Evolution of Land Distribution in West Bengal 1967-2004: Role of Land Reform*

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Abstract

This paper uses data from a household survey to estimate changes in land distribution and underlying causes in rural West Bengal in eastern India, between 1967-2004. There was a substantial drop in land per household and land per capita, while within-village inequality and landlessness rose. Land reforms directly reduced inequality by an extent that depends on the precise inequality measure used. These were dominated by effects of household division, immigration and land market transactions. We find no significant indirect effect of the land reforms on inequality via their impact on any of these phenomena. Among the two programs, only the land titling program had a significant negative effect on inequality and landlessness; effects of the tenancy registration program (Operation Barga) were insignificant.

1 Introduction

Land is the pre-eminent asset in rural sectors of developing countries, the primary determinant of livelihoods of the poor. Many developing countries have recently experienced marked reductions in per capita and per household landownership, a factor that has reduced the ability of the rural poor to sustain their livelihoods from traditional agricultural occupations, inducing a 'push' towards non-agricultural occupations.

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Inequality of landownership and tenancy arrangements are key determinants of wealth and income inequality within the rural sector, with important implications for agricultural productivity, poverty, local governance and social capital (Berry and Cline (1979), Binswanger et al (1993), Banerjee et al (2001), Banerjee, Gertler and Ghatak (2002), Bardhan (2004)). Many arguments have thus been made for the need for land reforms in the developing world as an instrument for reducing land inequality and poverty, raising productivity, improving governance and easing social and political tensions.

To evaluate these arguments, it is important to assess the poverty-reduction and growth enhancing effects of land reforms, and in particular the channels by which they operate. Given the high correlation between rural poverty and landlessness, one needs to understand the effect of land reform on landlessness to study its effect on poverty reduction. Farms of differing sizes typically select different organizational forms of production which differ in productivity. For instance, small farms are frequently found to be more productive in rice growing areas owing to their greater reliance on family labor. Hence changes in the size distribution of farms are likely to significantly affect aggregate productivity, after controlling for within-farm incentive effects. The impacts of land reform should thus include general equilibrium effects operating through the market for land, immigration and household division, apart from the partial equilibrium effects on within-farm incentives that have been studied by most prior literature.

Besides implied effects on poverty reduction and productivity growth, effects on land inequality are also of interest in their own right. The effect is not straightforward, since the distribution of landownership depends on market transactions, division of households and migration patterns besides the direct effect of land reforms. One needs to understand how these social and market processes are affected by land reform, in order to assess whether the resulting indirect effects accentuate or moderate the direct effects. In theory there could be several indirect effects going in opposite directions.

For instance the threat of appropriation of land for households with land above the allotted ceilings may motivate them to sub-divide in order to evade the ceiling, or keep the land within the larger family. Tenancy regulation can reduce the profitability of leasing out lands to tenants; awarding land titles to the landless may restrict the supply of agricultural workers, raise wage rates and thus render cultivation by hired workers less profitable. These may thus motivate selling off of lands by households with large properties, or subdivision among various family members who switch to cultivation based on family labor. These effects would be likely to reduce land inequality. On the other hand, the very same effects may also motivate medium and small farms to subdivide, setting off a process of landownership decline which in due course leads to landsizes being too small to be viable for cultivation, eventually leading the family to sell off all its land. Land reforms may attract in-migration if immigrating households expect to receive land titles: by enlarging the number of resident households who start with no land, landlessness may increase. These effects would tend to raise landlessness

and inequality. The overall effects are therefore theoretically ambiguous.

Besides the question of inequality effects of land reform, we are also interested in understanding the factors driving changes in the land distribution, such as the division of households and migration patterns. Whether or not the land market is active is another classic question in development economics that has not received enough attention, owing mainly to lack of suitable data. And even if it is active, whether the land market tends to equalize or disequalize the land distribution is another question that bears on debates concerning regulation of land markets. Arguments for regulation typically argue that the land market is thin, and most transactions tend to take the form of distress sales wherein small and marginal landowners sell their land to large landowners. Those arguing for deregulation emphasize the role of a vibrant land market in allowing more able farmers to expand their operations by buying out the land of less productive farmers, and argue that the land market tends to equalize landholdings as small farms tend to be more productive than large farms.

This paper examines the experience of West Bengal, a state in Eastern India with a population of 80 million, which ranks among the middle among Indian states with regard to both economic indicators as well as human development. Over the past four decades West Bengal has witnessed implementation of land reforms on a much larger scale than the average Indian state, distributing 6.7% of agricultural land in the form of land titles to the poor by the early 1990s compared with a national average of 1.35% (Appu (1996)), and registering tenancy agreements for over 1.5 million sharecroppers which protected them from eviction and put a floor to their cropshares. Most assessments of these reforms have found favorable effects on agricultural productivity and incomes, both at the farm level (Bardhan and Mookherjee (2008)) and at higher levels of aggregation such as the district level (Banerjee, Gertler and Ghatak (2002)). Besley and Burgess (2000) examine the effect at the level of states, an even higher level of aggregation, using legislative measures of land reform; they find a significant effect on poverty reduction. The effect on the distribution of land itself has not been studied, except for a small number of village case studies (e.g., Lieten (1992), Sengupta and Gazdar (1996), Rawal (2001)). Some commentators (e.g., Lieten (1992) have informally argued that the land reforms in West Bengal were instrumental in lowering inequality between 1970 and 1985, and in explaining why small and marginal landowners own a larger proportion of land compared with neighboring states Bihar and Uttar Pradesh. Yet earlier work (Bardhan and Mookherjee (2008, 2010)) has noted that the land reforms involved a relatively small fraction of agricultural land, and that the bulk of the observed changes in the land distribution reflect changes in landownership owing to other factors such as household division and market transactions. This raises the question of the extent to which these social and market processes may have been indirectly affected by the land reforms.

We study the evolution of land distribution in a sample of 89 villages drawn from all

the major agricultural districts of West Bengal. We utilize results from a survey of approximately 25 households in each village conducted in 2004-05, which was designed to trace the land histories of each household since 1967. These include details of land purchases and sales, land appropriated or distributed by land reform authorities, household divisions, immigration, exits of family members as well as major demographic changes such as marriages, births and deaths.

The next section describes the nature of the data. The following section presents a number of figures that summarize the key changes in land distribution, land reform, household division, immigration and market transactions between 1967 and 2004, which helps assess the respective roles of these various phenomena in explaining changes in land distribution. This is followed by results of cross-section and panel regressions both at the household and village level for land market transactions, household division and immigration that illustrate the indirect effect of the land reforms on these phenomena. The final section summarizes the main findings.

2 Data

The survey involved 2402 households in a sample of 85 villages in West Bengal. The village sample is a sub-sample of an original stratified random sample of villages selected from all major agricultural districts of the state (only Kolkata and Darjeeling are excluded) by the Socio-Economic Evaluation Branch (SEEB) of the Department of Agriculture, Government of West Bengal, for the purpose of calculating cost of cultivation of major crops in the state between 1981 and 1996. The same sample is used in Bardhan and Mookherjee (2006, 2008, 2010) and Bardhan, Mookherjee and Parra-Torrado (2010) for earlier studies of targeting of local government programs, political economy and productivity effects of the land reforms.

The village selection procedure used by SEEB was the following: a random sample of blocks was selected in each district. Within each block one village was selected randomly, followed by random selection of another village within a 8 Km radius. Our survey teams visited these villages between 2003 and 2005, carried out a listing of landholdings of every household, then selected a stratified random sample (stratifying by landownership) of approximately 25 households per village (with the precise number varying with the number of households in each village). 2 additional households were selected randomly from middle and large landowning categories respectively, owning 5-10 acres and more than 10 acres of cultivable land. This was to ensure positive representation of these groups, which are small in number in many villages. The stratification of the sample of households was based on a prior census of all households in each village, in which demographic and landownership details were collected from a door-to-door survey.

Representatives (typically the head) of selected households were subsequently administered a survey questionnaire consisting of their demographic and land history since 1967, besides economic status, economic activities, benefits received from various development programs administered by GPs, involvement in activities pertaining to local governments (gram panchayats (GPs)), politics and local community organizations. Response rates were extremely high: only 15 households out of 2400 of those originally selected did not agree to participate, and were replaced by randomly selected substitutes.

We combine the household-level data with data on the extent of land reform carried by the land reform authorities in each of these villages (which is available until the year 1998). Additional village-level information is available from previous surveys concerning various agricultural development programs implemented by local governments, productivity in a farm panel drawn from these villages for subperiods, and in indirect household land survey for each village corresponding to 1978 (or 1983) and 1998 (in which village elders compiled household land distributions for each of these two years, based on an enumeration of voters for each village).

2.1 Constructing Land and Household Size Time Series: Key Problems

The survey data included each household's land holding as of 2004 and as of 1967. In subsequent blocks the respondents were asked to list all land transactions that occurred in between these two dates, for each of the following categories: acquisitions (purchases, patta (land titles received), gifts and others), disposals (sales, transfers, appropriation by land reform authorities, and natural disaster), and household division or fragmentation (including both exits of individual members and household splits). We focus on agricultural land, both irrigated and unirrigated (in order to determine the relevant ceiling imposed by the land reform laws, which incorporate irrigation status and household size). Corresponding changes in household demographics on account of births, deaths, marriages and household division were also recorded. An effort was made in the questionnaire design to distinguish between exit of individual members and household splitting (where a household subunit consisting of at least two members left the original household). But the questionnaire responses indicate that the interviewers and respondents tended to lump the two together. Hence we will not distinguish between individual and group exits.[1]

Recalling the details of past changes in landholdings over the past three decades can be a challenging task. In order to gauge the significance of recall problems, we checked the consistency of reported landholdings in 1967 and 2004 with reports of land

[1]We do have information about nature of the exits, such as deaths, marriages etc in the survey which are yet to be used. We plan to utilize this information in the future.

changes in the intervening period. Starting with the 1967 land holdings, we added in all transactions for any given year to compute the total land holding in each year. The total land holding using this iterative process should match the total land holding in 2004. This was indeed the case for around 87% of the households, up to a 0.2 acres margin of error.[2] The comparison between the full sample and this restricted sample is shown in columns 1 and 2 in Table 1. The remainder of the sample is affected by inaccuracies of reporting.

A similar check for household size and composition indicated consistent reports for 77% of all households, shown in column 3 in Table 1. And when we seek consistent reports of both demographics and land histories, we end up with 67% of the sample, shown in column 4 of Table 1.

We thereafter proceed on the basis of two samples. One is the restricted sample formed by those households with consistent reports. The other is the full sample, where we correct the data by starting with the reported data for 2004, and working backwards using the changes reported for given years to construct a corrected size and composition for all past years prior to 2004. We then ignore the reported figures for 1967. For example, consider a household with 2 acres in 2004 that lost 1 acre due to household division in 1995 and bought 3 acres in 1970. Then, we would list the household as owning 2 acres each year from 1995-2004, 3 acres from 1970-1995, and 0 acres from 1967 until 1970. In case the procedure generates negative land holdings in any given year, this is replaced by zero.

