

The Regulation of Land Markets: Evidence from Tenancy Reform in India*

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Abstract

While the regulation of tenancy arrangements is widespread in the developing world, evidence on how such regulation influences the long-run allocation of land and labor remains limited. To provide such evidence, this paper exploits quasi-random assignment of linguistically similar areas to different South Indian states and historical variation in landownership across social groups. Roughly thirty years after the bulk of tenancy reform occurred, areas that witnessed greater regulation of tenancy have lower land inequality and higher wages and agricultural labor supply. We argue that stricter regulations reduced the rents landowners can extract from tenants and thus increased land sales to relatively richer and more productive middle caste tenants; this is reflected in aggregate productivity gains. At the same time, tenancy regulations reduced landowner willingness to rent, adversely impacting low caste households who lacked access to credit markets. These groups experience greater landlessness, and are more likely to work as agricultural labor.

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1 Introduction

The institutional arrangements that shape access to land are central to the functioning of an agricultural economy. Moreover, since a large fraction of the world's poor remain dependent on agriculture, production relations in this sector potentially have a first-order impact on aggregate poverty.¹ Accordingly, it is not surprising that policymakers all over the world have frequently intervened to regulate the terms on which land can be transacted. However, in large part due to data constraints, little is known about the long-run impact of regulated land markets.

Improving the efficiency of resource allocation is a central theme in economic development (Ray 1998). In the case of land, institutions introduced (or strengthened) by colonial powers frequently led to a significant concentration of land ownership and significant elite capture of policy-making. In conjunction with imperfections in other key markets (e.g., the market for credit), these inequalities continue to constrain long run economic growth and, in particular, the transfer of land towards high return activities (Acemoglu, Johnson & Robinson 2001, Binswanger, Deininger & Feder 1995, Banerjee & Iyer 2005, Pande & Udry 2006).² for an overview of the importance of credit market imperfections in development. As increasing demand for land from the industrial sector has clashed with often inefficient inherited institutions in many countries, most notably India and China, intense debates have emerged around whether and how governments should regulate the terms on which land can be acquired from landowners and tenants (Ghatak & Mookherjee 2011).

These debates are not new. Given the potential mismatch between relatively stagnant institutions and rapidly evolving demand, government regulation of land transactions is, unsurprisingly, common. In most cases, land reform, when implemented, is partial: agricultural tenants or others that work land receive incomplete property rights (Lipton 2009). In a second-best world, however, there is no guarantee that such regulation produces gains for all groups even if there is greater overall efficiency.³

Examining the long-run impact of existing land reform policies in specific contexts can thus provide important insights on the potential welfare implications of policies that seek to promote efficient land use. In this spirit, this paper studies the long-run impact of tenancy reforms in India which, following Independence, witnessed a wave of state-level reforms (Appu 1996). The major period of reform in the four Southern Indian states examined here (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) began shortly after Independence and continued until the early 1970s. We exploit village-level and household data to trace the impact of reforms which took place more than thirty years prior to our survey, allowing us to examine a number of dimensions in which we could expect tenancy reform to have a long-run impact.

Theoretically, landlords can choose between different ways of exploiting their land to generate a return, including selling land and investing in other assets. The attractiveness of operating

¹There is a classic view, formalized in Matsuyama (1992) which argues that productivity improvements in agriculture are a spur to industrial development since they increase the demand for industrial goods.

²See, for example, Banerjee (2003)

³The complexity of designing partial reform in a second-best world is a long-standing theme in the development literature – see, for example, Stiglitz (1988) for a discussion.

land when tenants have stronger user rights depends on the extent to which landlords can extract returns from doing so, while the ability to sell land depends on the capital market opportunities of potential owner-cultivators. Tenancy reforms make renting out land less attractive to landlords. We, therefore, expect less use of tenancy and more land sales, particularly to those with superior credit market opportunities. This will lead, in turn, to a change in the distribution of land ownership. If frictions in the land market allow landowners to extract only part of the surplus created in a land sale, sales will occur only to relatively high productivity individuals. Thus, by leading to more efficient land use, land sales will increase labor demand and hence the agricultural wage.

Tracing through these equilibrium effects complicates the overall welfare impact. Those cultivators who remain as tenants will gain, but marginal tenants will lose out as they become landless laborers. However, their opportunities in the labor market should improve. Households with better capital market opportunities are more likely to end up as owner-cultivators. These are the predictions that we bring to the data.

