Agricultural Growth and Land Reforms in India

Dilip Mookherjee, Lecture 1

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Background

- Importance of rural sector in the Indian economy where two-thirds of the population resides
- Productivity levels and growth are typically lower in the rural sector, resulting in lower incomes and greater poverty
- Hence transition from agriculture to industry and services a key component of growth process (Lewis dual economy model)
- This involves movement of people (migration), and transfer of land
- Agricultural performance has a strong direct effect on growth, besides important indirect effects:
  - food supply affects inflation, wages and profits in urban sector
  - effects on trade balance

Key Policies for Agricultural Growth

- Land
- Credit
- Technology
- Marketing

Land Policies

- 1. Land Redistribution
- 2. Tenurial (Sharecropping Regulations)
- 3. Land Consolidation
- 4. Land Acquisition for Industry:
  - (a) Compensation for Displaced Owners
  - (b) Eminent Domain vs. Laissez Faire
- I shall focus on items 1, 2 in this lecture
- Next lecture will deal with topic 4, followed by discussion of agricultural marketing issues

1. Land Redistribution

- Since Independence, land reform legislation in the 1950s mandated implementation of land ceilings, vesting of surplus lands and distribution to landless and marginal landowners
- Based on notions of fairness and distributive justice
- Implemented unevenly and haltingly, owing to administrative, legal difficulties and political unwillingness of many state governments
- Some states did implement these to some extent (Kerala, West Bengal, J&K)
- What are the likely impacts on agricultural productivity?

Expected Productivity Effects of Land Redistribution

- Conventional notion in economics that redistribution tends to lower incentives and productivity: tradeoff between equity and growth
- In the context of land redistribution, this would be the case in presence of scale economies in agriculture
- However, Indian Farm Management Studies in the 1960s noticed that small farms achieved higher yields
- Similar findings from other countries (Berry and Cline 1979)
- This suggests that there would be no trade-off between equity and growth: land redistribution would raise agricultural 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 (ha.)	563 (10–50)	274 (5–10)	148 (.7-1.0)
large (ha.)	100 (100+)	100 (20+)	100 (5.7–11.3)

Questioning the Farm Size-Productivity Relationship

Key Questions:

- **Theoretical Explanation:** How or why could there be a inverse size-productivity relationship?
- **Empirical Robustness:** Is this a spurious correlation?

Theoretical Explanations

- Imperfections in labor markets
- *Surplus Labor hypothesis:* Shadow cost of family labor is lower than hired labor, for following reasons:
  - transaction costs: transport and other costs for females and children working for wages elsewhere
  - moral hazard problems associated with supervising hired workers
- Time and capacity limits on work, implying owners of large farms must rely on less efficient hired workers

Leasing Options?

- Raises the question: if relying on hired workers lowers productivity, why don't owners of large lands lease out their lands to landless households?
- Most leasing takes the form of sharecropping tenancy contracts rather than fixed rent contracts
- This owes to imperfections in markets for credit and insurance: poor tenants would like to be insured against (price, weather, crop failure) uncertainties, receive credit from landlords
- Sharecropping also generates low productivity owing to impact on tenant incentives

Marshallian Sharecropping Inefficiency

- Inefficiency of sharecropping: goes back to Adam Smith, John Stuart Mill and (esp.) Alfred Marshall
- Main idea: share of output that goes to landlord is similar to a tax on farmer's effort and cost of purchased inputs
- Induces farmer to apply too little effort and material inputs, resulting in low yields
- If true, inequality in landownership can be a cause of low productivity (large landowners have to choose between cultivation based on hired labor, or leasing out land to sharecroppers, both of which result in low productivity)
- Argument either for land redistribution, or for regulation of tenancy to ensure farmer has enough stake in the outcomes of his effort

Countervailing Arguments

- How important are these imperfections in labor and credit markets?
  - Is cultivation based on wage labor less productive than family labor?
  - Is there evidence of Marshallian sharecropping inefficiencies?
- Are these large enough to overturn economies of scale associated with mechanization, access to credit, new varieties of seed and fertilizer?

Empirical Questions

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

Importance of Omitted Variable Bias

- From a policy standpoint, need to estimate productivity effects of redistribution of land from a large landowner to a landless household
- What if small farms are more productive because they happen to have better soil quality? Better access to irrigation? Less fragmented?
- Possibility of reverse causation: more productive soils generate higher income, higher population pressure, greater subdivision of lands, smaller farm size
- Or if productivity is really a function of the type of farmer, and more skilled or hardworking farmers tend to work on their own farms, while those less skilled in farming end up managing hired workers and/or are wealthier so own larger farms

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? (e.g., Boyce (1987) criticism of West Bengal government data)

Step 1: Separate Scale Effects from Mode of Cultivation in FMS (Abhijit Sen (1981, Camb J.Econ.))

