L19 Land Reforms: Evidence

Dilip Mookherjee

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Outline

- Empirical evidence concerning farm size-productivity relationship
- Estimated effects of recent land reforms in India, S Africa, Brazil
- Also discuss political and administrative problems in implementing land reforms within a democratic society

Testing Farm Size - Productivity Relationship More Carefully

- Estimate productivity variations with respect to:
  - scale
  - mode of cultivation (owner/hired labor/sharecropping tenant/fixed rent tenant)
- Control for possible omitted variables and reverse causation

Econometric Concerns

- *Omitted Variables:* What if small farms are more productive because they happen to have better soil quality? Better access to irrigation? Less fragmented?
- *Reverse Causation:* Maybe more productive soils generate higher income, higher population pressure, greater subdivision of lands, smaller farm size? Small farmers are better farmers?

Possible Measurement Errors

- Productivity measure: yield/per acre, excludes cost of inputs
- What if higher yields are arising from greater application of inputs per acre? Which inputs?
- How are inputs and outputs measured? Reporting/cultivation survey errors?
- Unit of analysis: state, district, village or farm?

Step 1: Separate Scale Effects from Mode of Cultivation in Indian FMS Data (Sen (1981), Table 12.5 in text)

INCOME PER ACRE OF W.BENGAL FARMS		
Acres	OC/HL	Sharecropped Land
0-3	1313	604
3-5	1044	709
5-8	960	676
8-12	691	604
12-	624	604

Step 2: Check for Omitted Variables Bias: Soil and Irrigation

- Bhalla and Roy (1988) control for possible variations in soil quality and (state provided) irrigation infrastructure across small and large farms
- Use farm level data for large sample of farms all over India (Fertilizer Demand Survey), with 21,500 farms in 1975-76 and 1976-77
- Unusually rich description of soils (color, type (sand/clay/loam), depth, salinity), irrigation source

Step 2, contd.

- Bhalla-Roy control for exogenous characteristics of soil (color/type/depth), irrigation (canals/tanks/village wells), fragmentation of farmland
- Regress farm income per acre on farm size first without controls (version A)
- Then they add soil controls (version B) and irrigation and fragmentation controls (version C)
- Carry out analysis at different levels of aggregation (state, subzones, district)
- Separate regressions for different areas (allow for heterogeneity of scale effects across areas)

Bhalla and Roy Results

TABLE 3

Summary Results of Farm Productivity Equations—By District, Zone, and Subzone (Number of classifications with a negative coefficient on log land)

	Zones				*Subzones*				*Districts*			
State	*Number of zones*	*Model A*	*Model B*	*Model C*	*Number of subzones*	*Model A*	*Model B*	*Model C*	*Number of districts*	*Model A*	*Model B*	*Model C*
Andhra Pradesh	7	4	5	4	13	6	7	5	14	6	7	7
Assam	5	2	1	1	7	2	1	1	9	3	1	1
Bihar	4	3	3	3	12	6	4	4	14	10	4	2
Gujarat	5	4	3	3	12	7	5	6	10	5	4	4
Haryana	3	2	1	1	4	3	0	1	5	2	1	1
Himachal	2	2	2	2	4	1	1	1	3	2	2	2
J and K	1	1	1	1	4	4	4	4	4	2	3	2
Karnataka	5	4	3	3	6	4	3	3	15	4	4	4
Kerala	1	1	1	1	2	2	1	2	0	—	—	—
M.P.	9	5	4	4	15	7	7	6	19	8	6	5
Maharashtra	5	5	5	5	8	5	4	4	6	3	2	2
Orissa	4	3	3	3	7	2	3	3	9	3	3	2
Punjab	3	1	0	0	6	1	0	0	9	2	0	0
Rajasthan	7	5	2	2	10	6	2	2	12	6	4	3
Tamil Nadu	6	4	4	4	12	7	8	7	11	7	6	6
U.P.	5	5	5	5	12	7	7	7	22	10	5	6
W Bengal	6	3	3	2	8	3	1	1	14	4	4	4
India	78	54	46	44	142	73	58	53	176	83	56	51

Notes

1. The order in which the results are reported (zones, sub-zones and districts) reflects decreasing levels of pooling/aggregation. The results for the most heterogeneous classification, the state, are reported in Table 2.
2. Models A, B and C reflect equations 3A, 3B and 3C respectively.
3. All significant tests are at the 5% level of confidence.

