ECON 184

Insurance and shocks

Contents

1 Theoretical considerations

1.1 A risky environment

- The poor face a risky environment.
- In rural areas, weather variability affects the productivity of agriculture.
- Examples: floods and droughts.
- Recent examples?
- Other sources of risk are plagues and price shocks. Why?
- Finally, we can also consider of health shocks (including death) and unemployment shocks.

How can households mitigate the impact of these shocks?

1. *Ex-ante* mechanisms
   - Diversification.
   - This could take place in many ways.
   - By crops, by place and by activities (including migration)
   - Adopting technologies that are less sensitive the changes in the "environment".
2. *Ex-post* mechanisms
   - Credit.
   - Insurance.
   - Savings.

1.2 Full insurance model

- Consider the case of village of farmers (based on D. Ray chapter 15).
- Assume that all farmers are identical.
- And assume that each farmer's income (y) has three components:
  $y = A + \epsilon + \theta$
- where A is the farmer's average income.
- ϵ is a *idiosyncratic* random shock that affect farmer's income. Think of the loss of crops due to animals, bugs, inappropriate application of water or fertilizers.
- θ is the *aggregate* source of uncertainty. This of this a a village-effect, something that affects all farmers in the same way.

- Assume also that ϵ and θ have zero mean.
- And consider the case where ϵ is distributed in such a way that for some farmers $\epsilon > 0$ and for others is $\epsilon < 0$.
- Hence, we can think of an arrangements where farmers provide (or withdraw) ϵ to a single pool.
- If a farmer had a lucky draw ($\epsilon > 0$) she will deposit that amount into the village pool, and farmers who received a negative shock will withdraw such amount.
- Notice that because the mean value of $\epsilon = 0$ the total amount of negative shocks must equal the amount of positive ones. So we can always insure farmers against their negative idiosyncratic shocks.

- Under this (ex-post) insurance scheme, each farmer income ($\tilde{y}$) will now be
  $\tilde{y} = A + \theta$
- $\tilde{y}$ has less risk than the original y.
- Farmer's consumption will depend on $\tilde{y}$ instead of y.
- Can we eliminate the risk coming from θ?
- No. Why?
- Unless the village is able to trade "risk" with other villages, aggregate shocks cannot be insured in this model.

1.3 Testing the theory

- The full insurance model suggests that villages have the possibility to smooth their consumption by pooling their income.
- If we control for aggregate village consumption (C_v, which is related to the uninsured aggregate risk θ), then fluctuations in individual income cannot affect fluctuations individual consumption.
- To show this, consider the income of farmer i in time t
  $y_{it} = A_i + \epsilon_{it} + \theta_t$
- A_i is time-invariant while θ_t varies with time but is the same for all farmers.
- In the full insurance model we have
  $\tilde{y}_{it} = A_i + \theta_t$

- Hence chances between periods t and $t-1$ are given by
  $\Delta\tilde{y}_{it} = \tilde{y}_{it} - \tilde{y}_{it-1}$
  $= A_i + \theta_t - A_i - \theta_{t-1}$
  $= \theta_t - \theta_{t-1} = \Delta\theta_t$
- If you run a regressions as follows
  $\Delta c_{it} = \alpha + \beta\Delta C_v + \gamma\Delta y_{it} + e_{it}$
- We should expect $\beta = 1$ and $\gamma = 0$. Why?

- Shocks in Ethiopia (Dercon et al 2005)

