A MODEL OF SHARE-CROPPING

1. Suppose there is a landlord who owns a plot of land which he himself cannot crop. In each period he employs exactly one tenant to crop the land. The tenant’s outside option is \( m \).

2. Suppose in each period output can take on two values, \( Y_H = 1 \) (‘high’ or ‘success’) and \( Y_L = 0 \) (‘low’ or ‘failure’) with probability \( e \) and \( 1 - e \) respectively. The tenant chooses \( e \), (‘effort’), which costs him \( ce^2 \). The realizations of output are independent over time.

3. First best maximizes: \( e - ce^2/2 \rightarrow \), \( e = 1/c \)

The key assumptions of this model are:

\( \rightarrow \) The tenant has no wealth and cannot save. He does however have an outside income of \( w \), so that the least he can get paid in any period is \( -w \). In other words, the landlord faces a limited liability constraint.

\( \rightarrow \) The tenant’s effort choice \( e \) is non-contractible.

\( \rightarrow \) At first assume that the contract is one-period contract: \( (h, l) \).

\( \rightarrow \) What are possible contracts?

ANALYSIS OF THE MODEL

\( \rightarrow \) The tenant maximizes: \( he + (1 - e)l - \frac{e^2}{2} \)

F.O.C: \( e = \frac{h - l}{c} = \frac{r}{c} \)

The landlord maximizes:

\[ e - e(h - l) - l = \frac{[1 - r]}{c} - l \]

subject to LL: \( l \geq -w \), and

\( P: \quad l + r^2/c - r^2/2c \geq m \)

\( \rightarrow \) Case 1: \( P \) does not bind: Then \( l = -w, r = 1/2, e = 1/2c \). This happens when \( 1/8c \geq m + w \)

\( \rightarrow \) Case 2: \( LL \) and \( P \) both bind: Then \( r = \sqrt{2(m + w)} \) and \( e = \sqrt{2(m + w)}/c \). Holds as long as \( \sqrt{2(m + w)}/c \leq 1/c \), i.e. \( m + w \leq 1/2c \).

\( \rightarrow \) Case 3: Only \( P \) binds: \( m + w \geq 1/2c, e = 1/c. \)
Observations

- Does the tenant earn the marginal product of his effort? Does he work as hard as he would in the first best?
- Is he paid his outside option?
- What happens to effort when \( w \) goes up? What does this tell us?
- Tenancy ladder...
- What happens to effort when \( m \) goes up? What does this tell us?
- Empowerment...
- What happens to contract when \( c \) goes up? What does this tell us?
- 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?

Other Views of Share-cropping:

- Risk versus moral hazard (Stiglitz):
  - Who becomes a tenant?
  - Version A: The more risk-averse by instinct.
  - Version B: The poor who are more risk-averse by virtue of being poor.
  - Can it explain S-P relation?
  - Two-sided moral-hazard (Eswaran-Kotwal)
  - Relative skills determine who becomes a tenant.
  - It explain S-P relation?
  - Irrelevance of contractual form (Cheung)

Land Reforms

- Suppose we took land from the landlord and made over the ownership to the tenant. What will be the effect on productivity under:
  - Limited liability moral hazard
  - Risk aversion moral hazard, version A
  - Risk aversion moral hazard, version B
  - Two-sided moral hazard
  - Cheung

Back to the data: Are owner operated farms more productive?

- Biswanger and Rosenweig use the ICRIStA data: very detailed panel (repeated observation for every household) data from India.
- Estimating equation:

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

where \( \Pi_{ij} \) is farmer's profit on plot \( j \), and \( R_{ij} \) indicate whether the plot is rented. \( \eta_i \) is the unobserved (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 \( \nu_{ij} \) and \( R_{ij} \).
- Table 1, Shaban: Some individuals cultivate both an owner-operated plot and a rented plot.
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:

\[ \Pi_{i2} - \Pi_{i1} = \beta (R_{i2} - R_{i1}) + \nu_{i2} - \nu_{i1}, \]

Biswanger and Rosenzweig find a strong negative \( \beta \). What does this suggest? What could be the remaining problem?

Shaban (1987) use the same data, but control in addition for plots quality, using plot sales value (collected for all the land in the village from the same group of informants), and looks at inputs choices.

Table 2: plot value is actually higher for owner cultivated farms. Could have just estimated an equation like Biswanger and Rosenzweig and control for land quality, but he does something a little different.

Estimating equation: \( \Delta x_i \) is the difference in the weighted averages of inputs between owned and sharecropped plots.

\[ \Delta x_i = \sum_m \beta_m (D^O_m - D^S_m) + \sum_j \theta_j E_j + \nu_{ij} \]

Where \( D^O_m \) is the average of plot characteristic \( m \) for the owned plot for farmer \( i \), \( E_j \) are village dummies.

Test whether \( \theta_j > 0 \) for all the village dummies, and jointly. Note: the average of the village dummies would have been the constant: one test would be to test whether the constant is positive after controlling for the differences in plot characteristics.

Results: Individual work 40% more on their own land (controlling for land size). Productivity 30% higher on own land than on sharecropped land.

Land reform very difficult to implement in practice (political opposition–implementation difficulties).

(At least some) theories suggests that complete land reform is not the only way to increase land productivity. Another way is to improve incentives for sharecroppers. Tenancy reform: Operation Barga.

- Communists reached power in West Bengal in 1977
- Within a year of being elected, implement a program to put in application a tenancy law previously not implemented
- A registered tenant could:
  1. Not be evicted as long as they paid their due
  2. Maximum legally binding due: 25% of the output
- Operation Barga was a drive to increase registration rates. In 1993 registration was 65%, in 1977: 15%.

EXPECTED EFFECT

Barga reduces eviction threats. In a survey of tenants, 80% of interviewees report that landlords used eviction threats before Barga, and 96% say that it is now difficult to evict a tenant.

- First effect: increase in outside option m: Impossibility to use eviction as a threat reduces the landlord bargaining power.
- Expected effect on productivity?
- Second effect: cannot use eviction threat as a discipline device.
- Why does it matter?
- In case 1 (P not binding), tenants earn rents: being in a relationship with the landlord is valuable, compared to the outside option.
- Multiperiod contract: threats of loosing these rents can be used as an additional incentives.
- Overall effect of Barga on productivity is ambiguous.

EMPIRICAL ANALYSIS: WB VS BENGALADESH

- West Bengal vs Bangladesh: simple DD.
- West Bengal and Bangladesh grew at similar speed before Barga.
- Early years of Barga, Bangladesh grew faster (drought).
- Afterwards West Bengal grows faster.

- Using estimate of the fraction of rice area under sharecropping in WB (about 25%), estimate an increase of 51% on the productivity of registered tenants.
- Only due to Barga? Other possibilities?
- Controlling of irrigation and HYV makes estimates higher.
- There could still be other policy differences: estimate the effects within West Bengal.

EMPIRICAL ANALYSIS: REGISTRATION INTENSITY

- Registration intensity varied by district.
- Registration happened mostly in "camps": variation in registration seem to have been mostly driven by supply constraints.
- Other possibilities?
- Assume that registration is not related to change in productivity.
- Estimating equation:

\[
\ln y_t = \alpha d_t + \psi_t + \gamma b_{t-1} + \sum_{k} \beta_k \ln X_{t+k} + \nu_t
\]

- Results. Effect on productivity on sharecropped land: 62%.
- Caveats?