The Impact of Area-Yield Index Insurance on Agricultural Investment and Production in Bougouni, Mali

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The cotton sector in Mali: significant state intervention

- Cotton industry in Mali is a monopsony (CMDT)
- Production takes place in cooperatives
- The cooperative receives a group loan in kind for input with a joint liability clause (BNDA)
- Joint liability creates social tensions within cooperatives and villages

The insurance product: linking insurance to a cooperative's loan

- Cooperatives subscribe our proposed insurance contract on a per hectare basis.
- When insurance payments are made, they are deposited into the farmers' bank accounts at the BNDA
  - These payments are primarily used in to pay back loans.
- It relaxes the joint liability rule, as it reduces the probability of a farmer not being able to pay back his loan.

Key features of the contract

- Dual-trigger contract
  - First trigger: ZPA- level trigger of 900 kg/ha
  - Second trigger: cooperative-specific triggers varying between 264 and 913 kg/ha
- Trigger levels determined using past yield data obtained from CMDT
- Small false negative probability: 20%
  - Expected uptake higher than with a conventional single scale contract, especially under ambiguity aversion.

The project:

This project is a collaboration between researchers and:

- CMDT (provides cotton yield data)
- Planet Guarantee (insurance broker)
- Swiss Re (reinsurance company)
- Allianz (insurance company)
- BNDA (Bank)

Research Design

- 86 cooperatives in the study area (984 households)
  - Two thirds treatment group
  - One third control group
- To encourage uptake, an encouragement design was adopted:
  - Treatment cooperatives received randomly distributed discounts that reduced the price to 50%, 75%, or 100% of the actuarially fair contract
- Decision at the group level

Research Design

- Timeline for the analysis:
  - No baseline survey, recall data for the 2010 growing season
  - Contract distribution: growing season 2011
  - First round of data collection: December- January 2012 (after the harvest)

- Hypothesis:
  - Insured households will increase their area planted to cotton, and hence increase their long-term, mean income
  - Smoother incomes and consumption streams will improve household well-being and facilitate accumulation of child human capital

Baseline characteristics: cooperative level

	Control	Treatment	Treatment- Control Difference
Farmers(#)	15.5	13.95	-1.553
	11.63	*9.418*	*(-0.6)*
Area (ha)	31.32	32.08	0.761
	25.88	*26.88*	*(-0.12)*
Area per farmer (ha)	2.13	2.381	0.25
	0.872	*1.05*	*(-1.13)*
Yield (kg/ha)	895.27	829.4	-65.9
	316.15	*252.671*	*(-0.94)*
N	26	57	83

Baseline characteristics: household level

	Control	Treatment	Treatment- Control Difference
Yield (kg/ha)	1064.4	925.5	140***
	-446.5	*-348.2*	*(-3.75)*
Area (ha)	2.19	2.41	-0.2
	-1.392	*-1.703*	*(-1.54)*
Production (kg)	2326.41	2277.14	-49.27
	1825.45	*1881.42*	*(-1.54)*
N	183	403	586

Uptake results

- First year: 16 out of the 58 treatment cooperatives agreed to purchase the contract
  - 184 insured households
  - 487.25 ha (26.7 % of the treated area)

- Pretty good uptake rates compared to previous pilot projects
  - Lower basis risk ?

Evaluation strategy

- Simple ITT regression: no significant results
- For ex- post impact indicators, the *true/objective* treatment status matters
- For ex-ante impact indicators, the *perceived/subjective* treatment status matters

Evaluation strategy

- Account for the farmer's misperceptions of the treatment status of his cooperative
- Variable confused_1=1 if a farmer in a treatment cooperative thinks he is part of a control cooperative (24.7%)
- Variable confused_0=1 if a farmer in a control cooperative thinks he is part of a treatment cooperative (12.8%)

Impact: area in cotton, harvest and yields

	area (ha)	Production (ha)	yield (kg/ha)
treatment	0.4690**	315.8262	-76.8581
	(0.2015)	(243.8382)	(50.8765)
confused_0	0.7652**	564.4632*	-96.8382*
	(0.2982)	(337.5026)	(51.3273)
confused_1	-0.4452**	-321.8833	26.2594
	(0.2229)	(259.5702)	(55.0651)
_cons	2.4199***	2437.7446***	1010.1499***
	(0.1486)	(195.3856)	(46.7833)
N	953	953	953
adj. R-sq	0.013	0.003	0.006

Impact: fertilizer use

	urea (kg)	complexe (kg)	manure (plow)
treat	22.8511*	43.2098	2.8873
	(11.5159)	(40.0088)	(2.5088)
confused_0	30.1407*	54.8268	5.5563
	(15.8819)	(52.9229)	(4.0624)
confused_1	-24.3541**	-12.7295	-3.4767
	(11.0911)	(56.5700)	(2.6286)
_cons	143.6905***	376.0823***	11.3268***
	(8.9288)	(34.0399)	(2.0213)
N	953	953	953
adj. R-sq	0.006	-0.001	0.000

Impact: seeds and other inputs

	seeds (Kg)	herbicide (L)	insecticide (L)
treat	14.9630**	1.0897*	107.7310
	(6.7336)	(0.5540)	(105.6129)
confused_0	6.6279	2.0422***	2.5396**
	(8.8450)	(0.6926)	(1.2099)
confused_1	-14.4645**	-1.3596**	-106.8257
	(6.4696)	(0.5396)	(105.6153)
_cons	52.1578***	3.6461***	7.0584***
	(5.2088)	(0.3695)	(0.6221)
N	953	953	953
adj. R-sq	0.012	0.006	-0.002

Conclusion

- Significant ITT results (seeds, area, herbicide and urea)
- Working on ATE/LATE
- Project relocated to Burkina because of a military coup on March 2012
  - Good uptake