The paper exploits two sources of variation to identify the impact of tenancy reform. First, we exploit a natural experiment arising out of the 1956 reorganization of state boundaries in southern India which was designed to transform the often illogical state units inherited from the British into linguistically coherent states. During this reorganization, regions of similar linguistic and cultural characteristics were divided by newly drawn state borders, and the districts thus created were assigned to different states. These districts, analogous both in historical experience and social structure, subsequently experienced significantly different programs of land reform. We choose a set of subdistricts or blocks within each pair of bordering districts that are matched on linguistic characteristics. The key identifying assumption is that the assignment of different blocks to different states along the border is quasi-random, i.e., the drawing of the border was not dictated by any political or economic criteria. If this assumption holds, estimating the impact of land reform within these block pairs allows for an unbiased estimate of the impact of land reform on economic outcomes.⁴

Second, we examine whether the impact of tenancy reform varies with households' (likely) land ownership status prior to the reform. Here, we exploit the fact that, on average, a household's caste is a historical predictor of its land ownership status. This view is argued, for example, by Shah (2004) and we provide evidence to support it in Section 4.2). At independence, India's land ownership structure largely mirrored the hierarchical social structure defined by the Hindu caste system. The large landowners typically came from the upper castes. The middle and lower castes were peasants who typically worked as tenants on reasonable sized plots (often grouped as Other Backward Castes (OBCs)) while the lowest castes and tribal households (grouped as Scheduled Castes and Tribes (SC/ST)) were agricultural laborers or sharecroppers with weak tenancy rights.

Our results show that tenancy reform did reduce land inequality within villages, predominantly by transferring land from upper caste landowners to middle caste tenants. However, in

⁴These outcomes were measured in a survey designed by the authors and implemented in 2002.

line with the theory, tenancy reform also increased the number of landless SC/ST households, a group that is likely to have had poorer access to credit. Thus increased equity was achieved primarily via the transfer of land from the upper to the middle castes.

Consistent with our model, we find that this reallocation of landholdings led to a higher agricultural wage after tenancy reform. However, this was not sufficient to counterbalance the negative effects of increased landlessness for scheduled caste households, on average the poorest groups in these rural communities. We estimate that the net impact of tenancy reform on the welfare of the SC/ST group as measured by assets owned to be negative. This serves as a reminder of the difficulty of implementing well-intentioned reform in a second-best environment where a Pareto improvement is unlikely even if there are output gains.

Our findings offer an insight into the distributional effects that are central to discussions of the political economy of reform by providing micro-evidence on how partial land reform differentially creates winners and losers. Recent studies of the political economy of land reform highlight the conflicts of interest generated by these differential effects. For example, Bardhan & Mookherjee (2010) evaluate the political determinants of land reform at the local level in West Bengal and find evidence that the intensity of political competition (rather than party ideology) appears to be the primary relevant causal factor. This suggests that land reform is primarily driven by parties' incentives to win votes from its potential beneficiaries. Similarly, for Mexico, de Janvry, Gonzalez-Navarro & Sadoulet (2011) argue that the left-wing party favored partial land reform over full land reform as it helped maintain a sufficiently large voter base of relatively poor voters. Further evidence from India analyzed by Anderson, Francois & Kotwal (2011) suggests that high-caste landowners exploit their tenancy relationships to sustain their political power by maintaining clientelistic vote trading networks with their workers.

By documenting the pattern of gainers and losers, our study provides some evidence that is helpful in studying these political economy issues. Whether voters are able to accurately evaluate the general equilibrium responses to policy reform could potentially have a significant impact on their political support of such reforms.

This paper is organized as follows: Section 2 provides background on the natural experiment, the history of land reform in southern India and the data employed. Section 3 lays out a theoretical framework which we use to generate predictions about tenancy reform which we take to the data. Section 4 introduces the data and discusses the empirical strategy. Section 5 provides the empirical results and Section 6 concludes.

2 Background

In this section we provide three types of background information relevant for our analysis. First, we describe the state reorganization that we exploit to create our natural experiment. Second, we outline the tenancy reforms that we will analyze. Third, we consider existing evidence on the effects of tenancy reform.

2.1 State Reorganization in India

At the founding of India in 1949, its administrative structure reflected the history of expansion of the British East India Company and subsequently the British colonial government over the subcontinent. Southern India was comprised of five states.⁵

In the post-independence period, a movement grew to redraw state borders along linguistic lines in order to create more coherent linguistically unified states. Based on the recommendations of a national commission, South India was divided into four linguistically unified states in 1956: Andhra Pradesh (AP), a largely Telugu-speaking state, was created from Hyderabad and the Telugu-majority areas of the Madras presidency. Karnataka (KA), intended to be predominantly Kannada-speaking, was created by the merger of Mysore and Kannada-speaking areas of Hyderabad and the Madras and Bombay presidencies. Kerala (KE), predominantly Malayalam-speaking, composed the princely states of Travancore and Cochin and parts of the Madras presidency. Tamil-majority areas of the Madras presidency constituted the new state of Tamil Nadu (TN). Districts were assigned to states mainly on the basis of the majority language spoken, but also in order to fairly assign valuable cities and ports, reasoning that was explained in great detail in the report produced by the commission (Manager of Publications 1955). Figure 1 shows the borders of the new south Indian states overlaid on the previous state borders.

