



Patterns of Rainfall Insurance Participation In Rural India

Xavier Gine (World Bank)

Robert Townsend (University of Chicago)

James Vickery (NY Fed)

Conference on the Indian Financial System: Wharton

April 20, 2007

Introduction

- ‘Index insurance’: pays out on realization of index correlated with household income / consumption.
 - eg. (i) rainfall at local rain gauge, (ii) area-level measure of crop yields, (iii) commodity price etc.
- Key features:
 - Realization of index is exogenous to household.
 - Minimizes monitoring/screening costs. Makes small ‘micro-insurance’ contracts more cost-effective.
- Recent growth in this type of insurance:
 - World Bank (2005) presents 10 case studies.
 - Indian National Agricultural Insurance Scheme (NAIS) example of index insurance.

This paper

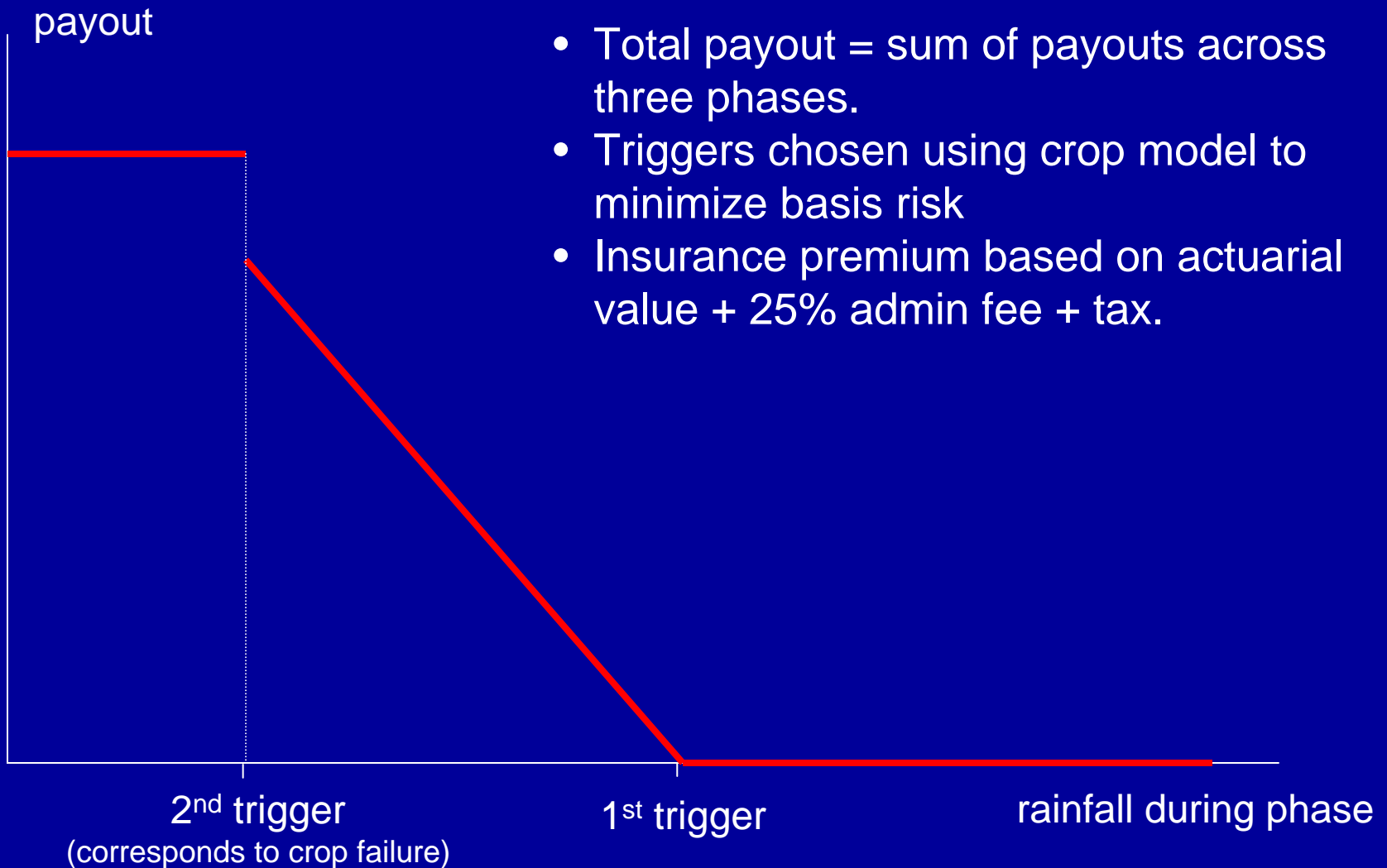
Two goals:

