ONLINE APPENDIX (NOT FOR PUBLICATION)

Evolution of Land Distribution in West Bengal 1967–2004: Role of Land Reform and Demographic Changes

Pranab Bardhan, Michael Luca, Dilip Mookherjee and Francisco Pino

1. Additional Descriptive Statistics

Average Landownership, Household Size and Immigration

Table A-1 provides average household size, ownership of agricultural land and immigration for select years between 1967 and 2004. Panel A shows statistics for the full sample, while panel B displays the statistics for the restricted sample. We see a sharp drop in the mean land owned from nearly 3 acres per household to a little over 1 acre. The median dropped by less, from 0.7 acre to 0. The drop is equally dramatic when we look at the restricted sample: for instance the 75th percentile landownership dropped from 2.86 to 0.66 acres. With regard to household size, there was some reduction but it was not as dramatic as the drop in land owned: the median fell from 6 to 5, and the mean also fell by 1 unit, resulting in a reduction of the order of 16%. Consequently land per capita fell by nearly three times in the full sample, and more than halved in the restricted sample.

To what extent was the reduction in average landownership the result of immigration? Table A-1 shows that approximately one third of all households in 2004 had immigrated into the village since 1967. Approximately one third to one fourth of these immigrants came from Bangladesh. Hence immigrant inflows were sizeable. Immigrating households typically arrive with no land, and lag behind natives with respect to landownership. Nevertheless, trends in average landholdings for native households were similar to those for the full sample, as shown in table A-1. This suggests that the declining patterns of landownership cannot be attributed to rising immigration.[1]

Could the decline in landholdings per household have resulted from conversion of agricultural land to non-agricultural purposes? Table A-2 shows changes in cultivable land and number of households over two decades of the 1980s and 1990s, using the indirect household survey used in Bardhan and Mookherjee (2006, 2010). The number of households rose sharply, while the amount of cultivable land per village remained approximately the same. Hence conversion of agricultural land into forests or other non-agricultural purposes was not the cause of the decline in land availability per household. This table also shows that village population increased sharply, as the number of households per village rose approximately 70%, significantly outweighing the 16% drop in average household size. Our theory suggests that the increase in the number of households resulted from the growth in population which spurred increased rates of household divisions.

Returning to the direct household survey, immigration accounted for a 15% drop in land per household, while for natives it dropped by about 40%. Table A-3 decomposes the latter change between different channels. For the full (restricted) sample, 81% (85%) of the decline in land for

[1] This is what one would expect if most of these immigrant flows were from other West Bengal villages, the effects of which would tend to wash out on average. However, our questionnaire did not ask immigrants where they had been living originally, except whether they had arrived from Bangladesh. So we do not know the extent to which the non-Bangladeshi immigrants came from within West Bengal rather than other parts of India.

native households was accounted for by land lost owing to household division, 6.6% (11%) to land market transactions, 6.3% (7%) to gifts and transfers, 4.6% (-1.1%) for land reforms, and 3.6% (1.3%) for other miscellaneous reasons. Hence land lost owing to household splits and migration of household members was the dominant source, followed by immigration, land market transactions and transfers. The direct effect of land reforms was negligible, measured by the proportion of land redistributed.

Household Divisions, Land Transactions and Land Reforms

Figure A-1 in the online appendix shows the size and frequency of land market transactions. These are not necessarily balanced because we are working with a sample of households rather than the entire village population. Besides we exclude non-residents who may own some land, as well as those who may have left the village between 1967 and 2004. Nevertheless it is apparent that the sales and purchases approximately balance each other in the data, except the last 5 years or so when the sales outstrip the purchases (which may reflect an increasing tendency for non-residents to purchase land). However the extent of excess sales towards the end is of the order of 0.2–0.25 acres, not large enough to explain the mean reduction in land per resident household in excess of 1 acre for the period as a whole.

Note also that the land transactions are considerable in frequency, and occur throughout the period. Hence the land market has been quite active. Table A-4 in the online appendix shows 26% of all households engaged in land sales, while 23% engaged in land purchases. In the full sample there is a tendency for rising extent of transactions in the first half, with some noticeable spikes between 1980–85, the period of heightened land reform activity. In the restricted sample these spikes are muted, with no evident tendency to be bunched in the earlier period.

