

# LAND REFORM, DECENTRALIZED GOVERNANCE AND RURAL DEVELOPMENT IN WEST BENGAL<sup>1</sup>

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## Abstract

Since the late 1970s the West Bengal government has implemented a comprehensive set of reforms of agrarian institutions involving land reform (land redistribution, tenancy registration) and democratic decentralization (devolution of administration of agricultural development programs to elected local governments). We evaluate the effectiveness of these reforms in promoting rural development, utilizing data collected directly from individual farms, local governments and local communities. The evidence shows that programs administered by the local governments were reasonably well-targeted to the poor, with few exceptions. Targeting improved as local elections became more contested, and deteriorated with greater socio-economic inequality. The tenancy registration program, distribution of agricultural minikits, IRDP credit, local road and irrigation programs administered by local governments had significantly positive effects on subsequent growth in farm productivity and incomes. The benefits diffused widely among farms within the village, with a bias in favor of small and marginal farmers, but did not trickle down to landless agricultural workers.

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# 1 Introduction

## 1.1 Background and Motivation

Two-thirds of India's population resides in rural areas, a significant proportion in abject poverty. An important component of Indian economic development therefore involves its villages, embracing growth of agricultural productivity and reduction of rural poverty. While the Green Revolution in the late 1960s and 1970s brought about impressive improvements in productivity, its scope was limited to a few areas of the country, to a few crops, with benefits (at least initially) limited to medium and large farmers. To a large extent, these outcomes owed to the fact that the Green Revolution at its outset involved an intervention that was mainly technological, rather than a reform of agrarian institutions.

Since the late 1970s, West Bengal has pursued an alternative approach to rural development based squarely on institutional reforms, involving land reform and decentralized governance. A Left Front government has been in power continuously since 1977 embarked on a comprehensive program of agrarian reform. A functioning three tier system of local governments (*panchayats*) elected every five years was instituted since 1978, well in advance of the 73rd and 74th Constitutional Amendments in the early 1990s which mandated such a system throughout India. In contrast to most other states (Karnataka and Kerala being notable exceptions), significant responsibilities have been devolved to the West Bengal panchayats, including implementation of land reforms, selection of beneficiaries of various development schemes funded by upper level governments, and administration of local infrastructure building programs. A significant land reform program was administered by panchayats at the block and village levels, involving implementation of land ceilings, distribution of surplus land to the landless, registration of tenants to protect them from eviction and enforce minimum crop shares. The magnitude of the land reform effort exceeded other Indian states by a considerable margin: e.g., Appu (1996) estimates over 6.7% land had been redistributed in West Bengal by the early 1990s, in contrast to less than 1%

in most other states.<sup>4</sup> By most accounts, these institutional reforms have transformed the balance of economic and political power away from big landowners and state bureaucrats, towards local governments more responsive to middle farmers and poorer sections of rural society, owing to a combination of political ideology of the Left and compulsions of electoral democracy.

These reforms were soon accompanied by accelerated growth in agricultural productivity, and diffusion of high-yielding rice varieties which transformed agricultural growth rates from one of lowest in the country in the 1970s to the highest during the 1980s (Saha and Swaminathan (1994)). It is commonly believed that these were the result of the agrarian reform program instituted by the Left Front (see, e.g., Lieten (1992), Sengupta and Gazdar (1996)). Most such assessments are, however, based on *post hoc ergo propter hoc* reasoning, the fact that the productivity changes closely followed the reform program.

It is important to subject such claims to detailed scrutiny, particularly since the West Bengal experience represents an explicitly egalitarian and democratic approach to rural development, in stark contrast to ‘Washington Consensus’ or ‘neoliberal’ policy approaches. The common belief among economists trained in the neoclassical tradition is that redistributive state policies tend to be growth-retarding, a view now increasingly challenged among academic economists (see e.g., Aghion, Caroli and Garcia-Penalosa (1999), Banerjee, Benabou and Mookherjee (2006), Bardhan, Bowles and Gintis (2000) or Franko (2003)). The ‘new institutional economics’ stresses the role of problems of incentives, information and governance ignored in traditional neoclassical economics. According to this approach realignment of property rights in favor of factors or agents with the most acute incentive problems can be growth facilitating. In the context of small-scale agriculture, this suggests that land reforms represent a form of redistributive state policy that can enhance rather than retard growth. Moreover, inequality can exacerbate problems of incentives and accountability of government officials, resulting in poor implementation of development programs. These problems may be reduced if elected local governments rather than state government-appointed bureaucrats administer these programs, provided institutions

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<sup>4</sup>Only one other state, Jammu and Kashmir had redistributed more land than West Bengal; no other state has embarked on a tenancy regulation program on a similar scale.

of local democracy function well.

This paper critically evaluates the role of the agrarian institutional reforms in West Bengal since the late 1970s, on trends in delivery of state provided agricultural services, and ultimately on agricultural productivity and rural poverty.

We first review the political economy of local governance in West Bengal: i.e., how well did local democracy function; how accountable were local governments; what were the major determinants of their effort to promote local development? The over-riding concern commonly expressed about a strategy of rural development based on local democracy is the prospect of capture of local governments by rural elites, or their proneness to corruption. In our earlier theoretical work (Bardhan and Mookherjee (2000, 2005, 2006a)) we have emphasized that local governments may be more or less prone to corruption than bureaucrats appointed by central or state governments, depending on how well institutions of local democracy function. Hence the relative effectiveness of a strategy of rural development centered on local democracy can be context-specific and for any given setting can only be settled empirically. Elsewhere we have provided detailed empirical analyses of the political economy of the West Bengal panchayats (Bardhan and Mookherjee (2004a,b, 2006b)); we summarize those results here in the first part of the paper. Since direct evidence about capture and corruption is difficult to obtain, we infer these by studying how land reform implementation and other developmental efforts of panchayats in different West Bengal villages varied with socio-economic inequality and political competition.

The second part of the paper provides estimates of the effects of land reforms and programs administered by local governments on growth of agricultural productivity, diffusion of HYV rice varieties and the distribution of resulting benefits across different sections of the rural population. A summary of the principal results is provided later in this Introduction.

## **1.2 Methodology, Data and Relation to Previous Literature**

Some previous studies have estimated the effects of land reforms in the Indian context but at a high level of aggregation and relying on official state government figures concerning agricultural performance. Besley and Burgess (2000) for instance examine the effects of

varying land reform legislations across different Indian states, while Banerjee, Gertler and Ghatak (2002) study the effect of one component of land reforms (*Operation Barga*, the tenancy registration program) across different West Bengal districts. These studies could be subject to a number of possible concerns: legislations do not necessarily correspond to actual implementation; data on agricultural performance or land reforms at the district or state levels could be subject to considerable error, intentional or otherwise.<sup>5</sup>

Moreover, the effects of the land reforms could be confounded with many other changes occurring in local governance or market contexts at the same time, that were not controlled for in previous analyses. It is possible that villages in which land reforms were vigorously implemented were also those in which the local panchayats played an active role in providing other essential agricultural inputs to farmers, and the measured effects of the former actually reflect those of the latter. The extent of cultivable land directly affected by the land reforms in West Bengal appears too small to explain the magnitude of observed changes: e.g., in our sample approximately 10% of cultivable land was involved in the reforms, whereas HYV adoption rates rose from 10% of acreage in the early 1980s to 66% by the late 1990s. The direct effects of the land reform can explain only a small fraction of this. Alternative hypotheses could possibly account for the same sequence of observed events: e.g., productivity changes arose initially in response to a combination of market and social factors (changes in prices, market arrangements, and diffusion of HYV rice via social learning) unrelated to state action. These productivity gains may have been biased in favor of small farmers (owing to the inherent nature of rice cultivation); the resulting change in income distribution within villages could have led to improved local governance, resulting in greater land reform and targeting by panchayats. In this scenario the direction of causation would be reversed: from market-led development to land reform.