All results are shown for both samples, to gauge the sensitivity of the results to these data problems. Table 1 shows the restricted sample contains a larger fraction of immigrants and a smaller fraction of landowners, which is to be expected as recall problems are less likely for immigrants or those owning less land.

Another source of imperfect recall comes from distinguishing between irrigated and unirrigated land. Respondents were asked to report the irrigation status of each plot in 2004, and if irrigated the year that the plot became irrigated for the first time. In addition, they reported whether their disposed or acquired land was irrigated or not at the time of the transaction. This matters in order to determine whether the household was above the ceiling defined by the land reform laws. Possible errors in measuring this compromise regression results which examine possible discontinuities in market transactions or division at the ceiling.

[2]This figure increases to 90% when allowing for a 0.5 acre margin of error.

3 Basic Facts

3.1 Trends in Land per Household

Figure 1 shows trend in agricultural land per household for the full and restricted sample, averaged across all villages. In the full sample there is a sharp drop in the mean from nearly 3 acres per household to a little over 1 acre. The median drops by less, from 0.7 acre to 0. The third quartile drops from 3.6 acres to slightly above 1. The drop in mean, median and third quartile is less dramatic in the restricted sample, but significnt nonetheless: both the median and the third quartile are more than halved. By 2004 only one quarter of households had more than 1 acre of land. Figure 2 shows similar but somewhat attenuated patterns for the sample that excludes immigrant households.

Figure 3 shows corresponding trends for household size. The median falls from 6 to 5, and the mean also falls by 1 unit, resulting in a reduction of the order of 16%. The steepest fall is in the third quartile. The distribution of household size shrinks over time, with the largest households shrinking by more. The inter-quartile range fell from 4–9 to 4–6.

The drop in household size was thus less dramatic than the drop in land per household. Consequently land per capita fell by a factor of three, as shown in Figure 4. In the restricted sample, the mean and third quartile dropped from 0.5 to near 0.2 acres per capita. This confirms the view commonly expressed in West Bengal that it is increasingly difficult for rural households to derive their livelihood from agriculture, creating an urgent need to generate non-agricultural employment opportunities in the state. It is also evident that the changes observed are gradual, with no noticeable fluctuations across different years. Figure 5 shows similar patterns for native households.

To corroborate these findings, Table 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 remained approximately the same. This indicates that conversion of agricultural land into forests or other non-agricultural purposes is unlikely to have been an important cause of the decline in land availability per household.

Returning to the direct household survey, immigration accounted for a 15% drop in land per household for both the full and restricted samples, while for natives it dropped by about 40%. Table 3 decomposes the latter change between different channels. For both the full sample and the restricted sample, 86% of the decline in land for native households is accounted for by land lost owing to household division, 5.5% to land market transactions, 7% to gifts and transfers, 2% for land reforms, and 2% for other miscellaneous reasons. Hence land lost owing to household splits and migration of household members was the dominant source, followed by immigration, land mar-

ket transactions and transfers. The direct effect of land reforms was negligible. It is therefore necessary to evaluate possible indirect ways in which land reforms affected the land distribution, by affecting processes of household division, immigration and land transfers.

3.2 Trends in Inequality and Landlessness

Figure 6 shows that within-village inequality (averaged across villages) rose by 10% for the Gini and somewhat more (15–20%) for the coefficient of variation, in both samples. Figures 7 and 8 calculate the contribution of three principal channels by which household landholdings changed: household division, land market transactions, and land reform respectively, using the following accounting exercise. For each of these channels, we calculate the amount of land the household would have owned in any given year had the landholding change associated with the corresponding channel not occurred, and all other changes in landholding would have occurred as observed. We then calculate the average within-village inequality that would have resulted, and subtract this from the observed inequality to estimate the contribution of this channel.

These figures show clearly that the source of rising inequality was household division, particularly after the mid-80s. Land market transactions contributed to a reduction in inequality, by an extent depending on the precise inequality measure used and the sample in question. In the case of the coefficient of variation, the inequality reduction effect of land market transactions was more pronounced, mostly occuring by the mid-80s. However if we use the Gini coefficient instead, the land market had a more modest effect on inequality, and nearly zero in the case of the restricted sample. Finally, the role of the land reforms was to reduce the coefficient of variation by a magnitude comparable to the land market for the period as a whole, though the effect was weaker in the first half of the period. For the Gini coefficient, by contrast, the direct effect of the land reform was near zero for the period as a whole, in both restricted and the full sample. Hence the land reforms exercised a weaker direct effect on the land distribution than processes of household division. The significance of the land reforms relative to land market transactions depends on the precise inequality measure used.

Table 4 shows the distribution of land across different size classes in 1967 and 2004. Landlessness rose from 39% to 46% for natives, and 55% for the population including immigrants. The proportion of households that were either landless or marginal (owning less than 1 acre) rose from 61% to 75% among natives, and 80% among the entire population. This was accounted for by a drop mainly of small landowners (between 1 and 2.5 acres) and large and big landowners (owning more than 5 acres).

In order to gauge the effect of rising landlessness on land inequality, we examined the distribution of land among households owning land in 2004. These are not shown here, in order to conserve space. Briefly, land inequality among landowning households

as measured by the coefficient of variation declined in the first half of the period, and rose thereafter to neutralize the earlier decline. In the case of the Gini coefficient there was a significant decline. Hence the rise in inequality observed for either inequality measure was mainly accounted for by rising landlessness.

3.3 Immigration

Figure 9 focuses on the role of immigration, defined by arrival of the household in question in the village after 1967. This includes both domestic and foreign immigrants. The proportion of immigrants rose smoothly to approximately 28%. In the early 1970s there was a sharp rise in the proportion of landless households that were immigrants, but this proportion stabilized thereafter at approximately 75%. Clearly the demographic share of immigrants amongst the landless is much larger than in the village population as a whole, so the arrival of immigrants tends to swell the ranks of landless households. Hence immigration contributed steadily to rising inequality and landlessness. The fact that their share among the landless was stable from the mid-70s onwards despite the steady flow of new immigrants indicates that landless immigrants tended to gradually acquire some land over time, on par with native landless households.

We have discussed above how immigration explains about one-third of the observed reduction in land per household. The role of immigration in contributing to inequality is illustrated by comparing the rise in inequality within native households (shown in Figure 10) with the rise in inequality in the village as a whole (Figure 6). The Gini rose by about 5% instead of 10%, and the rise in coefficient of variation is also halved. *Hence the two main factors accounting for the observed rise in inequality were household division and immigration, whose combined effect outweighed the inequality reducing effects of land reform and market transactions.* During the first half of the period (until 1985) inequality among natives actually fell (for CV) and remained stationary (for the Gini), owing to the greater effect of the market and land reform. Subsequently household divisions accelerated to cause inequality to increase overall, both among the native population as well as for the village as a whole.

3.4 Land Market Transactions

Figure 11 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 shown in Figure 1. It is within the margin of variation observed from year to year during the period in queston, thus unlikely to be statistically significant. Note also that the land transactions are considerable in frequency, and occur throughout the period. Hence the land market has been quite active. 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. However in the restricted sample these spikes are muted, with no evident tendency to be bunched in the earlier period. The earlier decompositions indicated that the land market transactions tended to reduce the coefficient of variation, and did not have a significant impact on the Gini. We shall investigate the inequality effects in more detail below.

3.5 Land Reform

Figure 12 shows lands lost and gained by households owing to land reform. In both sample the lands appropriated exceed those distributed, confirming the observation in Bardhan and Mookherjee (2010) that much land that is appropriated by land reform authorities is not distributed as titles, reflecting either legal roadblocks or corruption. As in the case of land market transactions, the spikes in lands appropriated are muted in the case of the restricted sample. But there are still spikes in the latter between 1970 and 1985, and only one later year (around the mid-90s). The spikes indicate an excess of land appropriated over distributed which in three years happens to exceed 0.1 acre, and is nearly 0.4 acres in one year. This accounts for the slight negative contribution of the land reforms to land per household noted above.

Figure 13 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, while 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 an 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. This reflects the phenomenon described in Bardhan and Mookherjee (2008) for tenants involved in the reform to be cultivating fertile plots in excess of an acre, while land titles were typically low quality land well under an acre. The estimated effects on farm productivity in that paper indicate that the tenancy program had a statistically significant and uniform impact on farms of varying size, and a somewhat

smaller impact on earnings and agricultural workers, in contrast to the negligible and statistically insignificant effects of the titling program.

3.6 Household Division

Figure 14 breaks down changes in household size into different sources: births, in-marriages (i.e., those who join the household via marriage), household division and other exits (including deaths, out-migration and out-marriages). Births rose over the period, while in-marriages had a steady effect on household size. These were outweighed by household division and other exits, generating a negative overall impact. Other exits were more pronounced in the first half of the period, while household division tended to arise especially in the second half. Exits owing to out-migration, out-marriages and household splits typically reduce land owned by the household, as departing members tend to leave with a certain share of the land. To the extent that big landowning households are more prone to such divisions than the rest of the village, land inequality tends to decline. However if small and marginal landowning households divide, it reduces their landholdings to below minimum viable sizes of cultivation, raising landlessness and inequality. Hence the effects of household division on the land distribution depend on the size classes in which they are particularly pronounced.

To examine this, Tables 5, 6 and 7 show division rates and land lost for househlds dividing, for different size classes. Over the entire period, the former table shows that the division rates increased from 7.7% per year among landless households to 9% among small and medium households, and over 10% for big landowners. Until 1986, the division rates among the big landowners were substantially higher than among small and medium owners. Between 1987 and 1991, division rates among big landowners dropped considerably, while division among small and medium owners remained steady, becoming higher than among the big owners. Moreover, conditional on division, small households lost at a higher rate during 1987-91 than the big households. After 1991, the small and big landowners divided and lost land at about the same rate. Table 7 shows the net rate at which land was lost for different size classes. For the period as a whole, small and big households lost land at roughly the same rate (around 1.6% per year). Division among the small would have led to rising inequality and landlessness, while among the big would have led to falling inequality.

We have mentioned earlier that increases in inequality were linked mainly to rising landlessness (as inequality within households owning positive lands in 2004 did not rise for the period as a whole). This indicates that subdivision of small households was the main factor driving rising landlessness and inequality. The fact that these accelerate after 1986 is additional confirming evidence.

4 Regression Results

In this section we explore the possible indirect role of land reforms in changing land distribution by affecting land market transactions, household division and immigration. We predict market transactions and division of households, utilizing the household panel, controlling for household demographics, land owned and status vis-a-vis land ceilings defined by the land reform regulations. Land reforms implemented in the village are measured by the proportion of land or households affected directly by the tenancy registration and land titling program in the village in question. These may have signaled the seriousness with which the land reforms were being implemented in the local area, thus affecting the inclination of large landowning households with land in excess of the ceiling to sub-divide or sell land in order to avoid having their lands appropriated by land reform authorities. Large landowning households below the ceiling may also have been affected by either kind of land reform. Operation Barga is likely to have reduced the profitability of leasing out land to tenants, while the land titling program may have raised wage rates for agricultural workers, reducing the profitability of cultivating land using hired workers.[3] The land titling program may also have increased the inclination of small and medium landowning households to divide into landless or marginal fragments in order to become eligible to receive the land titles.

