Providing Indexed Drought Insurance via Informal Insurance Groups: Evidence from a Field Experiment with Funeral Societies in Ethiopia

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Overview

1. Introduction: revisiting the evidence
2. The trouble with providing (index) insurance
3. Together we are strong
4. Some early results

1. Introduction: revisiting the evidence (1)

- Rainfall risk remains a key problem for Ethiopian farmers
  - 44% of farmers report serious losses due to drought in last 4 years, and 22% report losses due to too much rain and floods;
  - Dercon and Christiaensen (forthcoming, *J.Dev.Econ.*) – a strong link between willingness to take up fertilizer, and weather risk in Ethiopia.

- Suggestive of demand for some insurance against weather risk would have high demand

1. Introduction: revisiting the evidence (2)

- Crop insurance (individual indemnity based) is fraught with problems
  - Incentives from asymmetric information
  - Costly verification and high transactions costs
  - Most existing programmes typically involve high subsidies, often government-driven with political aims
- More recently: index-based parametrised 'insurance' products:
  - Payouts based on easily observable data (e.g. actual rainfall at local rainfall station)
  - Provided data are available, can be priced and managed without incentive problems

1. Introduction: revisiting the evidence (3)

Experimental evidence:

- Uptake is far lower than expected:
  - Gine et al. (2008) India (AP): 5% uptake
  - Cole et al. (2009) India (AP and Gujarat): 5-10% buy product
  - Gine and Yang (2008) Malawi – 13% fewer people take up loan with insurance than loan without (20 vs 33%)
- Uptake patterns are puzzling:
  - Increasing in wealth
  - **Risk averse buy less**
- Explanations offered?
  - **Trust** matters (in Cole et al. via experimental variation; in Gine et al. correlated with networks –

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1. Introduction: summary

In this paper:

- We **argue** that these findings are far less of a puzzle (including building on theory and lab experiments in Ethiopia)
- We use this to motivate **an alternative approach** to offer index-based products via insurance groups
- Show (pilot) **evidence** consistent with the benefits of working via existing groups to increase uptake

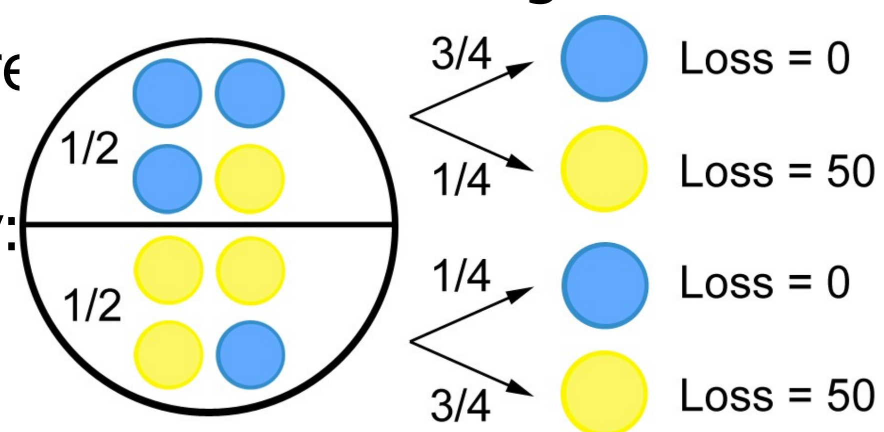
2. The trouble with (index)-insurance

Low demand could be caused by:

1. **Poor decision making**
   - Poor understanding of products
   - Poor understanding of how to use and evaluate products
2. **Low levels of trust**
   - Insurance requires much more trust than credit
3. **Unsuitable products**
   - Basis risk
   - High premium, relative to expected claim

Basis risk makes decisions really difficult!
(building Clarke, and Clarke & Macchiavello)

- Suppose YOU have been hired to offer independent financial advice to an Ethiopian farmer on buying weather insurance
- The farmer starts with £65 but will incur a loss of £50 with probability ½
  - £50 ≅ 50 days of casual farm labour wage
  - £50 loss is strongly corre there is basis risk
- This is a Compound Lottery:
  - $\mathbb{P}$(Good weather)=½
  - $\mathbb{P}$(Bad weather)=½
  - $\mathbb{P}$(Loss=50|Good weather)=¼
  - $\mathbb{P}$(Loss=50|Bad weather)=¾