Our study assesses the extent to which results of earlier studies are prone to these sources

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<sup>5</sup>For instance, considerable doubt has been raised about the reliability of agricultural output data of the West Bengal state government during the 1980s and 1990s, see e.g., Boyce (1987) and subsequent debates in the *Economic and Political Weekly*. The status of published statistics concerning aggregate agricultural performance by the state government continues to be mired in controversy; in private communication James Boyce indicated to us his belief that while the data for the 1980s is reliable, for the 1990s it was generated by flawed statistical procedures.

of bias. First, we do not rely on figures for aggregate agricultural production published by the state government at either district or state levels and used in public reviews of its past achievements. Instead we use data from cost of cultivation surveys of a stratified random sample of farms drawn from the major agricultural districts of the state. These surveys were carried out for the sole purpose of estimating agricultural costs by the state agriculture department; these were aggregated and sent subsequently to Central government bodies responsible for setting agricultural prices on a cost-plus basis. We utilize the disaggregated data collected at the level of individual farms. The sampling design chose eight farms randomly in each village stratifying by farm size; detailed data concerning inputs and outputs were collected in weekly visits by field investigators, relying on direct measurement rather than farmer responses to questionnaires. Each farm was followed for a period of five years each, with new selection of farms and villages once every five years, allowing us to construct a farm panel spanning fifteen years from 1981–1996.

We combine this farm dataset with direct collection of data from (a) village governments (*gram panchayats (GPs)*) concerning agricultural inputs supplied and infrastructure projects implemented; (b) local land reforms offices for records of land titles distributed, tenants registered in the concerned villages on a yearly basis since 1971; and (c) local communities concerning the local distribution of land, occupation, literacy and caste status in either 1978 or 1983 and 1998.<sup>6</sup> Lacking identifiers of household names in the farm survey, we were unable to match the farms with the beneficiaries of land reforms and panchayat programs. Hence our results concern the impact of the latter not on the direct beneficiaries of the programs, but rather their broader impact on a sample of representative farms in the village.

Second, the village (GP and household) datasets permit us to assess the political economy of the land reforms and panchayat programs, and disentangle their respective contributions. We jointly estimate the separate effects of Operation Barga, the land redistribution

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<sup>6</sup>Voter lists for these election years were used as the basis of creating a list of households in consultation with significant members of each village community; the land, literacy, occupational and caste status of each household for the corresponding year was subsequently identified by these community members based on their knowledge and recall. The land distribution constructed in this way match closely with the distribution of operational land holdings published by the National Sample Survey and the state Agricultural Censuses when aggregated upto the district level: see Bardhan and Mookherjee (2006b, Table 3) for further details.

(*patta*) program, GP expenditures on irrigation, road-building, distribution of agricultural minikits and IRDP credit to local residents. We additionally control for changes in local rainfall, price of rice, state-government provided canals and roads, besides farm-specific and year-specific effects. We use our political economy analysis of the land reform and GP programs to identify exogenous sources of variation in these (*instruments*, consisting of political and economic events at the national and state level, interacted with historical institutional variables at the local level) in order to control for possible reverse causality or omitted variable biases.

### 1.3 Summary of Results

Concerning political will of local governments to implement land reforms and target development programs to the poor, our empirical results lead us to reject polar hypotheses that local government officials were motivated by ideology or electoral opportunism alone. The ideology hypothesis predicts Left dominated panchayats will implement anti-poverty programs more intensively, while the opportunism hypothesis predicts that the latter will be independent of the political composition of panchayats. Both theories predict there will be greater anti-poverty effort when there is greater inequality and poverty to start with. In contrast to these predictions, we find evidence that political composition of panchayats mattered in a number of instances, but not in the way that the ideology hypothesis predicts. Anti-poverty efforts often slackened when the Left became more entrenched, and there was greater local poverty and socio-economic inequality. These results are consistent with the notion that there was some capture of the panchayats by local elites (e.g., medium landowners) or abuse of power among elected officials. Local election outcomes were explained better by swings in voter loyalty based on events at the national and state levels, rather than changes in the local distribution of land, literacy and caste.

Nevertheless, the extent of political distortions owing to capture varied across different contexts. For instance, *within* villages, ‘private good’ programs such as the IRDP credit program or agricultural minikits were well-targeted: more than 95% of these were allocated to small, marginal and landless households. On the other hand, employment generating

programs (such as JRY) were administered in a way that less employment was generated out of allotted funds when poverty within the village grew. Higher level panchayats were subject to noticeably greater distortions, with inter-GP allocation of minikits, employment grants and fiscal grants shrinking as poverty and SC/ST proportion within a given GP jurisdiction grew.

Turning to the effects of the land reforms and panchayat programs on agricultural performance:

- (a) The proportion of cultivable land registered under *Operation Barga* in a village upto any given year had a surprisingly strong positive effect on rice yields and farm value added per acre in subsequent years. This is true particularly when we control for other agricultural inputs (IRDP credit, minikits, medium irrigation, local roads) supplied by GPs, besides rice prices, rainfall and state-government provided roads and canals.
- (b) Minikits supplied, IRDP credit disbursed and roads both local and state also had similar strong positive effects on rice yields and farm incomes per acre.
- (c) The land distribution (*patta*) program had a smaller positive and statistically insignificant effect on farm yields, and a positive significant effect on HYV adoption rates.
- (d) HYV adoption rates did not significantly increase in response to higher incidence of *Operation Barga*, minikits distributed, or road program expenditures. Hence the positive productivity effects of these programs were not mediated through increased HYV adoption.
- (e) The distribution of productivity and income gains were biased in favor of small farms (between 2.5 and 5 acres). Marginal farms (less than 2.5 acres) gained at a rate more or less similar to the average farm in the village, though somewhat less than small farms (except with regard to GP road programs which disproportionately benefited marginal farms). Hence small and marginal farmers obtained a significant share of the gains.
- (f) Neither the land reforms nor GP-administered programs had a significant effect on wage rates for agricultural workers. Rates of employment were raised significantly by



GP irrigation spending, and lowered significantly by the *patta* distribution program. So there is no evidence of any significant positive impact on incomes of agricultural workers, the poorest section of the rural population.

Overall, the results indicate that the land reforms and panchayat administered programs had a favorable impact on agricultural productivity and farm incomes. Unlike the initial impact of the Green Revolution, the benefits were spread widely among small and marginal landowning farms. However, these favorable effects were limited to cultivating households, and did not trickle down to agricultural workers hired on these farms.

The effects of the tenancy registration program are especially surprising. Our results are consistent with the earlier findings of Banerjee *et al* (2002) based on state government figures for rice yields and tenancy registration rates at the district level. Note, however, that the proportion of land directly affected by the *Barga* reform was of the order of 5%, whereas the farm sample was chosen randomly from the population of all farms within these villages. Hence these measured effects mostly represent spillover effects of the program to productivity on farms not directly impacted by the program; they cannot be explained simply by incentive effects of the tenancy reform on efforts by registered tenants to raise productivity. We can only speculate regarding the channels by which the spillovers operated. One possibility is social learning: neighbors, kinship groups and friends may have learnt from new production experiments of tenant farmers. Registered sharecroppers may have initiated collective action within the village to secure better access to water and marketing arrangements. They may have lobbied the panchayat to provide better production facilities to small farmers. Faced with the threat of registration, large farms may have been subdivided into smaller plots and sold off; these new smaller farms may have been more productive. The precise channels through which these productivity improvements occurred are not well understood: our evidence does not show any effects on the diffusion of HYV rice varieties. Further research on the process by which these productivity improvements arose and spread are needed.

The paper is structured as follows. Section 2 explains different political economy theories of functioning of local governments that structures our analysis. Section 3 describes the

empirical results concerning political economy of the West Bengal panchayats, based on two prior papers (Bardhan-Mookherjee (2004b, 2006b)). Sections 4 and 5 presents results of the effects of panchayat actions on farm outcomes: Section 4 summarizes underlying theories and Section 5 our empirical results. Finally, Section 6 concludes.

## **2 Accountability of Local Governments: Political Economy Hypotheses**

The first hypothesis of the behavior of local governments is that elected officials are primarily motivated by ideology, a term used broadly to represent policy preferences of the party or group they represent. Based on Lipset (1960) and Wittman (1973) recent ‘citizen candidate’ versions of this theory (Osborne and Slivinski (1996), Besley and Coate (1998)) are based on the assumption that candidates cannot commit to their policy platforms before elections, and ignore effect of current policy choices on future electoral prospects. Political parties and groups have particular policy preferences, on the basis of an ideology or self-interest of constituencies they represent. For example, those from a Left party are expected to prefer more redistributive policies; women are expected to espouse policies that advance the interests of women generally, and so on. Once elected, officials implement their own preferred policies, so observed policies reflect the preferences of those elected. Policy choices can then be explained by the composition of elected governments: e.g., the more Left party candidates get elected, the more likely that redistributive policies will be chosen. It is also natural to suppose that ideological preferences for redistribution of the Left increase when there is greater inequality to start with. The ideology hypothesis thus predicts that local governments will be more accountable to the poor when the share of Left party candidates in the panchayat is higher, when there is more inequality and poverty, and the interaction of these two sets of factors is also likely to be positive. From the perspective of this hypothesis, local governments are likely to be more accountable to the poor in West Bengal relative to other states because of the predominance of the Left parties in the state.