INCOME PER ACRE OF 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

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

Importance of Level of Aggregation

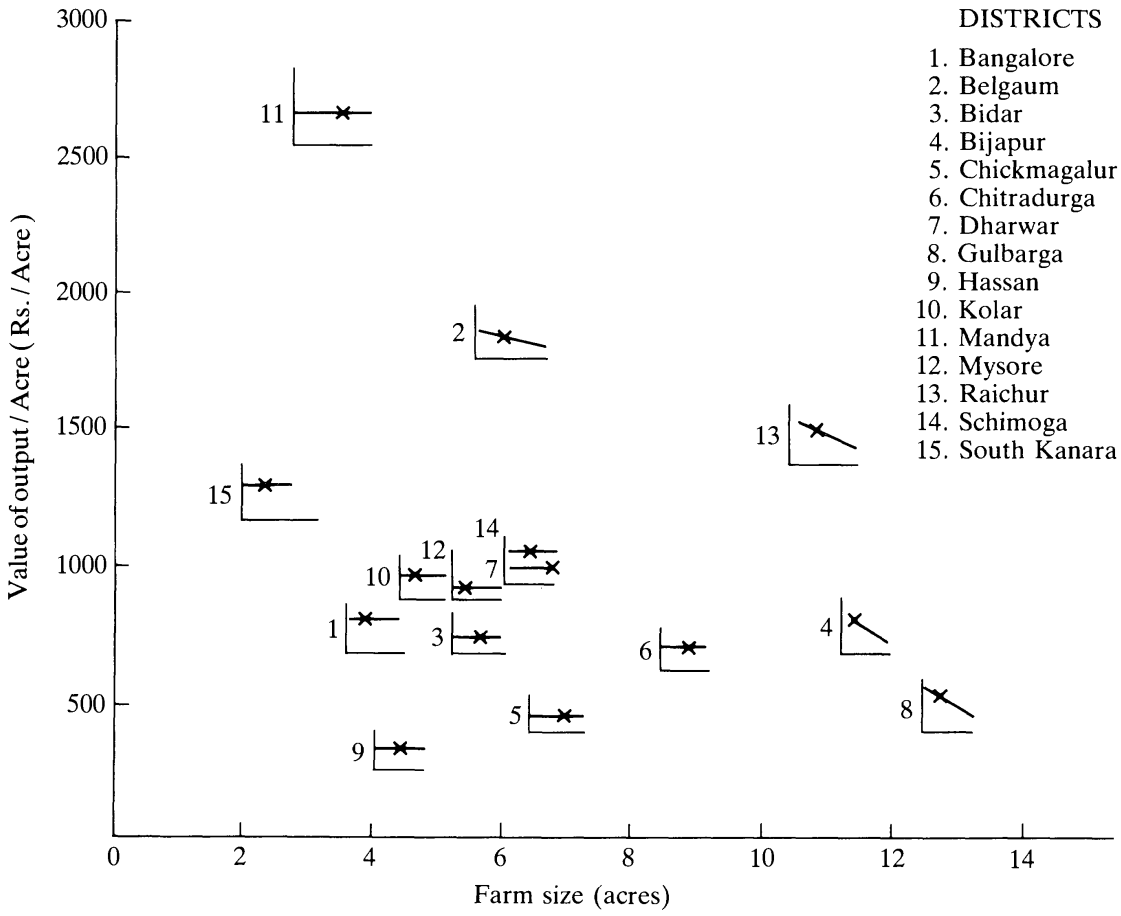

FIG. 1. Karnataka–District level regression.

Controlling for Farmer Type: ICRISAT data

- Shaban (JPE, 1987) compared output per acre across sharecropped, fixed rent and owner cultivation *for the same farmer*
- Utilize ICRISAT data for central India (six villages in AP, Maharashtra and Gujerat, 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
- Main finding: sharecropped plots achieve 17% lower yield *for the same farmer*, soil type, irrigation etc. compared with owner cultivation or fixed rent tenancy; associated with higher input application

