Hybrid contract design

Stefan Dercon and Daniel Clarke

University of Oxford and CSAE

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Overview

1. Introduction: restating the obvious
2. The trouble with providing (index) insurance
3. Together we are strong
4. Special Guest Appearance

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1. Introduction: restating the obvious

Challenge for insurance for the poor

- Cheap, so low transactions costs
- Offering clear incentives to use them well
- Easy to understand
- Offer much protection
- Without destroying what they have in terms of informal insurance

Stylised facts: the classic contrast

Three standard ways of offering agricultural insurance: index insurance, area yield insurance and indemnity insurance

Cost →

Basis risk ←

| Index insurance | Area yield insurance | Indemnity insurance |

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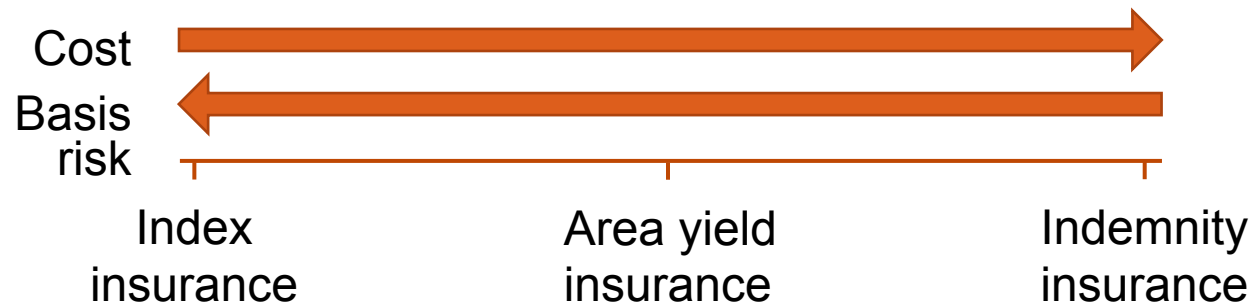
| Index insurance | Area yield insurance | Indemnity insurance |
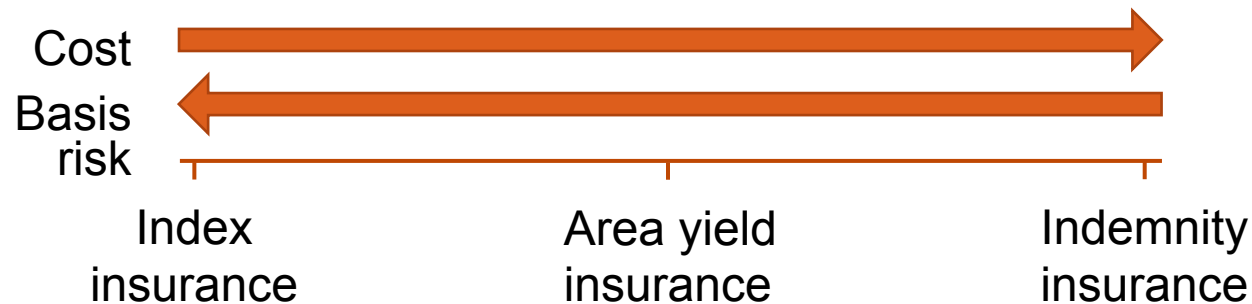
1. Supply-side insurance costs are important, as are incentive problems

2. Reducing basis risk by offering indemnity-based formal insurance is expensive

3. Index insurance are also considered transparent and easy to understand

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Challenge for insurance for the poor

- Cheap, so low transactions costs √
- Offering clear incentives to use them well √
- Offer much protection √ or ?
- Easy to understand √ or ?
- Without destroying what they have in terms of informal insurance √ or ?

2. The trouble with (index) insurance

So no contest?

- Are they really good products?

- Are they really easy to understand?

- Are they still so good once we consider existing informal insurance?

Are they offering much protection?

- Standard problem: basis risk
  - It is there, empirical issue how much is there?
- Key is: Impact on overall welfare, including impact on informal insurance √
  - If it is unchanged, OK
  - But if it crowds out informal insurance, net impact smaller
- Are we potentially throwing away child with the bathwater?
  - Are there ways of providing low basis risk, indemnity-based insurance at low cost? √
  - Are there ways of combining them with index-contracts? √

So no contest?

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So no contest?

- Are they really good products?   √ but with caveats
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Daniel Clarke's Insurance lab experiments with Ethiopian Farmers

- Series of laboratory experiments conducted in November-December 2009

- Funded by Microinsurance Innovation Facility.