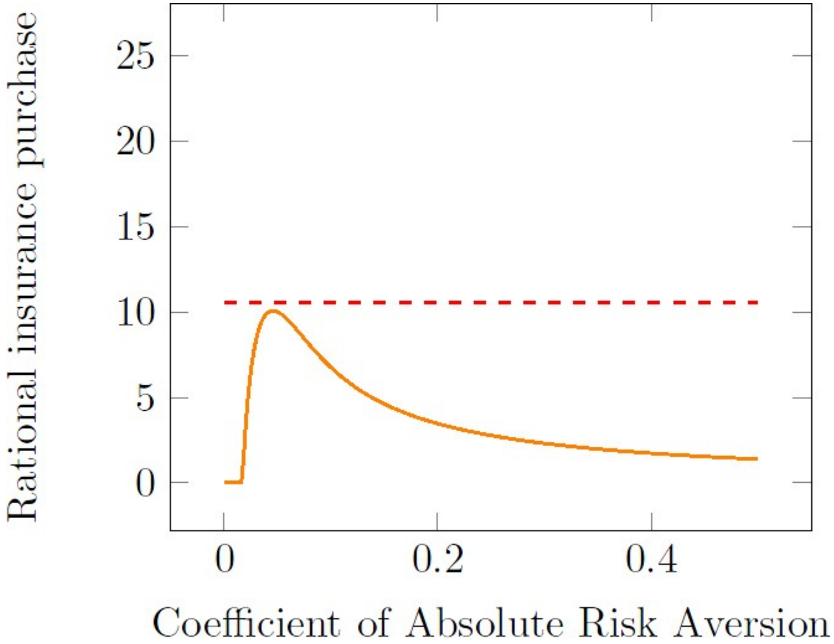


Lessons from economic theory about rational purchase of index insurance

1. If the individual is EU maximiser with CARA of γ, the optimal amount of cover to purchase is:

$$\frac{1}{50\gamma}\ln\left(\frac{2}{3}\times\frac{3e^{50\gamma}+1}{e^{50\gamma}+3}\right)$$

This is hump-shaped in γ...



2. No EU maximiser satisfying DARA would ever purchase cover of more than 10 (for premium of 6). Cover of more than 10 is irrational

Not insurance and difficult!

- This product is NOT offering “partial insurance” (or reducing spread with constant mean)
- It is not insurance but a weather derivative

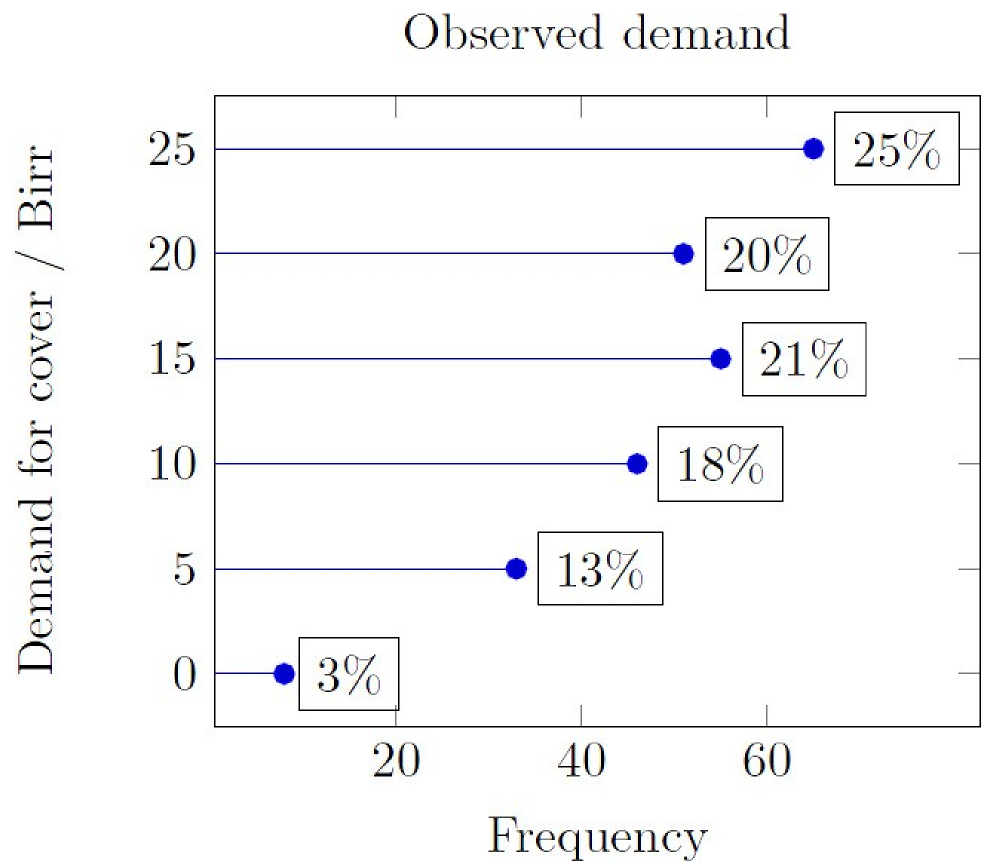
Insurance premium	Net wealth			
	£50 loss		No loss	
	Good W.	Bad Weather	Good Weather	Bad W.
	□=1/8	□=3/8	□=3/8	□=1/8
0	15	15	65	65
3	12	17	62	67
6	9	19	59	69
9	6	21	56	71
12	3	23	53	73
15	0	25	50	75