ICRISAT data

Table 1.pdf

Table 1

Data Description

Variable	Description
Output	Value of main output and by-products (in rupees)
Ownership dummy	One if plot is owned (83.2%), zero otherwise
Fixed-rent dummy	One if plot is rented on a fixed-rent basis (1.9%), zero otherwise
Cropped area	Area actually cropped (in acres)
Nonlabor input	Value of seeds, fertilizers, pesticides, and organic and inorganic manures, plus the rental value of bullocks and machinery (in rupees)
Labor input	Value of family and hired labor (in rupees)
Per-acre land value	Per-acre value of the plot (in 100 rupees per acre) estimated by ICRISAT's investigators using information about potential sale value, topography, location, and so on, obtained from a village specialist
Irrigation dummy	One if the plot is irrigated (31.8%)
Soil type dummies	7.1% deep black, 34.3% medium black, 21.7% shallow black, 11.1% shallow red, 2.4% gravelly, .5% problem soil (for example, saline), 9.8% sandy soil, 1.1% other soils, 12% undefined
Cropping pattern	Qualitative variable (with 1,031 different codes) describing all products cropped in each plot
Main-crop dummies	Dummy variables constructed from the first letter of the cropping pattern code (which describes a general category for the dominant cropping product): 16.8% oilseeds, 53.2% cereals, 9.3% fiber crops, .4% garden crops, 14% pulses, .8% sugar cane, 4.2% vegetables and spices, 1.3% fodder crops

Shaban (1987) results

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.

Braido (JLE 2008) Critique

- Braido raises question of possible unobserved variations in soil type in ICRISAT data between sharecropped plots and others: maybe sharecropped plots are of inferior quality (observable by farmers but not external investigators)
- Then farmers will apply less inputs and effort on sharecropped plots
- How can we test for this possibility?
- Look for variations in **ratio** of (labor and non-labor) inputs to output between sharecropped and other plots (which cancels out effects of unobserved soil quality)
- If there is a Marshallian inefficiency, sharecropped plots should be associated with lower input application *per unit of output*

Braido results

Table 5.pdf

Table 5
Econometric Test for the Profit-Maximization Conditions

	Log Nonlabor Input − Log Output (N = 10,690)			Log Labor Input − Log Output (N = 10,704)		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
Ownership dummy	−.05	−.05	.03	−.05	−.03	−.03
Robust *t*-statistic	−1.20	−1.16	.63	−1.16	−.68	−.93
Robust standard error	.05	.04	.04	.04	.04	.04
Fixed-rent dummy	.23	.24+	.09	.15	.18	.06
Robust *t*-statistic	1.54	1.72	1.19	1.19	1.49	.96
Robust standard error	.15	.14	.07	.12	.12	.07
Main crop dummies	No	Yes	Yes	No	Yes	Yes
Household-period fixed effects	No	No	Yes	No	No	Yes
Constant	−.87**	Yes	Yes	−1.36**	Yes	Yes

Implications of Braido's Results

- Infer that Shaban's results were actually driven by variations in soil quality observed by farmers before planting, but unobserved by the ICRISAT investigators
- Alternative explanation of productivity difference between sharecropped and other plots: owners that own multiple plots tend to cultivate the most productive ones themselves, and lease out the inferior ones
- Can be explained theoretically by adverse selection (Akerlof lemons principle) in the market for leasing (Ghosh (1994))
- Redistributing these lands or regulating sharecropping contracts will then have no effect on productivity

Productivity Effects of West Bengal's Land Reform

- Examine evidence directly from land reform policies actually implemented
- Focus on West Bengal experience since late 1970s
- Two major land reform policies:
  - Distribution of vested lands to landless
  - Tenancy Protection (Operation Barga): minimum share of 75% for tenants, protection from eviction

West Bengal's Land Reforms since late 1970s

- Large scale, esp. relative to other Indian states
- 15% of all households in late 1990s received land titles covering 6% of cultivable area
- 6-8% of farmers registered under OB covering 5% of cultivable area (as per Bardhan-Mookherjee (2011) estimates based on a all-WB-village survey)
- 50-66% of tenants (over 3 million) registered directly, others may have benefitted indirectly through enhanced bargaining power

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 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

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

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

- Re-examine effects of OB at higher level of disaggregation: farm-level panel, using Cost of Cultivation surveys (highly detailed weekly survey of inputs and outputs) covering 1982-95
- Unbalanced panel: approximately 500 farms followed for between 3-5 years each
- Overcomes critique of Boyce (1987) of WB state government reports of agricultural data
- Examines Marshallian inefficiency at the source: distinguish between tenant and owner-cultivated farms
- Marshallian effects of OB program should arise only for tenant farms

Re-Examination of Operation Barga Effects, contd.

- Newly elected panchayats played a key role in implementing OB, besides distributing land to landless, delivering other farm inputs (minikits, IRDP credit, village irrigation and roads in JRY employment programs)
- Check whether OB implementation may have been correlated with implementation of other programs: control for these
- Additional controls: price of rice, rainfall and state-level infrastructure as in Banerjee-Gertler-Ghatak, and farmer fixed effects

Re-Examination of Operation Barga Effects, contd.

