

Recitation Handout #9 – Limits to Insurance

(Based on Lecture Notes by Prof. Esther Dufflo)

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1 So far

1. Why people desire savings and insurance?
2. How pure insurance is different from pure credit.
3. Models of savings and insurance
4. Informal insurance – does it exist? does it work?
5. Limits to informal insurance

2 Different levels of insurance across villages/persons/shocks

For households within a village, these limits are not as strong as for households across villages. Contrast the results in Cote d'Ivoire (from last lecture) with results on insurance across *amphoes* (counties) in the same region in Thailand.

Why would insurance would be better within village than across villages?

-Information on outcomes, incomes, and enforcement mechanism are better.

Some insurance may be possible across villages: Chris Udry's survey in Nigeria, and long distance traders.

However, we have seen that insurance is not perfect even within villages.

In order to understand better how consumption smoothing works (what problems are present and how they are solved), we need to go passed very reduced form approach and try to describe:

- The different types of responses to fluctuation in income
- How the ability to smooth consumption varies across types of shocks
- How the ability to smooth consumption varies across type of people: villages, wealth, etc...

2.1 How do people cope with risk ?

Townsend (1995) (village institutions in Thailand), Lim and Townsend (1997): transaction files in Icrisat, Fafchamps and Lunds (ask people), Rosenzweig and Wolpin, Udry (observe all borrowing transactions)

- Run down savings and inventory
 - Cash savings (important for the poor in ICRISAT villages)
 - Grain savings (very important in ICRISAT, in Thailand, not in Philippines) Figures 5 and 6 in Lim and Townsend
 - Financial assets (bank account) (Thailand: those who are members of a financial institutions are much better insured against the crisis, mostly because they run down savings)
 - Other assets (bullocks, jewelry).
- Borrowing
 - From Friends/neighbors (Udry in Nigeria, ethnic group: Grimard in Cote d'Ivoire)
 - From Family (Fafchamps)
 - From Village institutions (Rice Banks, Housewife funds in Thailand)
 - From more formal institutions
- Insurance: gifts
 - From Friends/neighbors

- From Family (Fafchamps: Identifies ‘network members’ most are close family members-children or siblings table 2.
- From Village institutions
- From more formal institutions

Variation across class/institutions/shocks

- Shocks: Remember sickness insured much less well than loss of a job or death (Gertler, Fafchamps and Lunds)
- Class: pages 91, 92 in Lim and Townsend. Thailand: poor stock rice, rich lend outside the village at 12% a year.
- Villages: Thailand

Moreover, an empirical analysis of 3 neighboring villages in Thailand (by Townsend) suggests that the degree of insurance varies a lot from one village to the other.

- institutions in Mae Wak
 - * Village savings fund to which all villagers contribute. It provides a loan to members in case of need.
 - * Housewife fund
 - * Fund to finance the purchase of pigs and fertilizer
 - * Rice bank
 - * No one complains of shortage of credit.
 - * In bad times households report that they use loans from one of the funds.
- Institutions in Sop Nak
 - * The same institutions are present but they have difficulties:
 - getting members to contribute regularly
 - default rates
 - when asked about how they deal with defaulters they answer: “What can we do, they are our friends?” Rules have been changed (cannot borrow more than 90% of savings in the bank) to deal with future default.

- Institutions in Maanajohn
 - * No informal institutions.
 - * Rich households smooth fluctuations by saving and dissaving.
 - * Poor households smooth fluctuations by “working harder”. They are completely isolated from richer households financially.
 - * Several people complain of lack of credit.

This study also shows that informal insurance institutions break down when the village gets more integrated in the global economy.

- Village of Ba Pai lies near the highway to Bangkok.
 - * No informal institutions.
 - * Little borrowing or lending in response to fluctuations.
 - * 2 households have faced illness and were not insured against it.
 - * 2 elderly in the village were abandoned by their relatives.

Limits to insurance

Information on outcome: what was your real income?

- Limited information on realized outcomes explains why direct informal insurance will not take place across villages: farmers in one village cannot verify what happened to farmers in another village. In Townsend’s survey of Thailand, there are few instances of informal transfers from one village to the next (even neighboring villages). In a study of Nigeria (by Chris Udry) there was no direct lending across village boundaries.
- Does it mean that there is no insurance at all that can be taken across villages?
 - * Not necessarily: Example: Chris Udry looks at insurance in Nigerian villages. A network of long distance traders provides credit to villagers. The traders:
 - know the village well
 - know each other well
 - * They could organize an insurance system across villages by relaying the information from the village they know well to the network of merchants.

- Within villages, some people may have more information about each other.
 - We should restrict the analysis to these subgroups.
- Importance of *social capital*: the diversity of interactions. In the village of Maana-john, there were no contracts between rich and poor → no insurance can take place between them.
- Trade-off: people who are more alike (example: close neighbors) may have more social capital (which makes insurance easier) *but* they will also have more correlated income
 - there will not be much scope for insurance.
 - Informal mutual insurance cannot by definition insure people completely.

Information on inputs: Moral hazard

- Even if we observe output, we may not observe inputs (for example, effort, as in the sharecropping example)
- Consider a situation where the farmer can improve the probability of success by applying effort, but effort is costly (as in the sharecropping example). If we note e the effort and $c(e)$ the cost of effort, expected utility in autarky is

$$eu(y_H) + (1 - e)u(y_L) - c(e),$$

- With no insurance, what condition must be satisfied for the farmers to choose high effort, e_H over low effort, e_L ?

$$e_H u(y_H) - (1 - e_H)u(y_L) - c(e_H) > e_L u(y_H) - (1 - e_L)u(y_L) - c(e_L)$$
- Consider perfect insurance where effort is observable and each household receives his share of average proceeds: \bar{y} . When will such a scheme be feasible?
- What is the farmer's expected consumption and utility?
 - * Same as autarky b/c y is nonrandom.
 - * $E[U] = u(e_H y_H + (1 - e_H) y_L - c(e)) > e_H u(e_L) + (1 - e_L)u(e_L) - c(e)$, by Jensen's Inequality
- Consider the case where effort is unobservable. Can we feasibly continue the perfect insurance scheme? Why?