1. Describe institutional features of an individual rainfall insurance scheme:
 - offered to rural households in Andhra Pradesh region of southern India.
2. Present some evidence on cross-sectional patterns in insurance takeup.
 - What are the barriers to trade? Transaction costs? Credit constraints? Limited cognition / understanding of product? Limited exposure to rainfall risk?

Product Background

- Goal: Insure against deficient rainfall during primary monsoon season (~ June - September).
 - Designed by ICICI Lombard, sold to farmers by BASIX, a microfinance institution (MFI).
- Rain gauges report daily rain at the mandal (county) level.
 - Payout promised <30 days of verification of rainfall data.
 - Survey villages average 10.6km (6.6 miles) from gauge.
- Contract divides monsoon into three phases:
 - (i) sowing; (ii) podding; (iii) harvesting
 - Phase payout based on rainfall relative to trigger level. Includes payouts for excessive rain during harvest.

Payouts like a 'collar' option on rainfall



- Total payout = sum of payouts across three phases.
- Triggers chosen using crop model to minimize basis risk
- Insurance premium based on actuarial value + 25% admin fee + tax.

Predictions About Takeup Patterns

- Simple theoretical model of insurance participation under symmetric information. Willingness-to-pay for insurance is:
 - increasing in risk aversion
 - decreasing in basis risk (ie. imperfect correlation between insurance returns and consumption)
 - increasing in size of risk to be insured
- Add a financial constraint to the model:
 - participation is decreasing in credit constraints / increasing in wealth.

Predictions about Takeup Patterns II

Other predictions outside formal model:

- Product is new, and may not be well understood by farmers. Suggests insurance takeup may be:
 - higher for households who trust the insurance provider (BASIX), such as current customers.
 - higher for households with lower cost of understanding, experimenting with product:
 - younger, more educated households.
 - ‘early adopters’: members of local council, and self identified progressive households.
- Informally, have in mind a model of limited cognition or limited information.