The polar opposite hypothesis is that parties and candidates are motivated primarily

by electoral opportunism, i.e., office-seeking motives, rather than ideological policy preferences. Based on Downs (1957), this approach assumes that candidates can commit to policy platforms before elections, to which voters react. Alternatively, elected officials make policy choices based on their likely impact on chances for re-election (with retrospective voting). In a two party context, this hypothesis predicts that competing candidates will select the same policy that maximizes vote share, i.e. those preferred by the average voter. This implies that observed policy choices will bear no relation to the party, gender or caste composition of elected candidates. Instead they will be predicted by the distribution of voter preferences, which in turn will depend on the distribution of voter characteristics. Similar to the ideology hypothesis, greater inequality will tend to generate greater redistribution. This approach predicts greater accountability of local governments to the poor when there is greater local inequality, but independent of political competition or composition of elected governments.

A third approach modifies the Downsian approach to incorporate lobbies, special interest groups, and varying patterns of political awareness and participation of different voter groups. Based on the work of Grossman and Helpman (1996) and some of our own earlier work (Bardhan and Mookherjee (2000)), this approach introduces various frictions in the functioning of democracies in which selected policies can diverge from those that serve the preferences of the average voter (while continuing to hold the same assumptions concerning motivation of political candidates as in the Downsian theory). In these quasi-Downsian theories, policy choices of elected candidates can be influenced by special interest groups by campaign contributions or other forms of corruption, as well as asymmetries in awareness or turnout of different classes of voters. Interest groups tend to contribute more to parties that voters are more loyal to and so are in a stronger competitive position: such parties are therefore more vulnerable to special interests. Increased political competition tends to limit the scope for influence by special interest groups, as well as for corruption or administrative slack among elected officials. Hence accountability of elected governments to the poor is greater when there is greater political competition. This approach predicts an inverted-U relation between Left party share of the elected governments and its accountability. In contrast to both the ideology and Downsian hypotheses, the effect of local inequality on

accountability is ambiguous. On the one hand, it intensifies preference for redistribution for the average voter. On the other hand, inequality raises the scope for influence of local elites, and limits political awareness and participation of the poor. The effects of inequality are likely to depend on the extent of political competition: if an incumbent party is well entrenched and faces little competitive threat from rival parties, it is more likely to be prone to elite capture.

### **3 Empirical Evidence Concerning Accountability of West Bengal Panchayats**

#### **3.1 Background**

Summary statistics concerning the villages in our sample are provided in Tables 1 and 2. The 89 villages are located in 57 village government (Gram panchayat (GP)) jurisdictions. Each GP consists of ten to twenty elected members of a council governing administration of the jurisdiction of the GP, which usually consists of eight to fifteen villages or *mouzas*. On average each district comprises 20 blocks and 200 GPs. Each district has a single Zilla Parishad (ZP), the top tier of the panchayat system, and each block has a Panchayat Samiti (PS), the middle tier. The top official at each level is an ex-officio member of the next higher level; other officials at each tier are elected directly by voters. For most part, we focus on the composition of seats in GPs as they are the main implementing agencies at the ground level (e.g., with respect to selection of beneficiaries of various developmental schemes and infrastructure projects within villages). Moreover, party composition of GPs and higher tiers were highly correlated with one another.

The twenty year period witnessed four successive elected bodies in each GP, each with a five year term (which we sometimes refer to as a timeblock). The Left Front coalition won an absolute majority in approximately three-fourths of the elected GPs, with a mean seat proportion of 69% (and a slightly higher median). The main opposition party was the Indian National Congress and its various off-shoots (such as the Trinamool Congress which broke away for the 1998 elections). Most electoral constituencies witnessed a contest

between the Left and either the Congress (or the Trinamool Congress): there were hardly any three-way contests. In most cases, these two parties collectively garnered more than 90% of all elected positions. The dominance of the Left Front at higher levels was greater at higher tiers; e.g., the mean Left share in ZP positions during the period was 86%.

Table 2 shows the principal demographic and asset distribution changes in the sample villages between 1978 and 1998. The number of households almost doubled, the result of household subdivision and in-migration (especially from Bangladesh). Illiteracy rates fell, especially among the poor (landless or marginal landowners). The incidence of non-agricultural occupations rose from one-third to one-half.

The distribution of cultivable non-*patta* land (i.e., excluding land distributed through the land reforms) changed in interesting ways: landlessness increased, while the distribution of land among landowners became more equal. The proportion of households without any such land or with marginal holdings below 2.5 acres increased by almost 10%. In this sense poverty increased. On the other hand, the proportion of land in small holdings (below 5 acres) rose by 17%, i.e., signifying a reduction of land inequality among those holding land. These occurred as a result of market sales of land and fragmentation of landholdings accompanying household sub-division.

Table 3 indicates the extent of land reform implemented. Approximately 5.4% of cultivable land was distributed to 15% of the population in the form of registered land titles (*pattas*). Another 6% of cultivable land involved leased lands on which tenants (*bar-gadars*) were recorded (*Operation Barga*), who were subsequently protected from eviction by landowners and guaranteed a minimum share. The proportion of households registered was 4.4%. Aggregating the two programs, about 10% of cultivable land area was affected, and 30% of all households benefited. Undoubtedly this was a large program, one of the largest land reform initiatives in India in recent memory. Also distinctive was the involvement of *panchayats* in this process, who were instrumental in mobilizing mass participation in village meetings to identify the ownership of land among households in each village, selecting suitable beneficiaries, and pursuing contested cases through the courts.

Other important responsibilities entrusted to the *panchayats* included implementation of

the two principal poverty alleviation schemes (the IRDP credit program, and employment programs such as Food for Work (FFW), National Rural Employment Program (NREP), Rural Labour Employment Guarantee Program (RLEGP) in the 1980s which were merged into the *Jawahar Rozgar Yojana (JRY)* from 1989 onwards), distribution of subsidized agricultural inputs (in the form of minikits containing seeds, fertilizers and pesticides), local infrastructure projects (including roads and irrigation), and miscellaneous welfare schemes (old-age assistance, disaster relief, housing programs for the poor etc.). The bulk of the funds were devolved to the GPs under various schemes sponsored by the central and state government, amounting to 78% in our sample. The role played by the GPs therefore consisted mainly in selection of beneficiaries of various development programs handed down from the central or state government.

Table 4 depicts trends in subsidized state inputs provided between 1982–95 . The 1980s witnessed larger supplies of IRDP credit and minikits compared with the 1990s. One out of every four or five households received minikits in the 1980s, containing seeds, fertilizers and pesticides. The bulk of employment funds were spent by GPs on building and maintenance of local roads; these employment programs created 3-4 mandays of employment per household every year. There was also expansion of areas irrigated by state canals, though even greater expansions were witnessed in medium and small irrigation projects many of which were managed by panchayat officials.

Table 5 shows corresponding trends in agricultural outcomes. The most spectacular change was in rice yields which increased by more than 150%. Part of this is explained by widespread diffusion of HYV rice, with acreage devoted to such varieties expanding from less than 10% in 1982 to 39% by 1990, and 66% in 1995. In real terms, farm value added per acre more than doubled. Wage rates for agricultural workers rose by 66%, and employment more than doubled. Since the poorest sections of the rural population are landless and rely mainly on agricultural labor, incomes of the poor rose significantly during this period.

### 3.2 Explaining GP Election Outcomes

Table 6 provides panel regression results for the fraction of seats won by the Left Front in GPs, in terms of a variety of state and national factors likely to affect relative voter loyalties to the Left *vis-a-vis* the Congress, after controlling for distribution of land, literacy and caste within the villages. Among the state and national factors are the presence of the Congress party in the national Parliament, the rate of inflation of the price index for agricultural workers in the nearest of four centers of the state where this is computed by the state government (Asansol, Ranigunj, Japaiguri and Kolkata).

