
Land Property Rights and Development

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Introduction

- Rural development a key concern in LDCs, owing to large fraction of population and GDP in agricultural sector
- Rural poverty also tends to be higher than urban poverty, in India and China
- Important policy issue: land reform
- Important in Asia, Africa and Latin America though issues differ somewhat; my main focus will be Asia

Dimensions of Land Reform

- Redistribution of land to reduce land inequality
- Regulation of tenancy contracts (rent control, security of tenure)
- Land titling programs for squatters (security of property rights)
- Regulation of land sales (conversion of agricultural land to industrial use; communal restrictions)
- Focus on first two for most part

Criteria

- Most of the public discussion concerns distributive fairness and political implications
- Typically generates serious political and civil conflict
- Most successful land reform programs (East Asia) have not been carried out by democratic regimes
- We shall focus on consequences for incentives and productive efficiency

The Right-Wing View

- The right-wing argument for protection of landowners' property rights based primarily on productivity and efficiency consequences of land reform
 - land will be transferred to those lacking experience or skill, access to credit, infrastructure and marketing services
 - rent control will reduce incentives for landowners to invest in their properties and monitor tenants
 - regulating freedom to sell land to outsiders will undermine land markets, limit allocation to their most productive uses, and reduce property owners incentives to invest

The Left-Wing View

- Small owner cultivated farms are the most productive, so land redistribution can raise productivity
- This would raise GDP and reduce inequality/poverty, while obviously not constituting a Pareto improvement
- An alternative is to regulate sharecropping contracts, by either providing a floor to the share of the tenant, or restricting the power of the landlord to evict tenants
- With high land inequality, landowners offer tenants shares that are too low, creating high Marshallian distortions that lower productivity; eviction threats limit security of tenure and reduce incentives for tenants to invest in long-term improvement of property

Plan of the Lecture

- Present theories and empirical evidence pertaining to these issues
- Focus on two principal theories:
 - Incomplete contract theory of Grossman-Hart-Moore (GHM)
 - Complete contract theory: moral hazard with wealth constraints (MHW)
- Empirical evidence will be based on studies of Indian agriculture

The Grossman-Hart-Moore Approach

- The GHM model is based on inability of agents to commit to a comprehensive contract: aware that contracts will be renegotiated as the future unfolds
- Ownership is defined as residual rights of control (in contingencies that are not covered by pre-existing contractual commitments)
- Ownership affects *ex post* allocation of bargaining power and consequently of rents/surplus between agents
- Anticipations of these will affect their respective incentives to invest in relation-specific investments
- The theory assumes fully transferable utility (i.e., perfect credit markets), implying absence of wealth effects

The Moral Hazard with Wealth Constraints

Approach

- Based on Mookherjee (1997), Banerjee-Gertler-Ghatak (2002), also drawing on earlier work on sharecropping contracts with limited liability by Shetty (1988), Dutta-Ray-Sengupta (1989); similar models developed by Aghion and Bolton (RES 1997), Holmstrom and Tirole (1997)
- Here there are no commitment problems: agents enter into *ex ante* complete contracts which are enforced
- Imperfect credit markets, implying some agents can be wealth constrained: lack of fully transferable utility
- Ownership in the sense of *ex ante* bargaining power affects allocation of rents when some agents are wealth-constrained, which has implications for investment incentives and productive efficiency

Key Point of Contrast

- While there are many similarities between the two approaches, normative implications differ quite sharply
- In GHM approach, perfect transferability of utility implies allocation of ownership rights maximizes productive efficiency (subject to incentive constraints representing renegotiation constraints)
- In MHW approach, wealth constraints may prevent asset transactions that maximize (incentive-constrained) productive efficiency
- Hence in MHW approach, there is scope for land reforms that raise aggregate productivity and efficiency under suitable conditions

Detailed Outline

- Use a simple example to illustrate the GHM and MHW theories, with regard to their implications for effect of land reforms (focusing on redistribution or regulation of use rights)
- Describe empirical evidence from Indian agriculture
- Time permitting, describe some recent work on arguments for regulating exchange (sale) rights

The GHM Approach: An Illustration

- Two agents: L, T, and one asset (plot of land, taxicab, real estate etc.) which generates income or consumption benefits for T
- L invests x at personal cost $c_L(x)$, T invests y at personal cost $c_T(y)$: resulting (deterministic) flow of income/consumption benefits is $f(x, y)$
- c_L, c_T strictly increasing and convex; f strictly increasing and concave; for most part simplify by assuming $f = \alpha x + \beta y, c_L = \frac{x^2}{2}, c_T = \frac{y^2}{2}$
- f nonverifiable/noncontractible: only fixed rent contracts are feasible; normalize autarkic payoffs to 0

GHM Model: Sequence of Events

- At $t = 0$, L and T enter into a contract or agreement, which is merely an understanding but represents no real commitment
- At $t = 1$, L invests x , T invests y
- At $t = 2$, x, y are mutually observed by L and T. Then they renegotiate.
- Ownership defined as control rights in the event of a disagreement at this point.