Many other factors would be expected to affect incentives to divide or sell land. Demographic events (such as births, deaths, marriages, out-migration) that alter household size could trigger divisions or sales, as these change the ratio of land owned to family labor. Large households with multiple adult siblings may have a greater tendency to sub-divide owing to greater free-riding in household collective activities, lower value placed on household colective goods and increasing desire for privacy and independence in lifestyle as living standards increase (see e.g., models of Platteau and Guirkinger (2009) and Foster and Rosenzweig (2002)). We do not model the process of division or market transactions in this paper. Instead our intention is to examine the patterns in the data, as a prelude to any such modeling exercise.

We present reduced form regressions which predict land market transactions or household division for a household in any given year, based on lagged household size which incorporate the effect of recent demographic events, lagged landholdings, and recent incidence of land reforms implemented in the village, besides household and year fixed effects. In all of the following regressions, we use the average of land reforms implemented in the village in the past three years. We also examine a variant where this is replaced by the average of the reforms implemented for the subsequent three

[3]Bardhan and Mookherjee (2008) found using a farm panel for these villages between 1982-95 that Operation Barga induced substitution of family labor for hired labor and a corresponding reduction in the wage rate. The land titling program also induced a similar substitution pattern, with a positive but statistically insignificant effect on wages of hired workers.

years, in case households were able to anticipate the reforms. We calculate the land ceiling applicable to the household in question in any given year, using information concerning the number of household members and amounts of irrigated and unirrigated land owned in that year. This is used to create a dummy for whether the household is subject to the ceiling in any given year. The controls for land size include quadratic and cubic terms, so by including a ceiling dummy and interactions of this dummy with various measures of land reform activity in the village we examine how households above the ceiling behave differently from those below.

4.1 Household Division

Table 8 presents a logit regression predicting the event that a household experienced a division in any given year. The likelihood rises significantly with lagged household size, controlling for landholdings. It also rises in landholdings, though the rate at which this happens declines with landholdings. Column 1 shows that recent implementation of Operation Barga (measured by proportion of cultivable land affected) accelerated division rates significantly more for small landowning households compared with large landowners. Households with land above the ceiling subdivided at a discontinuously higher rate, compared to those just below the ceiling. In this sense the land reform legislation tended to accelerate the break up of large landowning households, reducing inequality. But there is no evidence that the rate of implementation of the reforms affected this phenomenon. Column 2 presents a similar regression, using the proportion of households affected by the land reform to measure their implementation rates. The results are similar, except that the negative impact of Barga implementation on slope with respect to landholdings is now insignificant.

The next two columns examine whether slope of the division rate with respect to landholdings and implementation rates were different above the ceiling compared with below. The slope turns out to be significantly lower above the ceiling, and there is no significant difference with regard to the effect of the implementation rates. Analogous results are obtained for the restricted sample, in the last two columns.

Next, we explore the possibility that households were able to anticipate the land reforms to be implemented in the near future, or that currently ongoing land reform efforts took a few years for the associated legal steps to be completed. Table 9 reruns the logit regression, replacing the recent land reform implementation rate with an average of the implementation rates achieved in the following three years. In the first column we see a significant increase in the slope of the division rate with respect to lagged landholdings, associated with a higher rate of Operation Barga implementation in the subsequent three years. However this result is not robust with respect to alternative specifications, e.g., in the second column when the household-based measure of implementation rate is used, or in the restricted sample (columns 5 and 6).

We turn now to the amount of land lost, conditional on dividing, shown in Table 10. In the first two columns we see no significant variations with household size, landholding, the above-ceiling dummy, or land reform implementation rates. In the third and fourth columns which allow for different patterns above and below the ceiling, we see a significant negative effect of Operation Barga implementation rates on the slope with respect to landholding. In other words, increases in the Operation Barga implementation rate raised division rates among small landowners relative to large owners, which would tend to *raise* inequality.

The last two columns present analogous results for the restricted sample, where the only difference is that landholdings has a significant positive effect on land lost conditional on division. This would tend to reduce inequality. But the size of this effect is still invariant with respect to land reform implementation rates.

In summary we see no clear evidence that implementation of land reforms indirectly reduced inequality via their effect on household division patterns.

4.2 Land Market Transactions and Gifts

Table 11 present regressions for net sales (sales minus purchases) as explained by the same set of explanatory variables. As expected, lagged household size has a significant negative effect, while lagged landownership has a significant positive effect. This confirms that land market transactions tended to equalize the land distribution.

Regarding the indirect effect of land reforms, there is no evidence that above-ceiling households behaved differently with respect to net sales. Nor is there any evidence of a significant positive effect of land reform implementation rates. In the fourth column which allows for different patterns above and below the ceiling, a higher Barga implementation rate lowered the slope of net sales with respect to landholdings. In other words, Barga implementation reduced the tendency of large landowners to sell, relative to small owners. Column 6 which is run on the restricted sample shows a significant negative effect of Barga implementation on above-ceiling households to sell land. This is an unexpected finding, which needs to be explained.

Table 12 shows the same regression, upon using average implementation rates one to three years following, to incorporate the possibility that househlds may have anticipated the reforms in advance. Again we see no significant effect of land reform implementation rates.

Tables 13 and 14 present analogous regressions for net gifts (gifts given, minus received) of land. The only significant effects arise in the latter table which uses the future rates of reform. Households with more land tend to gift more, resulting in an equalizing effect. Operation Barga implementation rates raised gifts, but at a lower rate for larger landowners. Hence just as in the case of land market transactions, the indirect effects of land reform would have been to raise inequality.

4.3 Immigration

Table 15 considers the determinants of demographic share of post-1967 immigrants, at the village level. Columns 1 and 3 regresses this on contemporaneous land per household, and measures of land reform, besides village and year dummies. Columns 2 and 4 present corresponding Arellano-Bond regressions with a lagged dependent variable. While the negative coefficient on land availability is unexpected, we find no robust significant effects of the land reform on immigrant inflows.

4.4 Reduced Form Impact of Land Reforms on Land Inequality

Finally Tables 16, 17, 18 and 19 examine the total impact of land reform measures implemented on changes in land inequality. Table 16 presents a cross-sectional regression predicting 1998 inequality (either Gini coefficient or coefficient of variation) by the cumulative land reforms implemented since 1968 and the level of inequality in 1968. Here the land title program registers a significant negative coefficient, irrespective of the inequality measure used. With approximately one-third of all 1967 households receiving titles, it implies a 0.15 drop in the coefficient of variation, and a 0.04 drop in the Gini. Table 17 presents the corresponding Arellano-Bond panel regression using yearly observations, where the effects of the land reforms are not precisely estimated.

Tables 18 and 19 present corresponding cross-section and panel regressions for the proportion of households that are landless. In the former we see a significant effect of the proportion of households receiving land titles in reducing landlessness. The magnitude of this coefficient is large, implying a reduction of landlessness by about 6%. The results in the panel regression depend on the implementation measures: the land title program has a negative impact when using the land-based measure, but Operation Barga has a negative impact when using the household-based measure.

5 Summary and Concluding Observations

We summarize our main conclusions.

1. There was a significant reduction in land owned per capita and land per household. The most important factor causing land per household to fall was household division, followed by immigration. There was no evidence of significant conversion of land from agricultural to non-agricultural purposes. Sales to non-residents is also unlikely to have been a significant factor, as net sales of land by residents accounted for a small fraction of land loss.

2. Within-village inequality also rose, by between 10 to 20%, depending on the inequality measure used. The most important contributing factor was household di-

vision, particularly of small landowning households that became ultimately landless. Rising immigration also contributed to rising inequality, since immigrant households typically arrive in a landless status. Hence a combination of demographic factors and technological conditions (viz, scale economies wherein farms below a certain size become uneconomical) were the principal drivers of rising inequality.

3. Land market transactions tended to reduce inequality by an extent depending on the precise inequality measure: negligible for the Gini but significant for the coefficient of variation. Households owning more land tended to sell more, controlling for household size. However, this effect was not significant enough to overcome the inequality-enhancing effects of household division and immigration.

4. The direct effects of the land reform on inequality were significantly negative for the coefficient of variation, and negligible for the Gini coefficient. In the case of the former, it was roughly equal in magnitude to the inequality-reducing impact of land market transactions. For both measures, it was dwarfed by the effect of household division and immigration.

5. Household division tended to raise inequality mainly via their impact on division of small and marginal landowning households that ultimately became landless. Small and large landowning households tended to divide and lose land at similar rates.

6. There is no evidence that land reforms tended to reduce inequality indirectly, via induced impacts on household division, market transactions, gifts or immigration. The reasons for this are likely to be complex, and will need further research on the motives for household division, land market transactions and migration patterns.

7. Consistent with these results, the overall reduced form impact of the land reform on inequality and landlessness amounted to the direct impact, which was negative and significant only for the land title program (operating via award of land titles to landless and marginal landowners). Nevertheless the overall scale of the land reforms was not large enough to outweigh the inequality enhancing effects of division of small households and immigration.

The main focus of this paper has been to understand the main facts, rather than modeling the complex behavior of households with respect to division, immigration and land market transactions. Future attempts to understand changes in land distribution in West Bengal will have to pay more attention to these. This will help refine the estimates reported in this paper for possible endogeneity concerns. There is also the need to explore possible endogeneity biases with regard to estimation of effects of the

land reforms, by using external (national and district-level) determinants of political competition as instruments for land reform implementation rates.

