

Land reform and agricultural productivity in India: a review of the evidence

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Abstract In this paper we review as well as contribute to the empirical literature on the impact of land reform on agricultural productivity in India. We find that, overall for all states, land-reform legislation had a negative and significant effect on agricultural productivity. However, this hides considerable variation across types of land reform, as well as variation across states. Decomposing by type of land reform, the main driver for this negative effect seems to be land-ceiling legislation. In contrast, the effect of tenancy reform, averaged across all states, is insignificant. There seems to be a wide range of state-specific effects, which suggests that focusing on average treatment effects can hide a considerable amount of heterogeneity. In particular, allowing a separate slope for West Bengal, one of the few states that implemented tenancy laws rigorously, we find that land reform had a marginal positive effect relative to the rest of India.

Key words: agricultural productivity, land reform, West Bengal

JEL classification: O4, Q1

I. Introduction

Land reform usually refers to redistribution of land from the rich to the poor. More broadly, it includes regulation of ownership, operation, leasing, sales, and inheritance of land. In an agrarian economy such as India, with great scarcity and an unequal distribution of land, coupled with a large mass of the rural population below the poverty line, there are compelling economic and political arguments for land reform. Not surprisingly, it received top priority on the policy agenda at the time of the Indian Independence in 1947.

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In the decades following Independence, India passed a significant body of land reform legislation. The 1949 Constitution left the adoption and implementation of land and tenancy reforms to state governments. This led to much variation in the execution of these reforms across states and over time, a fact that has been used in empirical studies trying to understand the causes and effects of land reform.

Land reform legislation in India consisted of four main categories—tenancy reform, abolition of intermediaries, land ceiling, and land consolidation. The first category of land reform, namely tenancy reform, imposed regulation that attempted to improve the contractual terms faced by tenants, including crop shares and security of tenure. Under the British land-revenue system, large feudal landowners (*zamindars*) received the rights to collect tributes from peasants in exchange for a land tax paid to the state. Almost half of the land was under this system at the time of Independence. This system was considered exploitative, and abolition of intermediaries was aimed at curtailing the power of these large landowners and ensuring that the cultivator of the land was in direct contact with the government, which minimized unjust extraction of surplus by the landowner. The third form of land reform was the imposition of a ceiling on landholdings that aimed to redistribute surplus land to the landless. Finally, consolidation of landholdings constituted the fourth kind of land reform, which ensured that small bits of land belonging to the same small landowner but situated at some distance from one another could be consolidated into a single holding to boost viability and productivity.¹ Because of variation in land quality across plots, this measure has been difficult to implement.

Abolition of intermediaries is generally agreed to be one component of land reforms that has been relatively successful. The record in terms of the other components is mixed and varies across states and over time. For example, under the ceiling law only 1.7 per cent of total cultivated area has been declared surplus and only 1 per cent of it has been distributed (Misra and Puri, 2000). Landowners resisted the implementation of these reforms by directly using their political clout and also by using various methods of evasion and coercion, which included registering their own land under names of different relatives to bypass the ceiling, shuffling tenants around different plots of land so that they would not acquire incumbency rights as stipulated in the tenancy law, and possibly even outright eviction.²

The general assessment on land reforms in the Indian context is rather negative. For example, the report of the Task Force on Agrarian Relations of the Planning Commission of India (1973) had the following overall assessment of land reforms in India: 'The programmes of land reform adopted since Independence have failed to bring about the required changes in the agrarian structure.' The report directly blames the political will of the state governments for this failure:

The lack of political will is amply demonstrated by the large gaps between policy and legislation and between law and its implementation. In no sphere of public activity in our country since Independence has the hiatus between precept and practice, between policy pronouncements and actual execution been as great as in the domain of land reforms.

¹ See Joshi (1975) for a discussion of land-reform legislation in India and its implementation. See also Besley and Burgess (2000), who provide a systematic description of these laws and their amendments that were passed in individual states over time.

² Often, such eviction was euphemistically referred to as 'voluntary surrender', although in most cases they were anything but voluntary.

Indeed, the two states in which land reform is widely considered to have been successful are West Bengal and Kerala, and in both cases it was pushed forward by left-wing administrations. These two states accounted for 11.75 and 22.88 per cent, respectively, of the total number of tenants conferred ownership rights (or protected rights) up to 2000, despite being home to only 7.05 and 2.31 per cent of India's population, respectively (Government of India, 2000). As regards implementation of land ceiling laws, West Bengal's share of total surplus land distributed was almost 20 per cent of the all-India figure (Government of India, 2000), although the state accounts for only about 3 per cent of India's land resources³ (Ministry of Agriculture (MoA), Government of India). Despite this consensus, until very recently there have been very few rigorous attempts to study the impact of land reforms. This is not surprising as there are serious conceptual issues in trying to measure the impact of land reform. For example, the amount of land area directly affected by the reform is not the appropriate measure of its success: for instance, measures may be taken in anticipation of or in reaction to the reform (e.g. eviction of tenants, or land sales) whose impact must be considered when studying the aggregate effects of the reform. Also, implementation of land reform is likely to be correlated with other government policies and economic trends, which in turn are likely to be correlated with outcome measures of interest, such as agricultural productivity and poverty. This makes causal inference difficult. In this paper we review, as well as contribute to, the empirical literature on the impact of land reform on agricultural productivity with a special focus on this problem, and also, more broadly, on understanding the mechanism of how the intervention works its way through.