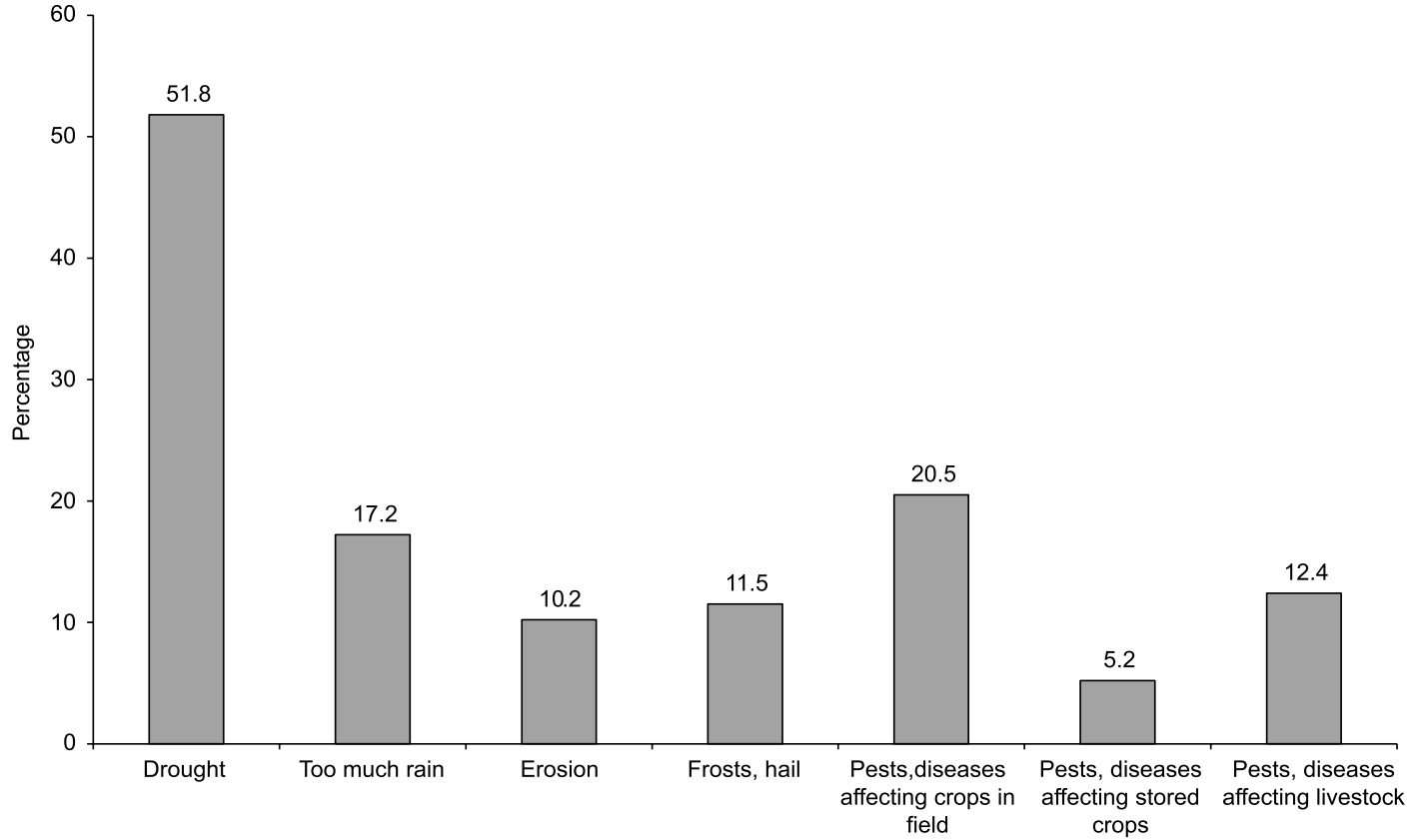


Figure 1: *Households Reporting Climatic Shocks between 1999 and 2004, Ethiopia*