The state reorganization commission largely kept the sub-state administrative units of districts and blocks (the unit under districts) unchanged. It identified configurations of linguistically similar and geographically contiguous districts that would form a state. In some cases blocks were reassigned across districts. Inevitably, on the borders of the new states, there were a number of cases in which two blocks with similar climate, geography and linguistic composition were separated into different states. Moreover, a number of these block pairs were previously part of the same state and possessed a shared political and administrative history. Our identification strategy exploits the presence of such block pairs, under the assumption that shared history and linguistic or caste structure renders one block within the pair an appropriate control group for the other.

2.2 Tenancy Reform in India

The Indian constitution decreed that land policy was a state subject, and soon after independence states began enacting land reforms. The bulk of state-level land reform was concentrated between 1950 and 1972. They included three main initiatives – abolition of intermediaries, tenancy reform and land ceilings. In Appendix Table 1 we list the tenancy reforms undertaken by states in our sample, based on Besley & Burgess (2000).

From an institutional perspective, there are several reasons to focus on tenancy reform.

⁵Hyderabad and Mysore had been princely states under British rule, governed by local rulers with indirect colonial control via a British resident. Hyderabad had originated as the territory of a Mughal governor who established control over part of the empire's territory in the Deccan plateau. Mysore emerged out of the defeat of the kingdom of Tipu Sultan in the early 19th century. Travancore and Cochin were progressive princely states located on the southwest coast. The remainder of south India was directly ruled under the Madras presidency, with its capital in Madras.

First, the British land management system had made tenancy ubiquitous across India, with the typical tenancy arrangement oral and terminable at will. Thus, in practice it appears that the most effective land reform measures in India were not directly redistributive measures, but tenancy reforms that affect the relations between the landlord and the tenant or, in some cases, render tenancy illegal (Eashvaraiah 1985, Herring 1991).

Second, the design of tenancy laws implied that their impact would vary with a household's initial tenurial security and access to credit. In almost every state, tenancy laws granted landowners rights of resumption for "personal cultivation." Tenants who remained on non-resumable tenanted land were eligible for ownership rights. In setting the land price, states either directly established a price or on occasion subsidized the market price. These laws also typically restricted the creation of future tenancies. Of our four sample states, Kerala prohibited tenancy while Karnataka and part of Andhra only allowed it in limited cases. Tamil Nadu and the Andhra area of Andhra Pradesh placed no restrictions on future tenancy. However, even in the last case provisions on maximum rent and tenants' rights to purchase land disincentivized tenancy arrangements (Appu 1996).

2.3 Existing Evidence

There is now a sizeable literature on the effects of land reform in general and tenancy reform in particular. Traditional macro accounts of development have often emphasized the appropriate organization of the agricultural sector as a precondition for development. To that end, Rodrik (1995) argues that land reform in Taiwan and Korea were important in creating the preconditions for their development paths.

There is a large literature on land reform in India, with much of the case-study literature referenced in Besley & Burgess (2000). Village-level studies have tended to offer a mixed assessment of the poverty impact of different land reforms in general and tenancy reforms in particular. However, a number of quantitative studies in India produce more promising findings. For example, Banerjee, Gertler & Ghatak (2002) combine theory and data to study Operation Barga, a program which encouraged tenancy registration in West Bengal. They find that this program of tenancy reform lead to significant increases in agricultural productivity. A subsequent paper on land reform in West Bengal found that while the direct effect of land reform was inequality-reducing, this effect is insignificant relative to the inequality-increasing effect of household division, migration and land market transactions (Bardhan, Luca, Mookherjee & Pino 2011).

There is also a broader literature that uses variation in land reform across different regions of India to estimate its effect. Using cross-state evidence, Besley & Burgess (2000) find significant correlations between land reform and poverty reduction. Conning & Robinson (2007) focus on the heterogeneous effects of land reform due to the underlying structure of production relations. They combine theory and evidence at the state level for India, postulating a model that predicts a decline in tenancy rates and presenting evidence that tenancy rates did fall as a result of land reform. Ghatak & Roy (2007) use cross-state evidence and find land reform had no impact on

land inequality as measured by the Gini coefficient and a negative impact on productivity, but argue there is considerable heterogeneity among states.