Our key findings are as follows. Overall, land-reform legislation seems to have had a negative and significant effect on agricultural productivity in India. However, this hides considerable variation across types of land reform, as well as variation across states. Decomposing by type of land reform, the main driver for this negative effect seems to be land-ceiling legislation. In contrast, the effect of tenancy reform, averaged across all states, turns out to be insignificant. However, in West Bengal, one of the few states where tenancy laws were implemented rigorously, the negative relationship between land reform and productivity is absent. More generally, there seems to be a wide range of state-specific effects, which suggests that focusing on average treatment effects can conceal a considerable amount of heterogeneity. Finally, tenancy reform seems to have increased the inequality of operational holdings in India if we exclude West Bengal, which suggests that in anticipation of the new tenancy legislation, landlords could be engaging in eviction of tenants in states, other than West Bengal, where tenancy reform had been poorly implemented.

The plan of the paper is as follows. In section II we discuss the economic arguments in favour of land reforms, drawing from the literature on development economics. In section III we discuss the evidence on land reforms in India, highlighting the key facts and unresolved puzzles. Our focus is the impact of land reform on agricultural productivity, but we also mention evidence on other outcome variables of interest, such as poverty, as well as discussing the effect of land reform on distribution of landholdings. In section IV we make some concluding remarks.

³ Here, land resources are calculated as the difference between geographical land and forest land.

II. Economic arguments in favour of land reform

Land-reform policy in India had two specific objectives:

The first is to remove such impediments to increase in agricultural production as arise from the agrarian structure inherited from the past. This should help to create conditions for evolving as speedily as possible an agricultural economy with high levels of efficiency and productivity. The second object, which is closely related to the first, is to eliminate all elements of exploitation and social injustice within the agrarian system, to provide security for the tiller of soil and assure equality of status and opportunity to all sections of the rural population. (Government of India, 1961)

In a land-scarce country with a significant section of the rural population below the poverty line, the case for ensuring that everyone has access to some minimum amount of land seems compelling from the point of equity. However, this is a general argument in favour of redistribution, not necessarily redistribution in kind (i.e. land). To make that case, one needs to understand the economic forces that govern the allocation of land and labour. Indeed, in the plan documents, it is clearly recognized that the equity and efficiency arguments in favour of land reform are related because of constraints inherent in the agrarian structure inherited from the past.

We begin with two empirical observations. First, small farms tend to be more productive than large farms. This inverse farm-size productivity relationship is widely documented (see Banerjee (1999) for a review of the literature). Another empirical regularity is that owner-cultivated plots of land tend to be more productive than those under sharecropping tenancy (Shaban, 1987).

Given these observations, one could make an argument in favour of land reform based not only on equity considerations, but also on efficiency considerations. For example, the inverse relationship between farm size and productivity suggests that land reform could raise productivity by breaking (less productive) large farms into several (more productive) small farms. Also, lower productivity under sharecropping suggests that land reform could raise productivity by converting sharecroppers into owner-cultivators.

But this raises the question of what prevents market forces from getting rid of the asymmetry and the resultant inefficiency? Saying that the inverse farm-size productivity relationship is driven by diminishing returns is not satisfactory, since that assumes that land cannot be sold or leased. For example, if a small farmer is more productive, and a large farmer less productive, then the latter would be better off leasing some land to the former. Similarly, if sharecropping is inefficient relative to owner-cultivation, a landlord should sell the land to the sharecropper to make him an owner-cultivator, and get a share of the resulting productivity gains.

Clearly, an explanation of these facts must be based on some frictions in the operation of the land market, or some other input relevant for agricultural production. Otherwise, the big bad landlord can be bad and yet bigger, by adopting a system of land allocation that results in greater surplus. From the point of view of economic theory, there must be a failure of the Coase theorem (e.g. due to informational asymmetries or transaction costs), and so efficiency and distributional considerations cannot be separated.

A leading explanation of both these facts is based on incentives. A small farmer cultivates his land with own and family labour, while a large landowner uses hired labour, with lower incentives to put in effort. Similarly, a sharecropper effectively faces an income tax of 50 per

cent (the most commonly observed sharing rule in the absence of tenancy legislation being 50:50) and naturally puts in less effort. This, however, raises a deeper question: why cannot these parties design contracts that would get rid of the incentive problem?

A key assumption here is that some inputs, such as effort and care and maintenance of land, are inherently difficult to monitor. As a result, unless the parties that are supplying these inputs are full residual claimants (i.e. retain 100 per cent of the profits) they will undersupply these inputs.

A landowner can offer a fixed-rent contract. This says the landlord simply gets a fixed fee, and the tenant keeps all the residual earnings. If everyone lived for one period, this would be equivalent to selling the land to the tenant. However, if the tenant is poor, then even though this contractual arrangement would be efficient, it might not be in a landlord's interest to make it.

Consider a simple example. Suppose that, given the scarcity of land, the fixed rent that would induce the landlord to lease out a given plot of land is Rs 100. However, since the tenant is poor and does not have enough liquid wealth, he may not be able to pay this rent up front, or guarantee to pay it irrespective of whether the output is high or low. He may be able to pay a guaranteed fixed rent of only Rs 50. It is in the landlord's interest, then, to ask for a share of output, even though that would reduce effort, since he gets a higher expected rent. He would not ask for too high a share of output though, since at some point reduced effort would start reducing his expected rent. (This is like the Laffer curve in the context of income taxes: if tax rates are too high, cutting taxes may actually raise revenue via increased labour supply.)