Importance of Level of Aggregation

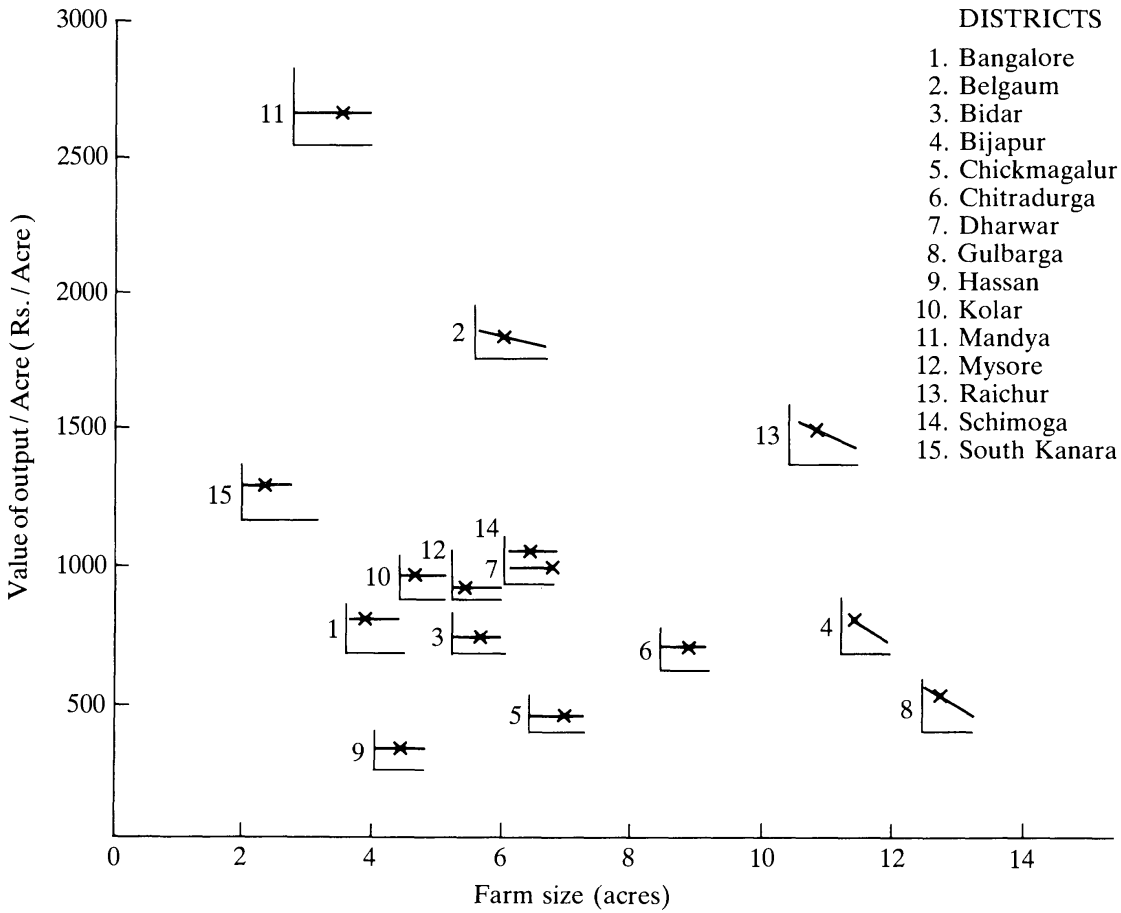

FIG. 1. Karnataka–District level regression.