- Let's solve for the optimal insurance scheme. Farmers produce y_H or y_L . Let's use the notation h and l for what he consumes in each case. Under full insurance, $h=l$.
 - * Budget Constraint: total insurance payments made equals total amount taken in.

$$e_H y_H + (1 - e_H)L = e_H h + (1 - e_H)l \quad (1)$$
 - * When do farmers choose high effort?

$$EU(e_H) \geq EU(e_L) \Rightarrow ? \quad (2)$$
 - * Is this possible under full insurance? no (solve in pbset)
 - * Is expected utility higher/lower than full/no insurance?
 1. It is lower than full insurance because full insurance gives the same expected consumption with no risk. (Show algebra in homework.)
 2. It is higher than no insurance. HINT: Use concavity to show this in your homework.
 - * From the homework: How do you show that $L < l < h < H$ must be satisfied?
 1. Show that $h \geq l$ to satisfy (2)
 2. Show that cannot have $h \geq H$ or $l \leq L$ by showing that they cannot be optimal because changing
- In the data, we will therefore see some correlation between own income and consumption: it is necessary to give people the right incentives \rightarrow this is what we have seen in Cote d'Ivoire and in the ICRISAT villages.
- Ligon (RES) derives the Euler equation with moral hazard and tries to test it.

Limited Enforcement

Reference: Coate and Ravallion.

- Reciprocal arrangements work without effective written contracts \rightarrow how can we make sure that someone will actually pay his share when he has a good year?
- There can be a social sanction: s (e.g. get frowned upon).
- What is the most natural sanction?

Consider a scheme in which many villagers participate.

- In the insurance scheme, everybody gets $u(E(y))$ every period.
- Outside, he gets $u(E(y))$ every period.

Intertemporal utility function:

$$V(Eu(y)) = \sum_{t=0}^{\infty} \beta^t Eu(y)$$

in the scheme that is equal to $\sum_{t=0}^{\infty} \beta^t u(E(y)) = V(u(E(y)))$

- Consider the choice of an individual who decides whether or not to stay in the scheme. If he rejects the scheme he pays a cost s and has to live in autarky ever after. If he stays he gets: $u(E(y))$ today, $V(u(E(y)))$ ever after. If he rejects the scheme he gets:
 - * if he had the high income $u(y_H) - s$ today, $V(E[u(y)])$ ever after
 - * if he had the low income $u(y_L) - s$ today, $V(E[u(y)])$ ever after

We know that: $y_L < E(y) < y_H$

- * Will an individual with low income ever quit the scheme?
- * A high income will stay in the scheme if:

$$u(y_H) - s + \beta V(Eu(y)) < u(E(y)) + \beta V u(E(y))$$

$$u(y_H) - u(E(y)) < \beta[V(u(E(y)))] - V(E[u(y)]) + s \quad (1)$$

gain from deviating < loss from deviating

Is insurance more likely if

- β is higher? (note: endogenize β and you get multiple equilibria...
- s is higher?
- the income are more spread out (the difference between y_H and y_L is higher)? The response to this question is not obvious: when there is a larger difference, both the left hand side and the right hand side of this equation go up. The result is therefore ambiguous.

→ Those who would gain more from insuring each other are those who are not able to do it!

– If the constraint (1) is not satisfied; how can we achieve some insurance:

* by providing less than full insurance

Choose X to be offered in good state, Y in bad states, such that:

$$pX + (1 - p)Y = py_H + (1 - p)y_L$$

and:

$$u(X) + \beta V(pu(X) + (1 - p)u(Y)) > u(H) + \beta V(pu(H) + (1 - p)u(L))$$

Solve for X using the IC constraint, and the budget constraint will give Y .

Draw a flat line for the IHS, a invert U shape for the left hand side (starting from the average income M).

* by compensating people who have to pay today by higher returns in the future: payment became “history dependent” → insurance starts looking like credit.

- – We could try to provide the high output guy with some gain to participate in the system= we can increase the share of the pie for him tomorrow.
- It makes insurance closer to credit, because someone who paid today will be partly “reimbursed” tomorrow.

Chris Udry documents this in Nigerian villages (an example of risk sharing).

- Chris Udry describes a system of “state contingent loans” which resembles this mix up of credit and insurance.

Continuous 1 year survey in Nigeria. Registered all transaction by households (lending or borrowing).

Widespread participation in the credit market: in 1 year

- 75% of households made loans

-65% of households borrowed

-50% were both lenders and borrowers

-97% of the loans take place between neighbors or relatives

- He shows that borrower takes longer time to repay loans and face lower interest rates when they experience shocks. When lenders experience bad shocks, borrowers pay higher interest rates and repay in short time.
- Is the market Pareto efficient?
 - It would be if there were enough state contingent loans.
 - Implications: we should see that the sum of net repayment to a household should not depend on the shock received by a transaction partner. In practice, we don't see this: when shocks to partner are included into the regression, they matter.
 - Failure of Pareto efficiency to hold is not surprising, since you do observe default.
 - Importantly, almost no reported default when the borrower has had a bad shock. More frequent when the borrower had a good shock: it suggests that the terms of loans are endogenously adapted when the borrower had a bad shock.
- Can this be explained with a limited liability framework?
- What are do the results say about why informal might be better than formal (i.e. within village better than across village)?
- Does this mean that an increase in formal institutions would not improve welfare?