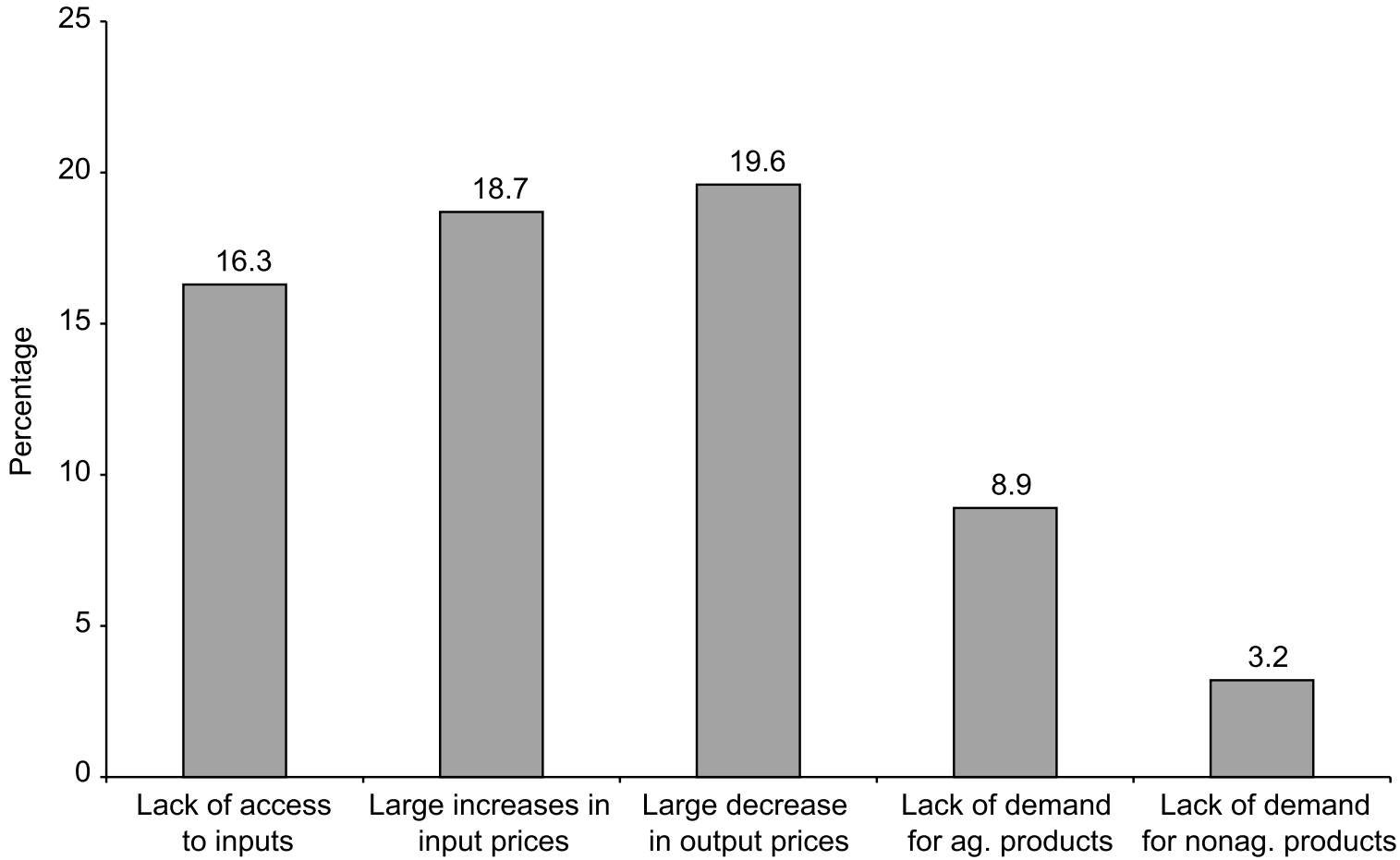


Figure 2: *Households Reporting Economic Shocks between 