This rent extraction versus incentives trade-off (see Mookherjee (1997) and Banerjee *et al.* (2002) for a formal analysis) can explain the persistence of inefficiency in the land market. This would explain both the stylized facts mentioned above, as well as why market forces will not necessarily get rid of the implied productivity losses.⁴ There are, of course, other instruments that the landlord might use to mitigate the loss of efficiency, such as interlinked credit and tenancy contracts (see, for example, Braverman and Stiglitz, 1982), and eviction threats as an incentive device (see Bardhan, 1984; Dutta *et al.*, 1989; Banerjee *et al.*, 2002; Banerjee and Ghatak, 2004), but as long as the tenant does not have sufficient wealth to make fixed-rental contracts attractive to the landlord, the core inefficiency problem will remain.

To the extent that such a problem is a widespread phenomenon in poor countries, where tenants are typically wealth-constrained, tenancy reform can redress the issue by regulating aspects of the tenancy relationship, such as the crop share and the duration of the contract (security of tenure). Tenancy reform increases the bargaining power of tenants *vis-à-vis* landowners. Given that the loss of efficiency in tenancy is due to the trade-off between rent extraction and incentive provision, any strategy that increases the bargaining power of tenants or, equivalently, reduces the ability of landowners to extract rents, will raise

⁴ This ignores the issue of whether the empirical observations mentioned above control for unobserved heterogeneity of tenants and soil quality. If these observations are *purely* driven by unobserved variations in farmer quality or land quality, then the efficiency case for land reform is weakened. For example, if higher-ability farmers prefer to cultivate smaller plots of land (as opposed to being constrained to do so), or landowners prefer to lease out lower-quality plots to sharecroppers, then, in the absence of any other frictions such as those mentioned above, land reform will not raise average productivity. However, there is some evidence (e.g. Rosenzweig and Binswanger (1993) on farm size and productivity, and Shaban (1987) on sharecropping) to suggest that these empirical facts are not purely driven by heterogeneity in farmer quality or land quality. For example, Shaban (1987) finds, after controlling for land quality, that the *same* farmer puts in less effort in plots of land that he cultivates as a sharecropper compared to plots of land that he cultivates as an owner-cultivator.

efficiency, even if they fall short of outright land transfer, and will also serve the goal of equity.

It is useful here to distinguish between land reform and tenancy reform. Land reform in this context refers to an outright transfer of land from the landlord to the tenant, while tenancy reform regulates aspects of the tenancy relationship as described above. Clearly, land reform, if properly implemented, gets rid of the agency costs mentioned above. However, to the extent that there are imperfections in the market for other inputs, such as credit, the gains in productivity will be limited. Also, radical land reforms are politically difficult to implement. Other than political difficulties, there is a basic constraint in an extremely land-scarce country such as India. As Sharma (1994) shows, even if land ceilings are fully implemented and all the surplus land is redistributed to the landless, such an exercise will lead to extremely small holdings. This will not make much of a difference to poverty, and is likely to affect productivity adversely. Sharma's suggestion is that focusing attention on rigorously implementing tenancy reform, along the lines of Kerala and West Bengal, might be a better option.

However, tenancy reform is likely to have some costs as well. Regulation of tenancy in the form of security of tenure may have the negative effect of reducing the incentive of landowners to lease out land. Indeed, in a cross-state analysis of tenancy laws in India, Conning and Robinson (2007) show that tenancy laws reduced the extent of tenancy. This is likely to be a particularly important concern for poorly implemented tenancy reform legislation: the presence of the tenancy law would have a negative effect on the land-lease market, while, at the same time, the positive incentive effect on tenants might only be partially realized, such that the overall impact remains theoretically ambiguous. We return to this point in the next section when we turn to a discussion of empirical work on the effects of land reform in India.

III. Indian evidence on land reform and agricultural productivity

The key empirical problem faced by researchers when evaluating the impact of land reform is to find out a source of 'exogenous' variation in the reform. Clearly, at the all-India level, it is impossible to determine the effect of land reform separately from the effect of all other economic and policy variables, given that they all vary over time. As a result, researchers have tried to exploit the over-time variation in the execution of land reforms across states or across districts within a state. This has the advantage of controlling for state (or district) fixed effects and, also, year fixed effects. Therefore, to the extent that fixed state- (or district-) specific factors (e.g. land inequality) drive the extent of these reforms, these methods are able to separate the effect of reforms from the direct effects of these factors. Analogously, to the extent that time-varying shocks that apply to all states or all districts affect the outcome variables of interest, controlling for year fixed effects takes care of the fact that the land reform measure is not picking up the effects of these other common time-varying factors.

Clearly, one limitation of this approach is that there could be other policies and economic trends that vary over time and across states or districts and, to the extent that the land reform measures are correlated with these, the effect of some of these factors will be picked up by the land-reform measures. Moreover, there is the question of endogeneity: factors that

affect the success of land reform are also likely to affect productivity. For example, if a left-wing administration comes to power, as happened in Kerala and West Bengal, it will implement land reforms more actively and also implement other reforms (e.g. empowering local governments) that might have a direct effect on productivity. The challenge in both cases is to isolate the effects of land reforms, and to understand the mechanism of how they operated.