Controlling for Farmer, Plot Type: ICRISAT data

- Shaban (JPE, 1987) compared output per acre across sharecropped, fixed rent and OC plots *for the same farmer* (see text, pp 430-431)
- Utilize ICRISAT data for central India (six villages in AP, Maharashtra and Gujarat, 10 farms per village, 1975-84) with weekly data on inputs and outputs by plot collected by resident investigators
- Shaban also controlled for irrigation, type of soil, crop pattern

Shaban's Results

- Main finding: sharecropped plots achieve 17% lower yield *for the same farmer*, soil type, irrigation etc. compared with OC or fixed rent tenancy
- No differences between OC and fixed rent tenancy
- However, still possible there were unobserved soil differences between plots that account for these differences

Revised Shaban Regressions

Table3.pdf

Table 3
Per-Acre Output, Land Value, and Inputs across Land Contracts

	Without Fixed Effects				With Household-Period Fixed Effects			
Log per Acre	Output	Land Value	Nonlabor Input	Labor Input	Output	Land Value	Nonlabor Input	Labor Input
Ownership dummy	.42**	.17**	.43**	.41**	.47**	.14**	.50**	.43**
Robust *t*-statistic	5.48	4.19	6.29	5.97	4.83	3.16	5.89	5.12
Robust standard error	.08	.04	.07	.07	.10	.04	.08	.08
Fixed-rent dummy	−.03	−.07	.08	.05	.12	−.03	.20	.18
Robust *t*-statistic	−.21	−1.25	.78	.52	.95	−.45	1.62	1.65
Robust standard error	.15	.06	.11	.10	.12	.07	.12	.11
Dummies for village, year, and season	Yes	Yes	Yes	Yes	Dropped	Dropped	Dropped	Dropped
N	10,704	10,702	10,690	10,704	10,704	10,702	10,690	10,704

Note. Results are for ordinary least squares regressions with a constant term. The cluster method is used to compute robust *t*-statistics and standard errors; this accounts for the fact that the household, rather than the plot, is the primary sampling unit. Household-period fixed effects refer to 2,773 dummy variables generated through the iteration of codes identifying the household and the period (year and season).
** Significant at the 1% level.

Evaluation of Recent (Less Radical) Land Reforms: Background

- Econometric evaluation of land reforms: only for more recent land reform efforts (West Bengal, S Africa, Rwanda)
- These were less radical
- Why?
- Political and administrative problems of implementation

Political Resistance from Landed Elites

- First reason: landed elites lose source of their wealth and power, and so do everything to block land redistribution
- Why all of the large radical land reforms were associated with political revolutions or wars which destroyed power of these elites:
  - Russian, Chinese revolution
  - Mexican civil war
  - Japan, Korea: post-war reconstruction by US occupation

Political Resistance from Landed Elites, contd.

- With the spread of democracy, landed elites have the power to block/circumvent reforms
- Many countries in S Asia, SS Africa after obtaining independence from colonial powers in 1950-60s became democracies and stated land reform as a major goal/instrument of development
- Yet they did not succeed in implementing these reforms
- Particularly in countries where dominant political parties still relied on rural elites (e.g., India, Pakistan, Kenya, Zimbabwe)

Administrative, Legal and Corruption Problems

- Additional reasons: many LDCs have weak administrative capacity and judicial institutions
- Loopholes in land ceiling regulations and poor land records allowed large landowners to circumvent these regulations
- Landowners filed court appeals, clogging up the legal system
- Difficulties in identifying suitable beneficiaries of land distribution
- Corruption in land distribution process

Example: Variations Across Different Indian States

- Land ceiling regulations in India passed in 1950s, implementation: responsibility of individual states
- Yet by early 1990s, less than 2% land had been redistributed in most states
- With the exception of only three states, two of which (West Bengal, Kerala) had a Left majority in state legislature
- West Bengal redistributed 6.7% land by early 1990s

West Bengal Land Reform Experience

- Yet, the land distribution program was not very effective for a number of reasons
- Poor quality of land
- Uneconomical size of plots (average size: 0.5 acre), owing to large number of recipients (15% of rural population)
- Corruption in distribution process: 50% of recipients already had 0.5 acres, 25% had at least 3.4 acres and 10% had 5.7 acres