1999 and 2004, Ethiopia*

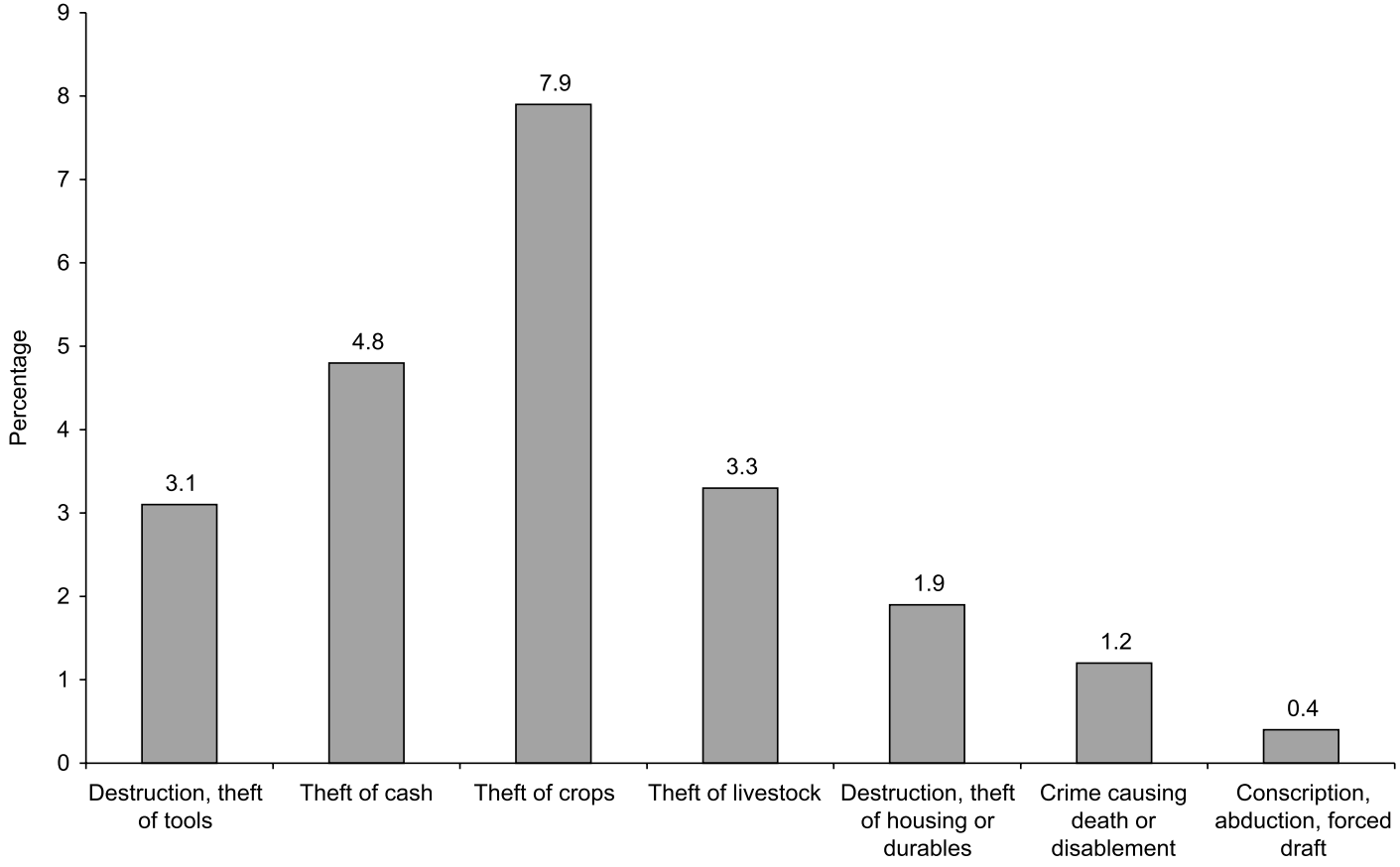
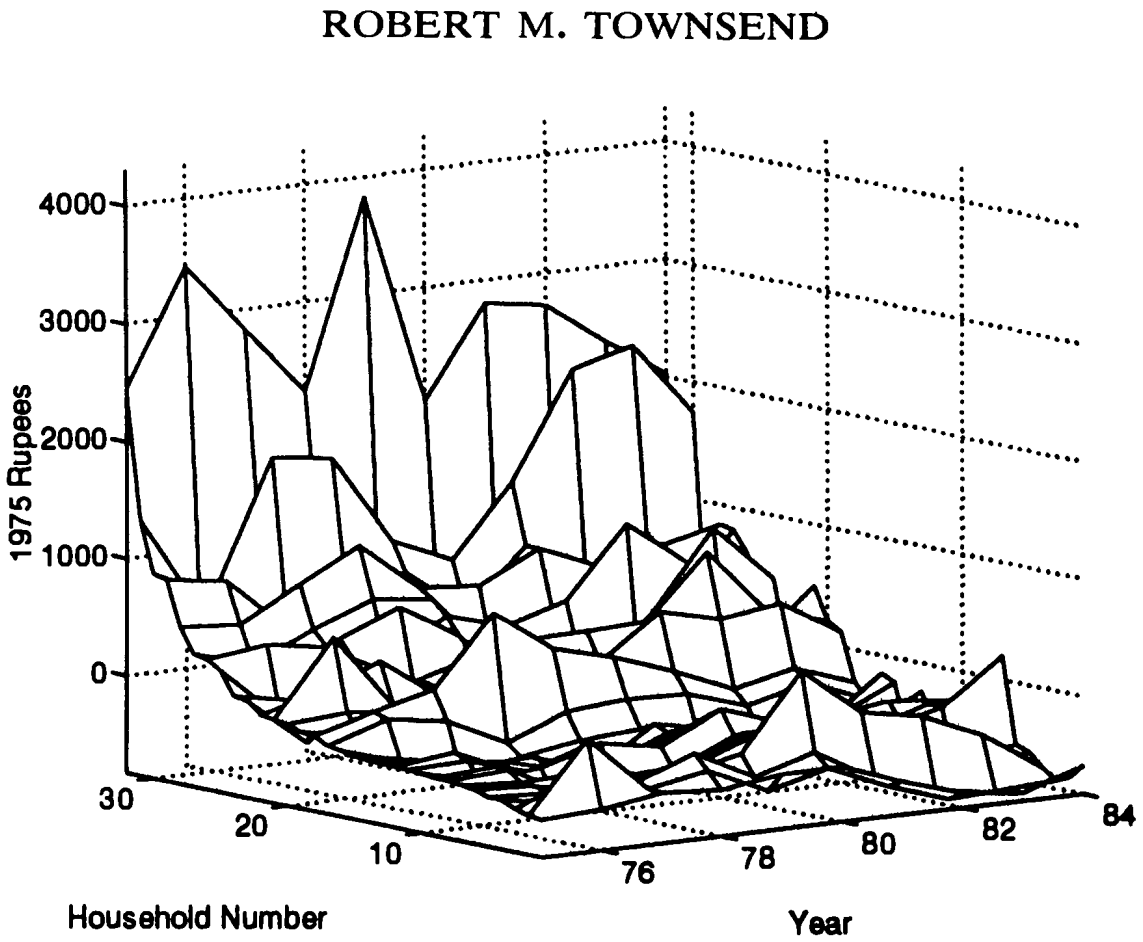