There is also widespread evidence that, as we argue here, capital market imperfections play an important role in determining the structure of land markets and the impact of policy reforms on that structure. A basic empirical regularity indicative of the prevalence of these imperfections is the persistence of large land plots despite the well-documented negative land size-productivity relationship (Ray 1998). This suggests that capital market frictions prevent landowners from extracting the full surplus from the sale of their land and thus inhibit sales that would otherwise be optimal. Other evidence supporting this hypothesis includes the fact that the average land sale is a distress sale, thus creating a market for lemons problem that inhibits efficient sales (Rosenzweig & Binswanger 1993). Finally, the land sale price often excludes the collateral value of land as buyers may have to mortgage land in order to purchase it (Binswanger, Deininger & Feder 1993, Deininger & Binswanger 1999). This leads potential buyers to undervalue the land, rendering the land market even thinner.

3 Conceptual Framework

We develop a model which motivates our empirical specification. As argued above, the tenancy reforms can best be conceptualized as strengthening the rights of tenants. To capture the impact of this in theory, we develop a model which features landowners lacking skill to farm land directly and thus choosing whether to sell or rent their land. We consider the impact of a reform which allows tenants to capture a larger fraction of the surplus generated by land. While this makes tenants better off, landowners may choose to sell more land and this can have an effect on patterns of land ownership, labor demand and wages.

3.1 Basics

There are three groups comprising a population: a measure π of landlords who owns all of the land and two groups of potential cultivators. The landlords own a measure $L < 1$ of land which we assume cannot be farmed directly, and land ownership is uniform among the landlord class. The technology matches one unit of land to one cultivator. We normalize the size of the group of cultivators to one.

The first group of cultivators, a fraction γ , have access to the capital market or some other form of wealth so that they can offer to buy land. In our data, this group will mainly comprise OBC households, but it could include some SC/ST households. The second group of cultivators, a fraction of $(1 - \gamma)$, cannot buy land but can be taken on as tenants.

Whether as a tenant or an owner, a cultivator can employ labor on the land to generate output:

$$\theta \frac{1}{\eta} \ell^\eta$$

where $\eta < 1$ and $\theta \in [\underline{\theta}, \bar{\theta}]$ is an idiosyncratic productivity parameter which can be thought of

as a cultivator's ability or access to relevant human capital. For simplicity, we assume that the distribution of ability is the same in each farmer group and denote this by $G(\theta)$.

Labor can be hired in a competitive labor market at a wage of w . It is supplied by cultivators who are neither tenants nor owners; there is always such a group since we have assumed that $L < 1$.

Let:

$$\pi(\theta, w) = \arg \max_{\ell} \left\{ \theta \frac{1}{\eta} \ell^\eta - w\ell \right\} = \frac{1}{\eta} \theta^{\frac{1}{1-\eta}} w^{-\frac{\eta}{1-\eta}}.$$

be the surplus generated by the land. Note that labor demand for a type θ cultivator is $(w/\theta)^{-\frac{1}{1-\eta}}$.

The model has two frictions which are reasonable for the developing agricultural economy that we are studying. While these could be given micro-foundations, the added complication is not worth this investment given our interest here.⁶ First, we suppose that a landlord can earn a share α of the surplus generated by a tenant. Think of this as capturing the relative bargaining power of landlords and tenants.⁷ Second, capital markets are imperfect, making it feasible for purchasers of land to pay only a fraction β of the surplus created by the land if they buy it.⁸ A key ratio in the model is α/β , denoting the relative ability of landlords to extract surplus from tenants versus owner-cultivators. We work throughout with the case where $\alpha/\beta > 1$.⁹ This is the case where capital market imperfections are in an appropriate sense more extreme than rental market imperfections from a landlord point of view. But, all else equal, those who can access capital to buy land would be better off by doing so.

3.2 Equilibrium

We are interested in two equilibrium decisions. First, the landlord decides how to divide his land between parcels to sell and parcels to rent out. Second, the labor market equilibrium determines the wage given this decision.

The landlord will decide how much land to rent out and how much to sell based on the ability of the farmer. Define from

$$\hat{\theta}(x) = \left(\frac{\alpha}{\beta} \right)^{\frac{1}{1-\eta}} x \equiv \phi x$$

⁶The main convenience lies in the way that we are separating efficiency and distribution. We are supposing that the same agricultural surplus is created by both tenants and owner-cultivators. Institutions affect only how it is distributed. In a classic tenancy model, there is a trade-off between rent extraction and efficiency under tenancy.

⁷In a Nash bargaining solution, α corresponds precisely to the share of the surplus that the tenant can earn in the event of disagreement.

⁸The parameter β corresponds exactly to the fraction of the surplus that can be credibly pledged to landlords and/or suppliers of credit.