The first and last columns of Table 6 show that election outcomes in GP elections closely mirrored average vote share differences between the Left Front and Congress averaged at the district level in preceding state assembly elections. Other columns show the role of the inflation rate for agricultural workers in one of four regions of the state as an important determinant. Hence wider issues at the state level influencing voter loyalties to the competing parties had a strong impact on local elections. The panel regressions show that nation-wide factors affecting the popularity of the Congress, as measured by the proportion of seats in the national Parliament, also had a strong impact on local government elections. The effects of these state and national factors differed according to historical incumbency: in traditionally Congress dominated areas, a rise in Congress presence in national Parliament or a fall in the inflation rate caused the Congress to become more entrenched, with the opposite effect in traditionally Left Front areas. In contrast to the effect of these broader factors influencing voter loyalties, changes in local land, literacy or gender distributions had no effect on panchayat election outcomes.

These results form the basis of our identification strategy for the effect of varying political competition on GP policy. Fluctuations in political events at the state or national level (interacted with local incumbency patterns) provide exogenous sources of variation in Left share. Outcomes of GP elections correlate closely with outcomes of elections to the state legislative assembly held one or two years apart, indicating the role of voter loyalties to the Left *vis-a-vis* the Congress rather than specific local issues. Most of the fluctuations in Left share can be explained by fluctuations in general voter loyalties, which are unlikely

to be uncorrelated with time-varying village-specific fluctuations in voter preferences for redistribution. Moreover, examining the reaction of GP policies to changes in Left share predicted by these sources of variation (rather than actual fluctuations in Left share) provide instrumental variable (IV) estimates of the effect of varying political competition.

### 3.3 Land Reform

Table 7 provides regression estimates for different measures of land reform implemented (*pattaland*, *bargaland* refer to proportion of cultivable land distributed or registered, while *pattadar*, *bargadar* refer to proportion of households receiving land titles or registered as a sharecropper). Since in many years there were no land reforms implemented at all in any given village, the regression has to incorporate endogenous censoring; accordingly we use a TLAD (trimmed least absolute deviation) estimator with village fixed effects (see Honore (1992)).

Table 7 shows no evidence of any tendency for land reforms to increase monotonically with the Left share. With the exception of the *pattaland* regression, there was an inverted-U relation instead, statistically significant in the *bargadar* regression. The top turning point of the U appeared at or below 50% Left share, indicating that *for most of the sample where the Left had an absolute majority, an increase in Left control of the local GP resulted in less rather than more land reform*. This directly contradicts the predictions of the ideology hypothesis, and confirms the prediction of the quasi-Downsian hypothesis. Additional confirming evidence against either polar ideology or Downsian hypotheses is the significant negative interaction between Left share and (either of two measures of) 1978 land inequality. This is consistent with the quasi-Downsian hypothesis wherein capture is positively correlated with inequality: given the general dominance of the Left, an increase in Left share represents reduced political competition between the two parties, which permits greater capture of elected officials, resulting ultimately in less land reform. The role of electoral competition is further indicated by pre-election year spikes in *Barga* activity, and election year spikes in *patta* activity.



### 3.4 Targeting of Other Development Programs

Tables 8, 9 and 10 display implications of panel regression estimates for targeting of subsidized credit under the IRDP program, agricultural minikits and fiscal grants respectively.

The first three columns of Table 8 show intravillage shares of intended beneficiaries of IRDP loans: landless, small landowning households (owning less than 5 acres of cultivable land), and scheduled castes and tribes (SC/ST). The mean shares of these groups were close to their demographic weights, indicating that on average these schemes were targeted well. The leakage of IRDP credit to medium and large landowners was small, though roughly in proportion to their demographic weights as well. Examining the effect of varying land inequality, significant effects are observed for the share of the ‘upto small’ group with a rise in share of land in big holdings, and a particularly strong effect of a rise in proportion of marginal landowning households on the share of the SC/ST group (which fell by a third). Effects on the inter-GP allocation of credit were not statistically significant. An increase in Left share at the district level (by 10% starting from the mean) tended to reduce credit allocations both within and across villages. These results are broadly consistent with the quasi-Downsian theory. However, effects of altered political competition at the GP level appeared to be insignificant, and the quantitative magnitudes of the ‘capture’ effects seemed limited overall (with the possible exception of the share of SC/ST groups).

Table 9 shows corresponding implications for targeting of minikits. The first column shows they were almost exclusively delivered within villages to small and marginal landowning households, rather than medium or big landowners. Moreover, there was almost no effect of changing land inequality, caste composition or political competition on intra-village targeting. On the other hand, the inter-village allocation responded significantly to land inequality and caste composition, favoring small non-SC/ST households relative to big landowners and SC/ST households.

Table 10 shows results for targeting of grants received by GPs from higher levels of government. The first column shows that increased landlessness and land share of big landowners lowered employment generated out of allotted funds by about a third, providing another indication of local elite capture. The inter-GP allocation of these grants

discriminated against the SC/ST households and big landowners, just as in the case of the minikits. The same is true for all fiscal grants, where an additional negative effect is observed with respect to the extent of landlessness. The quantitative magnitudes of these biases are much stronger than in the case of kits or credit allocation. Moreover, political competition at the GP level also mattered: entrenchment of the Left (i.e., increases in the Left share beyond the mean) lowered employment grants significantly.

In general, the results are broadly consistent with the quasi-Downsian model, and run counter to the ideology hypothesis. This indicates that electoral competition promoted accountability of local governments (with respect to sharecropper registration and employment programs). The effects of land inequality were more complex, in line with the theoretical ambiguity predicted by the quasi-Downsian theory. Within villages, pro-poor efforts were adversely affected by greater land inequality in the case of employment programs, favorably affected in the case of the *patta* program, and not significantly affected in all other cases (*barga* program, credit or minikits). By and large ‘private’ goods such as IRDP credit and minikits were well-targeted within villages by GPs. The inter-village allocation seemed to discriminate against big landowners, and in favor of medium and small landowners. Both intra- and inter-village allocations exhibited considerable discrimination against SC/ST groups, which paradoxically constituted one of the main bases of political support for the Left Front. These results are consistent with views expressed by many political commentators and critics that the Left Front has pursued the ‘politics of middleness’, more responsive to the needs of middle farmers rather than the poor.<sup>7</sup>

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<sup>7</sup>the Left parties have been subject to internal debate concerning the need to strike a balance between its traditional ideology and opportunism. See, e.g., Franda (1971), Nossiter (1988), Lieten (1992, pp.128-133) and Bhattacharya (1999). The transition of the CPI(M) from a revolutionary party in the 1940s to subsequent capture and consolidation of the state government is generally attributed to the pragmatism of its leaders Jyoti Basu and Promode Dasgupta who consciously chose an approach that would secure widespread political support with voters, at the cost of disenchantment of some of the party’s ideologues. Lieten summarizes some of the internal critiques of the Left Front government’s performance from those disillusioned with its compromise with traditional ideology. Bhattacharya describes the political transition of the CPI(M) in West Bengal as pursuing the ‘politics of middleness’.

## 4 Effects of Panchayat Actions on Farm Outcomes

### 4.1 Effect of Land Reforms: Theoretical Hypotheses

The effect of land reforms on farm productivity have been the topic of a large literature in development economics. The classic arguments concern Marshallian inefficiencies arising from sharecropping, where the share paid to the landlord acts as a tax on the tenant's effort. Sharecropper registration can raise farmer incentives by capping this implicit tax rate. Other incentive effects arise from removing the right of landlords to evict tenants: the direction of these are ambiguous, owing to conflicts between different effects. Eviction threats can be used by landlords as an incentive device, the removal of which could dull tenant incentives. On the other hand, security of tenure may promote longer time horizons for the tenant and thereby increase investment incentives. These issues are discussed in Bardhan (1984), Dutta, Ray and Sengupta (1989) and Banerjee, Gertler and Ghatak (2002). In sum, effects of sharecropper registration are theoretically ambiguous.

