

Risk and demand for incomplete insurance: Lab experiments with Guatemalan cooperatives

Elisabeth SADOULET

Alain de JANVRY

➔ ELISABETH SADOULET, is Professor of Agricultural and Resource Economics at UC Berkeley. She is Senior Fellow at Ferdi.

➔ ALAIN DE JANVRY, is Professor of agricultural & resource economics at the University of California at Berkeley. He is Senior Fellow at Ferdi.

Abstract

We report on a lab-in-the-field experiment on willingness to pay for index-based insurance run in 72 coffee cooperatives in Guatemala. Results show that demand for insurance increases with other uninsured risks (especially if they are correlated with insured risks) and with risk aversion, and that it declines when the worst states of nature are not insured. This is consistent with theory. We also explore demand for hybrid insurance where a group is insured on an index basis, and the group distributes compensations to insured members based on observed relative damages. We find that there is a strong demand for group insurance as a higher quality product, but that there is, in this case, a strong dislike for insuring as a group due to individualistic preferences. Demand for group insurance is also diminished by group heterogeneity, by lack of specification of the sharing rules, and by lack of a commitment device making the sharing rule enforceable.

► Demand for incomplete insurance: individual and group

The objective of this research is twofold. The first is to advance our understanding of demand for incomplete insurance. Insurance is “incomplete” when the payout is less than the damage. We can think of three conditions under which this may happen. The first is when the payment is less than the loss in the states of nature covered by the insurance. This is typical of contracts designed to cover “input costs” or of “partial” insurance in order to reduce cost. Choice of a particular amount to insure or of a deductible is part of this logic. This is also observed with insurance where the payout is related to a weather index and not to one’s loss.

The second is when there are states of nature implying losses that are not insured. This includes insurance for a specific risk such as excess rainfall, but not drought or pest infestations. It also includes insurance for specific sources of income such as agriculture or specific crops, and not for other activities or crops. With index insurance, it would include cases where there are negative shocks on one’s own property, but no shock on the index. These forms of incompleteness are referred to as **background** or **basis** risk. The third is cases where the worst states of nature are not among the insured states. This is the case when there is a **default** on insurance payment, with non-zero probability that a valid claim on a large shock will not be paid. In all cases, there is less than full insurance even as a premium has been paid. While demand for complete insurance products is well understood, very little is known about demand for incomplete insurance products. Yet, in many situations such as smallholder coffee growers in developing countries, this may be the only insurance product available.

The second objective is to evaluate the demand for “**hybrid**” or **group** insurance designed with

the purpose of reducing uninsured risks when the insurance product is incomplete. This is done by insuring a group with an index-based product, and complementing this with loss adjustments within the group based on distribution of the insurance payout based on directly observed relative losses among members of the group. This type of hybrid insurance product can be superior to an incomplete insurance taken at the individual level. It requires however, willingness of group members to cooperate to better insure. We investigate here whether there is effective demand for such group insurance.

► Lab in the field experiments: the setup

To analyze the demand for incomplete insurance at the individual or group level, we conducted laboratory experiments in the field with the members of 72 coffee cooperatives in Guatemala representing the population of cooperatives in that country. Some 9-10 members were randomly selected in each cooperative, resulting in a total of 662 players. The experiment consisted in eliciting the willingness to pay (WTP) for insurance by participants, presenting them with risks and rules for payout distribution that were fully specified.

The lab in the field experiment mimics an excess rainfall insurance with three characteristics: payouts inferior to losses, payouts based on an index and hence independent of actual losses, and existence of uninsured states of nature. Specifically, the setup was as follows:

- The climatic events consist in 5 normal years, one year with heavy rainfall implying a loss without triggering the index, and one year with excess rainfall that triggers the index, hence with a payout once in every 7 years.

- Income in a normal year is Quetzales 10,000 (a Quetzal is equal to 0.16 US\$).