⁹There is no reason to believe that this is always the case. In the current set-up, it generates the prediction below that wages increase when α/β falls. More generally, we would expect contracts to have efficiency effects on production with owner-cultivate land being more efficiently operated because owners become residual claimants. This would tend to reinforce the effects here and could be more modeled albeit at the price of introducing greater complexity.

as the level of productivity that makes a landlord indifferent between selling and renting to a tenant of productivity level x .¹⁰ Our assumption that $\alpha/\beta > 1$, implies that $\phi > 1$ so that $\hat{\theta}(x) > x$. This implies that the marginal cultivator who buys land will be more productive than the marginal tenant. This is because capital market imperfections make surplus extraction from selling more difficult than from renting.

The landlord will sell some land and rent some land. Since he is assumed to be unable to directly farm any land, the least productive tenant who farms land, x , is defined from:

$$L = [1 - G(\phi x)]\gamma + (1 - \gamma)[1 - G(x)]. \quad (1)$$

The first expression here is the land that is sold while the second is land that is rented. All the most productive cultivators farm land and the least productive are labourers. Note that:

$$\frac{\partial x}{\partial \phi} = -\frac{g(\phi x)x\gamma}{[\gamma g(\phi x)\phi + (1 - \gamma)g(x)]} < 0. \quad (2)$$

Observe also using (2) that $\partial(\phi x)/\partial\phi > 0$. This says that the more that can be extracted from tenants relative to sellers, the lower the productivity of the marginal tenant that is given land. The productivity gap between the marginal tenant and marginal owner cultivator also increases. This is because there is a switch towards tenants and away from selling the land.

The equilibrium wage solves:

$$1 - L = \gamma \int_{\phi x}^{\bar{\theta}} -\pi_w(\theta, w) dG(\theta) + (1 - \gamma) \int_x^{\bar{\theta}} -\pi_w(\theta, w) dG(\theta) \quad (3)$$

$$= w^{-\frac{1}{1-\eta}} \tilde{\theta}(\phi, x), \quad (4)$$

where $\tilde{\theta}(\phi, x) = \left[\gamma \int_{\phi x}^{\bar{\theta}} \theta^{\frac{1}{1-\eta}} dG(\theta) + (1 - \gamma) \int_x^{\bar{\theta}} \theta^{\frac{1}{1-\eta}} dG(\theta) \right]$. For future reference, observe that

$$\begin{aligned} \frac{d\tilde{\theta}(\phi, x)}{d\phi} &= \frac{\partial\tilde{\theta}(\phi, x)}{\partial\phi} + \frac{\partial\tilde{\theta}(\phi, x)}{\partial x} \cdot \frac{\partial x}{\partial\phi} \\ &= -\frac{g(\phi x)g(x)\gamma(1-\gamma)}{[\gamma g(\phi x)\phi + (1-\gamma)g(x)]} x^{\left(1+\frac{1}{1-\eta}\right)} [\phi - 1] < 0. \end{aligned} \quad (5)$$

This says that an increase in ϕ , which favors tenancy, will reduce the average productivity of land that is cultivated so long as $\phi > 1$.

An equilibrium is a pair $(x^*(\phi), w^*(\phi))$ which solves (1) and (3). To explore the effects of tenancy reform, we are interested in how these depend on ϕ .

¹⁰It is derived from

$$\beta\pi(\hat{\theta}(x), w) = \alpha\pi(x, w).$$

3.3 Tenancy Reform

We now consider what happens when there is a reform that makes tenancy less attractive. We model this as a reduction in ϕ due to α having fallen. In other words, tenancy reform makes surplus extraction from tenants relatively more difficult.

The model makes a number of predictions about the impact of this shift on landholding and wages. They can be summarized as follows.

Model Predictions: *Suppose that tenancy reform reduces ϕ . The model predicts the following equilibrium responses:*

1. *An increase in landholding among the sub-group of the population with better capital market opportunities.*
2. *A reduction in tenancy.*
3. *An increase in the agricultural wage.*

All of these effects of tenancy reform follow intuitively from the analysis above. By making tenancy less attractive, landlords sell more land to the group of cultivators who have the resources to purchase land. Since the marginal owner-cultivator is more productive (given our assumption that $\phi > 1$), this increases labor demand and hence increases the agricultural wage which clears the labor market.

The model can be used to explore the impact of tenancy reform on land inequality. A fraction

$$\beta_L(\phi) \equiv \frac{[(1-\gamma) + \gamma G(\phi x^*(\phi))]}{1 + \pi}$$

are landless among whom $\frac{(1-\gamma)[1-G(x^*(\phi))]}{1+\pi}$ are tenants. A fraction $\frac{\pi + \gamma(1-G(\phi x^*(\phi)))}{1+\pi}$ of the population owns land. This can be decomposed into a fraction of owner-cultivators:

$$\beta_C(\phi) \equiv \frac{\gamma(1 - G(\phi x^*(\phi)))}{1 + \pi}$$

which is decreasing in ϕ . The size of the landlord group remains fixed at π and, assuming that they sell land in equal numbers, their share of the land is:

$$\frac{[1 - \gamma[1 - G(\phi x^*(\phi))]]}{\pi}$$

which is increasing in ϕ .