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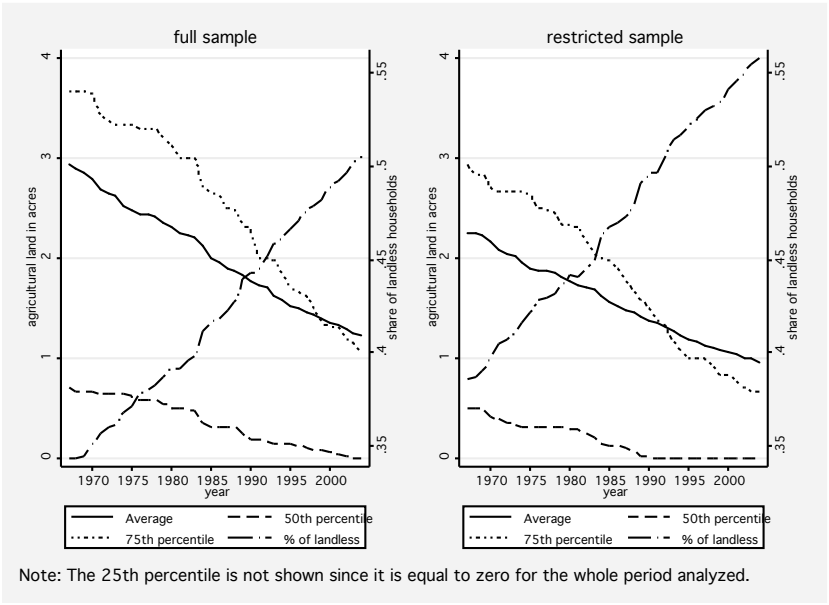
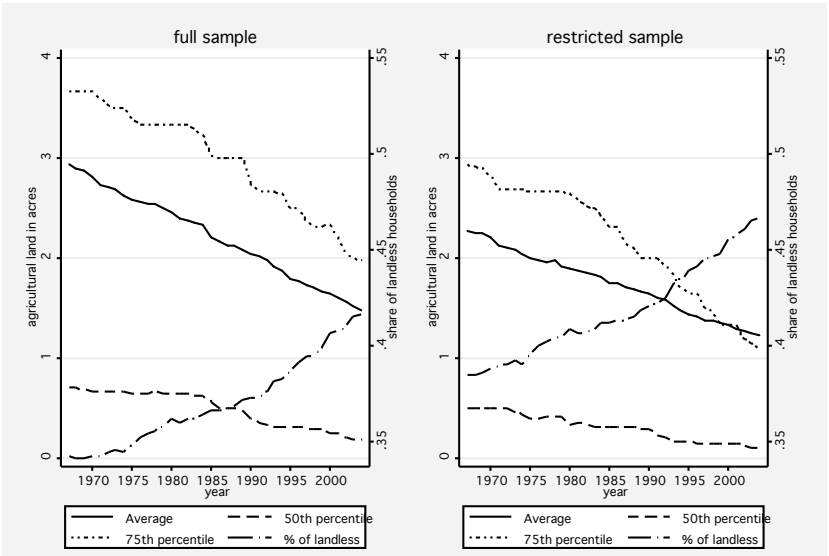
Figure 1: Agricultural land per household, various measures (1967-2004)



Note: The 25th percentile is not shown since it is equal to zero for the whole period analyzed.

Figure 2: Agricultural land per household, only natives (1967-2004)



Note: The 25th percentile is not shown since it is equal to zero for the whole period analyzed.

Figure 3: Household size, various measures (1967-2004)

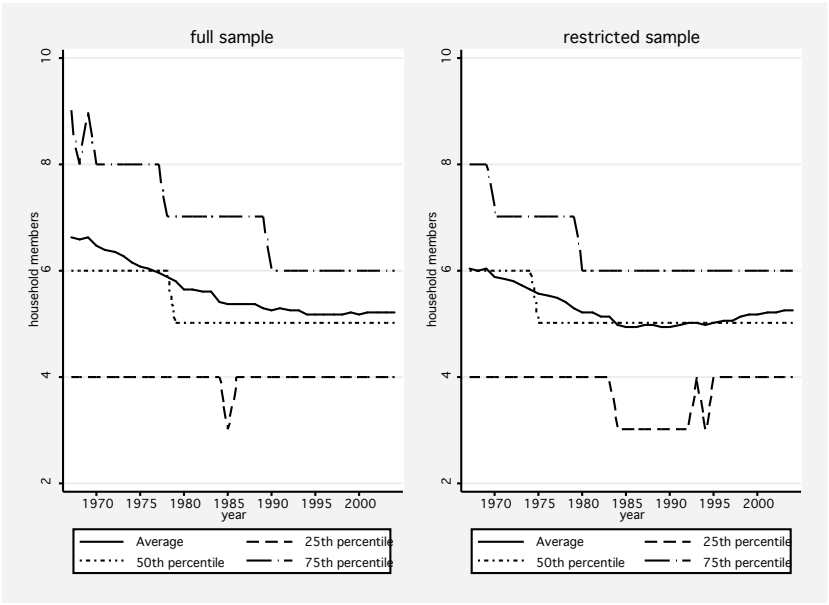
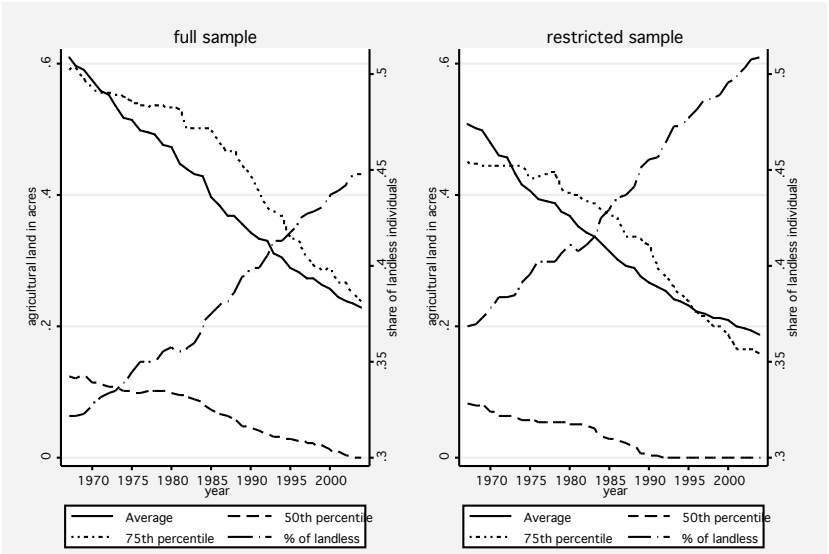
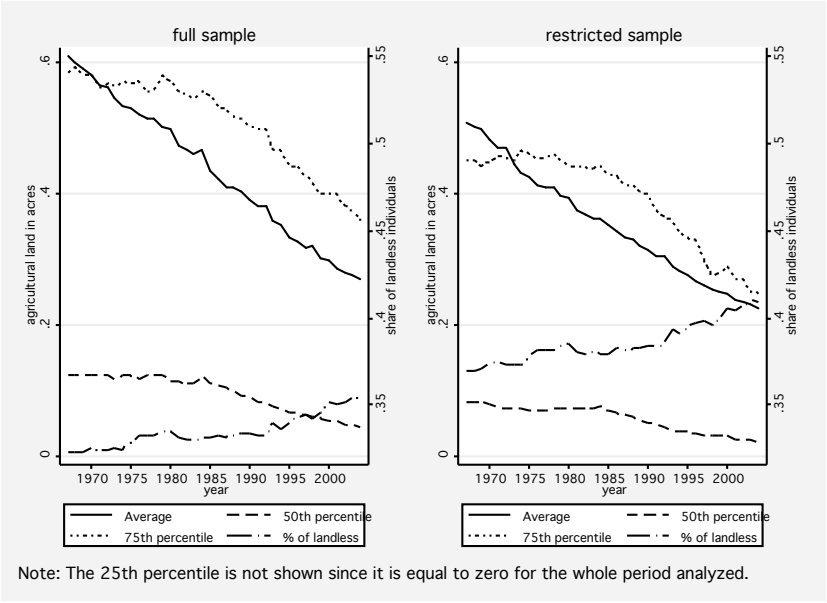


Figure 4: Agricultural land per capita, various measures (1967-2004)



Note: The 25th percentile is not shown since it is equal to zero for the whole period analyzed.

Figure 5: Agricultural land per capita, only natives (1967-2004)



Note: The 25th percentile is not shown since it is equal to zero for the whole period analyzed.

Figure 6: Average within-village land inequality, various measures (1967-2004)

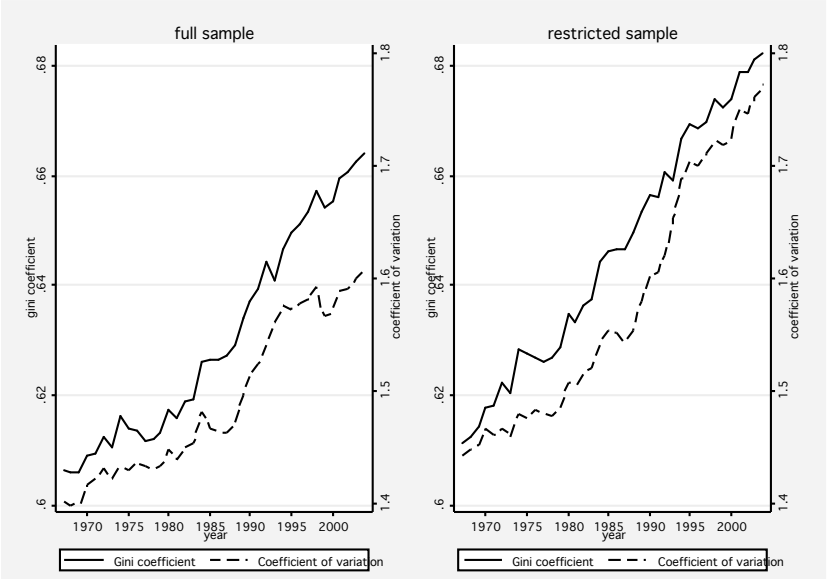


Figure 7: Average within-village land inequality, contribution to the Gini coefficient by channel (1967-2004)

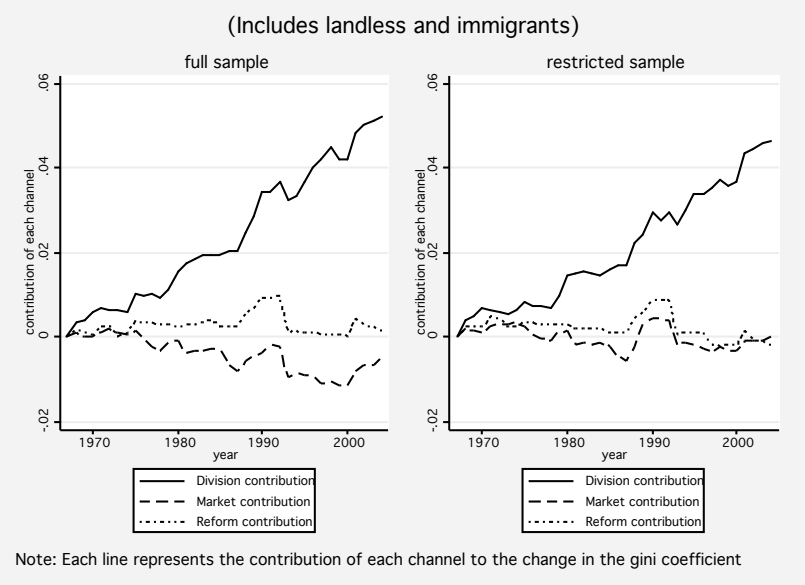


Figure 8: Average within-village land inequality, contribution to coefficient of variation by channel (1967-2004)