- Different measure of productivity: farm value added per acre, regressed on cumulative implementation of various programs at the gram panchayat (GP) level
- For latter, use proportion of cultivable land area covered by land distribution and OB programs (rather than proportion of tenants registered)

Different Panchayat Farm Support Programs

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TABLE 2—TRENDS IN PUBLIC SUPPLIES OF AGRI. INPUTS, LAND REFORM, AND TENANCY

	1982	1985	1986	1990	1991	1995
Minikits per household	0.13	0.14	0.13	0.10	0.09	0.07
IRDP[a] credit per household	63	43	38	35	35	22
Loc. govt. irrigation expenditure[b]	5,741	3,734	3,049	1,872	1,957	3,085
Loc. govt. road expenditure[c]	5,831	3,903	3,362	2,859	3,148	4,025
Loc. govt. employment mandays per household	3.9	3.2	2.8	2.5	2.6	2.2
Area irrigated by state canals (hectares)	73,691	70,416	70,990	77,552	77,556	82,721
State road length (km)	1,276	1,288	1,295	1,316	1,318	1,331
Cumulative proportion land area, titles distributed	0.05	0.15	0.14	0.14	0.13	0.12
Cumulative proportion land area with tenancy registration	0.03	0.06	0.06	0.07	0.07	0.07
Percent farms leasing in land	2.13	3.38	0.44	0.43	1.17	1.58
Percent cultivable area of farms leasing in land	12.98	6.94	1.2	2.07	6.54	4.27

Notes: Rows 1–5: Average yearly flow in sample villages. Rows 6–7: West Bengal government data.
[a] IRDP Credit Subsidy, 1980 prices.
[b,c] Expenditure out of Employment Program Funds, 1980 prices.
[d] for year 1983.

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

OLS Results, Farm-Panel

Table 6.pdf

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

Dependent variable:	All farms			Owner-cultivated farms	All farms
	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

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!
- Despite using different meaure of program implementation, and of productivity, and conducting analysis at farm level
- Other programs also had a significant positive effect, esp. minikit distribution
- Respective quantitative effects of different programs? Review later.

Potential Endogeneity of Program Implementation Rates

- Is it possible that more 'progressive' panchayats implemented OB at a higher rate, and also helped farmers improve their yields by delivering other farm services unobserved by us?
- Control for unobserved cross-village-effect heterogeneity by using farm dummies (which incorporate village-level fixed effects)
- What about time-varying panchayat motivations to implement programs and help farmers generally (e.g., owing to changes in political competition, competence of elected officials, or pressure from farmers over time?)

Potential Endogeneity of Program Implementation Rates, contd.

- Use external (political) determinants of program implementation such as political competition at the gram panchayat level
- Underlying idea: when last local election was highly contested (equal share of Left and Congress seats in GP), the GP officials will put in a lot of effort in implementing programs that help poor farmers
- So use lagged GP seat shares of the Left Front and its square as an instrument
- Additional instruments: average vote share difference (AVSD) in previous state assembly election in the district, percent seats secured by Congress in national Parliament, plus interactions between these

IV estimation of OB Effects: First-Stage Regression

Table 7.pdf

TABLE 7A—REDUCED FORM FOR BARGA

Dependent variable	Land registered
Cum lagged GP left share	48.414 ***
	(9.569)
Cum sq lagged GP left share	−28.546 ***
	(10.047)
Cum lagged AVSD × lagged GP left share	−101.948
	(91.797)
Cum lagged AVSD × sq. lagged GP left share	180.6652 **
	(91.107)
Cum %cong seats parliament × lagged left share	−43.890 ***
	(4.373)
Cum lagged aver vote share difference in district	−39.756
	(19.056) **
Cum lagged AVSD × lagged GP left share × cong parl. seats	−97.552 **
	(48.071)
Observations	2,032
F	19.5
R^2	0.77

IV estimation of OB Effects: Second-Stage Regression

Table 8.pdf

TABLE 8A—IMPACT OF KITS ON FARM PRODUCTIVITY: IV ESTIMATES

Dependent variable:	(1)	(2)	(3)
Kits per HH (cumulative)	0.350*	0.453**	0.405*
	(0.190)	(0.193)	(0.222)
Land registered (cumulative % of total land)		0.231	0.234
		(0.173)	(0.178)
Other controls	Y	Y	Y
Other programs	N	N	Y
Observations	1,995	1,995	1,919
F	5.99	5.92	5.76
R^2	0.091	0.085	0.106
Kleibergen-Paap under-id statistic (p-value)	17.802	18.886	21.450
	($p = 0.12$)	($p = 0.06$)	($p = 0.03$)
Hansen's J over-id statistic (p-value)	10.61	10.09	9.44
	($p = 0.47$)	($p = 0.43$)	($p = 0.49$)