Putting this together, it is straightforward to see that a reduction in ϕ leads to a new land distribution which Lorenz dominates the initial distribution. Hence, a wide variety of inequality measures, such as the Gini coefficient, should show a reduction in land inequality after tenancy reform.

To map the model further onto the data, note that we expect caste membership to map crudely onto our two cultivator sub-groups. Specifically, suppose that $\gamma = \gamma_{SC/ST} + \gamma_{OBC}$, then we would expect that $\gamma_{OBC} > \gamma_{SC/ST}$. While land ownership should rise in both groups, we

expect this to be a larger effect for OBCs. Moreover, reductions in tenancy should be larger for the SC/ST group with a greater increase in participation as agricultural laborers. Land inequality between castes may increase as result of tenancy reform since OBC households will benefit disproportionately. Average income among the cultivator group J is:

$$\begin{aligned} \mu_J(\phi) &= w^*(\phi) [\gamma_J G(\phi x^*(\phi)) + (1 - \gamma_J) G(x^*(\phi))] \\ &+ \frac{\beta}{\eta} [w^*(\phi)]^{-\frac{\eta}{1-\eta}} \left[\gamma_J \int_{\phi x^*(\phi)}^{\bar{\theta}} \theta^{\frac{1}{1-\eta}} dG(\theta) + \phi(1 - \gamma_J) \int_{x^*(\phi)}^{\bar{\theta}} \theta^{\frac{1}{1-\eta}} dG(\theta) \right]. \end{aligned}$$

The effect of a reduction in ϕ is ambiguous in sign for each group when groups differ in γ_J .

4 Data and Empirical Strategy

Our analysis makes use of multiple datasets. We describe these below and then provide a justification for our empirical strategy.

4.1 Data

4.1.1 Tenancy Reform Data

The core method for identifying tenancy reforms follows Besley & Burgess (2000). Data on tenancy reform in southern India before and after the states' reorganization report is assembled from a variety of historical sources. Appendix Table 2 provides a summary of the number of tenancy reforms before and after the states' reorganization in 1956 in the sampled districts and Appendix Table 3 lists the dates and provisions of tenancy reforms.

This definition of land reform assumes that each piece of legislation represents a separate land reform event presumed to have an additional, cumulative impact on land distribution. The primary analysis here employs a count index of tenancy reforms; however, we obtain very similar results using an index of tenancy reform where we directly index relevant provisions.¹¹

4.1.2 Household and Village Survey

Our sampling procedure started by selecting nine boundary districts, four pairs that were in the same princely state prior to 1956 and two pairs that were not (for details, see Appendix).¹² Within a district pair we matched blocks on the basis of linguistic similarity. The matching of blocks was done using a language match index based on 1991 census data on the proportion

¹¹In order to compile the alternative index of land reform, we compile a list of all provisions included in land reform events over this period, and assign each district a dummy variable for whether or not the district experienced this type of reform. The total score for tenancy reforms is the sum of these dummy variables. The indexed provisions are as follows: minimum terms of lease; right of purchase of nonresumable lands; the right to mortgage land for credit; mandatory recording of tenant names; limitations on the landlord's right of resumption; caps on rent; temporary protection against eviction or prohibition of eviction; prohibition of eviction for public trusts; establishing a system of processing land titles; extending formal tenancy to more classes of tenants; and granting tenants full ownership rights.

¹²Three adjacent districts (Kolar, Chittoor and Dharmapur) are compared pairwise. Thus in total, there are six districts that generate three separate pairs, and these three districts yield three additional more pairs.

of the population speaking each one of the eighteen languages reported spoken in the region; details on its calculation and summary statistics are reported in the Appendix.

The goal of the language match index is to identify pairs of blocks (on either side of state boundary) where the difference across blocks in proportion population speaking each language was minimized. Within a district pair, we selected the three independent pairs of blocks that were the best matches in terms of linguistic similarity. This yields 18 matched pairs of blocks (three pairs of blocks for each of six pairs of districts). The match quality indices for these block pairs are, on average, one and a half standard deviations lower (i.e., a closer match) than the mean.

Our outcome variables come from a series of interlinked surveys conducted in the sampled villages in 2002. We use two key elements of the survey. The first is data collected in 522 villages at a village-wide participatory rural appraisal (PRA) meeting at which attendees were asked to provide information about the caste and land structure in their villages, including the name of all castes represented and whether they were SC/ST, the number of households that belong to each caste, and the number of households falling into each one of a number of landowning categories. The same meeting was also used to obtain information from villagers about prevailing agricultural and construction wages. This methodology has been previously used to collect village-level data in other studies of local governance in India (Chattopadhyay & Duflo 2004, Beaman, Chattopadhyay, Duflo, Pande & Topalova 2009).

