Development Economics
Key questions (5)

Read Ray (1998) Chapter 15: *Insurance* (pp591-617) and answer the following questions regarding consumption smoothing and insurance mechanisms.

1. Explain why poor people smooth consumption? You can use mathematical symbols if you like. Further, raise at least three methods to smooth consumption (about 6-15 lines).

2. (Mutual) insurance possibilities are maximal when the fortunes of individuals are negatively correlated. Explain this. A simple example would help (about 6-10 lines).

3. Consider an insurance scheme in a rural farming area in a developing country. This insurance scheme stipulates that farmers with high yields of rice need to put a certain amount of their products into the community relief fund, while farmers with low yields of rice have access to a certain amount of rice from the community relief fund, without the obligation of paying back (as opposed to a loan where a borrower needs to repay). This insurance scheme may be subject to the following problems. Explain each of them (about 3-6 lines each).
   i)   limited information about rice yields
   ii)   moral hazard
   iii)   enforcement

4. Suppose that there are a large number of rice farmers in a community. Assume that all farmers cultivate one unit of rice field, so their agricultural output is equivalent to their agricultural yield. Assume also that all farmers are honest and diligent, implying that there are no information problems (neither limited information about rice yields nor moral hazard). Rice yields are subject to crop diseases. A rice yield is either high (H) with probability p or low (L) with probability $1-p$ for each farmer. The event H is independent across farmers. The farmers are risk averse and their common utility function is given by $u(C)$ where C

is rice consumption. There is rice insurance available in the community. The rice insurance requires farmers with high yields to give a part of their rice to farmers with low yields. In the community, farmers know each other. If a farmer with high yields refuses to give a part of her/his rice, she/he is never allowed to participate in the rice insurance in the future.

i)   Suppose we want to achieve perfect insurance among the farmers. Under the perfect insurance, how much of rice does each farmer consume?

ii)   Let's denote the level of consumption we find in i) by M. Assume that the farmers consider that this rice insurance scheme will continue forever in the future. The farmers discount utility from future consumption. For example, the utility from consuming M amount of rice one year and two years from now in the future are given by $\delta \times u(M)$ and $\delta^2 \times u(M)$ respectively in terms of the present value of utility, where $0 < \delta < 1$ is the common discount factor. Further, suppose that this community imposes social sanctions on those farmers who do not contribute a part of rice when their yields are H. Suppose that the value of the social sanctions in terms of utility is S. The social sanctions S are imposed on deviator farmers only one time when they do not contribute a part of rice. Derive a mathematical condition that is necessary for the rice insurance system with perfect insurance to survive in the future. (Show your work.) Is this constraint easier to hold with an increase in S (severer social sanctions)? How about with an increase in δ (more patient farmers)? (Show your work for an increase in δ.)

iii)   The perfect insurance we have considered so far may not be feasible. Next we consider imperfect insurance. We assume the same setting as under perfect insurance, except that farmers with yields H consume X and farmers with yields L consume Y, where H>X>Y>L. Derive two mathematical conditions that make the imperfect insurance scheme survive in the future. The first condition should be rice balance, meaning that total amount of collected rice must be equal to total amount of redistributed rice in a long run, or the per-farmer average of collected rice must be equal to the per-farmer

average of redistributed rice in a long run. The second condition comes from incentive constraint. (Show your work for the second condition.) Is this constraint easier to hold with an increase in S (severer social sanctions)? How about with an increase in δ (more patient farmers)? (Justify your answer for an increase in δ.)