(i) Using inter-state variation in land-reform legislation

Effect of the aggregative measure of land reform

Besley and Burgess (2000) use state-level data for the 16 major Indian states from 1958 to 1992 and exploit the variation across states and over time in land-reform legislation to identify the effect of land reform on productivity and poverty. They generate a cumulative variable that aggregates the number of legislative reforms to date in any particular state. Formally, their approach is to run state-level panel data regressions using the following specification:

$$y_{st} = \alpha_s + \beta_t + \gamma x_{st} + \psi l_{st-4} + \varepsilon_{st} \quad (1)$$

where y_{st} is the log of agricultural yield, defined as real agricultural state domestic product divided by the net sown area, α_s is a state fixed effect, β_t is a year dummy variable, x_{st} is a vector of controls that vary by state and year, l_{st-4} is a vector of cumulative land reform measures lagged by 4 years,⁵ and ε_{st} is an error term modelled as an AR(1) process with a state-specific degree of autocorrelation—i.e. $\varepsilon_{st} = \rho_s \varepsilon_{st-1} + u_{st}$. Additionally, their use of generalized least-squares estimation allows for heteroskedasticity in the error structure with state-specific error variance.

Controlling for state and year fixed effects, and a number of time-varying economic and policy variables, they find that the lagged version of their cumulative land-reform variable has had a negative and significant effect on poverty. They do not report the effect of this cumulative aggregative land-reform variable on agricultural productivity in their paper, but, when we ran it, the result turned out to be significantly negative (see Table 1(a), column 1).

These findings are quite interesting in the light of the discussion in the previous section. First, they run contrary to the general impression that land reform in India did not have any significant impact overall, based primarily on how little land area it directly affected and because of poor implementation. Second, they seem to suggest an efficiency–equity trade-off, contrary to the stated goal of the reform that it would achieve both equity and efficiency. However, without looking at the specific components of land reform, which we turn to in the following sub-section of section III(i), it is hard to make a judgement from this as to what drives this negative effect.

In order to check the robustness of these findings concerning the effect of land-reform legislation on agricultural productivity, we used an alternative yield measure. The yield measure that Besley and Burgess use is the ratio of real agricultural state domestic product to net sown area. However, the net state domestic agricultural product includes not only

⁵ It measures the number of legislative reforms concerning land in any particular state, calculated cumulatively over time. There are four key land-related laws: redistributive land reform, tenancy reform, abolition of intermediaries, and land-ceiling legislation. The 4-year lag is based on the reasonable assumption that the effect of legislative reform on productivity or poverty will not be instantaneous, owing to implementation and adjustment lags.

Table 1(a): Aggregated and disaggregated impact of land reform on agricultural productivity

Dependent variable	Log of agricultural yield (from Besley and Burgess, 2000)		Log of agricultural yield (using IACD data)		Log of rice yield (using MoA data)	
	Aggregated (1)	Disaggregated (2)	Aggregated (3)	Disaggregated (4)	Aggregated (5)	Disaggregated (6)
Model	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)
4-year lagged cumulative land reform legislation	-0.011** (0.005)		-0.019*** (0.007)		-0.019*** (0.006)	
4-year lagged cumulative tenancy reform legislation		-0.03*** (0.009)		0.012 (0.012)		0.010 (0.012)
4-year lagged cumulative abolition of intermediaries		-0.026 (0.018)		0.028 (0.033)		-0.012 (0.024)
4-year lagged cumulative land ceiling legislation		-0.021 (0.016)		-0.091*** (0.023)		-0.094*** (0.021)
4-year lagged cumulative land consolidation legislation		0.073*** (0.023)		-0.087*** (0.032)		-0.021 (0.032)
State effects	yes	yes	yes	yes	yes	yes
Year effects	yes	yes	yes	yes	yes	yes
Number of observations	495	495	402	402	512	512

Notes: Standard errors are in parentheses. *Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

crops but livestock as well. The latter is unlikely to be affected by land reform legislation, and is likely to introduce measurement error in the yield measure. Therefore, we used an alternative yield measure obtained from the India Agricultural and Climate Dataset (IACD) that was assembled by Evenson and McKinsey.⁶ This dataset covers six major crops of

⁶ The original dataset (available at http://chd.ucla.edu/dev_data/index.html#hhsurveys) covered the years 1971–87, and was later updated to 1999 by Duflo and Pande (2007) for their paper. We use the updated version. This dataset has also been used by Banerjee and Iyer (2005).

Table 1(b): Aggregated and disaggregated impact of land reform on agricultural productivity: controlling for omitted policy variables

Dependent variable	Log of agricultural yield (from Besley and Burgess, 2000)		Log of agricultural yield (using IACD data)		Log of rice yield (using MoA data)	
	Aggregated (1)	Disaggregated (2)	Aggregated (3)	Disaggregated (4)	Aggregated (5)	Disaggregated (6)
	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)
4-year lagged cumulative land reform legislation	-0.012** (0.006)		-0.017** (0.007)		-0.017*** (0.007)	
4-year lagged cumulative tenancy reform legislation		-0.027** (0.012)		0.018 (0.014)		-0.002 (0.015)
4-year lagged cumulative abolition of intermediaries		-0.035 (0.024)		0.078** (0.036)		0.036 (0.033)
4-year lagged cumulative land ceiling legislation		-0.026 (0.020)		-0.113*** (0.027)		-0.113*** (0.027)
4-year lagged cumulative land consolidation legislation		0.069** (0.030)		-0.079** (0.035)		0.003 (0.042)
4-year lagged per-capita education expenditure	0.002 (0.002)		0.004 (0.003)		-0.001 (0.002)	0.000 (0.002)

(continued overleaf)

Table 1(b): (Continued)

