

# Index insurance for aggregate risks

## Combining formal and informal insurance

Ruth Vargas Hill  
International Food Policy Research Institute

Washington DC, July 2011

# Background

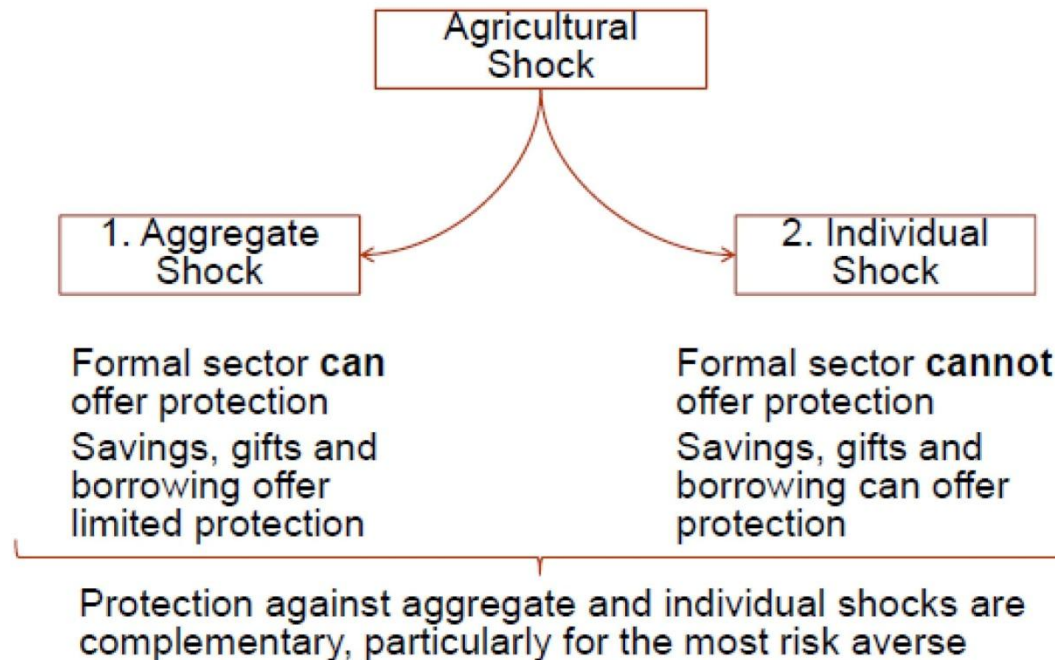
- Risk is prevalent in rural Africa and seems to constrain technology adoption:
  - In Ethiopia, fertilizer is available on credit but often not used because of the losses it implies in the face of uninsured weather risk (Dercon and Christiaensen 2011)
- Given malign effects of uninsured weather risk, insurance innovations would seem to offer potential.
- One much talked about innovation is weather index insurance—insurance that pays on the basis of an observable index rather than on losses an individual experiences.

## Traditional forms of agricultural insurance

- Individual farmer level insurance is very expensive for small-holder farmers—the cost of visiting a farmer and conducting loss adjustment are very high compared to insured value.
- Also has high levels of moral hazard (insured individuals exert less effort) and adverse selection (only the most risky farmers seek insurance).

Country	Period	Total cost / premium
Brazil (PROAGRO)	1975-81	4.57
Costa Rica (INS)	1970-89	2.80
India (CCIS)	1985-89	5.11
Mexico (ANAGSA)	1980-89	3.65
Philippines (PCIC)	1991-89	5.74

# Rethinking agricultural insurance



- Insurance is expensive and will not be able to cover all risks.
  - Savings and gifts/loans from friends and family are flexible forms of insurance.
- Design formal insurance that insures the risk that cannot be managed by savings and gifts/loans.
  - Large, aggregate, catastrophic shocks—e.g. drought and flood.

# Using indexes to insure aggregate agricultural risk

- Indexes are particularly good at capturing aggregate yield risk.
- Insurance pays out to all insured farmers in an area based on the index for that area.
- Examples:
  - Area yield: pays farmers on the basis of average yields recorded for a given area (usually through crop cutting experiments)—good at capturing all sources of aggregate yield risk (weather, pests, input supply shocks) but not widely available.
  - Rainfall deficit/excess: pays farmers on the basis of rainfall recorded at a nearby weather station (or satellite estimates)—can only cover rainfall related crop losses (too little or too much rainfall) and standard rainfall contracts have required calibration.
  - NDVI: pays farmers on the basis of satellite estimates of yield cover—suitable for estimating some types of yield (such as quality of rangeland for cattle), but not for all crops; also requires calibration.

# Promise and reality

- By linking insurance payments to an easily observable index, index-based insurance:
  - Avoids adverse selection and moral hazard problems
  - Has lower administrative costs - mostly thanks to no expensive loss adjustment
- BUT—indexes are only good at identifying aggregate shocks and they have basis risk (the risk that the index is different from a farmers losses—in particular that there is no payout when bad event is realised).
- Early field experiments so far have not lived up to expectations: demand for insurance has been low (Giné et al. (2008), Cole et al (2009) and Giné and Yang (2008).
- Many factors explain low demand, but basis risk is likely a large determinant (Clarke 2010).
- How much insurance can farmers buy at market prices?