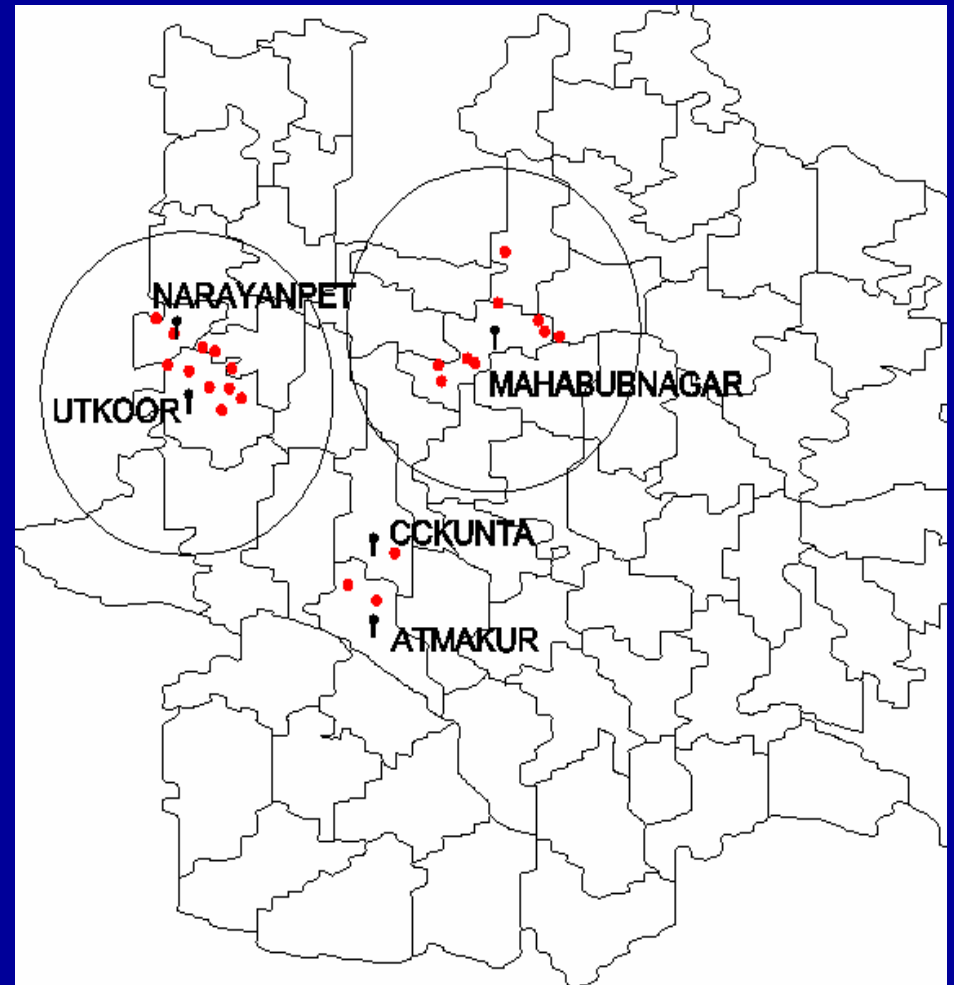
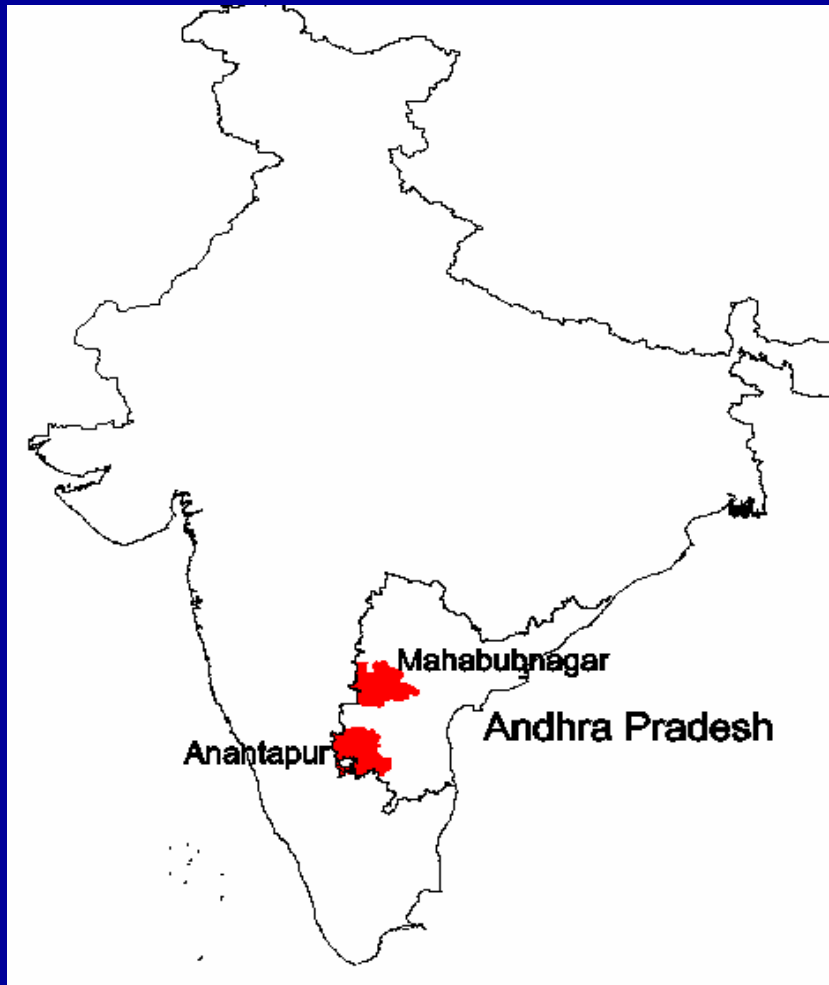
Survey