GHM Model, contd

- If L owns, L has the power to evict T at $t = 2$ and replace him with another tenant, and earn $f(x, \lambda y)$ where $\lambda \in [0, 1]$ represents extent of specificity of T's investment
- If T owns, has the power to replace L by some other L' and earn $f(\lambda x, y)$
- Rent is renegotiated at $t = 2$, according to Nash bargaining with disagreement payoffs serving as status quo payoffs

GHM: Effects of L Ownership

- Status quo payoffs: $\underline{\Pi}_L = f(x, \lambda y), \underline{\Pi}_T = 0$
- r_L^* maximizes $[r - f(x, \lambda y)][f(x, y) - r - 0]$: $r_L^* = \frac{f(x, \lambda y) + f(x, y)}{2}$
- *Ex ante* payoff: $\Pi_L = \frac{f(x, \lambda y) + f(x, y)}{2} - \frac{x^2}{2} \rightarrow x_L^* = x^{FB} = \alpha$
- $\Pi_T = \frac{f(x, y) - f(x, \lambda y)}{2} - \frac{y^2}{2} \rightarrow y_L^* = (1 - \lambda)\frac{\beta}{2} < \beta = y^{FB}$

GHM: Effects of T Ownership

- Status quo payoffs: $\underline{\Pi}_L = 0, \underline{\Pi}_T = f(\lambda x, y)$
- r_T^* maximizes $[r - 0][f(x, y) - r - f(\lambda x, y)]$: $r_T^* = \frac{f(x, y) - f(\lambda x, y)}{2} < r_L^*$
- *Ex ante* payoffs: $\Pi_L = \frac{f(x, y) - f(\lambda x, y)}{2} - \frac{x^2}{2} \rightarrow x_T^* = (1 - \lambda) \frac{\alpha}{2} < x^{FB}$
- $\Pi_T = \frac{f(x, y) + f(\lambda x, y)}{2} - \frac{y^2}{2} \rightarrow y_T^* = \beta = y^{FB}$

GHM: Compare Productivity Between T and L ownership

- Whoever owns the asset has first-best incentive, the other party under-invests
- Productivity under L-ownership $F_L = \frac{1}{2}\{\alpha^2 + (1 - \lambda)\frac{\beta^2}{2}\}$
- Productivity under T-ownership $F_T = \frac{1}{2}\{\beta^2 + (1 - \lambda)\frac{\alpha^2}{2}\}$
- To maximize productivity, asset should be owned by whoever has the bigger incentive problem

Implications of GHM

- First-best cannot be achieved: 'moral hazard in teams' problem with a two-sided incentive problem
- Within constrained-efficient allocations, one ownership structure can be associated with higher productivity/efficiency
- Owing to transferability of utility, market for ownership will operate so as to maximize utilitarian welfare across the different ownership structures (the 'quasi-Coase' theorem)

GHM Implications for Land Policies

- Land reform which coercively redistributes ownership will lower aggregate efficiency
- If L owned the asset, it must be because this was efficient: redistributive policy would lower efficiency
- Effect of rent control: if L owns the asset and there is rent control with maximum rent $\bar{r} < r_L^*$
- L's *ex ante* payoff $\bar{r} - \frac{x^2}{2} \rightarrow x^* = 0!!$; $\Pi_T = f(x, y) - \bar{r} - \frac{y^2}{2} \rightarrow y^* = y^{FB}$
- Productivity is even lower than T-ownership

Extension of GHM to Allow Some Commitment

- Edlin-Reichelstein (1996), Che-Hausch (1999) examine implications of allowing *ex ante* contracting in the GHM model
- *Ex ante* contract is $\underline{q}, \underline{r}$, where with probability $\underline{q}$ tenant has the right to stay upon paying rent $\underline{r}$
- This forms the basis of renegotiation at $t = 2$
- SQ payoffs at $t = 2$: $\underline{\Pi}_L = \underline{q}\underline{r} + (1 - \underline{q})f(x, \lambda y)$; $\underline{\Pi}_T = \underline{q}[f(x, y) - \underline{r}]$

Ex Ante Contracts in GHM

- $r_L^* = \underline{q}r + \frac{(1-\underline{q})[f(x,\lambda y)+f(x,y)]}{2}$
- $x^*(\underline{q}) = (1 - \underline{q})\alpha < \alpha$ if $\underline{q} > 0$
- $y^*(\underline{q}) = [1 - (1 - \underline{q})\{\frac{1+\lambda}{2}\}]\beta < \beta$ if $\underline{q} < 1$
- Raising $\underline{q}$ allows shifting incentives towards T under L-ownership

Ex Ante Contracts in GHM, contd.

