

1 **Agriculture: The efficiency of land use**

- Share of agriculture in employment is close to 50% for the world as a whole (50% in China, 57% in India).
- Is land used efficiently?

1.0.1 **Farm size and productivity: observed relationship**

- Farm size productivity differences: see table.
- Profit-Wealth ration and weather variability (monsoon outset is a measure of the risk faced by the farmer): see figure

- The Profit-Wealth ratio is always greater for small farmers
- Small farmers' profits are hurt much more by uncertainty than large farmers'

1.0.2 Why is this surprising?

- Arguments for increasing returns (the opposite relationship)
 - Technology with fixed costs (tractors, etc..)
 - Larger farmers have better access to capital
 - Larger farmers have better access to politically allocated inputs (evidence from Africa in a book by Bates “Market and states in tropical Africa”).
 - The best farmer will have more land...
- Mitigating factors:
 - Rental markets in farm machinery
 - Technological change in not very rapid. Savings not that important.

1.0.3 What could be going on: Arguments for decreasing returns

- – Agency problems: large farms are cultivated by hired labor, which has fewer incentive to work hard. Small farms are owner cultivated.
⇒ Redistributing land will create more owner cultivated land which will be more productive.
- But why cannot the owner of the land not give the right incentive to the farmers?

1.0.4 Different potential explanations for the observed inverse productivity relationship:

- Differences in land quality
- Differences in farmer characteristics
- Incentive Problems

Problem with the observed relationship: all of this could be going on... How can we separate these different effects.

1.0.5 Evidence: Study by Biswanger and Rosenzweig

- Using ICRISAT data: very detailed panel (repeated observation for every household) data from India.
- Some individuals cultivate both an owner-operated plot and a rented plot.
- Biswanger and Rosenzweig compare the inputs they apply on their own plot and the rented plots, and the overall productivity of both plots.

$$\Pi_{ij} = \alpha + \beta R_{ij} + \eta_i + v_{ij},$$

- where Π_{ij} is farmer's i outcome (profit, investment) on plot j , and R_{ij} indicate whether the plot is rented. η_i is the unobserved (but fixed)

characteristics of the farmers (risk aversion, quality, etc...). We think that η_i and R_{ij} may be correlated, but, for a minute, not v_{ij} and R_{ij} . What can we do?

- Control for the individual fixed effect to compare plots within individual's. So for example, for all the farmers that cultivate two plots of land, we can run the regression:

$$\Pi_{i2} - \Pi_{i1} = \beta(R_{i2} - R_{i1}) + v_{i2} - v_{i1},$$

- The individual fixed effect is gone!

Biswanger and Rosenzweig find a strong negative β . What does this suggest? What could be the remaining problem?

1.0.6 More evidence: Shaban (1987)

- Uses the same data, but controls in addition for plot quality.
- He finds that individual work 40% more on their own land (controlling for land size) and that the productivity is 15% to 30% higher on own land than on rented land (with or without controlling for land quality).
- On balance, the evidence suggests that the inefficiency comes from incentive problems.

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- What are possible contracts?

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- Case 3: Only P binds: $m + w \geq 1/2c. e = 1/c$.

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- Suppose that some people own 1 plot of land and some own 5. People can work 1 plot each. The rest are tenanted. What is the size productivity relationship?

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- Irrelevance of contractual form (Cheung)

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2 Where do we stand?

- From the policy point of view it is very important that we develop a methodology for sorting between these different models.
- Banerjee-Gertler-Ghatak find evidence that tenancy reforms increase productivity using a difference-in-difference approach but the effect they find is perhaps too large (60-70% increase in productivity resulting from an increase in the tenant's share from $1/2$ to $3/4$. What else could be going on?
- The literature has emphasized the importance of secure property rights. Goldstein-Udry show direct evidence for this. Field also shows some evidence that insecurity affects labor supply.
- The literature also talks about tradeable rights (Field, Besley) but the evidence there is not particularly compelling yet, despite Hernando De Soto.

- Are there advantages to make these rights non-tradeable? For example, might it change the balance of power within the family.
- Is there an ownership effect—are people somehow more enthused when they feel that it is their land?
- More generally, agriculture seems like a place where behavioral economics needs to arrive: learning seems very slow, risk aversion very high (Duflo-Kremer-Robinson, Conley-Udry).