The second dataset used is a household survey which was collected in a randomly selected subset of the sampled villages in each block. Twenty household surveys were collected in each of 259 villages. Households were randomly selected, with the requirement that at least four of the sampled households were required to be SC/ST households. This results in a total sample of 5180 households. The household survey collects data on familial structure, occupation, landholdings, and assets, as well as political knowledge and participation. The household and PRA surveys are the principal source of data for this dataset.¹³

The household dataset is linked to landholding data at the block and village level drawn from the 1951 census. The 1951 census reported the number of households in each of a number of land-owning/occupational categories (landlords, independent cultivators, tenants and landless laborers) by village; 302 of the 522 villages in our sample can be matched to villages in this census, while the remainder have names that have changed and cannot be matched. The data is also linked to the 1961 census, which provided data on the proportion of households that are SC/ST; 316 villages are matched to the 1961 data.

Land distribution data by village was collected in PRA meetings, where the assembled villagers were asked to name each caste in the village, and the number of households in that caste that held no land, between 0 and 1 acres of land, 1 to 5 acres, 5 to 10 acres, 10 to 25 acres, or 25 or more acres. The Gini and GE coefficients were calculated by assuming that each household in a given category possessed the mean amount of land (e.g., a household holding

¹³Information on number of factories in the village and surrounding areas was collected in a follow-up survey with key village informants in 2003.

between 1 and 5 acres is assumed to hold three acres.)¹⁴ We use these data to construct a variety of land distribution measures: the Gini coefficient, generalized entropy measures of inequality with α equal to 1, the ratios of total land held by percentiles 90/10 and percentiles 75/25 and the proportion of landless households. All capture land distribution in slightly different ways and, below, we check that the results are broadly consistent across different measures.

4.2 Identification Strategy

We will exploit variation in tenancy reform experiences across villages and social groups to identify the effect of reforms. A key challenge to identification in this analysis is establishing the validity of the quasi-experiment evident in the swapping of districts and blocks therein. Our analysis compares blocks in neighboring districts assigned to different states post-1956 that are relatively similar with respect to linguistic characteristics. The first step is to verify that the assignment of border regions to a given state is not driven by observable characteristics of those regions, and thus the assignment of different blocks to different states can be considered quasi-random. More specifically, we want to ensure that the assignment of blocks to states cannot be interpreted as an attempt to create a state more amenable to any particular policy agenda.

As a prelude to this, we use occupational data from the 1951 Census (i.e., before the state reorganization) for a subsample of villages that could be identified in the census to provide three checks on this strategy. First, we show that assignment of border blocks to a given state was quasi-random in that it was not correlated with land ownership patterns. Let $x_{1951,ip}$ be the proportion of the population engaged in agriculture in the village in 1951 that falls into each of the denoted occupational categories: agricultural laborer, tenant, self-cultivator, tenant, and non-cultivating landlord. We estimate the following equation, omitting the landlord category. R_{ip} denotes the number of tenancy reforms in village i of pair p post-1956 and γ_p block-pair fixed effects; all specifications include robust standard errors.

$$R_{ip} = \beta_1 Laborer_{ip} + \beta_2 Tenant_{ip} + \beta_3 Cult_{ip} + \gamma_p$$

Table 1 column (1) reports the results. The size of each landholding class is uniformly insignificant, and generally with high p-values. There is no evidence that villages with different landholding and tenancy structures are systematically assigned to states with differing levels of land reform, within a given block-pair. This supports our claim that the assignment of blocks to states cannot be interpreted as an attempt to create a state more amenable to any particular land reform agenda. Employing block-pair fixed effects, assignment to states can be considered quasi-experimental.

Next, we examine the quality of land match between block pairs within district pairs of interest. Our null hypothesis is that matching blocks on language should also generate similarity in caste and land structure. Given the absence of micro-level caste data prior to the reorganization, we restrict our test to land structure.

¹⁴Accordingly, they represent a lower bound on the true level of inequality, as the measures assume no dispersion within categories of landholding. The full definitions of both measures are provided in the Appendix.

We employ the same 1951 landlessness data, here at the village level and use a variant of the matching procedure employed for language. First, we create all possible matches between all 522 villages. We drop matches between villages in the same state, leaving only pairings across state lines. Some of these village pairs lie within the actual block pairs matched along linguistic lines, and some do not. We want to test whether the average difference in the percentage landless between villages in the matched block pairs is less than the average difference across all possible pairs of villages. We estimate the following equation, where $Same_{i,j}$ is an indicator variable equal to one when the villages are in a matched block-pair and zero otherwise. μ_{s_i,s_j} is a dummy variable for matches between the states of village i and village j .

$$Dif_{i,j} = \beta Same_{i,j} + \mu_{s_i,s_j} \quad (6)$$

Results from the estimation of this equation are displayed in the second column of Table 1. On average village pairs within matched blocked pairs are more similar than those not in matched pairs, with the difference in landless proportions about 11% less than the mean.