Dependent variable	Log of agricultural yield (from Besley and Burgess, 2000)		Log of agricultural yield (using IACD data)		Log of rice yield (using MoA data)	
	Aggregated (1)	Disaggregated (2)	Aggregated (3)	Disaggregated (4)	Aggregated (5)	Disaggregated (6)
Model	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)
4-year lagged per-capita health expenditure	-0.001 (0.002)	-0.001 (0.002)	0.000 (0.004)	-0.003 (0.004)	-0.004 (0.003)	-0.005 (0.003)
4-year lagged per-capita other expenditure	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.001** (0.001)
4-year lagged per-capita tax revenue from redistributive taxes	-0.004 (0.003)	-0.003 (0.002)	-0.009** (0.005)	-0.009** (0.004)	-0.004 (0.004)	-0.004 (0.004)
4-year lagged agricultural yield/4-year lagged log agricultural yield	0.010 (0.055)	-0.010 (0.055)	-0.026 (0.060)	-0.096 (0.063)	0.062 (0.047)	0.040 (0.048)
4-year lagged state taxes as a percentage of state domestic product	-0.349 (0.837)	-0.282 (0.836)	1.411 (1.143)	-0.213 (1.199)	2.313** (0.982)	0.914 (1.034)
State effects	yes	yes	yes	yes	yes	yes
Year effects	yes	yes	yes	yes	yes	yes
Number of observations	424	424	335	335	424	424

Notes: Standard errors are in parentheses. * Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

India—namely, rice, wheat, jowar, bajra, maize, and sugar—which are used to calculate average agricultural yield, and 13 major states.⁷ In Table 1(a), column (3), we present the results using this alternative yield measure. The results are very similar and, in both cases, we get a negative and significant effect of cumulative land reform on productivity.⁸

Additionally, we also controlled for a number of policy variables (similar to those used by Besley and Burgess) for both yield measures, and the results turn out to be very similar (see columns (1), (3), and (5) of Table 1(b)).

Effect of disaggregated measures of land reform

Turning now to the individual components of land reform, Besley and Burgess (2000) find a negative impact of tenancy reform and a positive impact of land consolidation on agricultural productivity in India. Both these measures had a negative and significant effect on poverty. The other measures—namely, abolition of intermediaries and a ceiling on landholdings—did not have a significant effect on agricultural productivity. Abolition of intermediaries had a negative and significant effect on poverty, but the effect of a ceiling on landholdings was insignificant. From this, the authors conclude that land reforms did not have much effect on the distribution of land and seem to have operated mainly through altering the contractual relations in agriculture.

Using the alternative IACD yield measure, we find that the results of these disaggregated components of land reform change rather significantly. In columns (2) and (4) of Table 1(a) we present these results with the yield measure that Besley and Burgess use and with the alternative IACD measure, respectively. Using the alternative yield measure we see that the impact of tenancy reform is positive, although insignificant. In contrast, Besley and Burgess found the effect of tenancy reform to be negative and significant.

Additionally, we also find the effects of land-ceiling and land-consolidation legislations to be negative and significant⁹ for the alternative IACD yield measure, in contrast to Besley and Burgess. Controlling for other policy variables does not change the results much for either measure of productivity, as is evident from columns (2) and (4) in Table 1(b).

The observed insignificant average impact of tenancy reform on productivity in our analysis could be due to several reasons. First, it could be that tenancy laws were not rigorously implemented in most states. Second, it could be due to the fact that the positive direct effects on tenant incentives are cancelled out by the negative indirect effects on the rural land-lease market that may reduce tenancy share. To investigate further this line of argument, we examine the evidence in section III(ii) from West Bengal, a state where the tenancy reform laws were rigorously implemented. We also look at the effect of tenancy laws and also the other components of land reform on the distribution of land later in section III(iii).

The negative and significant effect of land-ceiling legislation on productivity is likely to be capturing the effect of fragmentation of holdings that we discussed in the previous section. Indeed, in the case of Kerala, which has been among the leading states in implementing land reforms in India, it is generally acknowledged that land reform led to extreme fragmentation of land and made agriculture a low-profit venture in the state (see, for example, Krishnakumar, 2004).

⁷ The states that are dropped include Assam, Jammu and Kashmir, and Kerala.

⁸ We also report in the last two columns of Table 1(a) the results obtained when we used data on rice yields from the MoA, Government of India, for the purpose of comparison with Banerjee *et al.* (2002): see section III(ii).

⁹ The reason the coefficients in column (3) are very close but not exactly identical to those reported in Besley and Burgess (2002, Table 4) seems due to some missing values in our version of the Besley–Burgess estimation.

(ii) Using within-state variation of land-reform implementation: the case of West Bengal

The previous study takes land-reform legislation as the measure of land reform, and not its implementation. Given the widely acknowledged gap between the two, one concern is that, as discussed in the previous section, a poorly implemented tenancy reform may have a net negative effect on productivity by freezing up the land-lease market, even though it might improve the productivity as well as the income of some tenants. In fact, a study by Banerjee *et al.* (2002) that focuses on West Bengal, a state where tenancy reforms were implemented very thoroughly, yields very different conclusions: tenancy reforms improved agricultural productivity. Within a year of being elected in 1977, the left-wing administration launched Operation Barga, a programme designed to implement and enforce the long-dormant agricultural tenancy laws that regulated rents and security of tenure of sharecroppers. Under these laws, if tenants registered with the Department of Land Revenue, they would be entitled to permanent and inheritable tenure on the land they sharecropped, as long as they paid the landlord at least 25 per cent of output as rent. In the decade following the launch of Operation Barga, there was a significant improvement in the terms of tenants' contracts and more secure tenure.