The incentive effects of redistributing land ownership, in contrast, are expected to be positive (see e.g., Bardhan (1973) Berry and Cline (1979), Binswanger *et al* (1993)). Note that the West Bengal *patta* program concerned mainly distribution of titles to land that had already been vested (from those holding surplus land above legislated land ceilings). Most of the land had been vested prior to 1978 (e.g., for a subsample of 40 villages for which this data was available, we found that over 70% had been vested prior to 1978). It is likely that the land parcels transferred enabled them to be actively cultivated, compared to lying fallow since being vested. Freshly vested lands belonged previously to large landowning families, which would probably have cultivated them using hired labor. Given the advantages of family labor cultivation over hired labor, and the relative lack of important sources of scale economies (such as mechanization) in rice cultivation, one would expect small farms to be more productive than large farms. If so, one would expect the effect of the *patta* program to raise rice yields and farm incomes.

Table 11 provides estimates of variations in farm productivity with farm size and tenancy, after controlling for choice of HYV and cashcrops, inputs applied, district and year

fixed effects. Smaller farms were significantly more productive, both in cross-sectional and first difference regressions. Yields and farm incomes were also substantially higher following greater HYV and cash crop adoption. Table 12 shows that small farms tended to adopt HYV rice to a greater extent than large farms, further reinforcing the negative size-productivity relation.

Cross-sectional estimates (OLS level regressions in the first and third columns) show that productivity was increasing in the fraction of area leased. However the first-difference estimates (second and fourth columns) show that this effect was not statistically significant, with a substantially smaller regression coefficient. This suggesting that the positive cross-sectional correlation reflects a tendency for more skilled farmers to lease in more land, rather than a causal impact of tenancy on productivity. Indeed, Table 11 should be interpreted as observed correlations rather than firm estimates of productivity, as no attempt has been made to control for omitted variable bias. In particular, the inverse size-productivity relationship could be entirely spurious, reflecting possible heterogeneity of soil quality between small and large farms. Hence these relationships cannot be taken as firm evidence that land redistribution will raise farm productivity.

Moreover, we have seen above that the proportion of land directly affected by the land reforms constituted a relatively small fraction of all cultivable land in these villages, of the order of 10%. The direct incentive effects of the *patta* and *barge* programs could not possible account for a rise in the acreage devoted to HYV rice varieties from 10 to 66%. On the other hand, the land reforms could generate a range of spillover effects to other farms not directly connected with the land reforms, through patterns of social learning, changes in local prices or wage rates, or induced changes in patterns of land sales or household subdivision. For instance, the threat of land reforms may cause subdivision of large landowning households and of large farms. These may have productivity effects on lands transferred via the market or household divisions.

Even broader effects could operate through effects on local governance. Land reforms could reduce the scope for capture of local governments by landed elites: we have seen evidence in favor of this view in the previous section. This may have implications for the

targeting of subsidized credit, minikits or local infrastructure programs to the poor. Direct evidence of these spillover effects is rarely available. We shall therefore estimate reduced form regressions of farm outcomes with respect to the cumulative land reforms implemented in the village, apart from panchayat delivery of agricultural minikits, expenditure on local irrigation and road projects.

## 4.2 Empirical Estimates

Table 13 provides the first set of estimates of the effects of the *Barga* program on rice yields, showing the effects of using the regression specification of Banerjee, Gertler and Ghatak (2002) in our context, with a few variations. Since HYV adoption decisions are endogenous, we do not include them among the regressors (though the results do not change when they are included). Since the productivity effects of the program are likely to vary more directly with the proportion of cultivable land area covered by the program rather than proportion of sharecroppers registered, we use the (lagged) cumulative proportion of land area as the regressor.<sup>8</sup> Controls include state roads and canals at the district level, and annual rainfall. Since our data pertains to farm level yields, we use farm (rather than district) fixed effects. Interactions of year dummies with South Bengal districts, initial sharecropping and 1978 Left majority dummies are included in the third and fourth columns. OLS estimates are shown in the second and fourth columns, with corresponding IV estimates in the first and third columns. In the latter, cumulative *Barga* activity is instrumented by corresponding cumulatives of state and national factors that affected the extent of political competition at the GP level, interacted with historical incumbency factors.<sup>9</sup>

Table 13 shows the effects of *Operation Barga* on rice yields at the farm level were positive

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<sup>8</sup>An additional reason is that any estimate of the registration rate relies on an estimate of the actual number of tenants (registered or otherwise), reliable data regarding which is typically difficult to obtain.

<sup>9</sup>Specifically, (cumulative) bargaland and pattaland were instrumented by cumulatives of the following variables and corresponding squares and interactions: Left share lagged, Congress seats in Parliament, small factory employment at the district level, inflation, average vote share difference at the preceding Assembly election at the district level. The within- $R^2$  of the prediction equation for cumulative *bargaland* is .95, while that for cumulative *pattaland* is .56, so the instruments do predict land reforms implemented quite well.

but statistically insignificant, irrespective of whether we use the OLS or IV estimates. The IV estimates tend to be more than twice as big as the OLS estimates, i.e., a significant understatement by the latter of the true causal impact owing to omitted variable bias or reverse causality. The direction and magnitude of the bias are surprising, since one might have expected the OLS estimate to include the effect of other omitted variables (e.g., reflecting local governance) moving in the same direction as land reform implementation.

Table 14 provides the first full set of joint estimates of respective effects of both categories of land reforms, and other key inputs supplied by the GPs. Supplies of kits and IRDP credit are instrumented by the scale of these programs at the state level, the population-bank ratio, interacted with instruments for local political competition. The coefficient of cumulative lagged *bargaland* turns out to be strongly positive and significant in both OLS and IV versions, with the IV estimates continuing to be considerably higher than the OLS estimates. The effect of cumulative *pattaland* is positive, somewhat lower in magnitude, and generally statistically insignificant (with the exception of two OLS estimates).

Other inputs supplied by GPs, especially minikits, road programs and IRDP credit, also had a significantly positive effect, with the IV estimates larger than the OLS estimates. There was considerable multicollinearity between credit and kit supplies, as indicated by the last two columns of Table 14 where their respective effects lose significance when jointly included. Owing to this, we hereafter present separate regressions which include these one at a time. State roads had a strong positive effect throughout, while state canal irrigation exhibited a negative, significant effect. This result is quite puzzling, possible explanations of which need to be investigated in future research. One possibility is that state canal provision responded to the political and economic power of large landowners, which was negatively correlated with local productivity of the average small or marginal farm. Another is that the state government directed canal expansion into slow-growing areas for redistributive reasons.

Table 15 examines the corresponding effects on HYV adoption rates. Three different specifications are included, corresponding to a linear, logarithmic and logistic functions of the adoption rate. The effects of *bargaland*, kits and GP road programs are fluctuating

in sign and significance, while only *pattaland* has a positive, significant effect on (log and logistic forms) of the adoption rate. Hence the productivity enhancing effects identified in Table 14 cannot be explained by corresponding effects on HYV adoption incentives.

Table 16 examines effects on farm value added per acre, and finds these to be similar to those on rice yields (with the exception of rice price and state canal irrigation, which have positive and zero effects here, in contrast to a significant negative effect on rice yields). The elasticity of farm incomes with regard to price changes is about .4. The fact that this is less than one is consistent with the negative effect of rice price on rice yields shown in Table 14, possible reflecting a tendency for farmers to slacken effort when rice prices are rising. It is also conceivable that the rice price reflects mainly prices of traditional rather than high-yielding varieties, so a higher rice price is associated with a shift away from HYV to traditional varieties. However, Table 15 shows no such tendency for farmers to switch out of HYV rice as rice prices rose.

Table 17 examines differential effects on productivity and incomes of small (less than 5 acre) and marginal (less than 2.5 acre) farms. The positive effects of the *Barga* program, GP road and irrigation spending were intensified for small farms. Marginal farms obtained roughly the same or more benefits as the average farm (with the exception of kits, where their productivity increase was about 5% lower). In the case of GP road programs, their benefits were significantly higher. Hence the productivity and income gains from GP actions were spread evenly, with a bias in favor of small and marginal farms.

Finally, Table 18 examines the impact on wage and employment rates of agricultural workers hired by farms. Wage rates are not significantly affected by any of the GP administered programs. Employment rates are negatively affected by the *patta* program, possibly owing to a combination of supply-side and demand-side effects. On the one hand the distribution of land titles to the landless would tend to reduce the supply of agricultural labor (and raise wage rates, as was the case, though this effect was not statistically significant). On the other hand, the *patta* program accelerated HYV adoption rates, which tended to substitute hired labor with family labor. The net effect of these changes on the fortunes of landless workers is difficult to decipher. GP irrigation investments tended to raise em-

ployment rates, as did state investments in canals and roads. The latter result is equally consistent with the hypotheses that state canals responded to large landowners (since they employ more hired labor than small family farms) or to regional redistributive motives of the state government. In this respect there was a key difference between irrigation investments administered by local and state governments: the former tended to raise productivity and incomes of farmers but had no effect on agricultural workers, while the opposite appeared to be the case with state irrigation programs.