Rational demand for indexed insurance to meet own losses may be low

1. The most risk averse would not rationally purchase indexed insurance products
   - An infinitely risk averse individual would seek to limit ‘the worst that could happen’.
   - The ‘worst that could happen’ becomes worse on purchase of indexed insurance if the premium is positive and there is basis risk
2. Basis risk + premium loading ⇒ rational purchase of weather indexed insurance products to meet own losses may be low
   - If care enough about risk to purchase cover...
   - ... and risk averse expected utility maximiser with DARA...
   - ... then must care about downside basis risk enough to limit cover
3. Complicated product (compound lottery) so

In a set of laboratory experiments, Ethiopian farmers made poor decisions

- In a set of artefactual field experiments, 171 out of 258 farmers purchased more than the rational upper cover bound of 10 Birr.



- These are poor decisions:
  - If they cared enough about risk to hedge, they should care enough about

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3. Together we are strong

- Basis risk may be high for an individual farmer
  - Correlation between weather at contractual weather station and crop yield from individual plot is likely to be low

⇒ Rational demand from an isolated farmer is low

- Basis risk may be much lower if farmers pool idiosyncratic agronomic risk locally
  - Correlation between weather at contractual weather station and average crop yield in local area is likely to be higher

⇒ Rational demand from a group of risk-pooling farmer may be high

Groups could help to increase demand (especially risk-sharing groups)

1. Increase the **quality of decision making**
   - Group may better placed than individuals to understand, use and evaluate products
2. Increase the level of **trust**
   - Increase trust when used as intermediaries
3. Increase the **suitability of indexed products**
   - Soak up basis risk through within-group pooling of idiosyncratic risk
   - Reduce administrative costs
   - Avoid crowding out of informal arrangements, even if they are faced with enforcement problems (individual participation constraint is not affected – Rios-Rull/Attanasio)

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Field experiment 2010 Ethiopia

First attempt to market weather products to informal risk-sharing groups, in collaboration with Nyala Insurance

- Standard Weather index derivative marketed to iddirs: funeral societies
  - 95% of population is a member of at least one
  - No links with either government or NGOs
  - Mostly premium based : regular premiums, payout in cash and kind at time of funeral of member's family
  - Many are also involved in other idiosyncratic risks (oxen, fire, etc)
  - Typical size in most of rural Ethiopia about

Product design

- 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.
- Policies were calibrated using the historic data from the local rainfall station, and designed and underwritten by Nyala Insurance.
- Six policies were introduced:
  - Two policies for each of the rainy season months: July, August and September.
  - ’Severe Shortfall’ Coupon: For a premium of 100 Birr, the farmer could receive a payment of 500 Birr with a chance of 1/5.
  - ’Very Sever Shortfall’ Coupon: For a premium

	This policy costs 100 Birr and it will pay 500 Birr if the rain recorded at Butajira weather station is less than 116mm in July
	This policy costs 50 Birr and it will pay 500 Birr if the rain recorded at Butajira weather station is less than 97mm in July

	This policy costs 100 Birr and it will pay 500 Birr if the rain recorded at Butajira weather station is less than 114mm in August
	This policy costs 50 Birr and it will pay 500 Birr if the rain recorded at Butajira weather station is less than 96mm in August