- Losses are 0 in normal years, 1,000 with heavy rainfall, and between 2,000 and 8,000 with heavy rainfall.
- Payout with heavy rainfall is only 1,400, whatever the loss. Fair price of the insurance coverage is thus 200.
- Respondents record their WTP for each of 37 scenarios presented to them: 13 for individual games, 20 for group games, and 4 validation games.
- Games are incentivized by payment for participation proportional to the outcome of one of the games being played drawn randomly, in addition to a fixed assistance bonus.
- The list of activities consisted in
 - An initial and a follow-up marketing survey
 - Games in which subjects were shown probability distribution functions describing different types of risks and were presented with different contractual environments for protecting themselves from these risks, and ask to record their WTP for the contract.
 - Of these games, some were for individual insurance (varying expected loss, standard deviation of expected loss, background risk, and real values) and some for group insurance (group with no intra-group distribution rule, group with rule, group with heterogeneity, and group with deliberation).

The preliminary results presented here are taken from a working paper by de Janvry, McIntosh, Povel, and Sadoulet (2013).

► Main results for individual games

We find the following significant results:

1. WTP for the index-based excess rainfall insurance product increases with background risk (i.e., with uninsured risk such as pest infestation). This is consistent with higher vulnerability to risk increasing the demand for insurance, even if incomplete.

2. With incomplete insurance, demand for insurance rises with the correlation between insured and uninsured risks.
3. WTP is more responsive to the benefits of insurance when risk aversion increases.
4. Demand for insurance declines when the worst states of nature are uninsured, but not differentially more for the more risk averse producers.

These results are consistent with the predictions of theory of demand for incomplete insurance. We take them to show that the lab in the field experiments are able to induce behavior among participants that is as predicted, thus validating the approach.

► Main results for group insurance games

We now turn to hybrid insurance as a superior product relative to individual insurance given the incompleteness of index insurance. In this case, the group gets the insurance payout based on the index, but can decide on how to allocate it among group members depending on actual losses. Important questions are whether within-group loss adjustments induce more demand for index-based insurance as it helps reduce basis risk, whether people intrinsically value insuring through a group, and how do they respond to group heterogeneity (when members have different risk levels). We find the following:

1. There is a demand for sharing payouts according to relative losses within the group. Hence, the value of group insurance to improve the quality of an index-based insurance product is recognized and valued by members of coffee cooperatives.
2. However, there is a strong intrinsic dislike for insuring as a group, equal to about 20% of the WTP for insurance. These two effects—extrinsic appreciation for a hybrid insurance product and intrinsic dislike of insuring as a group—al-

most completely cancel each other. As a consequence, WTP for individual insurance, assuming the burden of all basis risk, is equal to the willingness to pay for group insurance with maximum risk sharing. This dislike for group sharing may be specific to Guatemala with its unique recent history of rural violence and group repression.

3. With group heterogeneity and intra-group loss compensations through distribution of the insurance premium, less risky members would subsidize the more risky members. Results show that there is a dislike for group insurance when there is heterogeneity, also equal to 20% of the WTP for insurance, and this regardless of whether people are the riskiest or the least risky members. Group heterogeneity thus clearly plays against demand for hybrid insurance products.

4. When the way in which the insurance payout will be shared is not specified ex-ante in the contract, and is left to the group to decide, people seem to assume that sharing will actually be minimal. Clear ex-ante setting of the sharing rules is thus essential.

5. There is concern among group members that ex-post renegeing on sharing after shocks may occur. Setting a commitment device for sharing (such as third party enforcement) would thus be important in creating effective demand for hybrid insurance products.

► Reference

- **de Janvry, Alain, Craig McIntosh, Felix Povel, and Elisabeth Sadoulet.** 2013. "Utility, risk, and demand for incomplete insurance: Lab experiments with Guatemalan cooperatives." University of California at Berkeley.



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Contact

www.ferdi.fr

contact@ferdi.fr

+33 (0)4 73 17 75 30