- After 2004 monsoon: survey 1052 landowner households across 37 villages.
 - Subsample for this paper: 752 households in villages where insurance offered. Stratified random sample:

	sample obs.	% share of population
Purchased insurance	267	5%
Attended marketing meeting but did not purchase	233	6%
Did not attend mkting meeting	252	89%
TOTAL	752	100%

- Choice based sampling:
 - Weighted regressions to produce consistent parameter estimates.

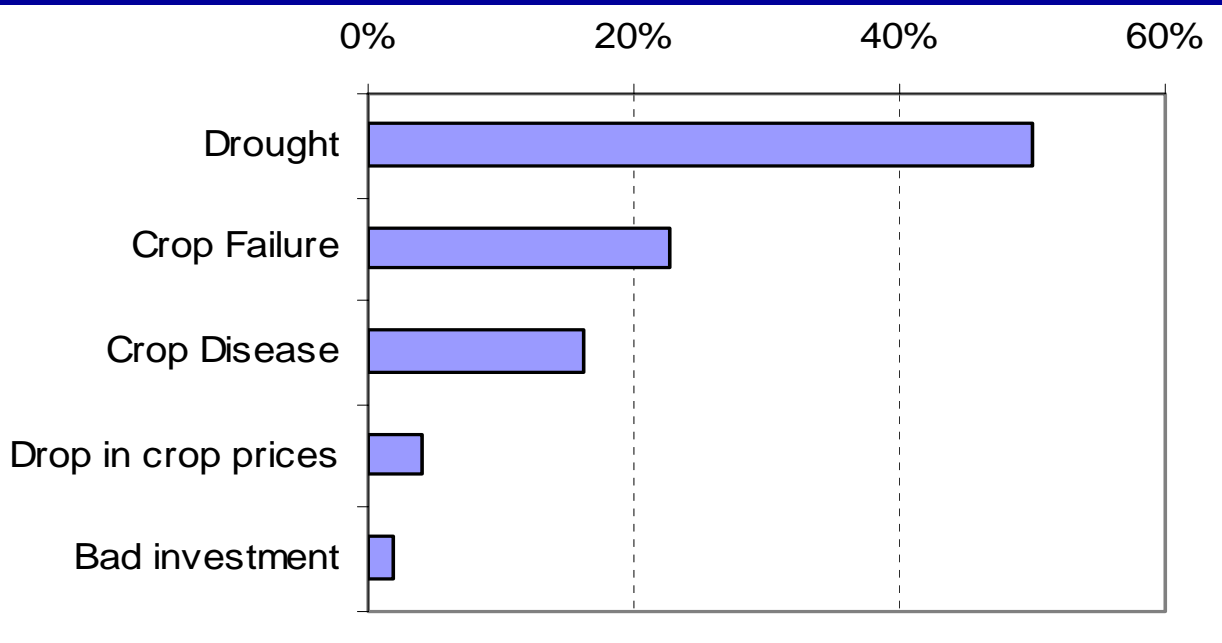
Survey area



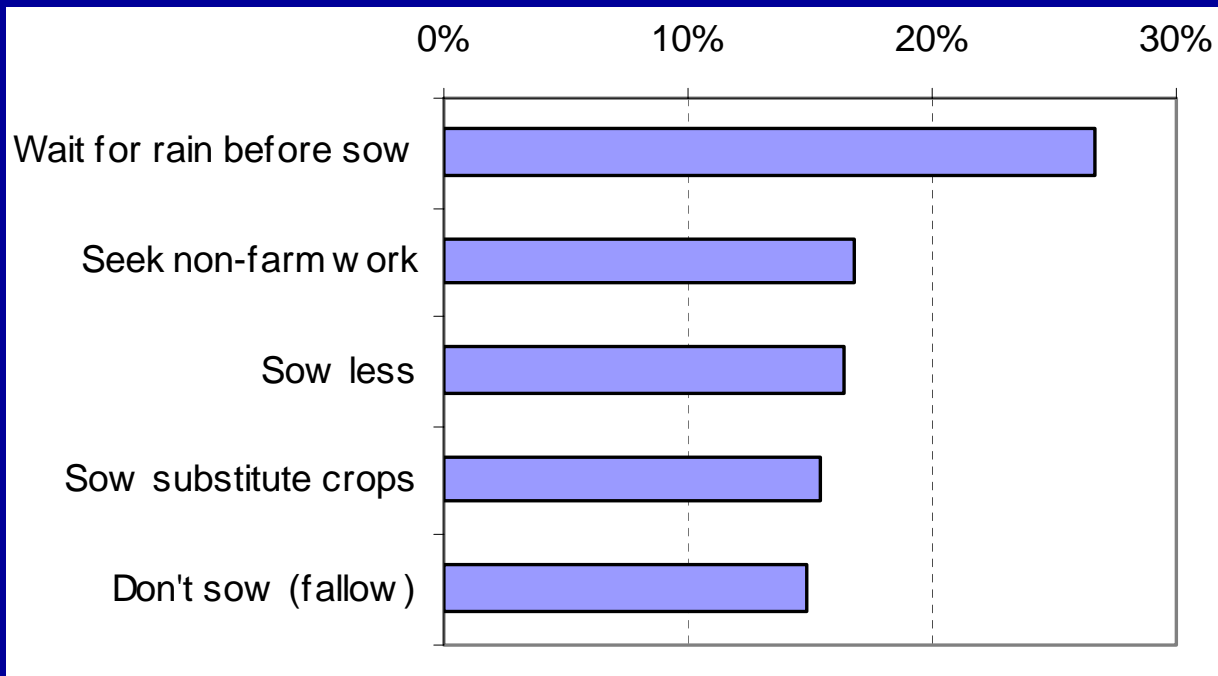
Radius of circle = 20km

Selected summary statistics

	buyers	non-buyers
Risk aversion	0.22	0.40
% land used for groundnut	0.22	0.22
% land used for castor	0.26	0.25
BUA member	0.35	0.02
Member Gran Panchayat	0.13	0.05
Credit from BASIX	0.46	0.05
Liquid savings (Rs, 000s, median)	14.9	8.0
Total wealth (Rs, 000s, median)	119.8	75.2
Landholdings (acres, median)	6.0	4.0