	This policy costs 100 Birr and it will pay 500 Birr if the rain recorded at Butajira weather station is less than 79mm in September
	This policy costs 50 Birr and it will pay 500 Birr if the rain recorded at Butajira weather station is less than 61mm in September

Intervention design

- In May 2010, Nyala offered anyone in 17 Kebeles in the Meskan, Silte and Anilemo districts (or Woredas) to buy these coupons
- We identified the 100 largest Iddirs to take part in our study, with an average of 6 Iddirs per Kebele.
- While all policies introduced were identical, we provided training sessions - to Iddir leaders - that varied across Iddirs.
- In each Kebele, from these 100, we randomly selected Iddirs to two training Exercises: A and B. Training lasted 1.5-2 hours.
- All training exercises explained the basic concepts of insurance and discussed in

- Eligible for training in Exercise A and B were Iddir leaders (i.e. members of the Iddir commitee, which typically includes 5-7 individuals).
- We also varied the intensity of training per Iddir; we randomized the number of Iddir leaders and members of the committee taking part in training.
- The intervention time frame was as follows:
  - Mid-May to End-May 2010: Nyala distributed information flyers. Training Exercises carried out.
  - End-May to End-June 2010: Demand forms collected by Nyala Insurance.
  - July-September 2010: Insurance policy period.

- Plenty of organisational problems, and all

Baseline survey

- Soon after the last of the demand forms was collected, we implemented a baseline survey.
- The sampling frame for the survey were the membership of Iddirs that took place in the training exercises.
- A random sample of Iddir members whereby we over-sampled farmers that had taken part in the training e
- From the … that implemen… fect, such that some … ted to Training A

	Not-Trained Farmers	Trained Farmers	All Surveyed Farmers
Iddir: Type-A	36	49	85
Iddir: Type-B	27	50	77
Iddir: Mixed A&B	68	95	163
Total	131	194	325

Did Randomization work?

- Using data from the baseline, we test for equality of means across all three categories, and find that all three a very similar.
- From a total of 51 tested variables only five show significant differences between Type-A and Type-B Iddirs
- F-tests: Type-A in training sample is more often leader of iddir, has a bit more land, more willing to pay for insurance than Type-B
- All results hold with or without adding these controls

Uptake of product?

- No final figure yet from Insurance company across *all* kebeles; among non-trained, 256 policies sold (population of 10,000+ households).
- Figures in baseline survey:
  - For those not trained: **<2%**
  - For those trained: 42%
    - Type A: **37%** versus Type B: **58%**
    - Mixed group 37%

Empirical strategy

- To estimate the impact of training on Insurance Demand, we estimate the following interaction model:

$$Demand_i = IddirType_j \otimes Training_i + \mathbf{X}\pi + \mu_v + \varepsilon_i \qquad (1)$$

- We include controls for variables that failed the test of equality across Iddir types, while we also allow for Kebele fixed-effects.
- To address the problems of training implementation, we use the following alternative definitions for the Iddir training status variable (IddirTypej):
  - Dummies: Iddir Type-A, Iddir Type-B, Iddir Mixed A&B

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Demand for Insurance, by Iddir Training Type

Table 1: Dependent Variable: Purchase of Insurance Policy

	Core Regressions			Modifying Treatment Definition	
	Naive	Core Controls	Village FE	Default: Type-A + Mixed	Intensity of Type-B Training
	LPM	LPM	LPM	LPM	LPM
	(1)	(2)	(3)	(4)	(5)
Iddir: Type-B	-0.0278	-0.0719	-0.1324	-0.0659	
	(0.028)	(0.048)	(0.090)	(0.086)	
Iddir: Mixed A&B	-0.0131	-0.0378	-0.1149		
	(0.031)	(0.040)	(0.093)		
Trained	0.3396***	0.3640***	0.3554***	0.3796***	0.3412***
	(0.077)	(0.077)	(0.071)	(0.048)	(0.065)
(Iddir Type-B) X (Trained)	0.2404**	0.2713***	0.2959***	0.2725***	
	(0.102)	(0.098)	(0.093)	(0.077)	
(Mixed A&B) X (Trained)	0.0036	0.0275	0.0372		
	(0.097)	(0.093)	(0.091)		
Share of B Training					-0.1722**
					(0.076)
(Share of B) X (Trained)					0.2088**
					(0.097)
R-Squared	0.2337	0.2849	0.3190	0.3165	0.3056
Nr Observations	325	325	325	325	325
Basic Controls	No	Yes	Yes	Yes	Yes
Community fixed effects	No	No	Yes	Yes	Yes