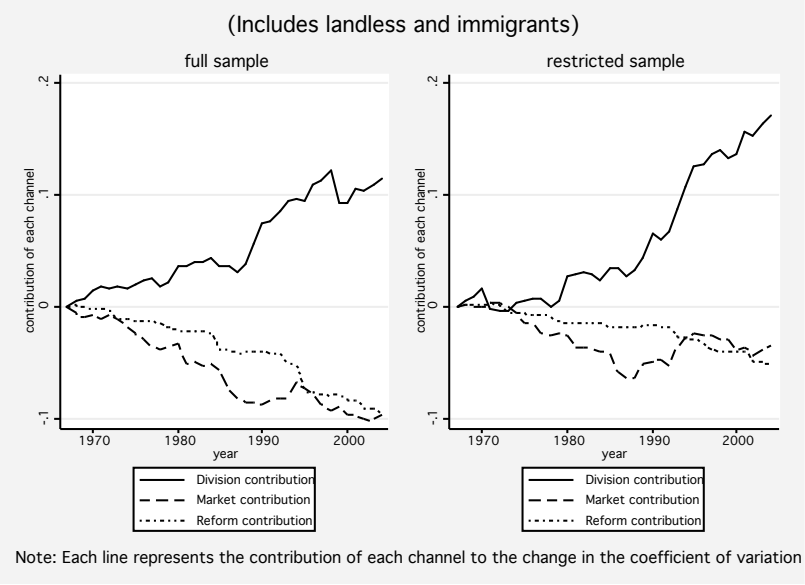


Figure 9: Immigration (1967-2004)

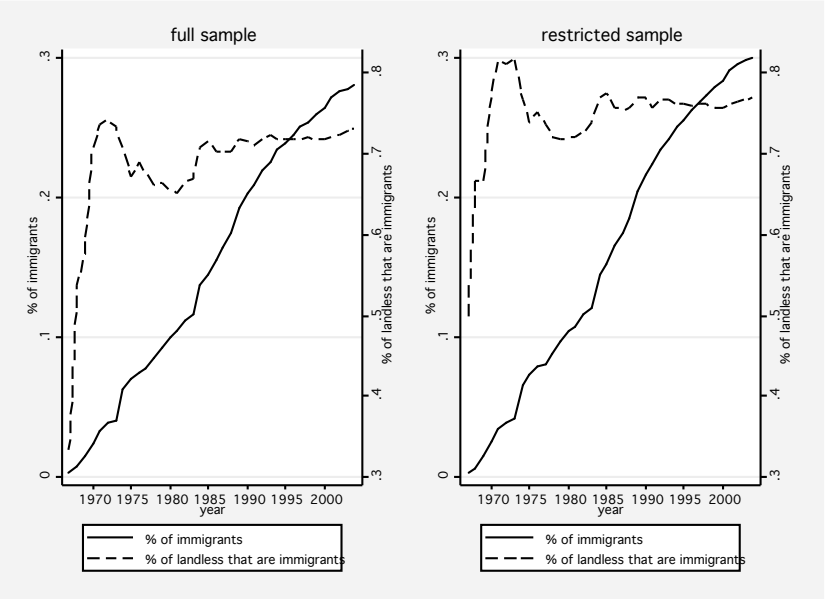


Figure 10: Average within-village land inequality, excluding immigrants (1967-2004)

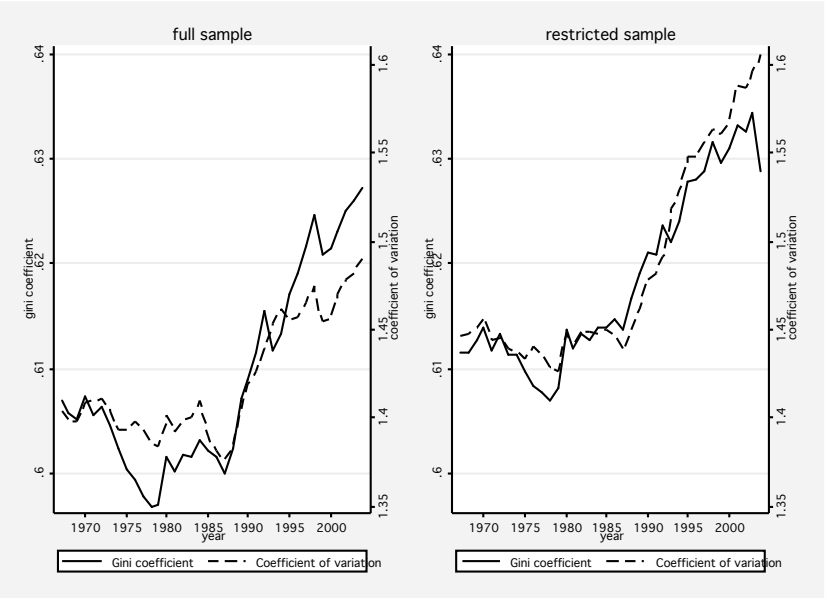


Figure 11: Land market: Average of total sales and purchases per village (1967-2004)

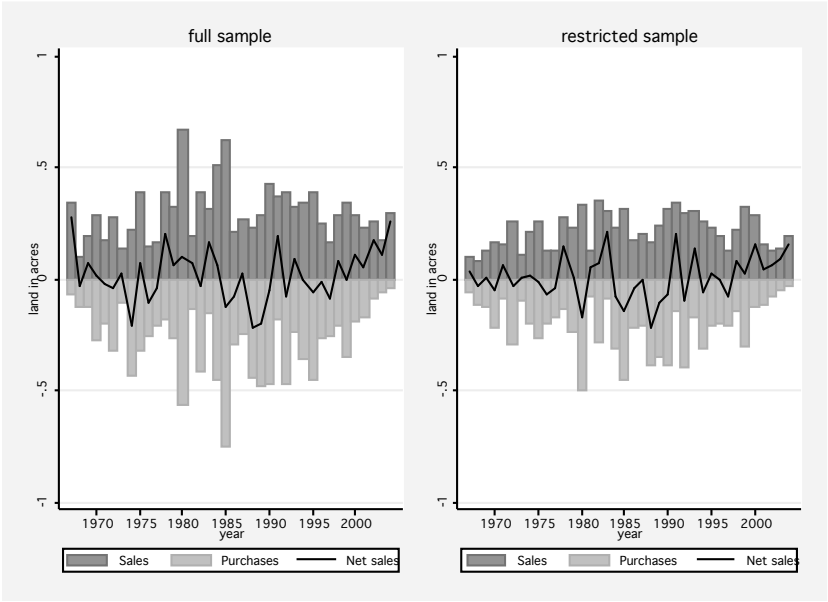
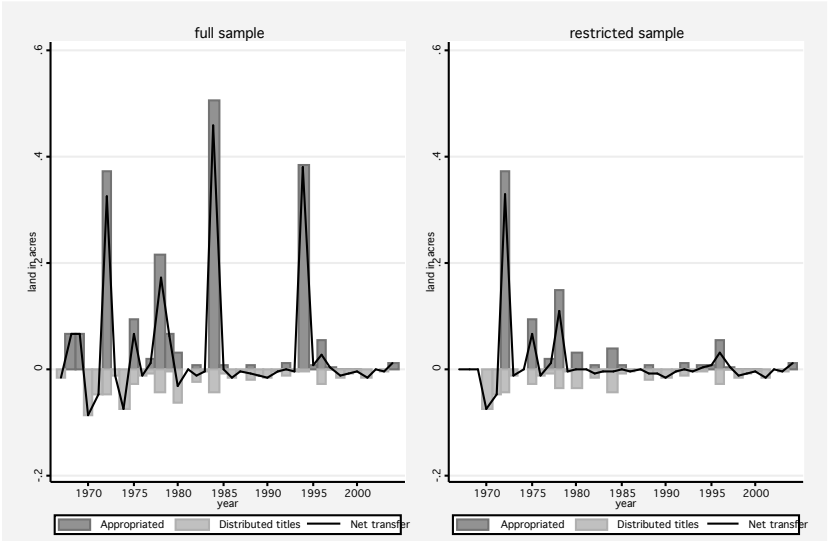
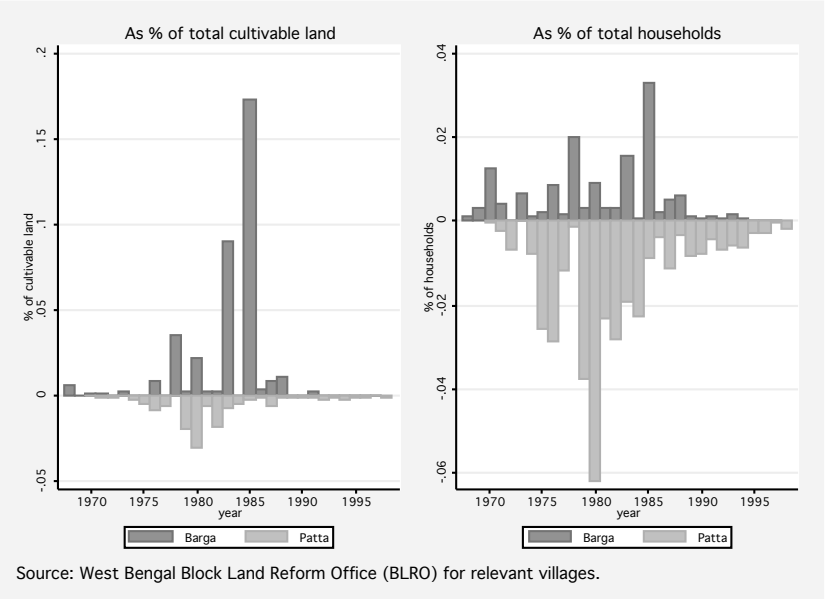


Figure 12: Average of total land lost and gained due to land reform, household survey (1967-2004)



Notes: The figure is constructed using data from the household survey. For each village, the sum of land lost and gain is computed, and then the average across villages is reported.

Figure 13: Average land reform implemented, official land records (1968-1998)



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

Figure 14: Changes in household size by cause (1967-2004)