Since there may be recall problems with regard to land reforms, we rely instead on the official land records. Figure A-2 in the online appendix uses data from the local land records offices for both tenancy registration (*barga*) and land title distribution (*patta*) for the village as a whole, until the year 1998 (the year when the official village level data on land reform was collected). The figure on the left expresses the extent of land reform as percent of cultivable land, and the latter as a percent of households. These data series are taken from Bardhan and Mookherjee (2006, 2010), with the land area and household numbers calculated on the basis of interpolation of estimates from the indirect household survey for years 1978 and 1998. Both sets of land reforms were pronounced between the late 1970s and mid-80s, with the tenancy reform more significant in terms of cultivable land area and the land titling program more significant in terms of the number of households directly benefitting.

References

Bardhan, P. and Mookherjee, D. (2006). Pro-poor targeting and accountability of local governments in west bengal. *Journal of Development Economics*, 79(2):303–327.

Bardhan, P. and Mookherjee, D. (2010). Determinants of redistributive politics: An empirical analysis of land reforms in west bengal, india. *American Economic Review*, 100(4):1572–1600.

2. Additional Figures

Figure A-1: Land market: Sales and purchases per household (1967-2004)

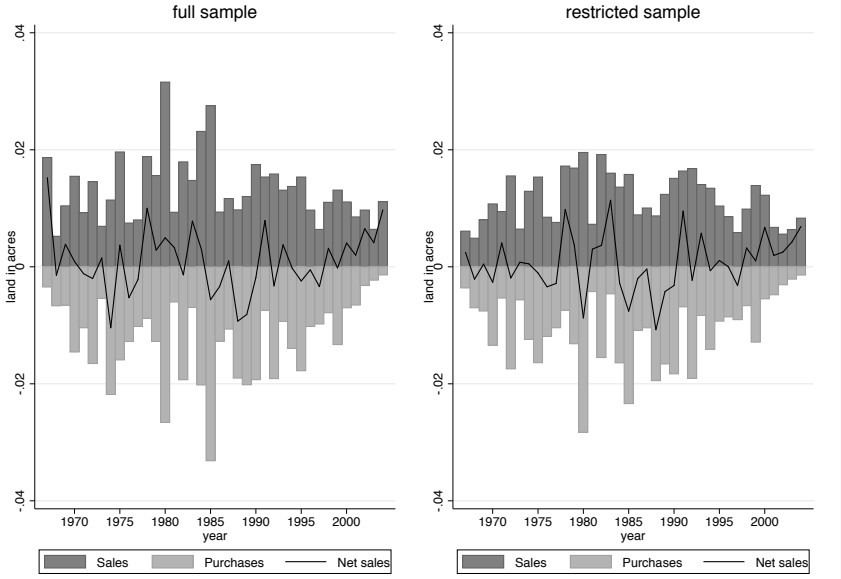
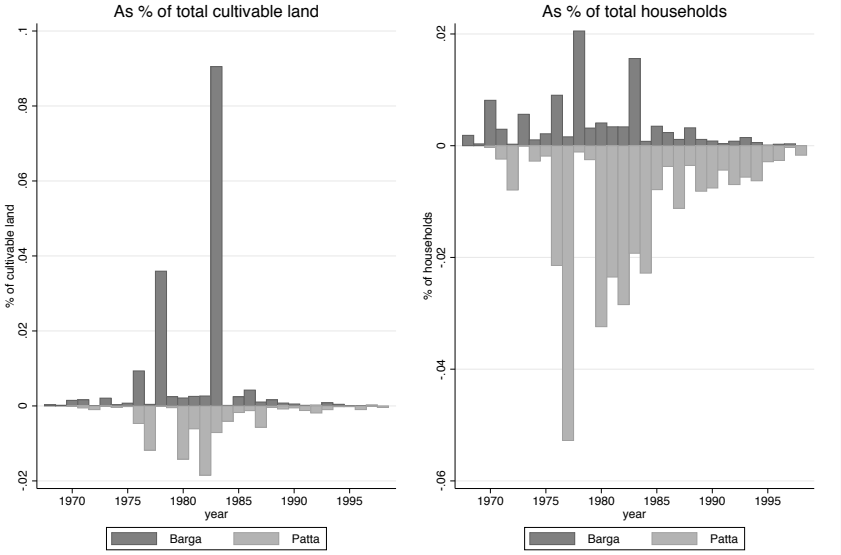


Figure A-2: Average land reform implemented, official land records (1968-1998)



Source: West Bengal Block Land Reform Office (BLRO) for relevant villages.