Demand for Insurance, by Iddir Training Type

Table 2: Dependent Variables: Nr of Policies and Value Insured

	Number of Insurance Policies	Total Value Insured
	OLS	OLS
	(1)	(2)
Iddir: Type-B	-0.2214*	-8.0996
	(0.122)	(6.091)
Iddir: Mixed A&B	-0.2494*	-11.8322
	(0.146)	(7.663)
Trained	0.3732***	19.0964***
	(0.091)	(4.801)
(Iddir Type-B) X (Trained)	0.4137***	23.5757***
	(0.119)	(6.526)
(Mixed A&B) X (Trained)	0.1220	12.6217*
	(0.112)	(7.319)
R-Squared	0.2562	0.2276
Nr Observations	326	320
Basic Controls	Yes	Yes
Community fixed effects	Yes	Yes

Was Training-B Different?

Table 3: Dependent Variables: Product Knowledge and Literacy

	Insurance Demand (1)	Do You Know 'Millimeters'? (2)	Insurance Knowledge (3)	Financial Literacy: Probabilities (4)	Financial Literacy: Mathematics (5)
By Training Type					
Iddir: Type-B	-0.1324	0.1645	-0.3531*	-0.1820	0.0362
	(0.090)	(0.137)	(0.211)	(0.281)	(0.292)
Iddir: Mixed A&B	-0.1149	0.2448**	0.0994	0.1953	-0.0837
	(0.093)	(0.103)	(0.181)	(0.284)	(0.284)
Trained	0.3554***	0.3170***	0.1996*	0.0473	-0.1577
	(0.071)	(0.103)	(0.112)	(0.205)	(0.246)
(Iddir Type-B) X (Trained)	0.2959***	-0.0486	0.0186	0.4161	-0.0875
	(0.093)	(0.125)	(0.216)	(0.272)	(0.358)
(Mixed A&B) X (Trained)	0.0372	-0.2775**	-0.1241	-0.0523	0.0768
	(0.091)	(0.124)	(0.151)	(0.238)	(0.302)
Intensity of Type-B Training					
Share of B Training	-0.1722**	0.0902	-0.1015	-0.1409	-0.1221
	(0.076)	(0.123)	(0.195)	(0.273)	(0.237)
Trained	0.3412***	0.1940**	0.1938*	-0.0277	-0.1968
	(0.065)	(0.090)	(0.108)	(0.174)	(0.212)
(Share of B) X (Trained)	0.2088**	-0.0533	-0.1182	0.2774	0.1188
	(0.097)	(0.119)	(0.188)	(0.250)	(0.295)
Nr Observations	325	324	325	326	326
Basic Controls	Yes	Yes	Yes	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes

What is different about consequences of Training-B?

Table 4: Dependent Variables: Talk to Others or Decide with Others

	Trained Farmers		Insured Farmers Only	
	Talked to Others about Insurance?	To how many People (logs)?	When Deciding, Did You Discuss with Others?	Made decision: Alone, Discussed, or Joint Decision
	LPM	OLS	LPM	OLS
	(1)	(2)	(3)	(4)
By Training Type:				
Iddir: Type-B	-0.1137	-0.4498	0.7586***	0.6150
	(0.088)	(0.301)	(0.212)	(0.370)
Iddir: Mixed A&B	-0.1539*	-0.0322	0.0516	-0.1109
	(0.082)	(0.324)	(0.231)	(0.362)
R-Squared	0.1248	0.1415	0.3227	0.2422
Nr Observations	194	194	83	83
Basic Controls	Yes	Yes	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes
Sub-Sample	Trained	Trained	Purchased	Purchased

Interpretation

- Training B does not seem to have led to more knowledge or more discussion with others;
- **Only** difference in content of training was emphasis on scope for group risk-sharing;
- Suggestive of these benefits contributing to higher uptake.

Conclusion

- We **argue** that standard findings of low up-take of weather indexed insurance products are far less of a puzzle (including building on theory and lab experiments in Ethiopia)
- We use this to motivate **an alternative approach** to offer index-based products via insurance groups, allowing potentially more trust, better decision making and pooling of basis risk
- Show (pilot) **evidence** consistent with the benefits of working via existing groups to increase uptake, and that training emphasizing scope for risk-sharing of basis risk has strong impact.