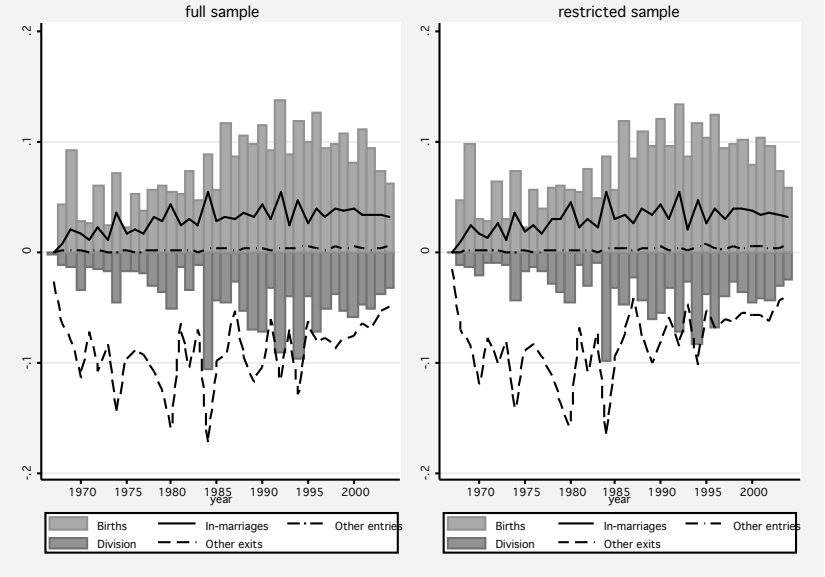


Table 1: Comparing samples

	Full Sample (1)	Land history Correct (2)	Household size history correct (3)	Both land and household histories correct (4)	Diff. between columns (1) and (2) (5)	Diff. between columns (1) and (3) (6)	Diff. between columns (1) and (4) (7)
Household size	5.216	5.083	5.258	5.119	0.114	-0.079	0.046
	(2.583)	(2.383)	(2.612)	(2.397)	(0.071)	(0.077)	(0.075)
Fraction of immigrant households	0.279	0.300	0.322	0.341	-0.013	-0.042	-0.055
	(0.449)	(0.458)	(0.467)	(0.474)	(0.012)	(0.013)***	(0.014)***
Total agricultural land	1.229	0.975	1.189	0.927	0.201	0.013	0.225
	(2.389)	(2.121)	(2.371)	(2.043)	(0.062)***	(0.066)	(0.063)***
Irrigated agricultural land	0.832	0.639	0.799	0.603	0.153	0.017	0.176
	(1.924)	(1.660)	(1.886)	(1.556)	(0.050)***	(0.054)	(0.051)***
Unirrigated agricultural land	0.397	0.336	0.388	0.325	0.048	-0.004	0.049
	(1.335)	(1.224)	(1.324)	(1.188)	(0.032)	(0.035)	(0.033)
% Landless	50.50	55.79	52.22	57.04			
% Marginal (between 0 and 1.25 acres)	25.65	24.96	24.96	24.45			
% Small (between 1.25 and 2.5 acres)	5.45	4.86	5.08	4.71			
% Medium (between 2.5 and 5 acres)	10.74	8.62	9.84	8.13			
% Large (between 5 and 10 acres)	6.24	4.76	6.49	4.77			
% Big (more than 10 acres)	1.42	1.00	1.41	0.88			
N	2402	2099	1911	1697			

Notes: Columns (1)-(4) report means with standard errors in parentheses. Means are computed using only survey answers for the year 2004. Column (2) includes those households for which the constructed land holding matched the reported in 2004, up to a 0.2 acres margin of error. Column (3) includes those households for which the constructed family size matched the reported in 2004, up to a 1 member margin of error. Column (4) include those households for which both the constructed land holding and family size matched the reported in 2004. Columns (5), (6) and (7) report tests for differences of means across column (1) and columns (2), (3), and (4), respectively. Robust standard errors are in parentheses. Tests are based on regressions with village fixed effects.

Table 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
Change in cultivable land	63	1.7	148.2	-843.8	244.4
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
Change in No. households	63	188.5	192.6	-6.0	841.0
	Initial report 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
Change in cultivable land	26	-13.0	66.5	-225.3	109.9
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
Change in No. households	26	110.0	83.0	10.0	332.0

Notes: Cultivable land is measured in acres. 46 villages report cultivable land in 1977, 14 in 1978, 3 in 1979, 1 in 1980, 1 in 1981, 23 in 1983, and 1 in 1984.

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

Sample:	full	restricted
Land change	-1.389	-1.000
Lost due to land division	-1.124	-0.864
Lost through sales	-0.559	-0.470
Gained through purchases	0.468	0.416
Lost due to reform	-0.097	-0.048
Gained due to reform	0.034	0.030
Lost as a gift	-0.116	-0.103
Gained as a gift	0.030	0.030
Lost for other reasons	-0.060	-0.032
Gained for other reasons	0.011	0.010

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.

Table 4: Proportion of households in each land category (restricted sample)

	Initial	Final (2002-2004)	
Land Class	(1967-1971)	natives and immigrants	only natives
Landless	39.33	55.43	46.44
Marginal	22.45	24.83	29.02
Small	10.89	5.00	5.85
Medium	13.81	8.78	11.02
Large	8.97	4.96	6.37
Big	4.56	1.00	1.29

Notes: Numbers indicate the proportion of households in each category. Numbers are percentages.

Table 5: Proportion of households dividing (1967-2004)

Land Class	1967 - 2004	1967 - 1971	1972 - 1976	1977 - 1981	1982 - 1986
Landless	7.73	5.53	7.80	9.00	9.32
Marginal	8.12	5.80	7.51	7.89	10.22
Small	9.43	4.72	9.12	10.12	10.69
Medium	9.32	6.22	10.29	11.16	12.21
Large	8.95	6.20	9.39	11.26	11.04
Big	10.28	8.45	10.16	13.40	14.63
Land Class	1987-1991	1992-1996	1997 - 2001	2002 - 2004	
Landless	7.78	8.50	7.94	5.53	
Marginal	8.10	8.68	8.75	6.28	
Small	10.62	11.42	10.03	8.25	
Medium	8.39	9.39	9.35	7.94	
Large	8.63	8.18	9.30	8.37	
Big	6.23	12.31	9.64	8.49	

Notes: All numbers indicate the proportion of households that divided in a given period of time. Division means one or more members left the household. Numbers are percentages.

Table 6: Proportion of land lost due to division, conditional on dividing (1967-2004)

Land Class	1967 - 2004	1967 - 1971	1972 - 1976	1977 - 1981	1982 - 1986
Landless	1.92	0.00	0.00	0.00	0.00
Marginal	12.93	8.95	1.92	8.97	7.81
Small	16.71	1.16	8.29	6.91	10.93
Medium	13.07	8.93	9.97	9.14	12.34
Large	12.13	9.22	6.82	6.44	11.32
Big	16.14	19.84	12.10	7.49	16.58
Land Class	1987-1991	1992-1996	1997 - 2001	2002 - 2004	
Landless	0.00	10.00	0.00	0.00	
Marginal	15.19	20.95	14.88	14.45	
Small	25.06	25.36	19.38	28.90	
Medium	15.40	20.84	12.43	12.49	
Large	12.84	21.65	12.37	16.83	
Big	12.95	27.07	13.27	23.86	

Notes: Numbers indicate the proportion of land that households lost due to division (one or more members left the household). Numbers are percentages. Landless households have some land gave away because at the same time they gained land through purchase or other source.

Table 7: Proportion of land lost due to division, unconditional (1967-2004)

Land Class	1967 - 2004	1967 - 1971	1972 - 1976	1977 - 1981	1982 - 1986
Landless	0.20	0.00	0.00	0.00	0.00
Marginal	1.03	0.51	0.14	0.67	0.77
Small	1.58	0.05	0.76	0.70	1.18
Medium	1.22	0.56	1.03	1.02	1.48
Large	1.08	0.56	0.64	0.72	1.25
Big	1.65	1.68	1.23	1.00	2.39
Land Class	1987-1991	1992-1996	1997 - 2001	2002 - 2004	
Landless	0.00	1.11	0.00	0.00	
Marginal	1.21	1.79	1.29	0.91	
Small	2.65	2.91	1.95	2.39	
Medium	1.30	1.97	1.17	1.00	
Large	1.11	1.77	1.15	1.41	
Big	0.81	3.33	1.28	2.03	

Notes: Numbers indicate the proportion of land that households lost due to division (one or more members left the household). Numbers are percentages. Landless households have some land gave away because at the same time they gained land through purchase or other source.

Table 8: Determinants of household division, using past reform, average of last three years (logit model)

Dep. Variable:	Probability of fragmentation					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	0.52688***	0.52660***	0.53111***	0.53067***	0.66146***	0.66123***
	(0.03872)	(0.03872)	(0.03926)	(0.03913)	(0.05109)	(0.05103)
pattaland	1.05057***		1.06576***		1.88263***	
	(0.14491)		(0.14642)		(0.52868)	
bargaland	-0.01259		-0.01447		-2.25088**	
	(0.10676)		(0.11431)		(1.03632)	
Ceiling dummy	1.56340**	1.56867**	5.43554***	5.35892***	2.52887	0.63742
	(0.72489)	(0.73183)	(1.39480)	(1.44587)	(7.36609)	(7.71633)
Lagged land	0.49142***	0.48591***	0.40668***	0.39986***	0.70321***	0.69698***
	(0.10598)	(0.10512)	(0.10517)	(0.10449)	(0.18634)	(0.18646)
Lagged land^2	-0.01790***	-0.01759***	-0.00658	-0.00597	-0.05498**	-0.05324**
	(0.00672)	(0.00672)	(0.00632)	(0.00630)	(0.02530)	(0.02511)
Lagged land^3	0.00020**	0.00020**	0.00011	0.00010	0.00112*	0.00099*
	(0.00010)	(0.00010)	(0.00008)	(0.00008)	(0.00062)	(0.00055)
Lagged land*bargaland	-0.42209*		-0.42410		0.29891	
	(0.22866)		(0.27059)		(0.24063)	
pattahh		0.60102***		0.61519***		0.55701***
		(0.14397)		(0.14082)		(0.11783)
bargahh		-0.21254		-0.25690		-0.40343
		(0.83541)		(0.89114)		(0.78117)
Lagged land*bargahh		-0.10292		-0.11396		-0.09149
		(0.17357)		(0.24207)		(0.33046)
ceiling*Lagged land			-0.32937***	-0.32439***	-0.05949	0.09279
			(0.09631)	(0.09879)	(0.62652)	(0.65298)
ceiling*bargaland			17.11288		13.92553	
			(15.21538)		(49.92552)	
ceiling*Lagged land*bargaland			-0.91161		0.28408	
			(1.02978)		(3.55781)	
ceiling*bargahh				19.36214*		11.01935
				(10.66553)		(8.60526)
ceiling*Lagged land*bargahh				-1.23895		-0.37798
				(0.85005)		(0.69899)
Pseudo R^2	0.160	0.159	0.161	0.160	0.171	0.170
Observations	32470	32470	32470	32470	20462	20462
No. households	1225	1225	1225	1225	776	776

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland 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. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the previous three years of the share of households affected by each program over the total number of households per village.
(*** p<0.01, ** p<0.05, * p<0.1)

Table 9: Determinants of household division, using anticipated reform, average of next three years (logit model)

Dep. Variable:	Probability of fragmentation					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	0.52037***	0.52060***	0.52622***	0.52569***	0.66896***	0.66799***
	(0.04008)	(0.04003)	(0.04028)	(0.04020)	(0.05839)	(0.05835)
pattaland	-1.36234		-1.29530		-0.81655	
	(1.42484)		(1.37753)		(1.04452)	
bargaland	-0.09175		-0.07930		-0.06770	
	(0.07079)		(0.06501)		(0.08167)	
Ceiling dummy	0.96437	0.98701	4.82901***	4.90062***	6.82157**	7.25966***
	(0.68604)	(0.65669)	(1.29601)	(1.38727)	(2.82537)	(2.73495)
Lagged land	0.50472***	0.50617***	0.47354***	0.47503***	0.61980***	0.62510***
	(0.11620)	(0.11574)	(0.11066)	(0.11051)	(0.17248)	(0.17120)
Lagged land^2	-0.01543	-0.01568	-0.01196	-0.01210*	-0.04920*	-0.04966*
	(0.00985)	(0.00977)	(0.00740)	(0.00735)	(0.02743)	(0.02723)
Lagged land^3	0.00017	0.00018	0.00020	0.00021	0.00153	0.00157*
	(0.00016)	(0.00016)	(0.00013)	(0.00013)	(0.00095)	(0.00092)
Lagged land*bargaland	0.06588***		0.05654***		0.02351	
	(0.02398)		(0.01764)		(0.01720)	
pattahh		-0.58050		-0.56688		-0.54776
		(0.52648)		(0.52071)		(0.62349)
bargahh		-0.86436		-0.76954		-0.49922
		(0.75538)		(0.69980)		(0.43162)
Lagged land*bargahh		0.15666		0.02742		-0.40291
		(0.18125)		(0.26903)		(0.31332)
ceiling*Lagged land			-0.28514***	-0.28815***	-0.44136**	-0.48042**
			(0.06828)	(0.07380)	(0.19745)	(0.18780)
ceiling*bargaland			22.42708*		14.70044	
			(13.15272)		(42.89242)	
ceiling*Lagged land*bargaland			-1.05222		-0.24251	
			(0.92132)		(3.15630)	
ceiling*bargahh				9.43745		-6.83220
				(12.72823)		(22.78889)
ceiling*Lagged land*bargahh				-0.40327		1.20720
				(0.84827)		(1.73230)
Pseudo R^2	0.169	0.169	0.171	0.171	0.182	0.182
Observations	28187	28187	28187	28187	17761	17761
No. households	1099	1099	1099	1099	695	695