- By committing to $\underline{q} = 1$, can induce first-best investment by T , at the cost of eliminating one's own investment incentive (whereas with T ownership L was still left with some incentive)
- First-best cannot be achieved, since investments are 'cooperative' rather than 'selfish'
- This requires courts to enforce such contracts, even if L should *ex post* insist on his right to evict T
- If courts are biased in favor of L rights, may not be willing to enforce such contracts (e.g., China, where L is the local government): then we are back to the GHM setting without *ex ante* contracts
- In any case, if T ownership is efficient then in a free land market T will buy the land, and there is no need for such contracts

MHW Model

- Consider the same setting as before but with some differences: production is stochastic: output is 1 with prob. $\alpha x + \beta y$, and 0 otherwise
- Output is verifiable/contractible, so sharecropping contracts are possible
- T is wealth constrained: T has zero wealth and zero autarkic payoff, his consumption must be nonnegative in all states
- This implies fixed rent contracts are infeasible: T cannot pay if output is zero

MHW Model, contd.

- At $t = 0$ L and T sign an *ex ante* contract (s, t) which will be enforced, where s, t denote T's income if output is 1, 0 respectively (and $1 - s, -t$ is L's income)
- Then at $t = 1$, they choose x, y respectively, these are noncontractible
- At $t = 2$ output is realized, and the contract is implemented (no renegotiation)

$$\Pi_L \equiv (1 - s + t)f(x, y) - \frac{x^2}{2} \quad (1)$$

$$\Pi_T \equiv (s - t)f(x, y) + t - \frac{y^2}{2} \quad (2)$$

MHW Model, contd.

- Limited Liability constraint: $s, t \geq 0$
- T's participation constraint can be ignored
- Incentive constraints: $x^* = (1 - s + t)\alpha$ provided $s - t \leq 1$, and 0 otherwise;
- $y^* = (s - t)\beta$ provided $(s - t) \geq 0$; and 0 otherwise
- Raising s raises y^* , lowers x^*
- Raising t has the opposite effect

MHW Model, contd.

- First-best is unachievable: ‘moral hazard in teams’ problem (for $x^* = \alpha$ need $s - t = 0$ but then $y^* = 0$)
- What if the investment problem is one-sided ($\alpha = 0$)?
- Then first-best is feasible: set $s = 1, t = 0$ whence $y^* = \beta$, but then $\Pi_L = 0$
- As long as L has some bargaining power *ex ante*, and obtains positive surplus, must have $s < 1, t = 0$ and T will under-invest

MHW Model, contd.

- How are (s, t) determined: by *ex ante* bargaining over a contract
- Status quo payoffs depend on ownership, in conjunction with distribution of assets
- Suppose L owns the land, and land is scarce, in the sense that landowners are on the short side of the market; there are lots of T's with $w = u = 0$
- Then L will have all the bargaining power in a stable allocation: contract will be chosen to maximize Π_L

L-ownership in MHW Model

- If L has all the bargaining power, s, t are chosen to maximize $\Pi_L(s, t) = (1 - s + t)[\alpha x^* + \beta y^*] - \frac{x^{*2}}{2} - t$
- Optimal to set $t = 0$; otherwise (provided $y^* > 0$) lower s and t in step, leaving $s - t$ unchanged
- So s chosen to maximize $\Pi_L(s, 0) = (1 - s)^2 \frac{\alpha^2}{2} + \beta^2 s(1 - s)$
- $s < 1$ so T under-invests
- Using $\gamma \equiv \frac{\beta^2}{\alpha^2}$:

$$s^* = \frac{2\gamma - 1}{4\gamma - 1}$$

T-ownership in MHW Model

- If T owns the plot of land, he has the option of cultivating it himself, irrespective of whether or not L supplies any x
- T enters into an *ex ante* contract with L for supply of x
- Disagreement payoffs: L gets 0, T selects y to $\max \beta y - \frac{y^2}{2}$ and attains payoff $\frac{\beta^2}{2}$
- Relative to L -ownership this shifts bargaining power in favor of T
- So the contract shifts in the direction of the contract which maximizes Π_T subject to $\Pi_L \geq 0$

T-ownership in MHW Model

- To simplify matters set $t = 0$, this is okay if β is large relative to α since only role of t is to provide L with incentives at the expense of T's incentives
- $s_T^* = \frac{1}{2-\gamma} > s_L^*$ provided $\gamma \equiv \frac{\beta^2}{\alpha^2} \geq 1$
- If β is large relative to α , this raises productivity
- If $\beta < \alpha$ it lowers productivity, and may lower welfare
- Changing ownership to T rather than L raises s^* , lowering x^* , raising y^*

