Development Economics

Lectures 5 & 6 – Please bring this handout copy to the next lecture as well.

Consumption smoothing– Insurance

Ray (1998) Chapter 15: *Insurance* (pp591-617).

- Objectives of today's lecture:
  To understand the motivation for and obstacles to insurance.

- Consumption smoothing – simple (but unrealistic) illustration:
  Suppose unrealistically that a farmer knows that her income this year and next year is going to be good and bad, respectively. With the bad income, she has a problem fulfilling the basic needs. We make the following assumptions.

  1. The farmer is risk averse. The utility function is given by $u = \sqrt{c}$ where c is the consumption of rice.
  2. The farmer's output of rice this year and next year are 9 and 4, respectively.
  3. The farmer does not discount the utility next year. (She considers her utility next year as important as her utility this year.)

  Consumption smoothing gives the farmer a higher utility because the marginal utility of consumption is diminishing for a risk-averse farmer.

- Mutual insurance:
  1. Claim
     Mutual insurance loses power when the fortunes of individuals are perfectly positively correlated.
  2. Assumptions
     i) Two individuals, A and B.
     ii) Two types of rice yields, H and L, where H > L.
  3. Mutual insurance possible?
     i) If both have H, then there is no scope for insurance. ➔ Both consume H.
     ii) If both have L, then there is no scope for insurance ➔ Both consume L.
     iii) If one of them has H and the other has L, then there is scope for mutual insurance. ➔ A person with H can give a part of rice to the other person.

- Obstacles to insurance:
  Consider mutual insurance where farmers with high yields give a part of their yields to farmers with low yields. This insurance scheme is a bit different from what you know as insurance. Usually, people first pay insurance premiums to participate in insurance. Here in this example (and other examples in today's lecture), there are no premiums in the usual sense. Instead, under this insurance scheme, farmers with high yields give a specific amount of rice to farmers with low yields after farm yields occur. In a poor developing country, it is difficult to collect insurance premiums ex ante, and the traditional insurance scheme there is ex-post mutual help as described here.

  1. Information problems
     i) Verifiability of crop yields
     ii) Verifiability of farmers' efforts (moral hazard)
  2. Enforcement problem
     i) Under perfect insurance
     ii) Under imperfect insurance

- Information problem, Verifiability of crop yields:
  1. Description

  Sometimes, it is not easy to verify crop yields. Then, farmers may have incentive to under-report their crop yields under a mutual-insurance contract.

- Information problem, Verifiability of farmers' efforts:
  1. Description

  Often, it is difficult to verify farmers' efforts. When low yields occur, it is difficult to determine whether the low yields are due to the lack of famers' efforts, or due to other reasons (bad weather, insect pests, and so on), or due to both. Moreover, if insurance benefits are available, farmers may lose incentive to work hard (moral hazard problem).
  2. Theoretical model highlighting moral hazard

     Assumptions
     i. Farmers are risk averse.
     ii. N farmers (where N is large). Each farmer cultivates one unit of rice field, so their agricultural output is equivalent to their

agricultural yield.

iii. Two types of outputs, H and L where $H > L$

iv. If farmers put efforts, the probability of H is p and the probability of L is $1-p$. The event H (L) is independent across farmers. Because the events H and L are not positively correlated across farmers, there is scope of insurance.

v. If farmers do not put efforts, the probability of H is q and the probability of L is $1-q$. The event H (L) is independent across farmers. Naturally, $p > q$.

vi. Work effort is given by $-X$ in terms of utility.

- Enforcement, Under perfect insurance:

1. Description

   Under perfect insurance, farmers are entitled to the same amount of rice regardless of their own outputs. Farmers with good harvests have incentive not to fulfill the requirement of rice contribution.

2. Theoretical model assumptions

   i. We assume away information problems by assuming that farmers are all honest and diligent.

   ii. A large number of farmers. Each farmer cultivates one unit of rice field, so their agricultural output is equivalent to their agricultural yield.

   iii. Farmers are risk averse with utility function given by u.

   iv. Two types of output H and L, where $H > L$.

   v. The probability of H is p while the probability of L is $1-p$. The event H (L) is independent across farmers.

   vi. Farmers think the insurance system continues forever into the future.

   vii. Farmers contribute a fixed amount of rice to the community relief fund when their yields are H (high) and receive a fixed amount of yields when their yields are L (low).

   viii. The common discount factor for farmers is given by $0 < \delta < 1$.

   ix. S = one-time social sanctions in terms of utility if farmers do not fulfill their requirements.

   x. Once farmers do not fulfill their requirements, they can never participate in the insurance scheme in the future.

- Enforcement, Under imperfect insurance:
  1. Description

     Under imperfect insurance, the consumptions of farmers depend on their own outputs, but a difference in consumption across farmers is smaller than a difference in output across farmers by partial transfers of rice from farmers with good fortunes to farmers with bad fortunes. It is possible that an imperfect insurance system is sustainable although a perfect insurance system is not.[1]
  2. Theoretical model assumptions

     i. The same assumptions as under the perfect insurance. The only difference is that farmers with output H consume X and farmers with output L consume Y where H > X > Y > L.

- Conclusion:

  As long as individuals are risk averse, their life-time utility is higher if they smooth consumption. One way to smooth consumption is through mutual insurance. However, there are obstacles to mutual insurance, which are information and enforcement problems.

- Video about micro-insurance from TED:

  Rose Goslinga: Crop insurance, an idea worth seeding

  (Subtitles in many languages including Japanese and English are available.)

  https://youtu.be/RPjqPHCMJHU?list=PLtX_0wh4AKxXjMyDsjFtPGh_D30KtzeD9

[1] The model focusing on enforcement problem (under either perfect or imperfect insurance) assumes away information problems, in particular, the problem arising from moral hazard (difficulty in verifying farmers' efforts). An insurance scheme under imperfect insurance is often more sustainable than an insurance scheme under perfect insurance in the real world partly because of the moral-hazard problem. Unfortunately, the model discussed today assumes away the moral-hazard problem, so the above insurance scheme under imperfect insurance is not necessarily more sustainable than the above insurance scheme under perfect insurance. However, we can show that imperfect insurance is more sustainable than perfect insurance when X is slightly larger than $M = pH - (1-p)L$ [and, equivalently, Y is slightly smaller than $M = pH - (1-p)L$]. See Ray (1998) pp608-610.