## Ongoing work

- Improving the design of indexes—reducing basis risk by better designed contracts.
- How to link formal insurance to informal insurance mechanisms such as saving and borrowing.
- How to link insurance to improved financial access—particularly access to credit for investing in inputs.
- Showing the impact of insurance on consumption smoothing and investments in high-return but high-risk production activities.
- Getting the right balance between informal insurance, privately provided insurance, and government subsidies or indexed-safety nets.

# Formal insurance and risk-sharing groups

- Work undertaken in Bangladesh and Ethiopia with colleagues Alemayehu Seyoum Taffesse and Guush Berhane
- And with Stefan Dercon, Daniel Clarke and Ingou Outes-Leon at Oxford University and Alebel Bayrou at EDRI
- Funding from USAID via I4, and from the International Growth Center (DFID), AfD, World Bank and Gates Foundation.
- Overall concept and results from a pilot undertaken in Ethiopia last year.
  - Dercon, S. Hill, R.V., Outes-Leon, I., Bayrou, A., Clarke, D. and Seyoum Taffesse, A. 2011. "Offering rainfall insurance to informal insurance groups: evidence from a field experiment in Ethiopia"



## Formal insurance and risk-sharing groups

- Risk-sharing within groups is commonly practiced in rural Africa.
- Groups find it hard to manage risks that affect all group members simultaneously, such as catastrophic weather events.

## Formal insurance and risk-sharing groups

- Risk-sharing within groups is commonly practiced in rural Africa.
- Groups find it hard to manage risks that affect all group members simultaneously, such as catastrophic weather events.
- Can index insurance be used as a tool to transfer large covariate shocks (extreme shortfalls in rain) away from groups, whilst encouraging group members to share smaller agricultural risks among themselves?



# Groups and demand

Groups can increase demand for insurance for a number of reasons:

- Share basis risk
- Groups might make better decisions:
  - Group leaders are more financially educated
  - Might be best placed for understanding insurance products and explaining them to member farmers
- Reduce transaction costs in purchasing insurance and making claims.
- When groups are used as intermediaries they can increase levels of trust in insurance products.

In this study, focus on group potential for mitigating basis risk.

# Policies offered

- Nyala Insurance S.C. introduced an individual index-based rainfall insurance in rural Ethiopia.
- The policies took the form of monthly coupons whereby a fixed payout would be due if the monthly rainfall fell short of a particular precipitation target (Hill and Robles 2011)
- Policies were calibrated using the historic data from the local rainfall station.
- Eight policies were introduced:
  - Two policies for each of the rainy season months: June, July, August and September.
  - 'Severe Shortfall': For a premium of 100 Birr, the farmer could receive a payment of 500 Birr with a chance of 1/5.
  - 'Very Severe Shortfall': For a premium of 50 Birr, the farmer could receive a payment of 500 Birr with a chance of 1/10.

# This Study

- Policies are marketed through pre-existing risk-sharing groups: funeral societies called iddirs.
  - Primarily funeral societies, but becoming engaged in other forms of insurance provision to their members—a third provide cash payouts for other types of adverse shocks such as fires or illness; and a quarter offer loans.
  - Inclusive, often quite formalized (regular payments made monthly), and pervasive throughout most regions in Ethiopia.
- We selected leaders of iddirs to be trained in general concepts of insurance and the details of the products.
- We randomize the content of the training sessions:
  - In some iddirs, training emphasizes the benefits of sharing the policies, and thereby pool basis risk.

## Intervention Design: randomization of content



Training A: Focused on the individual benefits of insurance, and illustrated how to choose the right policies for an individual farmer.

## Intervention Design: randomization of content



Training A: Focused on the individual benefits of insurance, and illustrated how to choose the right policies for an individual farmer.



Training B: Focused on the group benefits of insurance, and illustrated how to choose the right policies for a group, and how groups could enable risk sharing.

# Results

- Look at the impact of training allocation on demand within the group.
- Focus on cohesive groups where leaders all received the same type of training.
- We find that:
  - Purchase of an insurance policy was 59% more likely (take-up across all farmers increased from 21% to 34% and higher rates for those trained)
  - The average number of policies purchased per person and value of insurance purchased also increased.
- Was this because training was better?
  - Does not seem so: individuals in iddirs whose leaders received the group-training did not have a better understanding of the insurance.
- How did training have an effect?
  - Training encouraged discussion about the insurance policy, especially among small groups of farmers.



# Conclusions

- Study suggests substantial potential for using index insurance to insure groups, when groups are cohesive and high-functioning.
- Future work:
  - What would be the magnitude of the effects in less cohesive groups, or groups that are not as familiar with formalized risk-sharing?
  - Do sharing rules have to be formalized at the time of insurance purchase? What kind of rules can members credibly commit to?
  - How much sharing of basis risk is needed to encourage uptake? How can groups best finance this?
- Other questions:
  - How do we link indexes and formal insurance to safety net provision?
  - How much risk should be financed by farmers themselves?