- 378 participants
  - From seven sites of the Ethiopian Rural Household Survey, spanning Amhara, Oromiya and SPNNR regions of Ethiopia

- Played a series of five insurance games

- Each participant is given 65 Birr (US $5) of game money and will incur a loss of 50 Birr with probability ½
  - P(Good weather)=½ and loss is zero
  - P(Bad weather)=½ and loss is 50

Participant characteristics

	Number	Percentage
Male	255	67%
Relationship to Household Head		
Head	263	70%
Spouse	36	10%
Son/Daughter	59	16%
Other	20	5%
Age		
0-24	48	13%
25-49	177	47%
50-74	139	37%
75-99	14	4%
Literate	291	77%
Correct answers given to financial literacy questions		
5 + 3	326	86%
3 x 7	206	54%
1/10th of 300	113	30%
5% of 200	5	1%

Standard insurance game

Description of two of the games played

- Treatment: Participants may purchase individual indemnity insurance

Indemnity Insurance purchase
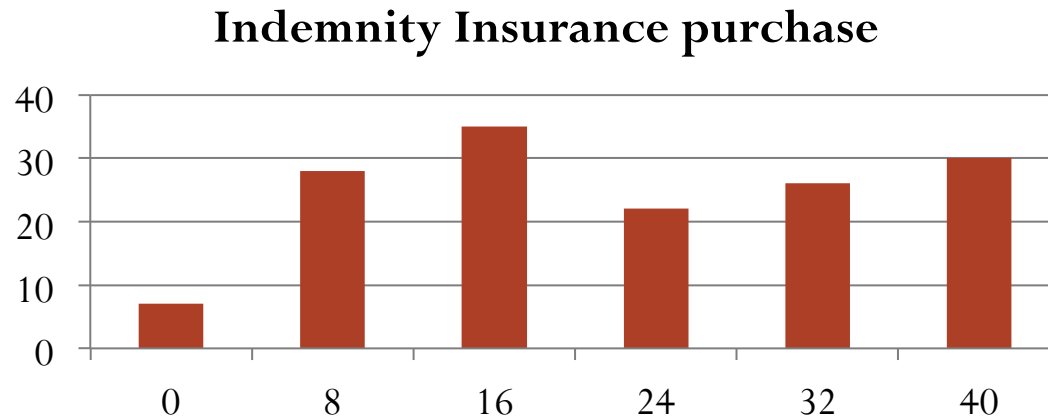
Probability structure of rainfall insurance game

- Each participant is given 65 Birr (US $5) of game money and will incur a loss of 50 Birr with probability ½

- Compound lottery:
  - P(Good weather)=½
  - P(Bad weather)=½
  - P(Loss=50|Good weather)=¼
  - P(Loss=50|Bad weather)=¾

3/4 → Loss = 0
1/4 → Loss = 50
1/4 → Loss = 0
3/4 → Loss = 50
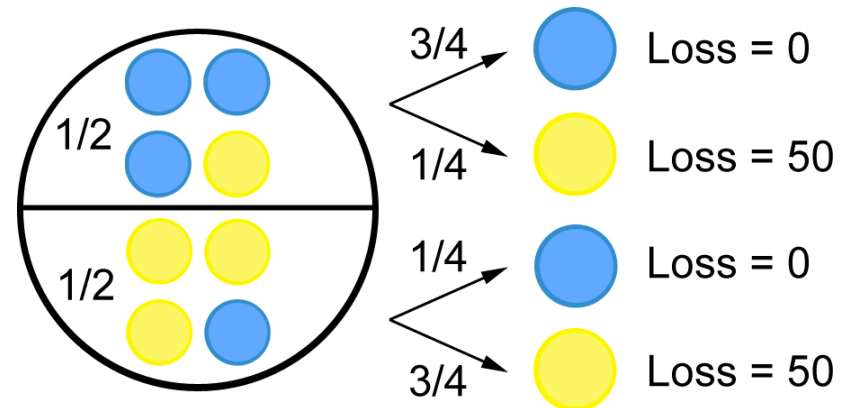
- Treatment 4: Participants may purchase individual index insurance

Premium	0	3	6	9	12	15
Payout if Weather=Bad	0	5	10	15	20	25
Loading	20%	20%	20%	20%	20%	20%

Rainfall insurance game with basis risk

Index insurance purchase

Index Insurance purchase

Proposition: It is never optimal for any risk averse expected utility maximiser with DARA preferences to pay a premium of 6 or more.

Rationale: Risk averse participants shouldn't buy large amounts of index insurance because of the risk of crop loss after good weather. Risk neutral participants shouldn't as it decreases expected earnings.

Participants purchased quite a lot or **TOO MUCH** of index insurance

A B IT WORRYING IF IN PRACTICE WE FIND TAKE UP RATHER LOW...

So no contest?

- Are they really good products?

- Are they really easy to understand? **Easy to understand is not the same as 'easy to make informed, rational decision' !!!**

- Are they still so good once we consider existing informal insurance?

So no contest?