## 5 Concluding Comments

To summarize our main results, we found evidence in favor of the quasi-Downsian theory stressing the proneness of electoral competition to elite capture, with respect to the pro-poor accountability of West Bengal local governments. Local inequality and political competition mattered in the way that this theory predicts. These were especially pronounced in the case of the *barga* program, in the treatment of SC/ST groups with respect to IRDP credit, the administration of employment programs by GPs, the inter-village allocation of minikits, employment grants and fiscal grants by higher levels of government. There was relatively less indication of elite capture in intra-village allocation of private goods (except with respect to treatment of SC/ST groups) and in the implementation of land reform, so local democracy seemed to have functioned well in regard to these programs.

We also found evidence of the importance of the actions of GPs for growth in farm productivity: the *barga* program, supplies of IRDP credit and agricultural kits, local investments in irrigation and roads contributed to the rise in rice yields and farm productivity during the 1980s and 90s. Unlike the initial impact of the Green Revolution in earlier decades elsewhere in the country, these benefits were biased in favor of small and marginal farmers. With the exception of local infrastructural investments, however, these benefits did not trickle down to landless agricultural workers.

The results raise a number of puzzles concerning the channels by which the reforms affected productivity. Considering the small fraction of land distributed, it is surprising



that the *barga* program had large effects on farm productivity on farms in general, not just the tenants who were registered. Conventional theories of effects of tenancy regulation on effort incentives of tenants can only explain the effect on the farms directly affected, not other farms in the village. A better understanding is needed of the process by which productivity improvements diffused — perhaps through social learning, collective action within the village with respect to minor irrigation, induced effects on land fragmentation through the land market, or on the accountability of local governments. Our currently ongoing research seeks to explore this question in more detail. The contrasting effects of irrigation provided by panchayats and the state government poses another puzzle.

The main policy implications of our findings are to affirm the benign productivity and distributive benefits of agrarian institutional reforms in the West Bengal context. How relevant these are to other Indian states with contrasting historical traditions and agricultural settings is not evident. In terms of the design of local democracy, our analysis suggests greater attention needs to be placed on the process of disbursement of grants at higher levels of the panchayat system *across* GPs. In addition, policy-makers should be sensitive to instances of perverse intra-village targeting with regard to employment generating programs administered by GPs, and treatment of SC/ST groups. Measures to enhance electoral competition — e.g., institutional reforms that reduce incumbency advantages, such as the scope for manipulation of electoral outcomes by current governments — are also warranted.

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<b>TABLE 1: DISTRICT-WISE ALLOCATION OF SAMPLE VILLAGES</b>		
<b>DISTRICT</b>	<b>NUMBER OF VILLAGES IN SAMPLE</b>	<b>LEFT FRONT PERCENT OF SEATS IN GP (average 1978-98)</b>
24 Parganas (N)	6	56
24 Parganas (S)	8	54
Bankura	5	87
Birbhum	6	56
Bardhaman	8	84
Cooch-Behar	8	85
Hooghly	6	70
Howrah	4	79
Jalpaiguri	5	74
Malda	2	60
Midnapur	8	78
Murshidabad	6	46
Nadia	5	79
Dinajpur	4	51
Purulia	8	62
<b>WEST BENGAL</b>	<b>89</b>	<b>69</b>

**TABLE 2: VILLAGE CHARACTERISTICS  
IN SAMPLE VILLAGES, 1978 AND 1998**

	1978	1998
Number of households	228	398
Operational land-household ratio (acre/hh)	1.54	0.87
% households landless	47.3	52.3
% households marginal (0–2.5 acres)	35.2	39.1
% households small (2.5–5 acres)	11.2	6.4
% households medium (5–12.5 acres)	4.7	2.0
% households big (12.5– acres)	1.6	0.3
% land small	56.7	73.9
% land medium	23.9	18.5
% land big	19.5	7.6
% poor households low caste	38.3	39.8
% upto small households illiterate	44.1	31.9
% big households illiterate	4.4	3.2
% households in nonagricultural occupation	41.1	51.4
Population-Bank ratio	41.6	23.1
‘Poor’ household is either landless or marginal landowner		
‘Upto small’ household is either landless, marginal or small landowner		
All land information pertains to distribution of cultivable non- <i>patta</i> land owned		
Source: indirect household survey;		
Population-bank ratio from West Bengal Economic Review, various years		

**TABLE 3: LAND REFORMS**

	1978 Average	1998 Average
% operational land vested	16.4*	15.3
% operational land distributed	1.4	5.4
% hh’s receiving <i>pattas</i>	4.9	14.9
% operational land leased	2.7	4.2
% operational land with registered <i>barga</i>	2.4	6.1
% hh’s registered <i>bargadar</i>	3.1	4.4
% tenants registered	43.4	51.2
Source: Block Land Records Offices; indirect household survey		
*Only available for 34 villages		

<b>TABLE 4: TRENDS IN PUBLIC SUPPLIES OF AGRICULTURAL INPUTS</b>				
	1982	1985	1990	1995
Minikits per hh	0.24	0.21	0.15	0.10
IRDP <sup>a</sup> per hh	62	42	35	23
GP Irrig. Exp. <sup>b</sup>	1598	1350	1497	1674
GP Road Exp. <sup>c</sup>	6898	5345	4167	5556
GP Empl. Mandays per hh	4.20	3.25	2.37	2.09
Area Irrig by State Canals (hectares)	66651	66369	73065	77997
State Road Length (Km)	1240	1261	1288	1282
a: IRDP Credit Subsidy, Rs 1980				
b,c: Expenditure out of Employment Program Funds, Rs 1980				
Source: Block Agricultural Dev. Offices, Lead Banks, GP budgets, West Bengal Economic Review				

<b>TABLE 5: TRENDS IN FARM PRODUCTIVITY, INCOMES, WAGES</b>				
	1982	1985	1990	1995
Rice Yield Kg/hectare	1414	1932	2758	3647
HYV Share	.08	.06	.39	.66
Value Added/Acre	635	777	1232	1368
Wage Rate	0.62	0.69	0.88	1.01
Hired Labor Hrs/Acre	156	176	249	369
All rupee figures deflated by CLI, 1974=100				
Source: Cost of Cultivation Surveys				

<b>TABLE 6: LEFT SHARE REGRESSIONS</b>				
	Cross-Section (OLS)	Panel (Ar-Bond)	Panel (Ar-Bond)	Panel (Ar-Bond)
No. obs. (GPs)	57	221 (56)	221 (56)	221 (56)
F-st(d.f.)	3.11(9,47)	28.00(6,214)	17.90(14,206)	18.41(15,205)
p-value, 2nd order ser. corr. diff. res.		.14	.04	.06
Assembly Vote Share Difference, District	1.32*** (0.40)			0.85*** (0.28)
% Cong Seats in Parliament		-0.51** (0.24)	-0.45* (0.24)	-0.64*** (0.24)
% Cong Seats Parlmt*		0.80*** (0.23)	0.72*** (0.23)	1.01*** (0.25)
Lagged GP LeftShare Inflation Rate		3.48*** (0.91)	3.77*** (0.85)	3.43*** (0.85)
Inflation Rate*Lagged GP Left Share		-6.97*** (1.13)	-7.34*** (1.05)	-6.60*** (1.04)
Panel regressions: Arellano-Bond GMM estimator				
Controls include distribution of land, literacy, caste; small factory employment growth				
robust standard errors in parentheses; ***: significant at 1%, ** at 5%, * at 10%				