West Bengal Tenancy Regulation Reform

- However, a different reform in West Bengal (*Operation Barga*) was more effective (show/explain below)
- Program provided opportunity to existing tenants to **register** their tenancy status
- Registered tenants protected from eviction, and entitled to a minimum share of 75% (akin to rent control)
- Program (1977-1995) covered 6% of cultivable land, 5% of households; avg plot size of 1.5 acres, high quality land

Changes in West Bengal Agricultural Production Growth

- Land reforms implemented 1970s onwards
- During 1960s and 1970s, West Bengal had the slowest rate of growth of foodgrains output and yields, among 17 major Indian states (less than 2% p.a.)
- From early 1980s, growth rate shot up to above 5%, accompanied by widespread diffusion of HYV rice, became the top performing state

West Bengal Green Revolution: Trends in Farm Productivity and Wages

Table 5.pdf

TABLE 5— TRENDS IN FARM PRODUCTIVITY AND WAGES

	1982	1985	1986	1990	1991	1995
Cropped area (acres)	1.04	0.71	1.16	1.19	0.86	1.74
Fraction rice area HYV	0.06	0.06	0.26	0.40	0.58	0.67
Rice value added per acre	936	1,492	1,557	2,903	4,191	5,444
Value added per acre	635	777	875	1,232	1,309	1,368
Value added per farm	3,027	3,831	4,007	5,365	5,181	5,642
Hired labor wage rate per hour	0.62	0.66	0.92	0.88	0.88	1.01
Hired labor annual hrs/acre	153	176	235	251	317	371

Notes: All values are averaged across farms, with equal weight assigned to each farm. All rupee figures deflated by cost of living index, 1974 = 100.

Source: Cost of Cultivation Surveys

Causes of West Bengal's Green Revolution?

- Left Front government (came to power in 1977) which stepped up implementation of the reforms
- They claimed the land reforms were responsible for the turnaround of productivity and production
- Skeptics: argued many other changes were happening at the same time (rise in irrigation, rice prices, HYV seeds availability), so role of the land reforms is not obvious

Banerjee-Gertler-Ghatak (JPE, 2002) Estimates of Productivity Effect of Operation Barga

- Banerjee-Gertler-Ghatak use a WB district-level panel data set
- Regress average rice yield on rate of registration of tenants under OB across different years (1979-87)
- Use state government data
- Include controls for price of rice, real wages, rainfall, state roads, state canals, HYV share of rice area, and district fixed effects

Banerjee-Gertler-Ghatak (2002) results

Table.pdf

TABLE 6
EFFECT OF REGISTRATION ON THE LOG OF RICE YIELD IN WEST BENGAL, 1979–87
(N=126)

	Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b
Sharecropper registration	.44*** (2.71)	.46*** (2.73)	.46*** (2.41)	.48*** (2.89)	.40** (2.34)	.41** (2.29)
Log(real wages)	…	.11 (1.07)	…	.05 (.55)	…	.03 (.31)
Log(price of rice)	…	−.11 (−.98)	…	−.04 (−.40)	…	.001 (.01)
Log(rainfall)	…	…	−.08* (−1.65)	−.08 (−1.52)	−.08 (−1.45)	−.08 (−1.41)
Log(public irrigation)	…	…	.10** (2.34)	.09** (2.30)	.09** (2.19)	.09** (2.14)
Log(roads)	…	…	.10 (.82)	.10 (.78)	.08 (.47)	.08 (.50)
HYV share of rice area	…	…	.66** (2.14)	.59* (1.77)	.49 (1.45)	.47 (1.34)
F-statistic:						
South × year	…	…	…	…	yes	yes
Left Front × year	…	…	…	…	yes	yes

Banerjee-Gertler-Ghatak Estimates of Productivity Effect of Operation Barga

- BGG find significant positive effect (1% rise in registration rate associated with .4% rise in rice yields)
- Estimate is robust to inclusion of all controls
- Corroborated by comparison of changes in rice yields in West Bengal and Bangladesh during this period
- Implies that Operation Barga accounted for about one-sixth (11%) of observed rise (69%) in rice yields

Re-examination of Operation Barga Effects (Bardhan-Mookherjee (2011))

- Re-examine effects of OB: concerns that proportion of tenant farms was too low for these results to be credible
- Concerns regarding
  - level of aggregation
  - measure of productivity, land reform
  - controls for other agricultural development policies
  - data source

Re-examination of Operation Barga Effects (Bardhan-Mookherjee (2011), contd.)