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland are computed as the sum over the following three years of the share of land affected by each program over the total cultivable land in each village. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the following three years of the share of households affected by each program over the total number of households per village.
(*** p<0.01, ** p<0.05, * p<0.1)

Table 10: Determinants of land lost by households when dividing (using lagged reform)

Dep. Variable:	Land given away (acres)					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	0.03341	0.03370	0.03481	0.03881	0.01407	0.01511
	(0.02948)	(0.02936)	(0.03018)	(0.02934)	(0.01865)	(0.01789)
pattaland	0.46839		0.44030		0.33515	
	(0.78451)		(0.66850)		(0.41694)	
bargaland	-0.02880		-0.01058		-0.00563	
	(0.03438)		(0.01832)		(0.01539)	
Ceiling dummy	-1.38529	-1.39825	5.16942	4.44927	0.47666	0.22873
	(1.97339)	(1.96517)	(4.13188)	(4.12458)	(3.80891)	(3.47264)
Lagged land	-0.04014	-0.04288	-0.17334	-0.18000	0.34806***	0.34649***
	(0.54833)	(0.54681)	(0.56052)	(0.56036)	(0.09054)	(0.09364)
Lagged land^2	0.04391	0.04397	0.06067	0.06103	-0.00443	-0.00576
	(0.06666)	(0.06664)	(0.06735)	(0.06726)	(0.01193)	(0.01214)
Lagged land^3	-0.00096	-0.00096	-0.00105	-0.00107	-0.00037	-0.00034
	(0.00153)	(0.00153)	(0.00153)	(0.00153)	(0.00044)	(0.00043)
Lagged land*bargaland	-0.02099		-0.03249***		-0.02798**	
	(0.01848)		(0.00775)		(0.01192)	
pattahh		0.15627		0.19944		0.07242
		(0.28753)		(0.27928)		(0.12542)
bargahh		-0.00620		0.35106		-0.02241
		(0.30392)		(0.26605)		(0.27595)
Lagged land*bargahh		0.09596		-0.26681*		0.14626
		(0.28465)		(0.13872)		(0.30478)
ceiling*Lagged land			-0.55577	-0.51004	-0.07868	-0.07546
			(0.33562)	(0.33409)	(0.37911)	(0.34285)
ceiling*bargaland			-353.43938		-91.64442	
			(463.89722)		(482.62708)	
ceiling*Lagged land*bargaland			28.49714		17.28066	
			(33.62708)		(37.58600)	
ceiling*bargahh				-60.34650		-38.81002
				(173.24892)		(82.14287)
ceiling*Lagged land*bargahh				5.94118		6.23116
				(13.17607)		(6.35060)
Constant	-0.66490**	-0.66589**	-0.69095**	-0.71652**	-0.11831	-0.10217
	(0.30393)	(0.30224)	(0.32379)	(0.32192)	(0.18087)	(0.18134)
Adjusted R^2	0.120	0.120	0.139	0.133	0.154	0.175
Observations	4951	4951	4951	4951	3252	3252
No. households	1770	1770	1770	1770	1194	1194

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland 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. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the previous three years of the share of households affected by each program over the total number of households per village.
(*** p<0.01, ** p<0.05, * p<0.1)

Table 11: Determinants of net sales (sales – purchases), using lagged land reform (average for past 3 years)

Dep. Variable:	Net agricultural land sold (acres)					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	-0.00364***	-0.00363***	-0.00358***	-0.00358***	-0.00319***	-0.00316***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
pattaland	-0.02413		-0.02377		-0.03405	
	(0.045)		(0.044)		(0.030)	
bargaland	-0.00388		-0.00404		-0.00562	
	(0.005)		(0.005)		(0.006)	
Ceiling dummy	-0.04319	-0.04295	0.00753	0.00482	0.16685	0.17615
	(0.055)	(0.055)	(0.103)	(0.104)	(0.196)	(0.196)
Lagged land	0.04397***	0.04395***	0.04278***	0.04277***	0.05883***	0.05860***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.013)	(0.013)
Lagged land^2	-0.00104	-0.00103	-0.00089	-0.00087	-0.00223**	-0.00218**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Lagged land^3	0.00001	0.00001	0.00001	0.00001	0.00003	0.00003
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged land*bargaland	-0.00125		-0.00111		-0.00090	
	(0.002)		(0.002)		(0.002)	
pattahh		-0.02213		-0.02219		-0.01929
		(0.022)		(0.022)		(0.015)
bargahh		0.00397		0.01255		0.00046
		(0.016)		(0.014)		(0.015)
Lagged land*bargahh		-0.00342		-0.01288**		-0.00595
		(0.009)		(0.006)		(0.011)
ceiling*Lagged land			-0.00432	-0.00457	-0.00769	-0.00823
			(0.008)	(0.008)	(0.015)	(0.015)
ceiling*bargaland			0.20326		-0.37161	
			(1.510)		(2.317)	
ceiling*Lagged land*bargaland			-0.01756		-0.01227	
			(0.101)		(0.158)	
ceiling*bargahh				0.73221		-0.66499*
				(0.685)		(0.390)
ceiling*Lagged land*bargahh				-0.02531		0.03171
				(0.031)		(0.025)
Constant	-0.07029***	-0.07038***	-0.07061***	-0.07065***	-0.06341***	-0.06350***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Adjusted R^2	0.014	0.014	0.014	0.014	0.025	0.025
Observations	54,175	54,175	54,175	54,175	36,142	36,142
No. households	2,268	2,268	2,268	2,268	1,572	1,572

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland 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. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the previous three years of the share of households affected by each program over the total number of households per village.
(*** p<0.01, ** p<0.05, * p<0.1)

Table 12: Determinants of net sales (sales – purchases), using future land reforms enacted (average of following 3 years)

Dep. Variable:	Net agricultural land sold (acres)					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	-0.00282***	-0.00283***	-0.00282***	-0.00285***	-0.00336***	-0.00339***
	(0.00077)	(0.00077)	(0.00077)	(0.00076)	(0.00125)	(0.00126)
pattaland	0.01016		0.01075		0.00347	
	(0.01129)		(0.01128)		(0.01006)	
bargaland	-0.00044		-0.00113		-0.00145	
	(0.00117)		(0.00102)		(0.00095)	
Ceiling dummy	0.01108	0.01108	-0.00166	0.00147	0.25278	0.26077
	(0.04084)	(0.04086)	(0.09818)	(0.10061)	(0.19042)	(0.19399)
Lagged land	0.04262***	0.04265***	0.04292***	0.04289***	0.05694***	0.05699***
	(0.01108)	(0.01104)	(0.01131)	(0.01130)	(0.01355)	(0.01348)
Lagged land^2	-0.00111	-0.00111	-0.00113	-0.00114	-0.00218*	-0.00219*
	(0.00075)	(0.00075)	(0.00078)	(0.00078)	(0.00117)	(0.00116)
Lagged land^3	0.00001	0.00001	0.00001	0.00001	0.00003	0.00003
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00003)	(0.00003)
Lagged land*bargaland	-0.00011		0.00043		0.00083	
	(0.00097)		(0.00072)		(0.00081)	
pattahh		0.00622		0.00738		0.00144
		(0.01018)		(0.01020)		(0.00929)
bargahh		-0.00688		-0.02039		-0.01696
		(0.01662)		(0.02148)		(0.01639)
Lagged land*bargahh		-0.00092		0.01055		0.01755
		(0.00822)		(0.01064)		(0.01958)
ceiling*Lagged land			0.00118	0.00136	-0.01338	-0.01279
			(0.00669)	(0.00681)	(0.01405)	(0.01422)
ceiling*bargaland			0.26742		-0.36027	
			(1.27581)		(4.43554)	
ceiling*Lagged land*bargaland			-0.04221		0.07925	
			(0.09620)		(0.29997)	
ceiling*bargahh				-0.15695		-1.38278
				(1.03275)		(0.89962)
ceiling*Lagged land*bargahh				-0.02850		0.04701
				(0.06400)		(0.04250)
Constant	-0.06202***	-0.06190***	-0.06215***	-0.06172***	-0.05474***	-0.05477***
	(0.01254)	(0.01253)	(0.01249)	(0.01259)	(0.01188)	(0.01186)
Adjusted R^2	0.013	0.013	0.013	0.013	0.023	0.024
Observations	51907	51907	51907	51907	34570	34570
No. households	2254	2254	2254	2254	1558	1558

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland are computed as the sum over the following three years of the share of land affected by each program over the total cultivable land in each village. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the following three years of the share of households affected by each program over the total number of households per village.
(*** p<0.01, ** p<0.05, * p<0.1)

Table 13: Determinants of net land gifts, using lagged land reform (average for past 3 years)