3. Additional Tables

Table A-1: Landownership, household size and immigration

Variable	statistic	1967	1976	1985	1994	2004
A. Full Sample						
Land per household	(mean)	2.908	2.418	1.973	1.557	1.228
	(50th perc.)	0.720	0.620	0.330	0.160	0.000
	(75th perc.)	3.662	3.320	2.660	1.840	1.060
Share of landless	-	0.344	0.376	0.416	0.461	0.505
Household size	(mean)	6.332	5.763	5.158	5.074	5.216
	(50th perc.)	6.000	6.000	5.000	5.000	5.000
	(75th perc.)	8.000	7.000	7.000	6.000	6.000
Land per capita	(mean)	0.621	0.509	0.407	0.306	0.230
	(50th perc.)	0.129	0.109	0.080	0.033	0.000
	(75th perc.)	0.611	0.556	0.500	0.370	0.238
Land per capita (only natives)	(mean)	0.622	0.531	0.446	0.355	0.270
	(50th perc.)	0.132	0.125	0.113	0.075	0.047
	(75th perc.)	0.611	0.600	0.563	0.472	0.364
Share of immigrants	-	0.002	0.073	0.143	0.233	0.278
Share of immigrants from Bangladesh	-	0.001	0.018	0.033	0.062	0.065
B. Restricted Sample						
Land per household	(mean)	2.170	1.869	1.523	1.204	0.950
	(50th perc.)	0.500	0.330	0.100	0.000	0.000
	(75th perc.)	2.865	2.640	1.980	1.000	0.660
Share of landless	-	0.378	0.426	0.475	0.527	0.566
Household size	(mean)	5.937	5.433	4.785	4.843	5.098
	(50th perc.)	6.000	5.000	5.000	5.000	5.000
	(75th perc.)	7.000	7.000	6.000	6.000	6.000
Land per capita	(mean)	0.407	0.366	0.303	0.234	0.184
	(50th perc.)	0.096	0.060	0.026	0.000	0.000
	(75th perc.)	0.500	0.447	0.383	0.244	0.143
Land per capita (only natives)	(mean)	0.408	0.385	0.340	0.285	0.222
	(50th perc.)	0.096	0.083	0.080	0.043	0.027
	(75th perc.)	0.500	0.500	0.473	0.350	0.250
Share of immigrants	-	0.002	0.089	0.169	0.278	0.332
Share of immigrants from Bangladesh	-	0.001	0.021	0.041	0.075	0.077

Notes: Land includes only agricultural land. Household size includes all members (adults and children).

Table A-2: Changes in cultivable land and number of households, indirect survey

	Obs.	Mean	Std. Dev.	Min	Max
	Initial report prior to 1980				
Cultivable land in initial year	63	358.5	303.6	18.0	1265.5
Cultivable land in 1998	63	360.2	283.3	26.2	1304.0
No. households in initial year	63	231.0	219.5	24.0	1083.0
No. households in 1998	63	419.5	380.3	47.0	1692.0
	Initial report on or after 1980				
Cultivable land in initial year	26	230.6	170.1	4.6	642.7
Cultivable land in 1998	26	217.6	149.2	9.6	495.3
No. households in initial year	26	236.7	156.0	18.0	759.0
No. households in 1998	26	346.7	186.9	60.0	770.0

Notes: Cultivable land is measured in acres. Date of initial report varies by village. Among those with reports prior to 1980, 46 villages report cultivable land in 1977, 14 in 1978 and 3 in 1979. Among those with reports on or after 1980, 1 village reports cultivable land in 1980, 1 in 1981, 23 in 1983, and 1 in 1984.

Table A-3: Determinants of decrease in land holdings: cumulative changes at the household level, only natives (1967-2004)

Sample:	full	restricted
Land in 1967	2.862	2.143
Land change	-1.370	-0.926
Lost due to land division	-1.108	-0.785
Lost through sales	-0.557	-0.475
Gained through purchases	0.467	0.373
Lost due to reform	-0.097	-0.018
Gained due to reform	0.034	0.028
Lost as a gift	-0.116	-0.097
Gained as a gift	0.030	0.032
Lost for other reasons	-0.060	-0.024
Gained for other reasons	0.011	0.012

Notes: All numbers indicate average acres gained or lost per household. The category *Lost for other reasons* includes forced transfer, mortgaged, and lost due to natural disasters. All data comes from the household survey.