- Farm level analysis: can examine Marshallian inefficiency at the source (distinguish between tenant and owner-cultivated farms); control for farmer fixed effects
- Cost of Cultivation surveys (detailed weekly survey of inputs and outputs)
- Control for other government agricultural development programs (minikits, credit, village irrigation, roads, employment programs)

Re-Examination of Operation Barga Effects, contd.

- Productivity measure: farm value added per acre, not physical yield of single crop
- Land reform measure: proportion of cultivable land area covered by land distribution and OB programs (rather than proportion of tenants registered)

OLS Results, Farm-Panel

TABLE 6—IMPACT OF PROGRAMS ON FARM PRODUCTIVITY: OLS ESTIMATES

	All farms			Owner-cultivated farms	All farms
Dependent variable:	Farm productivity (log value added per acre)				Village productivity (log value added per acre)
	(1)	(2)	(3)	(4)	(5)
Kits per HH (cumulative)	0.417***	0.474***	0.492***	0.500***	0.397***
	(0.103)	(0.087)	(0.164)	(0.175)	(0.146)
Land patta (cumulative % of total land)			0.188	0.253	−0.054
			(0.119)	(0.170)	(0.144)
Land registered (cumulative % of total land)			0.423***	0.441***	0.349***
			(0.126)	(0.130)	(0.130)
IRDP subsidy per HH (cumulative, in 1,000s)			0.533**	0.601 **	0.316
			(0.259)	(0.261)	(0.236)
JRY mandays per HH			0.049	0.043	0.046*
			(0.031)	(0.032)	(0.024)
Other controls	N	Y	Y	Y	Y
Observations	2,408	2,193	2,085	1,914	275
Number of farms	616	570	539	492	
F	16.170	10.930	8.63	7.29	5.31
R^2	0.038	0.138	0.135	0.107	0.198

Notes: The dependent variable for all specifications is the log of value added per acre for all crops. OLS coefficients are reported with robust standard errors in parentheses. Standard errors are clustered at the village level. All speci-

Implications

- So we continue to get a significant positive effect of OB implementation on productivity at farm level
- Estimated elasticity with respect to OB is about 0.4, just as in B-G-G!
- Other programs also had a significant positive effect, esp. minikit distribution
- IV estimates however lower OB effect by about a half: overall, role of OB in explaining Green Revolution was small (but positive), while land distribution had zero effect

Recent Land Reform Programs Elsewhere

- Post-apartheid South Africa: LRAD program since 2001
  - market-assisted land grants
  - grants of between 20-100K rand, required matching contributions 5-40K
  - eligibility restrictions
  - multi-stage approval process
- Brazil: land disappropriated during 1985-89 (Sarney-Color adm; 5 million ha.), then again during 1992-2003 (Franco-Cardoso adm, 10 million ha.) but moved towards 'negotiated land reform'

S Africa LRAD Program Effects

- Estimated by Keswell and Carter (JDE, 2014) on consumption of beneficiaries
- Examine data on those who applied for the grants, and compared consumption of grant recipients with others still waiting (controlling for observable characteristics)
- Grant recipients had 28% higher monthly consumption compared with similar waiting applicants
- Dip in consumption in first year, followed by a 50% increase in subsequent years!!

Brazil 1993-2003 Land Redistribution Program Effects

- Assuncao (2006) finds no significant effect of the program on the proportion of landless households overall (negative effect only for bottom 20%)
- Increase in land inequality!
- His analysis does not provide any explanation of these findings

Conclusion

- In the context of peacetime democracies, little scope for radical land redistributions
- Recent initiatives have been less radical: sharecropper regulations, land purchase grants
- Evidence on effectiveness:
  - S Africa land grant program: successful in reducing poverty
  - W Bengal tenancy reform: somewhat successful in raising productivity and lowering poverty
  - Brazil land distribution: less effective