<b>TABLE 7: LAND REFORM PANEL TLAD REGRESSIONS, YEARLY DATA 1978-98</b>				
	PATTALAND	PATTADAR	BARGALAND	BARGADAR
% Left	-0.35 (0.63)	0.64 (0.50)	1.10 (0.71)	0.90*** (0.23)
% Left Sq.	0.12 (0.55)	-0.15 (0.30)	-0.66 (0.56)	-0.59*** (0.22)
% Left*% 1978 HH's Landless	0.91 (0.82)	-1.12** (0.47)	-0.82 (0.88)	-0.38 (0.47)
% Left*% 1978 land big	-1.25*** (0.40)	-1.02** (0.50)	-2.88*** (1.08)	-0.47* (0.25)
% Election year Dummy	0.14 (0.15)	-0.01 (0.06)	-.04 (.03)	0.00 (.01)
% Pre-election year Dummy	-0.07 (0.08)	-0.08 (0.06)	0.36 (0.31)	0.16*** (0.05)
Total Obs.	1755	1755	1755	1755
Censored Obs.	1570	1570	1588	1588
No. Groups	89	89	89	85
* Village controls include land distribution, illiteracy rates, proportion low caste.				
Also included: timeblock dummies, village fixed effects.				
Standard errors in parentheses				
***:significant at 1%, ** at 5%, * at 10%				

**TABLE 8: TARGETING OF IRDP CREDIT SUBSIDIES**

	(Intravillage) Landless % Share	(Intravillage) Upto Small % Share	(Intravillage) SC/ST % Share	(Inter-GP) GP average per HH
Mean (sd) at 1980 prices	45.0 (39.7)	96.5 (13.8)	45.4 (42.0)	23.56 (66.24)
EFFECT OF FOLLOWING HYPOTHETICAL CHANGES:				
2.5% households switch: medium to landless	7.8	3.3	-11.1	-11.54
2% households switch: big to medium	-6.6	-2.1	-0.8	13.97
2% households switch: big to marginal	-3.7	0.7	-13.1**	3.8
10% cult. land shifts: small to big	-6.6	-7.1***	-1.1	-10.44
5% poor households switch non-SC/ST to SC/ST:	3.7	-1.0	0.4	3.9
Left share of ZP seats rise: 86% to 96%	10.9	-4.1*	-0.7	-8.5?
Left share of GP seats rise: 66 to 76%	-7.5	-0.8	0.7	-0.31
***, **, *, ? denote significant at 1,5,10,15% respectively				

**TABLE 9: TARGETING OF MINIKITS**

	(Intravillage) Upto Small % Share	(Inter-GP) GP average per HH
Mean (sd)	97.7 (8)	0.085 (0.114)
EFFECT OF FOLLOWING HYPOTHETICAL CHANGES:		
2.5% households switch: medium to landless	0.3	-0.053
2% households switch: big to medium	-0.2	.017
2% households switch: big to marginal	-0.3	-0.012
10% cultivable land shifts: small to big	0.6	-0.062*
5% poor households switch: non-SC/ST to SC/ST	-0.1	-0.078***
Left share of ZP seats rises: 86% to 96%	1.2	-0.029
Left share of GP seats rises: 66% to 76%	-0.3	-0.007
***, **, * denote significant at 1,5,10% respectively		

<b>TABLE 10: TARGETING OF FISCAL GRANTS</b>			
	(Intravillage) Empl. Days Generated per rupee employment grant	(Inter-GP) GP average per HH employment grant	(Inter-GP) GP average per HH all grants
Mean (sd)	0.024 (0.095)	195 (366)	464 (1247)
<b>EFFECT OF FOLLOWING HYPOTHETICAL CHANGES:</b>			
2.5% households switch: medium to landless	-0.010**	-17	-84*
2% households switch: big to medium	0.009**	2	60
2% households switch: big to marginal	0.001	-17	-18
10% cult. land shifts: small to big	-0.008*	-66*	-146**
5% poor households switch: non-SC/ST to SC/ST	0.001	-39	-125***
Left share of ZP seats rise: 86% to 96%	-0.005	-0.31	-16
Left share of GP seats rise: 66% to 76%	0.000	-46**	-97***
***, **, * denote significant at 1,5,10% respectively			

<b>TABLE 11: VARIATIONS IN FARM PRODUCTIVITY WITH FARMSIZE, TENANCY AND CROP CHOICES</b>				
	Value Added/Acre		Rice Yield/Acre	
	OLS Levels	OLS First Difference	OLS Levels	OLS First Difference
Farmsize	-162.5*** (15.7)	-272.5*** (28.8)	-.43*** (.07)	-1.02*** (.13)
% Leased	632.5*** (135.6)	94.9 (185.4)	1.64*** (.62)	.94 (.88)
% area HYV	534.4*** (108.0)	558.04*** (152.8)	3.68*** (.49)	3.65*** (.72)
% area potato-oilseeds	233.5 (277.6)	815.8** (372.9)	-	-
Labor hrs	.29*** (.029)	.25*** (.05)	6e-4*** (1e-4)	7e-4*** (2e-4)
Seeds exp.	-.02 (.02)	18e-4 (.03)	-8e-6 (114e-6)	6e-5 (14e-5)
Fertilizer exp.	.09*** (.03)	.025 (.042)	39e-5*** (13e-5)	14e-5 (20e-5)
Irrigation exp.	.02 (.03)	.048 (.030)	32e-5** (13e-5)	49e-5* (14e-5)
Pesticide exp.	-.04 (.12)	.47*** (.16)	-93e-5 (53e-5)	21e-5 (75e-5)
n,R-sq.	2818,.69	2038,.06	2818,.39	2038,.04
District, year fixed effects included in level regressions				
***, **, * denote significant at 1,5,10% respectively				

<b>TABLE 12: CROP CHOICE VARIATIONS ACROSS FARM SIZE</b>		
	LOG % AREA HYV RICE	LOG % AREA POTATO-OILSEEDS
Log Farmsize	-.131*** (0.017)	-.294*** (0.027)
n, R-sq.	1848,.59	1397,.42
District, year fixed effects included		
***, **, * denote significant at 1,5,10% respectively		

<b>TABLE 13: OPERATION BARGA EFFECTS ON RICE YIELD: BANERJEE ET AL SPECIFICATION, FARM PANEL</b>				
	Log Rice Yield OLS	Log Rice Yield IV	Log Rice Yield OLS	Log Rice Yield IV
Cumulative %Area	.124	.278	.172	.369
Barga Reg.	(.092)	(.205)	(.167)	(.276)
Log Rainfall	.257*** (.101)	.260** (.101)	.375*** (.119)	.381*** (.119)
Log State Canals	-.021***	-.021***	-.026**	-.025**
Distt Level	(.007)	(.007)	(.011)	(.011)
Log State Roads	2.052***	2.066***	3.226***	3.240***
Distt Level	(.769)	(.771)	(1.024)	(1.025)
Interactions <sup>a</sup>	No	No	Yes	Yes
no. obs,farms	2231,585	2231,585	2231,585	2231,585
within-R.sq.	.12	.12	.17	.17
Farm, year fixed effects included				
Robust s.e., clustered at village level				
a: Interactions of year dummies with initial sharecropping and with dummies for South Bengal districts, 1978 Left Front majority districts				
***, **, * denote significant at 1,5,10% respectively				

<b>TABLE 14: LAND REFORM AND PUBLICLY SUPPLIED INPUTS: EFFECT ON LOG RICE YIELD</b>						
	IV	OLS	IV	OLS	IV	OLS
Cum. Bargaland (Lagged) (I)	.701*** (.258)	.428*** (.141)	.474*** (.215)	.323** (.130)	.539* (.297)	.384** (.148)
Cum. Pattaland (Lagged) (I)	.234 (.329)	.146 (.112)	.625 (.446)	.285** (.117)	.535 (.527)	.212* (.122)
Cum. Minikits/HH (Lagged)(I)	.454*** (.166)	.307** (.133)			.114 (.421)	.144 (.174)
Cum. IRDP Credit/HH (Lagged) (I)			1.31e-3* (6.65e-4)	5.82e-4** (2.73e-4)	.001* (.001)	.000** (.000)
Log Cum. GP Irrigation Exp. (Lagged)	.008 (.011)	.009 (.010)	.018* (.010)	.015 (.009)	.016 (.011)	.013 (.010)
Log Cum. GP Road Exp. (Lagged)	.029*** (.009)	.029*** (.009)	.033** (.013)	.034*** (.013)	.030** (.014)	.031*** (.011)
Log State Canals Distt Level	-.017** (.007)	-.018*** (.007)	-.020*** (.007)	-.020*** (.009)	-.019** (.007)	-.019*** (.007)
Log State Roads Distt Level	1.708** (.690)	1.861*** (.659)	1.594* (.879)	1.856** (.801)	1.619* (.846)	1.854** (.710)
Log Rice Price (real) <sup>b</sup>	-.172** (.083)	-.210** (.081)	-.236** (.093)	-.233** (.090)	-.227** (.103)	-.222** (.086)
Number obs., farms	2128,549	2138,554	2074,541	2084,546	2044,526	2054,531
Within-R sq.	.18	.19	.15	.16	.15	.17
I: Instrumented in IV regressions						
b: Deflated using regional CPI for Agricultural Workers						
All regressions include farm fixed effects, year fixed effects, annual rainfall						
Robust standard errors in parentheses, clustered at village level						
***, **, * denote significant at 1,5,10% respectively						