Table A-4: Proportion of households experiencing transactions, land reform and divisions (1967-2004)

Sample:	full	restricted
Sales	0.257	0.238
Purchases	0.229	0.211
Lost due to reform	0.007	0.004
Gained due to reform	0.036	0.036
Exits and division	0.685	0.638

Notes: All numbers indicate the proportion of households with at least one event (sale, purchase, etc) between 1967 and 2004.

Table A-5: Determinants of land lost by households due to division

Dep. Variable:	Land lost due to division in acres					
Sample:	full			restricted		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH size	0.016***	0.019***	0.019***	0.009**	0.013***	0.013***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
Lagged land	0.051***	0.040**	0.040**	0.069***	0.038***	0.038***
	(0.010)	(0.016)	(0.016)	(0.019)	(0.007)	(0.007)
% land registered		-0.011	-0.010		-0.020	-0.020
		(0.014)	(0.014)		(0.021)	(0.021)
Lagged land*% land registered		0.000	-0.000		0.006	0.006
		(0.009)	(0.009)		(0.012)	(0.012)
Above-ceiling dummy		0.175	0.173		0.091	0.093
		(0.122)	(0.121)		(0.110)	(0.110)
% land distributed			-0.208			0.181
			(0.231)			(0.134)
Lagged land*% land distributed			0.062			-0.069
			(0.077)			(0.086)
Constant	-0.148***	-0.190***	-0.189***	-0.120***	-0.134***	-0.135***
	(0.032)	(0.036)	(0.036)	(0.027)	(0.022)	(0.022)
Observations	58,765	54,175	54,175	41,536	38,190	38,190
R-squared	0.030	0.027	0.028	0.035	0.019	0.019
Number of households	2,304	2,268	2,268	1,681	1,649	1,649

Notes: OLS coefficients reported with robust standard errors in parentheses, adjusted for clustering on villages. The regressions include observations where there was no land lost (coded as a zero). All regressions include year dummies and household fixed effects. The variables % land registered and % land distributed are computed as the sum over the previous three years of the share of land affected by each program over the total cultivable land in each village, using official records. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.

Table A-6: First stage of IV regressions

Dep. Variable:	Cum. % Land Registered			
Sample:	full		restricted	
Sample (landowners):	small	large	small	large
	(1)	(2)	(3)	(4)
$LS_{v,t-1}$	51.834***	43.065***	53.596***	48.190***
	(13.454)	(11.990)	(12.194)	(11.123)
$LS^2_{v,t-1}$	-33.096***	-19.500*	-33.754***	-25.944**
	(10.406)	(11.151)	(10.259)	(12.224)
$INC_t * LS_{v,t-1}$	-44.357***	-49.269***	-46.550***	-50.998***
	(11.484)	(10.139)	(9.937)	(6.813)
$AVSD_{vt}$	-46.757**	-38.319**	-41.561**	-37.539**
	(18.481)	(16.876)	(18.664)	(16.198)
$AVSD_{vt} * LS_{v,t-1} * INC_t$	26.258*	45.887**	28.799*	34.921
	(15.466)	(21.032)	(15.739)	(21.728)
$AVSD_{vt} * LS_{v,t-1}$	-142.562	-113.064	-170.430	-141.744
	(102.542)	(85.646)	(110.623)	(111.487)
$AVSD_{vt} * LS^2_{v,t-1}$	173.238*	114.981	193.336*	152.922
	(95.678)	(92.658)	(102.201)	(113.288)
Observations	5,685	1,549	4,254	861
F-test	18.59	8.29	47.79	91.21
Number of households	1,328	387	997	218
Adjusted R-squared	0.570	0.619	0.620	0.726

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. All regressions include year dummies and household fixed effects, as well as the number of households, rainfall, GP local irrigation and road expenditures, log price of rice, canals and roads in district. Political variables (LS, INC, AVSD and interactions) are cumulated and scaled by the amount of cultivable land in the village. Small landowners are households with less than 2.5 acres of cultivable land. ***, ** and * indicate statistical significance at the 99%, 95% and 90%, respectively.