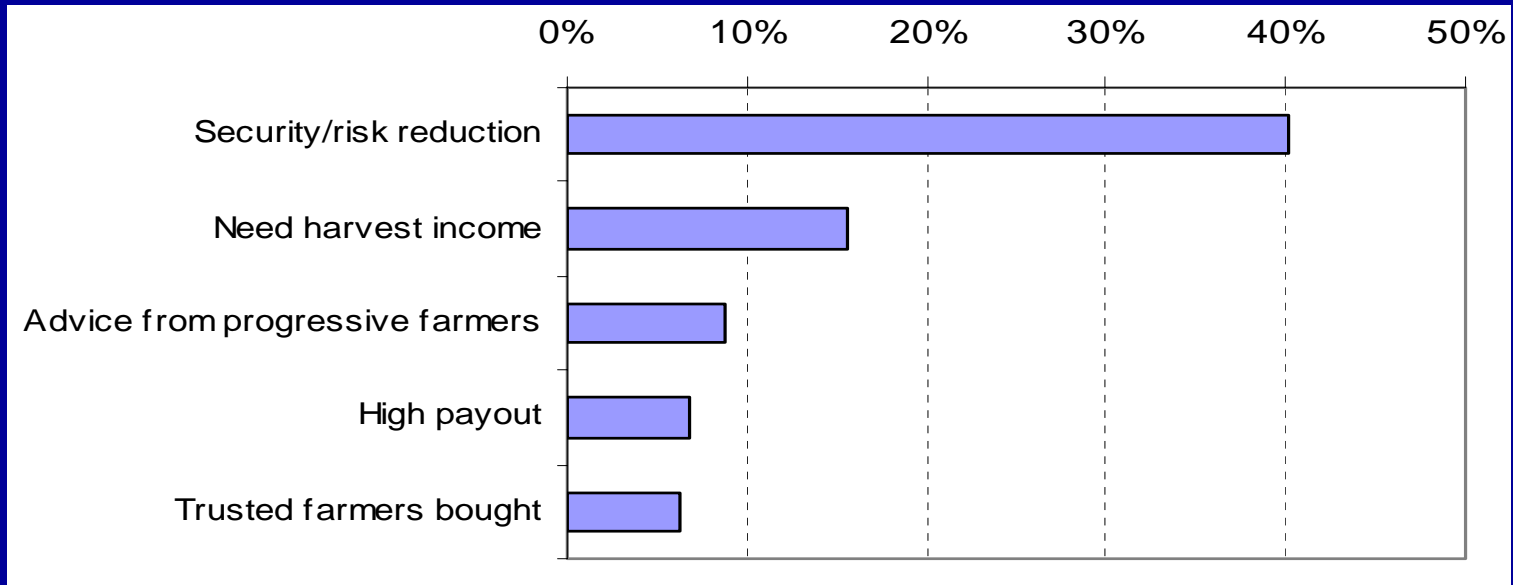


Weighted self-reports:
 “What are the major sources of risk faced by your household?”

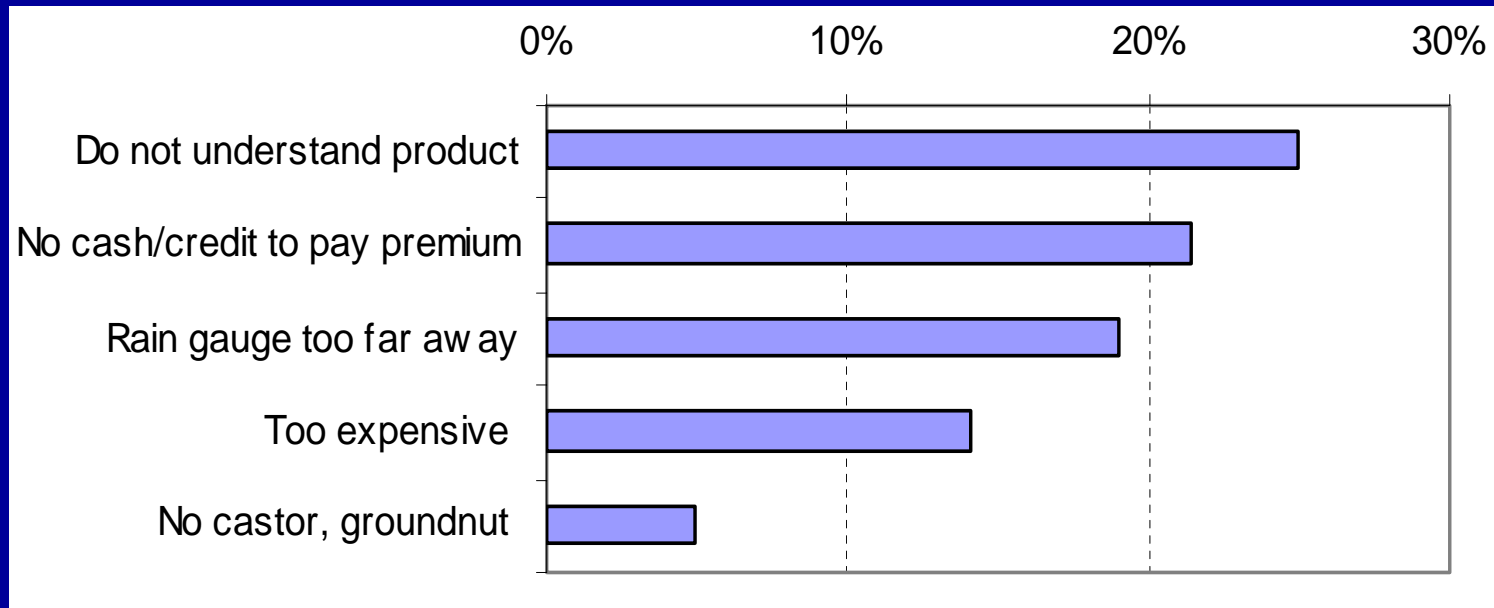


Weighted self-reports:
 “If it does not rain, what do you do?”