Dep. Variable:	Net agricultural land lost as gift (acres)					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	-0.00152	-0.00151	-0.00165	-0.00168	-0.00066	-0.00065
	(0.001)	(0.001)	(0.002)	(0.002)	(0.000)	(0.000)
pattaland	0.00103		0.00097		-0.00447	
	(0.006)		(0.007)		(0.011)	
bargaland	0.00064		-0.00045		-0.00040	
	(0.001)		(0.001)		(0.000)	
Ceiling dummy	0.00879	0.00893	-0.16499	-0.16712	-0.18109	-0.17599
	(0.019)	(0.019)	(0.152)	(0.151)	(0.375)	(0.368)
Lagged land	0.00865	0.00873	0.01256	0.01254	-0.00175	-0.00162
	(0.006)	(0.006)	(0.009)	(0.009)	(0.006)	(0.005)
Lagged land^2	0.00014	0.00014	-0.00035	-0.00036	0.00123	0.00120
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Lagged land^3	-0.00000*	-0.00000*	0.00000	0.00000	-0.00004	-0.00004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged land*bargaland	-0.00086		0.00002		0.00008	
	(0.001)		(0.000)		(0.000)	
pattahh		0.00690		0.00665		0.00015
		(0.006)		(0.006)		(0.004)
bargahh		0.00813		-0.00749		-0.00246
		(0.006)		(0.009)		(0.008)
Lagged land*bargahh		-0.00560		0.00848		0.00136
		(0.006)		(0.008)		(0.006)
ceiling*Lagged land			0.01502	0.01535	0.01680	0.01656
			(0.014)	(0.013)	(0.030)	(0.030)
ceiling*bargaland			0.56333		1.33840	
			(0.648)		(2.364)	
ceiling*Lagged land*bargaland			-0.07537		-0.15850	
			(0.055)		(0.196)	
ceiling*bargahh				0.14833		-0.15190
				(0.191)		(0.307)
ceiling*Lagged land*bargahh				-0.03245*		-0.00844
				(0.018)		(0.019)
Constant	-0.01331**	-0.01348**	-0.01258**	-0.01227**	-0.00340	-0.00343
	(0.006)	(0.006)	(0.005)	(0.005)	(0.003)	(0.003)
Adjusted R^2	0.007	0.007	0.008	0.008	0.006	0.006
Observations	54,175	54,175	54,175	54,175	36,142	36,142
No. households	2,268	2,268	2,268	2,268	1,572	1,572

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland 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. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the previous three years of the share of households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)

Table 14: Determinants of net land gifts, using future land reforms enacted (average of following 3 years)

Dep. Variable:	Net agricultural land lost as gift (acres)					
Sample:	full				restricted	
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged HH Size	-0.00257	-0.00259	-0.00253	-0.00258	-0.00087*	-0.00087*
	(0.00163)	(0.00164)	(0.00161)	(0.00162)	(0.00051)	(0.00050)
pattaland	-0.00273		-0.00199		-0.00509	
	(0.00571)		(0.00369)		(0.00830)	
bargaland	0.00175		0.00061		-0.00038	
	(0.00185)		(0.00087)		(0.00035)	
Ceiling dummy	-0.02591	-0.02662	-0.02315	-0.01584	-0.29593	-0.26887
	(0.05645)	(0.05628)	(0.17399)	(0.17424)	(0.33621)	(0.33904)
Lagged land	0.01117*	0.01144*	0.01103	0.01116	0.00183	0.00210
	(0.00652)	(0.00659)	(0.00946)	(0.00945)	(0.00745)	(0.00734)
Lagged land^2	0.00020	0.00020	0.00021	0.00022	0.00103	0.00100
	(0.00030)	(0.00030)	(0.00079)	(0.00080)	(0.00121)	(0.00119)
Lagged land^3	-0.00000	-0.00000	-0.00000	-0.00000	-0.00004	-0.00004
	(0.00000)	(0.00000)	(0.00001)	(0.00001)	(0.00004)	(0.00004)
Lagged land*bargaland	-0.00158		-0.00071		0.00017	
	(0.00151)		(0.00071)		(0.00022)	
pattahh		-0.00476		-0.00406		-0.00192
		(0.00408)		(0.00377)		(0.00422)
bargahh		0.02249**		0.01450		-0.00014
		(0.01112)		(0.01082)		(0.00324)
Lagged land*bargahh		-0.01590**		-0.00924		0.00523
		(0.00748)		(0.01000)		(0.00717)
ceiling*Lagged land			0.00003	-0.00051	0.02603	0.02479
			(0.01750)	(0.01766)	(0.02687)	(0.02697)
ceiling*bargaland			0.80661		5.36833	
			(1.40144)		(7.25107)	
ceiling*Lagged land*bargaland			-0.09305		-0.38170	
			(0.08888)		(0.44973)	
ceiling*bargahh				0.01128		-0.95056
				(0.51611)		(0.77895)
ceiling*Lagged land*bargahh				-0.02343		0.01933
				(0.04438)		(0.03412)
Constant	-0.00631	-0.00662	-0.00654	-0.00648	-0.00483	-0.00519
	(0.00992)	(0.00993)	(0.01010)	(0.00986)	(0.00373)	(0.00372)
Adjusted R^2	0.010	0.010	0.010	0.010	0.006	0.006
Observations	51907	51907	51907	51907	34570	34570
No. households	2254	2254	2254	2254	1558	1558

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1), (3) and (5), pattaland and bargaland are computed as the sum over the following three years of the share of land affected by each program over the total cultivable land in each village. In (2), (4) and (6), pattahh and bargahh are computed as the sum over the following three years of the share of households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)

Table 15: Determinants of immigration, village panel

Dependent variable: Share of immigrants				
	(1)	(2)	(3)	(4)
	Fixed Effects	Arellano Bond	Fixed Effects	Arellano Bond
Lagged share of immigrants		0.47418***		0.47428***
		(0.06127)		(0.06116)
Lagged land per capita	-0.02057***	-0.01685*	-0.02051***	-0.01691*
	(0.00491)	(0.00883)	(0.00496)	(0.00885)
Lagged bargaland	-0.00211*	0.00017		
	(0.00125)	(0.00066)		
Lagged pattaland	-0.00895	-0.01148		
	(0.02609)	(0.00982)		
Lagged bargahh			-0.00740	-0.00065
			(0.02638)	(0.00445)
Lagged pattahh			0.00040	-0.00299
			(0.01150)	(0.00596)
Constant	0.20286***	0.02245***	0.20284***	0.02249***
	(0.00814)	(0.00624)	(0.00814)	(0.00626)
Observations	2670	2581	2670	2581
Adjusted R^2	0.469		0.469	
p-value from test for f.o. autocorr.		0.0000		0.0000
p-value from test for s.o. autocorr.		0.6158		0.6188
Observations	2759	2581	2759	2581
No. villages	89	89	89	89

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1) and (2), pattaland and bargaland are computed as the share of land affected by each program over the total cultivable land in each village. In (3) and (4), pattahh and bargahh are computed as the share of households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)

Table 16: The effect of land reform on inequality: cross section village regressions

Dependent variable:	Gini coefficient in 1998		Coefficient of variation in 1998	
	(1)	(2)	(3)	(4)
gini coefficient in 1968	0.65706***	0.58309***		
	(0.12244)	(0.11824)		
coefficient of variation in 1968			0.81420***	0.74170***
			(0.14830)	(0.13972)
cummulative bargaland	0.00152		0.02894*	
	(0.00416)		(0.01596)	
cummulative pattaland	-0.05183**		-0.36143***	
	(0.02431)		(0.12719)	
cummulative bargahh		-0.08661		-0.13608
		(0.07593)		(0.28462)
cummulative pattahh		-0.08854**		-0.53733***
		(0.03755)		(0.17268)
Constant	0.26382***	0.32943***	0.49078***	0.68765***
	(0.06877)	(0.06731)	(0.18076)	(0.18531)
Adjusted R^2	0.350	0.384	0.453	0.491
Observations	89	89	88	88

Notes: Robust standard errors in parentheses. In (1) and (3) cumulative pattaland and bargaland are computed as the share of total land affected by each program over the total cultivable land in each village. In (2) and (4) cumulative pattahh and bargahh are computed as the share of total households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)

Table 17: The effect of land reform on inequality: village panel regressions

Panel A - Dependent variable: Gini coefficient				
	(1)	(2)	(3)	(4)
	Fixed Effects	Arellano Bond	Fixed Effects	Arellano Bond
Lagged gini coefficient		0.63172***		0.63212***
		(0.01215)		(0.01215)
bargaland	-0.00084	-0.00081		
	(0.00354)	(0.00152)		
pattaland	-0.01635	-0.01521		
	(0.02178)	(0.00971)		
bargahh			0.00818	-0.00849
			(0.02339)	(0.01041)
pattahh			-0.00179	-0.00214
			(0.01308)	(0.00608)
Constant	0.60590***	0.23110***	0.60589***	0.24414***
	(0.00583)	(0.00790)	(0.00583)	(0.00821)
Adjusted R^2	0.033		0.033	
Observations	2759	2581	2759	2581
No. villages	89	89	89	89
Panel B - Dependent variable: Coefficient of variation				
	(1)	(2)	(3)	(4)
	Fixed Effects	Arellano Bond	Fixed Effects	Arellano Bond
Lagged coefficient of variation		0.62565***		0.62595***
		(0.01181)		(0.01181)
bargaland	-0.00123	0.00160		
	(0.01419)	(0.00584)		
pattaland	-0.01770	-0.05990		
	(0.08732)	(0.03742)		
bargahh			0.08211	-0.00684
			(0.09375)	(0.04000)
pattahh			0.02687	-0.01481
			(0.05243)	(0.02350)
Constant	1.39768***	0.59571***	1.39757***	0.60347***
	(0.02336)	(0.01999)	(0.02335)	(0.02038)
Observations	2753	2575	2753	2575
Adjusted R^2	0.033		0.033	
No. villages	89	89	89	89

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1) and (2), pattaland and bargaland are computed as the share of land affected by each program over the total cultivable land in each village. In (3) and (4), pattahh and bargahh are computed as the share of households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)

Table 18: The effect of land reform on the proportion of landless households: cross section village regressions

Dependent variable: Share of landless in 1998		
	(1)	(2)
share of landless in 1968	0.84380***	0.72433***
	(0.10088)	(0.09670)
cummulative bargaland	-0.01663	
	(0.01041)	
cummulative pattaland	0.01936	
	(0.09421)	
cummulative bargahh		-0.19035
		(0.13120)
cummulative pattahh		-0.21718***
		(0.05912)
Constant	0.11858***	0.21156***
	(0.03337)	(0.03573)
Adjusted R^2	0.532	0.627
Observations	89	89

Notes: Robust standard errors in parentheses. In (1) cumulative pattaland and bargaland are computed as the share of total land affected by each program over the total cultivable land in each village. In (2) cumulative pattahh and bargahh are computed as the share of total households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)

Table 19: The effect of land reform on the proportion of landless households: village panel regressions

	Dependent variable: Share of landless			
	(1)	(2)	(3)	(4)
	Fixed Effects	Arellano Bond	Fixed Effects	Arellano Bond
Lagged share of landless		0.53394***		0.53494***
		(0.01271)		(0.01269)
bargaland	-0.00168	-0.00089		
	(0.00422)	(0.00178)		
pattaland	-0.00193	-0.02020*		
	(0.02599)	(0.01195)		
rbargahh			-0.01382	-0.02147*
			(0.02791)	(0.01235)
rpattahh			0.01199	0.00664
			(0.01561)	(0.00722)
Constant	0.28414***	0.13161***	0.28415***	0.16829***
	(0.00695)	(0.00438)	(0.00695)	(0.00510)
Adjusted R^2	0.046		0.046	
Observations	2759	2581	2759	2581
No. villages	89	89	89	89

Notes: Robust standard errors in parentheses, adjusted for clustering on villages. Regressions include village and year fixed effects. In (1) and (2), pattaland and bargaland are computed as the share of land affected by each program over the total cultivable land in each village. In (3) and (4), pattahh and bargahh are computed as the share of households affected by each program over the total number of households per village. (*** p<0.01, ** p<0.05, * p<0.1)