Ownership Effects in MHW Model

- Struggle for rents between L and T; ownership changes *ex ante* bargaining power, thus changing the chosen contract and allocation of rents and incentives
- Each side ignores the effect on the rents of the other: hence neither pattern of ownership may maximize productivity
- If the investment problem is one-sided, productivity and welfare is maximized if the party with the investment problem owns the asset
- However, allocation of ownership may not maximize constrained efficiency/productivity

Efficiency of Ownership Allocation in MHW Model

- If L owns the asset to start with, and T has the stronger incentive problem, aggregate efficiency/welfare maximization entails a shift in ownership to T
- But if T is wealth constrained, he will not be able to buy the asset from L
- So the market allocation of property rights may not maximize efficiency/welfare, in contrast to GHM model
- L ownership is constrained Pareto efficient, however

MHW Implications for Land Reform

- If T ownership is more 'efficient', coercive redistribution of land can raise aggregate output, lower inequality/poverty
- But it is not possible to compensate L's adequately without running a budget deficit: why land reform is so difficult politically
- Alternative to land redistribution: regulate sharecropping by imposing minimum share going to the tenant, that will have the same effect in this model
- Note, however, that land reform may lower productivity and welfare, if L's incentive problem is more important, so this is an empirical matter

Empirical Evidence

- Inverse-farmsize-productivity relationship
- Indian farm management studies in the 1960s and early 1970s
- Berry and Cline (1978) reported similar results in Brazil, Pakistan and Malaysia
- Surprising, since expect large scale economies with respect to technology, access to credit, modern inputs etc.
- These suggest land redistribution will raise aggregate productivity

INDIAN FMS, LATE 1960s		
Acres	Av. Size	Income per acre
0-5	3.0	737
5-15	9.3	607
15-25	19.5	482
25+	42.6	346

FARM SIZE PRODUCTIVITY RELATION			
	N.E. Brazil	Pakistan	Malaysia
small	563	274	148
(ha.)	(10–50)	(5–10)	(.7-1.0)
large	100	100	100
(ha.)	(100+)	(20+)	(5.7–11.3)

Size-Productivity Relationship

- What does this tell us about ownership effects?
- Small farms tend to be owner cultivated (or tenant cultivated)
- Large farms are wage labor farms (like L ownership and $s = 0$)
- So there isn't a clear implication for effects of ownership or sharecropping contract on productivity

Empirical Evidence on Sharecropping Effects

- Shaban (JPE 1987) used Indian ICRISAT data, a farm panel in 6 villages of central India, 8 years
- Owner cultivated farms have higher output per acre (by 33%) and higher inputs per acre (by 19%) for major inputs supplied by farmer, compared to sharecropped farms
- Controls for farmer fixed effects, soil quality, irrigation status lowers the difference in output per acre to 16%
- Family labor (male) higher by 21%, female labor by 47%, bullock labor by 17%
- No difference between owner-cultivated farms and fixed rent tenancy (both like $s = 1$)

SEN (1981) RESULTS FOR W.BENGAL FARMS		
Acres	Pure OC	Sharecr Land
0-3	1313	604
3-5	1044	709
5-8	960	676
8-12	691	604
12-	624	604

Banerjee-Gertler-Ghatak (JPE, 2002)

- Study effects of *Operation Barga*, tenancy registration program in West Bengal between 1979–93
- 2-3 million sharecroppers registered: created minimum share of $T = .75$, eviction restrictions; average registration rate rose from 15% to 65%
- Use panel of rice yields at the district level, 15 major districts, on tenancy registration rate (assuming timing of latter was exogenous)
- Controls for HYV adoption rate, rainfall, roads and canals provided by state government
- rise in registration rate found to raise rice yields significantly, total predicted effect around 18% rise

Bardhan-Mookherjee (2007)

- Study effects of Operation Barga at the farm level: farm panel for sample of 550 farms for about 3–5 years each between 1982–95
- Control for other programs being simultaneously implemented: a land titling program, farm extension services, credit supply, spending by local governments on roads and medium irrigation, in addition to BGG controls
- Instrument for possible endogeneity of program implementation rates
- Significant effect of proportion of agricultural land in the village registered, on rice yields and total value added per acre: accounted for 8% rise (smaller than BGG estimate)

Bardhan-Mookherjee (2007) contd.

- Surprising finding: effects on OC farms almost the same as that on tenant farms
- This cannot be explained by reduction of the Marshallian distortion in tenant farms
- Need to account for large spillover effects to non-tenant farms (induced effects on groundwater investments)
- Effects of farm extension programs, credit, village infrastructure on farm productivity growth much larger than effects of Operation Barga
- Former set of programs explain rapid diffusion of HYV rice, whereas Operation Barga had almost no effect on this