Notes: The dependent variable for all specifications is the log of value added per acre for all crops. IV estimates of coefficients are reported with robust standard errors in parentheses. Standard errors are clustered at the village level. All specifications include farm and year fixed effects. Other controls include rainfall, GP local irrigation expenditures, GP local road expenditures, log price of rice, WB canals in district, WB roads in district, an indicator for

Implications

- IV estimate of effect of OB is half the OLS estimate, and ceases to be statistically significant
- IV estimate of minikit distribution (using analogous set of instruments for political competition, interacted with scale of minikit program at the state level) continues to retain its size and significance
- Hence endogeneity controls reduce the size of the productivity elasticity with respect to OB
- Another issue: relative quantitative significance of different programs in explaining changes in farm productivity
- Predicted program effects: Multiply observed change in program by its estimated (OLS) elasticity from year to year

Implied Decomposition of Changes in Farm Productivity, by Local Govt. Program

Table 9.pdf

TABLE 9—DECOMPOSITION OF PRODUCTIVITY GROWTH BY PROGRAM

	Unweighted			Area weighted		
Years	1982–1985	1986–1990	1991–1995	1982–1985	1986–1990	1991–1995
Total productivity growth	22.40%	40.78%	4.45%	21.28%	21.65%	4.55%
Total explained	21.70%	−1.01%	14.68%	35.15%	−0.16%	8.71%
Kits	17.35%	16.14%	8.39%	35.24%	14.69%	2.78%
Land registration	3.92%	−0.36%	−0.60%	−0.35%	0.37%	0.85%
Credit	6.37%	4.09%	2.04%	18.75%	4.39%	2.97%
Patta	0.62%	0.07%	0.07%	0.88%	0.00%	0.07%
JRY mandays per HH	−3.75%	−1.58%	−3.22%	0.41%	−1.85%	−0.37%
GP spending on roads	0.01%	−3.62%	0.20%	0.82%	−4.33%	−0.07%
GP spending on irrigation	14.52%	0.40%	16.19%	14.64%	1.25%	5.26%

Notes: The unweighted decomposition assigns equal weight to the number of programs given in each village, as well as to the average productivity of each village. The area weighted decomposition weights productivity and programs by the amount of cultivable land in each village.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Implications

- Hence OB explained only a small fraction of observed changes in productivity, even using OLS estimate
- Mainly because overall scale of OB was small, measured by proportion of cultivable land area covered
- Another curious fact: effect of OB is just as large on owner cultivated farms as for tenant farms!
- Positive effect observed cannot be just a Marshallian effect: other (e.g., general equilibrium) effects must be in play
- Recent paper (Bardhan, Mookherjee and Kumar (JDE, forthcoming)) argues that tenancy program stimulated private investment in minor irrigation (tubewells) which lowered price of irrigation for all farms

Summary of Empirical Findings concerning Causal Effect of Land Reform on Farm Productivity

- West Bengal experience shows little effect of redistribution of land on productivity growth, though there were significant effects on poverty reduction
- In contrast, estimate elasticity of farm productivity w.r.t. tenurial protection of between 0.2–0.4.
- No evidence that either kind of land reform *lowers* productivity
- Extensive literature on this topic is instructive with respect to nature of careful empirical work, informed by economic theory, and the data requirements for this

Summary of Empirical Findings, contd.

- Quantitative estimate of productivity effects of land reform are limited, compared to other farm support programs
- Effects cannot be understood entirely in terms of reduction in Marshallian inefficiencies: there are other (positive) general equilibrium effects
- Unmeasured effects on quality of local governance or social capital:

Policy Implications

- Don't expect dramatic growth effects from land reforms, if they can be implemented
- Politically difficult, plus land records are of poor quality
- Scope for land reform is now much less than 50 years ago:
  - land holdings of households have come down quite a lot, so there arent that many large landowners (owing to population growth, household division, out-migration of family members, land sales)
  - incidence of tenancy is quite low (under 10% nationwide), a significant part of which is fixed rent tenancy and reverse leasing

Policy Implications, contd.

- Agricultural growth and rural poverty reduction in years ahead will depend more on other kinds of policies:
  - delivery of HYV seeds and fertilizers
  - building rural infrastructure
  - enhancing access to credit
  - improve marketing institutions
- Next lecture: focus on land acquisition, and agricultural marketing