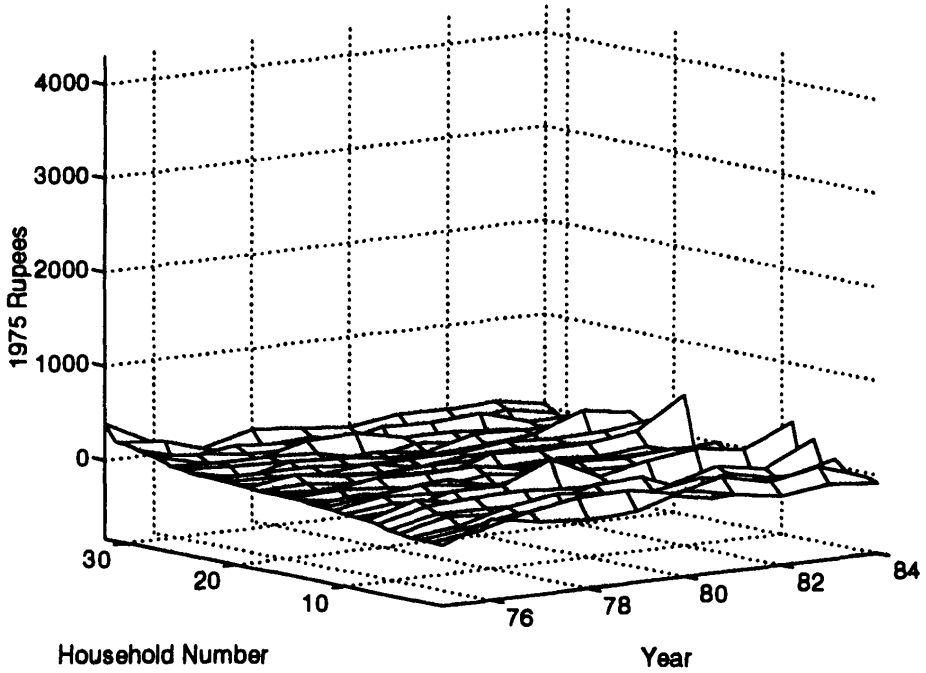
Figure 4: *Households Reporting Crime Shocks between 1999 and 2004, Ethiopia*

- Here are some examples from India (Townsend, 1994). Similar patterns are observed in Ethiopia and Ivory Coast.