- Are they really good products? √ but with caveats
- Are they really easy to understand?   √??
- Are they still so good once we consider existing informal insurance?

Informal and formal insurance

- Standard argument: informal is about idiosyncratic, and formal is about covariate – so different risks and no competition

- Correct if perfect informal risk-sharing (separability result)

- However, if risk-sharing arrangement is imperfect, enforcement constraints may matter

  Max V=pareto-weighted sum of u_i

  s.t. Staying in agreement is beneficial compared to outside options

- Theory results by Arnott and Stiglitz (1988), Rios-Rull and Attanasio (2001): offering formal insurance can crowd out informal insurance even if other risks are insured

- Evidence? Attanasio; D and Krishnan 2000, EJ

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3. Together we are strong

- Existing personal lines insurance arrangements typically have a sole policyholder

- Question: Can we improve on existing contracts? Can insurers do better by selling insurance products to groups of policyholders?

- Answer: YES
  1. Index insurance: Yes, if the insurer can increase the within-group mutualisation of losses.
  2. Indemnity insurance: Yes, if group members are able to mutualise losses at low informational and transactional cost, given incentive and costly state verification.

Contract Form 1: Group Index Insurance

- In quite general circumstances demand for formal index insurance should be higher when risks are mutualised within a community.
  - Basis risk = Idiosyncratic element of basis risk + systematic element of basis risk
  - Selling to mutual insurance network as a whole can increase insurance as mutual insurance group can internalize idiosyncratic part of basis risk (so 'crowding in' of more informal insurance)

Contract Form 1: Group Index Insurance

- No impact from offering to groups instead of individuals if :
  - Idiosyncratic element of basis risk is non-zero
  - Or if mutual insurance group is perfect risk-sharing group (e.g. D and K in EJ – any idiosyncratic transfer will be shared, so indifferent between group or individual insurance)
- If imperfect risk-sharing due to enforcement problems (as in Rios-Rull):
  - group superior as it will NOT affect outside options,
  - so NO crowding out effect (and only incentives to crowd in)

Contract Form 2: Group Excess of Loss cover

- Suppose that N individuals are subject to income shocks x_i
- An Excess of Loss (XOL) contract with a single group deductible of χ would have claim payout in state $x=(x_1,\ldots,x_N)$ of:

$$\max\left(0, \sum_{i=1}^{N} x_i - \chi\right)$$

- … resulting in total group net loss of:

$$\min\left(\chi, \sum_{i=1}^{N} x_i\right)$$

- No TOTAL claims for below χ means no call-out for loss adjuster for low claims, saving on transactions costs for insurer

Contract Form 2: Group Excess of Loss cover

Under a group XOL contracts:

- **Systematic risk**: insured by external insurer at high cost.

- **Idiosyncratic risk**: semiformal mutual insurance by group members at low cost.

- i.e. Group XOL contracts complement, rather than crowd out, existing cheap informal/semiformal insurance.

Contract Form 2: Examples:

Examples: Formal insurer could sell excess of loss (XOL)-style products to extended families or community organisations that paid out in the following circumstances:

1. Crop insurance
   - If total insured loss for a specified group of farmers is above a specified level (cf. Self-Insurance Funds in Mexico, Ibarra (2004))
2. Life insurance
   - Longevity insurance: If fifteen of twenty over-50s are still alive in five years time
   - Assurances: If more than four of forty 20-40 year olds die in the coming year (cf. reinsuring funeral societies)

Theory?

- Daniel Clarke model
  - Group of excess of loss cover, drawing inspiration from Townsend (1979) and Rai and Sjostrom (2004)
  - Allowing for costly verification
  - But also robust to incentives to collude against insurer
  - Under particular assumptions, can be shown to be superior to 'bilateral' (=individual) contracts

Side contracting over τ:

Ex ante   Interim

$t = 0$ $t = 1$ $t = 2$ $t = 3$ $t = 4$

Accept/reject mechanism   Loss x_i Message m_i Audit a_i Claim payment θ_i
Premium p_i Transfer τ_i
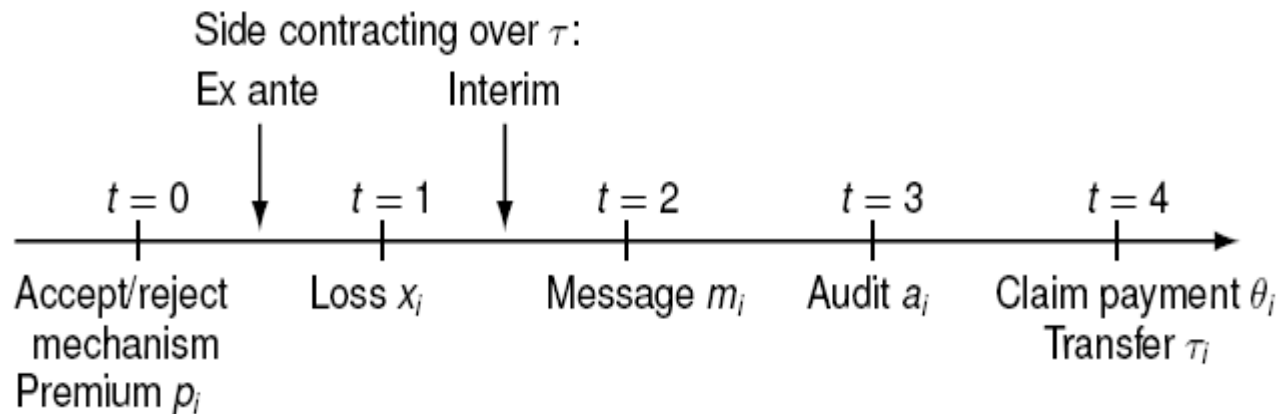
Theory

Statement of optimisation program

Applying Theorem 1 of Wilson (1968) to reduce the problem to one between an insurer and a group representative agent, we may show that:

Lemma

Any truth-telling equilibrium outcome of an optimal feasible direct grand mechanism $G^* = (a^*, p^*, \theta^*)$ and ex ante side contract τ^* solves the following Program for some strictly concave function u_0 and some constant $\bar{u}_0'$:

$$\max_{p_0, y_1(x_1), y_2(x_2), z(x)} \int_X f(x) \Big[p_0 - \max(y_1(x_1), y_2(x_2)) - z(x)$$

$$- \kappa_0 - \kappa_1 \times \max(y_1(x_1), y_2(x_2)) - \kappa_2 \times z(x) \Big] dx$$

subject to

$$\int_X f(x) u_0 (w_0 - x_0 - p_0 + \max(y_1(x_1), y_2(x_2)) + z(x)) \, dx \geq \bar{u}_0$$

$$p_0 \geq 0 \quad, y_1(x_1) \geq 0, \quad y_2(x_2) \geq 0, \quad z(x) \geq 0 \qquad \forall x = (x_1, x_2) \in X$$

Optimality of pure XoL contract when $\kappa_1 = \kappa_2$

Proposition ($\kappa_2 = \kappa_1$)

For $\kappa_1 = \kappa_2$ there is a constant χ such that the optimal contract has an equilibrium claim payment in a.e. loss states x of

$$z(x) = \max(0, x_1 + x_2 - \chi)$$

and equilibrium group consumption of:

$$c_0(x) = w_0 - p_0 - \min(x_1 + x_2, \chi)$$

That is the optimal contract offers full marginal insurance for the combined loss above a group loss deductible of χ.

Examples

Self-Insurance Funds in Mexico

Described in detail by a practitioner in Ibarra (2004):

- Cover around 50% of total insured agricultural area in Mexico.

- Approximately 70,000 farmers in 242 self-insurance funds.

- Voluntary mutual organisations charge premiums, bear some risk and purchase stop loss reinsurance. One reinsurer reinsures all funds.

Examples

Indira Kranti Patham (IKP) health insurance program

- The insurer has delegated claim payout decisions to informal group institutions but retained the right to audit any decisions (which it essentially does randomly).
- To date the scheme annually sells life and severe disability insurance to more than 2 million women.
- This scheme has not been written about anywhere, except in an internal World Bank note.
- Trials of a similar scheme are being planned in East Africa.

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Examples

Protection and Indemnity (P&I) Clubs

- Contracts similar to those suggested in this paper have existed for shipowners since at least the 18th Century, and have developed into today's Protection and Indemnity (P&I) Clubs.

- The thirteen major P&I Clubs coordinate not-for-profit mutual liability insurance for approximately 90% of the world's ocean-going tonnage.

- The thirteen Clubs pool uncertainty between them and purchase one insurance policy providing reinsurance for the group.

- The observed insurance arrangement involves risk pooling within the group and formal reinsurance only for large group losses.

- Shipowners are likely to have access to cheaper information than an insurer

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Conclusions

- Selling to groups will REDUCE basis risk compared to individual insurance, so 'better' products;

- Selling to groups provides incentives for MORE informal risk-sharing, and less risk of crowding out, compared to individual insurance;

- Could allow indemnity based products to be LESS COSTLY and so less likely to be inferior to index-based products;

- Informal insurance groups are likely to understand and trust insurance better as well…

- Time for some trials and experimentation

Weather Index insurance for funeral societies in Ethiopia

- Ruth Vargas Hill's presentation
- Experiment (RCT) funded and ready to be launched in which iddirs, and individuals will be offered index insurance in controlled circumstances with control groups (Outes, Clarke, Dercon, Vargas Hill, Seyoum).