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. Saviness 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.

\[ \Pi_{ij} = \alpha + \beta R_{ij} + \eta_i + \nu_{ij}, \]

- where \( \Pi_{ij} \) is farmer’s \( i \) outcome (profit, investment) on plot \( j \), and \( R_{ij} \) indicate whether the plot is rented. \( \eta_i \) is the unoberved (but fixed)
characteristics of the farmers (risk aversion, quality, etc...). We think that $\eta_i$ 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!

Biswaenger and Rosenzweig find a strong negative $\beta$. 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.
A Model of Share-cropping
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3. First best maximizes: $e - ce^2/2 \rightarrow e = 1/c$
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- What are possible contracts?
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→ Case 2: LL and P both bind: Then \( r = \sqrt{2c(m + w)} \) and \( e = \sqrt{2(m + w)/c}. \) Holds as long as \( \sqrt{2(m + w)/c} \leq 1/c, \) i.e. \( m + w \leq 1/2c. \)
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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 tennated. What is the size productivity relationship?
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- Irrelevance of contractual form (Cheung)
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5. Cheung
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 have 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 somewho 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).