The authors use two different approaches to estimate the effect of this reform on agricultural productivity. Their first approach is to compare the growth in productivity in West Bengal districts with that in the districts in the neighbouring country of Bangladesh. Except for religion and political boundaries, the two regions are very similar in most respects. These include agro-climatic conditions, prevalence of tenancy, and agricultural technology, and so we can expect technological shocks to agricultural yields to be similar between these two regions. Indeed, during this period agricultural productivity in both regions (and much of eastern India) grew, in part owing to the belated arrival of the Green Revolution permitted by the spread of a locally suited high-yield variety (HYV) of rice, a fall in the price of fertilizers, and an increase in small-scale private irrigation. However, the authors find that even though the rate of adoption of HYV rice was faster in Bangladesh than in West Bengal, the rate of growth in rice productivity was higher in West Bengal. They attribute this difference to the implementation of tenancy reform. There are two concerns with this approach. First, there are some concerns that the data-collection method concerning agricultural production underwent some changes under the new administration that could have inflated West Bengal's growth performance relative to Bangladesh. Also, during this period a number of other policy reforms were undertaken in West Bengal, such as decentralization of certain public programmes, and this approach could be picking up the effects of these other policies.

The second approach uses the fact that this reform was implemented in different districts of West Bengal at different rates, owing to bureaucratic frictions. The authors use inter-district variations in the rate of implementation of this programme (captured by the fraction of sharecroppers who were registered under this programme) as exogenous changes in the availability of a new contractual regime. That is, districts that received the programme earlier are the 'treatment' districts and the districts that received it later are the 'control' districts. The resulting changes in productivity are attributed to the reform, after controlling for a number of other policy and economic variables that also changed during the period when the programme was implemented. Since this approach studies *inter-district variation* in agricultural productivity, it is not likely to be affected by concerns about any possible upward bias in the *level* of agricultural productivity owing to changes in the data-collection methods. Also, since it looks at variation in the intensity of implementation of tenancy reform, it is

less likely to pick up the effect of other programmes. This approach yields similar results regarding the effect of tenancy reform on agricultural productivity as the previous one, suggesting that tenancy reform did have a positive effect on agricultural productivity.

To sum up, it seems likely from the above studies that tenancy reform had a direct positive effect on tenants who were directly affected by it, but the indirect effects of this reform on the rural land market and, in turn, on productivity are less clear.

(iii) Uniqueness of the West Bengal experience and evidence of inter-state heterogeneity

We now examine how different the experience of West Bengal was in the cross-state analysis of Besley and Burgess. For the sake of comparability with the Banerjee *et al.* (2002) study, we re-ran the Besley–Burgess regressions with rice yield measures obtained from the MoA, Government of India. In Table 1(a), columns (5) and (6) present the results without controls, and in Table 1(b), the corresponding columns present the results with the controls. The aggregate measure of land reform continues to have a negative and significant effect. For the individual components of land reform, the results are very similar to those obtained for the alternative measure of agricultural productivity: namely, tenancy reform has a positive but insignificant effect, but land-ceiling legislation has a negative and significant effect.

To disentangle the experience of West Bengal in this analysis, we then ran the Besley–Burgess regressions allowing for an interaction between the West Bengal dummy and the cumulative land-reform dummy in order to identify the marginal effect of land reform in West Bengal. In columns (1), (2), and (3) of Table 2, we present the results with the agricultural yield measure that Besley and Burgess use, the alternative IACD yield measure, and rice yield. We find that for both the yield measure used by Besley and Burgess and the rice yield measure, the marginal effect of land reform in West Bengal was significantly different from that in the rest of India in a positive direction. For the alternative IACD yield measure, the marginal effect is positive but insignificant. The average effect of land reform for West Bengal is positive and insignificant using the Besley and Burgess yield measure and the rice yield measure, and negative and insignificant using the alternative IACD yield measure.

To sum up, we find that in India, on average, land-reform legislation had a negative and significant effect on agricultural productivity. This appears not to be the case for West Bengal. The reason for this is likely to be a combination of two factors. First, during the period under study, tenancy reform and not land-ceiling legislation was the key source of variation of the land-reform measure in the case of West Bengal relative to other states (see Besley and Burgess, 2002, Table 1). Second, tenancy laws were implemented thoroughly in West Bengal, thereby bypassing the potentially negative effects that could arise due to efforts to evade the law.¹⁰

Our analysis therefore suggests that states that saw rigorous and effective implementation of reform(s) performed better than their poorly implementing counterparts, but this heterogeneity of experience might be lost when the impact is analysed at the aggregate level. Indeed, this comes out clearly if we allow state-specific slopes for all the states, as we do in Table 3.

¹⁰ We also ran the robustness checks for the West Bengal experience, using the same policy controls as in Table 1(b), and the results are similar.

Table 2: Effect of aggregate land reform in West Bengal compared to the rest of India

Dependent variable	Log of agricultural yield (from Besley and Burgess, 2000) (1)	Log of agricultural yield (using IACD data) (2)	Log of rice yield (using new data) (3)
Model	GLS AR(1)	GLS AR(1)	GLS AR(1)
4-year lagged cumulative land reform legislation (West Bengal)* (4-year lagged cumulative land reform legislation)	-0.028*** (0.005)	-0.027*** (0.009)	-0.026*** (0.006)
	0.03* (0.005)	0.011 (0.011)	0.02*** (0.008)
State fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Number of observations	495	402	512

Notes: Standard errors are in parentheses. *Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

In column (1) we use the productivity measure of Besley and Burgess, and in columns (2) and (3) we use our alternative IACD and rice productivity measures, respectively. In all three columns we see considerable heterogeneity: eight out of a total of 16 states in columns (1) and (3) and four out of the 13 states in column (2) experienced significant effects (at the 1–10 per cent level) of cumulative aggregate land reform. In column (1), six of these states had a negative effect and two of them had a positive effect. In column (2), three had a negative effect and one had a positive effect. In column (3), five of them had a negative and three had a positive effect. This highlights the importance of the data used in these different estimations: the Besley–Burgess estimation uses state agricultural product to calculate yield data and, hence, it comes as no surprise that Gujarat turns out a positive and significant coefficient for the impact of land reforms on productivity—most likely, this is picking up the effect of the highly successful dairy farming for which Gujarat is famous. On the other hand, for both estimations using the alternative productivity measures, Gujarat shows an insignificant impact.¹¹

However, it remains difficult to infer from this dataset what drives this heterogeneity, and differences in implementation could be one of several possible mechanisms at work.