Reasons for purchasing insurance | meeting participation



Reasons for not purchasing insurance | meeting participation



Probit. RHS variable = 1 if bought insurance, = 0 otherwise.

	baseline	parsimonious
Risk aversion	-0.217 (2.28)**	-0.239 (2.39)**
<i>Basis risk</i>		
Use acc. rainfall to decide to sow	0.065 (0.41)	
% land for groundnut, 2003	0.935 (3.79)***	0.935 (3.58)***
% land for castor, 2003	0.457 (2.85)***	0.457 (2.74)***
<i>Wealth and credit constraints</i>		
log(wealth)	0.130 (1.35)	
log(landholdings)	0.087 (0.93)	0.261 (3.87)***
% irrigated land	0.109 (1.23)	0.152 (1.69)*
Household constrained (1=yes)	-0.130 (1.76)*	-0.130 (1.64)

Probit. RHS variable = 1 if bought insurance, = 0 otherwise.

	baseline	parsimonious
<i>Familiarity with insurance and BASIX</i>		
BUA member	13.458 (6.22)***	14.002 (6.14)***
Credit from BASIX (1=yes)	2.131 (6.21)***	2.566 (6.79)***
Other insurance (1=yes)	0.065 (0.78)	
<i>Technology diffusion</i>		
Progressive household	0.217 (2.34)**	0.239 (2.59)***
Member Gran Panchayat	0.391 (2.05)**	0.413 (2.09)**
Education (years)	0.043 (1.14)	
log(age)	-0.304 (1.90)*	-0.370 (2.49)**

Regression also includes village dummies, five other covariates. N=752

Risk aversion interactions

Inverse relationship between risk aversion and participation is concentrated amongst households with less knowledge of insurance, insurance provider

	Baseline specification			
	combined	interaction terms added individually		
Risk aversion	-0.017 (2.48)**	-0.012 (2.61)***	-0.014 (3.13)***	-0.016 (2.30)**
<i>Interaction terms</i>				
Risk aversion * BUA	0.003 (0.18)	0.016 (0.98)		
Risk aversion * credit from BASIX	0.022 (1.93)*		0.024 (2.17)**	
Risk aversion * other insurance	0.004 (0.51)			0.009 (1.00)
F-test [joint significance, p-value]	0.10*			

Magnitudes

	as a fraction of....	
	liquid assets	farm income
Insurance expenditure	1.9%	0.8%
Maximum payout	46.5%	19.5%

- Insurance expenditures fairly small relative to liquid assets, farm income.
 - Households ‘experimenting’ with product?
- Maximum payouts large relative to expenditures:
 - insurance contract protects against most extreme drought events.

What have we learned?

Evidence in this paper is a preliminary step forward in understanding 'microinsurance'. Some lessons:

1. Participation rates lower amongst 'vulnerable' households (ie. poor, credit-constrained, not members of social networks etc.)
 - Morduch (2004): general equilibrium concerns; insurance purchasers 'bid up' prices of non-traded goods during drought, making poor worse off.
2. Social networks, familiarity with provider key determinant of insurance participation.
3. Simple practical suggestion for BASIX: provide payouts faster!
 - Household discount rates likely higher than for ICRISAT / BASIX.

Future research directions

- Effects on:
 - risk-taking / income smoothing behavior by households
 - existing informal risk-sharing arrangements
 - consumption smoothing
 - General equilibrium effects of insurance provision a la Morduch (2004).
 - Patterns of diffusion for new financial technologies.
- ⇒ Research in progress: Field experiment, randomize insurance provision across households.