(a) Comovement of household incomes (deviation from village average) Aurepalle.

- While income varies by household, consumption is less variable.



(a) Comovement of household consumptions (grain only) (deviation from village average) Aurepalle.

- The evidence shows that consumption smoothing takes place, but it is not perfect.
- When tested, $\beta \neq 1$ and $\gamma \neq 0$.
- Hence, the full insurance model is rejected.
- Why?

1.4 Extensions

- The full insurance model has two main assumptions.
  1. It assumes that information flows without problems. All farmers know exactly how big or small the idiosyncratic shock was.
     - That is, ϵ_i is assumed to be public knowledge.
     - What do you think happens when this is not true? How does the knowledge of ϵ might affect the insurance?
     - Also, we are assuming that ϵ is random. What if the shock can be mitigated by effort?.
     - Suppose that the probability of a bad shock decreases with effort, but effort is not observable.
     - Would you still insure your neighbor is she has a bad shock?

2. Enforcement
   - In the full insurance model, the contracts are not written ones.
   - In most cases they will be informal arrangements among villagers.
   - Consider where shocks are observable.
   - Imagine the situation when a farmer had a big, positive ϵ.
   - Why would this farmer participate in the insurance?
   - Enforcing the contract requires a set of restrictions that might reduce the possibility of full insurance.

2 Examples

2.1 Credit as insurance

- Udry (1990) explore credit markets in Northern Nigeria.
- In Nigeria 90% of the population is Muslim and Islamic law strongly condemns the practice of charging interest for loans.
- But at the same time households are exposed to weather-related risks.
- Udry shows that credit is a form of insurance in this region.
- From a sample of 400 households, he finds that only 10% of them did not report any lending or borrowing.
- Half the households actually participated as both borrowers and lenders at some in time.
- Udry also shows that most of the transactions are informal: there is no written contract or witness. There were no dates specified neither a rate of interest.

- So how could these transactions be sustained (the default rate is only 5%)?
- We know that such transactions have problems because people have no incentives to repay loans.
- Knowing this, households would prefer not help others and denied them loans.
- Udry shows that default is limited because of the ease of information.
- Most transactions occur within close communities and it is hard to misrepresent a financial situation.

2.2 Microcredit in Africa

- The example from Nigeria shows how important is information and monitoring for repayment of loans.
- A similar feature is exploited in what is known as "microcredit."
- Microcredit projects are small loans given to women and now is practised in many countries in Asia, Latin America and Africa.
- In the 1980s this idea emerged due to the results from the Grameen Bank in Bangladesh.
- Grameen experience significant growth and repayment rates above 95%.
- Most importantly the project is self-sustained in part due to the high interest rates.

- There are four main aspect that differentiate microcredit from other forms of credit
  1. Joint liability substitute for lack of collateral. The loan is given to a group instead of to individuals. If one person defaults the group is responsible for the repayment of the loan.
  2. Loans are paid on a weekly basis. Regular loans are not paid until six or twelve months.
  3. During the weekly repayment meetings there are "empowerment messages." Borrowers agree on 16 decisions such as grow vegetables all year; forgo dowry; use pit latrines, etc.
  4. The staff, the people who handled the loans, have a "high-powered" incentives including generous promotions and retirement schemes.

- The joint liability has three advantages
  1. Social pressure. Defaulting on a loan in this case has a severe penalty that is not monetary. From ostracism to embarrassment through gossip, social pressure can create the incentive to repay loans.
  2. Mutual insurance. The "carrot" part of the arrangement is that is something bad happens to one member she knows the others will help her.
  3. Screening through self-selection. The self-formation of groups reduces the information problem. You will form a group with someone who you trust and that finds you trustworthy.
- These mechanisms made Grameen a successful story.
- See Kevane (chapter 10) for an example in Burkina Faso.