To sum up, the above analysis provides suggestive but far from conclusive evidence that effective implementation is likely to be a key determinant of the *nature* of the effect of land reform on productivity, and is responsible for introducing considerable heterogeneity across states on this count. However, both the studies discussed above are based on aggregate data (state or district level) and cannot distinguish between the direct and indirect effects of land reform. Only micro-level studies can throw more light on this question.

In this respect, the recent study by Bardhan and Mookherjee (2007) is noteworthy. They use village-level (as opposed to district-level) data in West Bengal, and follow a methodology similar to that used by Banerjee *et al.* (2002). They continue to find significant impact of tenancy registration on rice yields—the effects are somewhat smaller, but of the same order of magnitude. They, however, argue that the estimated positive impact of tenancy registration

¹¹ We also ran the robustness checks in this case, using the same policy controls as in Table 1(b), and the results are similar.

Table 3: Different state-specific slopes regarding the effect of aggregate land reform on yield^a

Dependent variable	Log of agricultural yield (from Besley and Burgess, 2000) (1)	Log of agricultural yield (using IACD data) (2)	Log of rice yield (using MoA data) (3)
Model	GLS AR(1)	GLS AR(1)	GLS AR(1)
(Andhra Pradesh)*(4-year lagged cumulative land reform legislation)	0.021 (0.043)	0.053 (0.047)	0.096* (0.054)
(Assam)*(4-year lagged cumulative land reform legislation)	-0.077*** (0.018)	(dropped)	-0.090*** (0.025)
(Bihar)*(4-year lagged cumulative land reform legislation)	0.018 (0.014)	-0.075*** (0.017)	-0.056*** (0.016)
(Gujarat)*(4-year lagged cumulative land reform legislation)	0.053** (0.026)	0.043 (0.048)	0.024 (0.036)
(Jammu and Kashmir)*(4-year lagged cumulative land reform legislation)	0.044 (0.040)	(dropped)	0.084 (0.066)
(Karnataka)*(4-year lagged cumulative land reform legislation)	-0.031** (0.015)	-0.025 (0.034)	-0.024 (0.021)
(Kerala)*(4-year lagged cumulative land reform legislation)	-0.028*** (0.007)	(dropped)	-0.024*** (0.006)
(Madhya Pradesh)*(4-year lagged cumulative land reform legislation)	-0.052** (0.024)	-0.054* (0.031)	-0.070* (0.038)
(Maharashtra)*(4-year lagged cumulative land reform legislation)	-0.037 (0.062)	-0.015 (0.070)	-0.112 (0.070)
(Orissa)*(4-year lagged cumulative land reform legislation)	-0.019* (0.010)	-0.041*** (0.010)	-0.026** (0.011)
(Punjab)*(4-year lagged cumulative land reform legislation)	0.103*** (0.035)	0.167*** (0.059)	0.336*** (0.090)
(Rajasthan)*(4-year lagged cumulative land reform legislation)	-0.086 (0.078)	-0.169 (0.206)	-0.227 (0.238)
(Tamil Nadu)*(4-year lagged cumulative land reform legislation)	-0.049*** (0.007)	0.000 (0.010)	0.010 (0.012)
(Uttar Pradesh)*(4-year lagged cumulative land reform legislation)	-0.013 (0.012)	0.021 (0.018)	0.079*** (0.028)
(West Bengal)*(4-year lagged cumulative land reform legislation)	0.004 (0.004)	-0.012 (0.009)	-0.003 (0.007)
State fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Number of observations	495	402	512

Note: Standard errors are in parentheses.*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level. ^a Haryana's interaction with land reform dummy is dropped as there was no legislation in this respect.

in West Bengal on yields is actually a part of broader village-wide general equilibrium effects of local governance implementing various agrarian reforms (including land reforms), rather than partial equilibrium effects of tenancy reforms alone, following improved effort or investment incentives of farmers directly affected by them. For example, these could affect the prices of complementary inputs, such as credit or fertilizer, or could affect the

balance of political power and consequently how collective-action problems are resolved.¹² However, they cannot empirically identify the channel given the data. This clearly highlights an important area of future research.

(iv) Effect of tenancy reform on the distribution of land

As noted above, tenancy reforms may have indirect effects in the form of reduced tenancy shares if poorly implemented. In a recent contribution, Conning and Robinson (2007) show that, despite having been designed to protect tenant rights, tenancy reforms that guaranteed security of tenure and stipulated rent actually ended up reducing the extent of reported tenancy in India.¹³ Such a decline in the share of cultivated land under tenancy can come about in several ways. The first is under-reporting. The second is anticipatory eviction: in anticipation of the new tenancy legislation, landlords can evict tenants and cultivate the land using hired labour, or sell it off to a third party. Third, they can sell off the land to the erstwhile tenants. For the first case there ought to be no change in land ownership or operation. In the second case, concentration of ownership may stay the same if the owner does not sell the land (or go up or down if he sells it, depending on whether the buyer is richer than him or not). However, concentration of operational holdings will certainly go up in this case. In the third case, concentration of ownership will go down and that of operational holdings will stay the same.

