduction in income variability?