

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

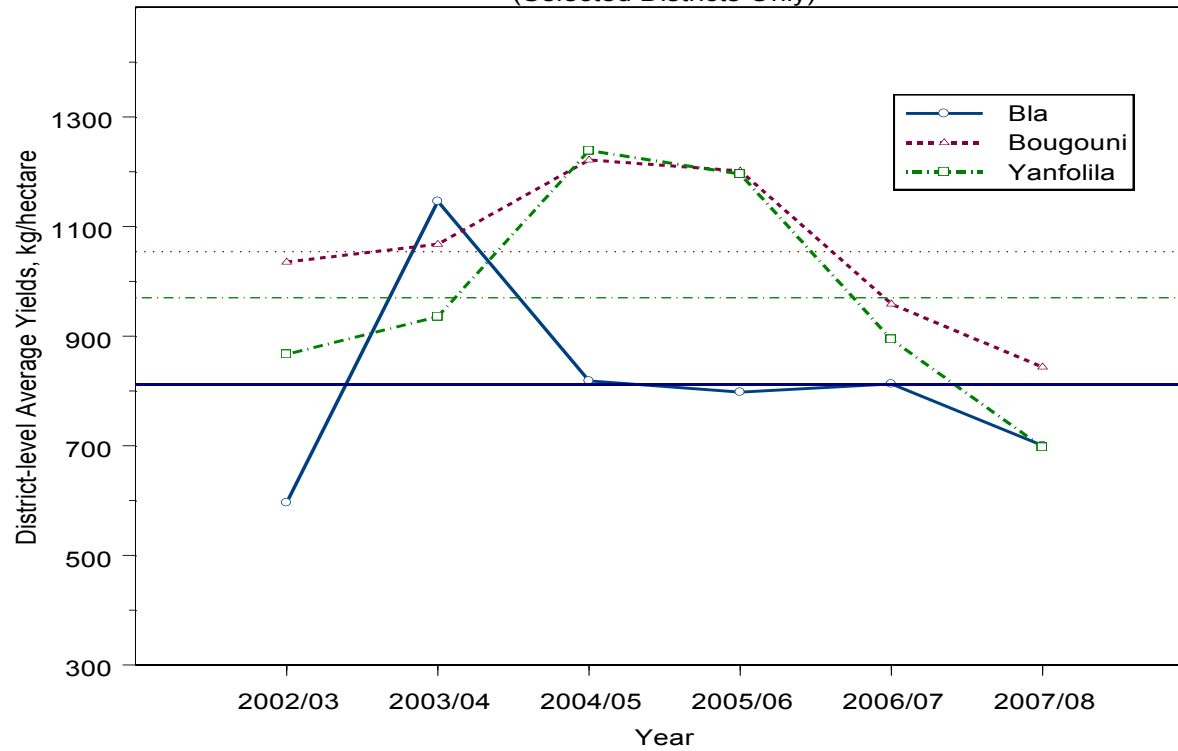
Cotton farmers

- 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)



Designing DARBY

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

$$f(y) = \frac{a_d}{b_d} \left(\frac{y}{b_d}\right)^{a_d-1} \exp\left(-\left(\frac{y}{b_d}\right)^{a_d}\right)$$

$$a_d = a_0 + a_1 \bar{y}_d$$

$$b_d = b_0 + b_1 \bar{y}_d$$

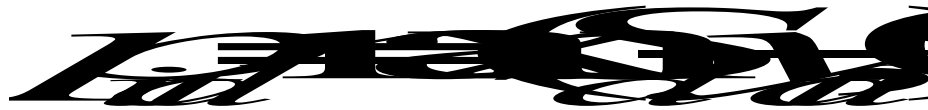
y: yield

a's and b's: parameters to be estimated

d: district

Designing DARBY

- The contract:



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

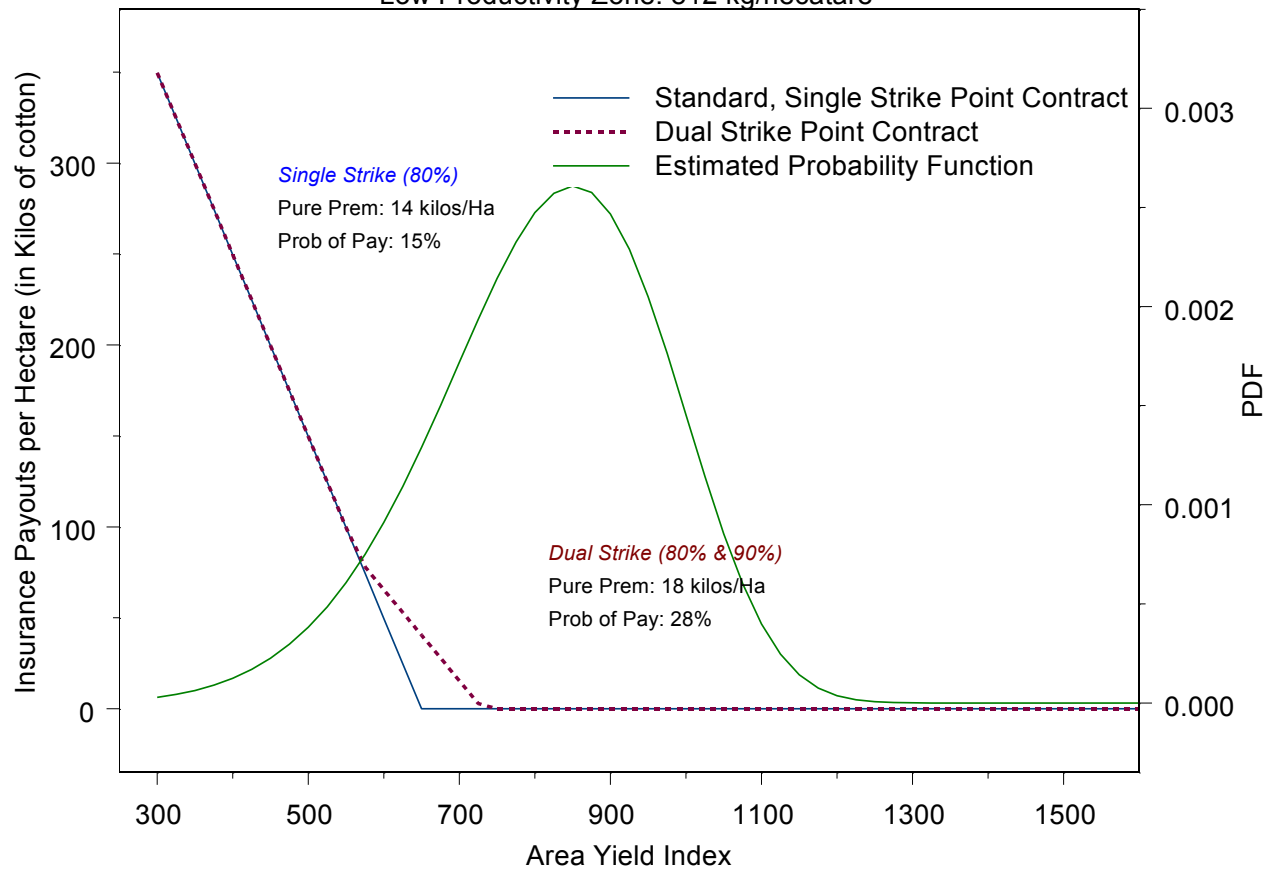
S_d : strike point

y_{dt} : average yield in district d

Designing DARBY

Area Yield Contract for Bla District

Low Productivity Zone: 812 kg/hectare



Designing DARBY

- The trade-offs in choosing a strike point:
 - ▣ Higher strike-point = higher and more frequent pay-offs but higher premia

An original distribution channel

- 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 farmers:

ADVANTAGES

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

Insuring the MFI rather than directly farmers:

CHALLENGES

- 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?