TABLE 15: LAND REFORM AND PUBLICLY SUPPLIED INPUTS: EFFECT ON % AREA HYV ( $p$ )						
	$p$ IV	Log ( $p + k$ ) IV	Log ( $\frac{p}{1-p} + k$ ) IV	$p$ IV	Log ( $p + k$ ) IV	Log ( $\frac{p}{1-p} + k$ ) IV
Cum. Bargaland (Lagged) (I)	-.093 (.093)	.136 (.605)	-.499 (.919)	-.149*** (.049)	.268 (.406)	-.704 (.53)
Cum. Pattaland (Lagged) (I)	.211 (.133)	3.006** (1.171)	3.684** (1.691)	.248 (.151)	3.012** (1.256)	3.878** (1.885)
Cum. Minikits/HH (Lagged)(I)	.008 (.008)	-.013 (.048)	.337 (.812)			
Cum. IRDP Credit/HH (Lagged) (I)				2.52e-4* (1.35e-4)	1.8e-3 (1.1e-3)	2.8e-3* (1.4e-3)
Log Cum. GP Irrigation Exp. (Lagged)	-.003 (.002)	-.029 (.019)	-.049 (.029)	-.002 (.002)	-.028 (.020)	-.039 (.028)
Log Cum. GP Road Exp. (Lagged)	-.001 (.002)	.033** (.015)	.020 (.019)	-.001 (.002)	.020 (.016)	.009 (.021)
Log State Canals Distt Level	-.011** (.005)	-.095** (.046)	-.142** (.066)	-.011** (.004)	-.090* (.045)	-.133** (.061)
Log State Roads Distt Level	-.855*** (.32)	-5.701*** (2.15)	-9.620*** (3.228)	-.697** (.310)	-5.645*** (2.083)	-8.250*** (3.083)
Log Rice Price (real) <sup>b</sup>	-5e-4 (2.7e-2)	.346 (.23)	.213 (.302)	-.012 (.033)	.336 (.230)	.143 (.331)
Number obs., farms	2128, 549	2128,549	2128,549	2074,541	2074,541	2074,541
Within-R sq.	.08	.07	.08	.07	.07	.07
$k$ set to .025, $p > 0.99$ truncated to 0.99						
I: Instrumented in IV regressions						
b: Deflated using regional CPI for Agricultural Workers						
All regressions include farm fixed effects, year fixed effects, annual rainfall						
Robust standard errors in parentheses, clustered at village level						
***, **, * denote significant at 1,5,10% respectively						

<b>TABLE 16: LAND REFORM AND PUBLICLY SUPPLIED INPUTS: EFFECT ON LOG FARM VALUE ADDED PER ACRE</b>				
	IV	OLS	IV	OLS
Cum. Bargaland (Lagged) (I)	.73*** (.24)	.51*** (.12)	.41*** (.17)	.36** (.14)
Cum. Pattaland (Lagged) (I)	.22 (.33)	.14 (.10)	.66 (.46)	.31*** (.11)
Cum. Minikits/HH (Lagged)(I)	.58*** (.16)	.43*** (.08)		
Cum. IRDP Credit/HH (Lagged) (I)			1.38e-3*** (4.84e-4)	7.2e-4** (3.1e-4)
Log Cum. GP Irrigation Exp. (Lagged)	.00 (.01)	.00 (.01)	.01 (.01)	.01 (.01)
Log Cum. GP Road Exp. (Lagged)	.04*** (.01)	.04*** (.01)	.04** (.02)	.05*** (.02)
Log State Canals Distt Level	.00 (.01)	.00 (.01)	-.00 (.01)	-.00 (.01)
Log State Roads Distt Level	1.79** (.82)	1.88** (.80)	1.71* (1.00)	1.91* (.96)
Log Rice Price (real) <sup>b</sup>	.39*** (.09)	.36*** (.08)	.29*** (.09)	.31*** (.09)
Number obs., farms	2120, 549	2130,554	2066,541	
Within-R sq.	.19	.19	.15	
I: Instrumented in IV regressions				
b: Deflated using regional CPI for Agricultural Workers				
All regressions include farm fixed effects, year fixed effects, annual rainfall				
Robust standard errors in parentheses, clustered at village level				
***, **, * denote significant at 1,5,10% respectively				



TABLE 17: LAND REFORM AND PUBLICLY SUPPLIED INPUTS: DIFFERENTIAL EFFECTS ON SMALL, MARGINAL FARMS		
	Log Farm Value Added Per Acre IV	Log Farm Value Added Per Acre IV
Cum. Bargaland (Lagged) (I)	.639*** (.230)	.694*** (.234)
Bargaland*Small	.068*** (.013)	
Bargaland*Marginal		.021 (.018)
Cum. Pattaland (Lagged) (I)	.303 (.456)	.222 (.341)
Pattaland*Small	-.117 (.246)	
Pattaland*Marginal		-.089 (.183)
Cum. Minikits/HH (Lagged)(I)	.607*** (.158)	.616*** (.164)
Minikits*Small	-.029 (.019)	
Minikits*Marginal		-.035** (.016)
Log Cum. GP Irrigation Exp. (Lagged)	-.003 (.009)	.001 (.011)
GP Irrig Exp*Small	.009* (.005)	
GP Irrig Exp*Marginal		.003 (.010)
Log Cum. GP Road Exp. (Lagged)	.028*** (.010)	.030*** (.009)
GP Road Exp*Small	.019*** (.007)	
GP Road Exp*Marginal		.027** (.011)
Number obs., farms	2120,549	2120,549
Within-R sq.	.20	.21
Small: < 5 acres; Marginal:< 2.5 acres;I: Instrumented.		
All regressions include farm, year fixed effects; state canals, roads; annual rainfall; log real rice price		
Robust standard errors in parentheses, clustered at village level		
***, **, * denote significant at 1,5,10% respectively		

**TABLE 18: LAND REFORM AND PUBLICLY SUPPLIED INPUTS:  
EFFECT ON AGRICULTURAL WORKERS**

	LOG REAL WAGE			LOG HIRED LABOR/ACRE		
	IV	IV	IV	IV	IV	IV
Cum. Bargaland (Lagged) (I)	.011 (.088)	.02 (.08)	.002 (.076)	.16 (.16)	.38 (.26)	.07 (.16)
Cum. Pattaland (Lagged) (I)	.141 (.116)	.18 (.11)	.135 (.118)	-.71* (.37)	-1.06** (.49)	-.89* (.47)
Cum. Minikits/HH (Lagged)(I)	.007 (.078)				.396 (.238)	
Cum. IRDP Credit/HH (Lagged) (I)		2.7e-4 (2.4e-4)		9.2e-4 (7.1e-4)		
GP Employment/HH (I)			.009 (.018)			.025 (.058)
Log Cum. GP Irrigation Exp. (Lagged)	-.001 (.005)	.000 (.005)	-8.6e-4 (5.3e-3)	.032*** (.011)	.027** (.01)	.027** (.011)
Log Cum. GP Road Exp. (Lagged)	.001 (.009)	.000 (.009)	1.5e-5 (9.4e-3)	.005 (.017)	.004 (.013)	.002 (.018)
Log State Canals Distt Level	.011*** (.004)	.011*** (.003)	.019*** (.004)	.022** (.009)	.024*** (.008)	.021** (.009)
Log State Roads Distt Level	-.184 (.220)	-.198 (.247)	.191 (.221)	3.309*** (1.007)	3.483 (.79)	3.568*** (.923)
Number obs., farms	1840,492	1787,485	1870,507	1788,485	1841,492	1871,507
Within-R sq.	.12	.13	.12	.08	.10	.08
I: Instrumented						
All regressions include farm fixed effects, year fixed effects, annual rainfall, log deflated rice price						
Robust standard errors in parentheses, clustered at village level						
***, **, * denote significant at 1,5,10% respectively						