We use the following regression equation to find out empirically what happened to the concentration of land ownership and operational holdings following land reform in India:

$$z_{st} = \alpha_s + \beta_t + \eta l_{st-4} + \varepsilon_{st} \quad (2)$$

where z is land Gini (pertaining to ownership holdings and operational holdings), α_s is a state fixed effect, β_t is a year dummy variable, l_{st-4} is the cumulative stock of past land reforms lagged by 4 years, and ε_{st} is the error term. We use fixed-effects panel regression and η , which embodies the effect of land reform on the land Gini coefficient, is our coefficient of interest. In this entire analysis, we exclude households that do not own or operate any land.

The data used in this section are obtained from various rounds of the National Sample Survey (NSS) Reports, which are collated efficiently in Sharma (1994). In keeping with our analysis in the previous section, we restrict our sample to begin from 1961, and use data for 1961, 1971, and 1982. Unfortunately, Sharma only reports data till 1982, and hence our sample set only covers the period 1961–82 instead of 1961–92 as in the previous section.

The results of this regression are presented in Table 4. Columns (1) and (2) present the regression results for all 15 major Indian states except Haryana.¹⁴ We find no significant impact of tenancy reform on either type of Gini coefficient, and even in magnitude, the coefficients are very small indeed.

Since West Bengal is one of the few states that implemented tenancy laws rigorously, we re-estimated equation (2) excluding West Bengal.¹⁵ From columns (3) and (4), we

¹² See Bardhan *et al.* (2007) for a formal analysis of the latter effect.

¹³ For the relevant regression results, see Conning and Robinson (2007, p. 440, Table 4, column 3).

¹⁴ Haryana is dropped owing to missing observations.

¹⁵ Owing to the very small sample, we do not use the more standard method of interacting the reform dummies with the state dummies to capture the state-wise effects.

Table 4: Effect of tenancy reform on land Gini coefficient and share of area cultivated as evidence in favour of eviction

Dependent variable	All states		All states excluding West Bengal	
	Gini coefficient (ownership)	Gini coefficient (operational)	Gini coefficient (ownership)	Gini coefficient (operational)
	(1)	(2)	(3)	(4)
Model	Fixed effects	Fixed effects	Fixed effects	Fixed effects
4-year lagged cumulative tenancy reform legislation	0.003 (0.003)	0.010 (0.0072)	0.002 (0.0035)	0.011** (0.0051)
4-year lagged cumulative abolition of intermediaries	-0.016 (0.01)	-0.026 (0.0199)	-0.016 (0.0096)	-0.025 (0.0205)
4-year lagged cumulative land ceiling legislation	-0.003 (0.01)	-0.039* (0.0222)	-0.001 (0.011)	-0.039* (0.0225)
4-year lagged cumulative land consolidation legislation	-0.010 (0.008)	-0.005 (0.0182)	-0.013 (0.0167)	0.000 (0.0369)
State effects	yes	yes	yes	yes
Year effects	yes	yes	yes	yes
No. of observations	45	45	42	42
R ²	0.9545	0.781	0.9551	0.7746
Adjusted R ²	0.9165	0.5985	0.9164	0.58

Note: Standard errors are in parentheses. *Significant at the 10% level; **significant at the 5% level; *** significant at the 1% level.

see that tenancy reform had no significant effect on Gini coefficient for ownership land but significantly increased the Gini coefficient for operational land. This suggests that, in anticipation of the new tenancy legislation, landlords could be engaging in eviction of tenants in states other than West Bengal where tenancy reform had been poorly implemented.

(v) Determinants of land reform

So far we have discussed the effects of land reform. Now we turn to the question of what determines its success and 'effective implementation'.

Besley and Burgess (2000) find that political factors had a significant effect. In particular, Congress administrations had a negative effect on the passing of land-reform legislation, especially tenancy reform. In contrast, left-wing administrations had a significant positive effect. Besley and Burgess use these political variables as instruments for their land-reform measure to address the concern that land reform is endogenous and could be driven by factors that also affect the dependent variables of interest.

Conning and Robinson (2007) pursue further the investigation of determinants of land reform and find that, after controlling for other variables including state and year effects, the likelihood of reforms increases when land inequality is higher and where peasants have greater political power. Bardhan and Mookherjee (2005) study village-level data from West

Bengal and find an inverse U-shaped relationship between the left wing's share of seats in village local governments (*panchayats*) and land-reform implementation.

To sum up, land reform is clearly driven by political factors. One important ingredient is the strength of left-wing parties in the state. We can think of the support for left-wing parties as 'demand' for land reform. The 'supply' of land reform seems to depend on the electoral success of left-wing parties, as well as how tight the electoral competition is. West Bengal, perhaps, provides an example where all these factors came together to ensure proper implementation of land reform.

IV. Conclusion

In this article we have reviewed the economic arguments in favour of land reform and showed that they are based on frictions in the allocation of land. These frictions could either be due to agency costs or imperfect property rights. We then evaluated the evidence on land reforms in India, which suggests considerable heterogeneity in their effect on productivity across states, for which difference in intensity of implementation might be a possible reason. We also provide evidence that tenancy reform has actually increased inequality in operational land holdings in India. Most of the existing work uses aggregative data from which it is hard to understand the microeconomic mechanism through which land reform affects agricultural productivity. In particular, future work should focus on disentangling the direct from the indirect effects of land reform, ideally with more micro-level data.

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