Thus, our matching identifies block pairs that are similar in both language and land structure.¹⁵

Finally, our conceptual framework defined two groups of cultivators differentiated by the fact that only one has access to capital to buy land. In the data it is impossible to differentiate households by their pre-land reform land or asset status; the only indicator of class is caste membership, presumed to be unchanging. Accordingly, in order to test the model predictions about the impact of land reform on different classes of tenants, we assume that tenants with access to capital are members of the OBC caste-group, while those without access to capital are primarily SC/ST.

We can substantiate this assumption by employing data on landowning classes from the pre-reform 1951 census. Unfortunately, caste information is unavailable in that year's census; however, the 1961 census includes data on the proportion of SC/ST and non-SC/ST households in each village. Accordingly, we can test whether there is a positive (negative) correlation between the 1951 proportion of agricultural laborers (tenants, self-cultivators, landlords) and the 1961 proportion of SC/ST households. We regress the proportion of the population that is SC/ST on each landholding category, including block-pair fixed effects.

$$SCST_{1961,ip} = \beta x_{1951,ip} + \gamma_p$$

The results are shown in columns (3)-(6) of Table 1. The proportion of SC/ST is positively correlated with the proportion of agricultural laborers, uncorrelated with the proportion of tenants, and negatively correlated with the proportion of owner-cultivators. Thus among the non-landlord class, SC/ST are more likely to be agricultural laborers than their OBC counter-

¹⁵There are, of course, residual inter-block differences in land ownership structure in each block pair. Given the existing evidence on the persistent long-term effects of land ownership structure (Banerjee & Iyer 2005), one potential concern is that the differences we measure simply reflect these initial differences. However, we also estimate our primary equations of interest controlling for initial conditions and the results are consistent. This suggests the results do not reflect different initial conditions.

parts, and less likely to be owner-cultivators.

We can also test the assumption about access to capital more directly by regressing the proportion SC/ST in 1961 on a dummy for whether there is a bank in the village in 2001; data on banking facilities or other measures of access to credit was not recorded in the 1951 or 1961 census. The results of this regression are shown in column (7) of Table 1, where we see villages with a higher proportion of SC/ST population are significantly less likely to have access to banking facilities.

$$SCST_{1961,ip} = \beta x_{2001,ip} + \gamma_p$$

These results suggest that our assumptions about caste, landowning status and access to capital are plausible. SC/ST households are more likely to be agricultural tenants prior to reform, and more likely to live in villages without access to capital. Accordingly, they are more likely to be tenants displaced by new landowners following the implementation of tenancy reforms.

5 Results

We present three sets of findings. First, we examine the impact of tenancy reform on land inequality. Second, we evaluate the impact by caste sub-group. Third, we examine labor supply and wage outcomes. To explore the robustness of the results, we then perform some placebo tests.

Overall Land Inequality The model predicts that overall land inequality should fall in villages that have experienced tenancy reform. To assess whether tenancy reform had an impact on land distribution, our primary equation of interest is of the form:

$$Y_{ip} = \beta R_{ip} + \gamma_p + \epsilon_{ip} \tag{7}$$

where Y_{ip} is a measure of inequality of land distribution in village i in block pair p ; R_{ip} is the number of tenancy reforms, and γ_p is a fixed effect for the block pair in which village i lies. There are 522 villages included.¹⁶

The results in Panel A of Table 2 show that tenancy reform had a negative and strongly significant effect on overall inequality in land distribution measured in different ways.¹⁷ Moreover,

¹⁶Land reform acts occur at the level of the princely state and then the state. As a recent literature has shown that inference employing clustered standard errors with a low number of clusters can be even more unreliable than inference using unclustered heteroskedasticity-robust standard errors, we estimate the main specifications without clustering (Cameron, Gelbach & Miller 2008, Cameron, Gelbach & Miller 2006). However, we have re-estimated the principal specification (7) for the main outcomes of interest employing a wild bootstrap to bootstrap the T-statistics within each princely state-state cluster (on this, see Cameron et al. (2008)) ADD REF. Our main results remain significant with p-values of 0.15 or below.

¹⁷Estimating all the major results presented here with total reform as the independent variable results in coefficients of roughly equal magnitude, suggesting that abolition and ceiling reforms had no additional impact on village-level measures of inequality.

the effect of tenancy reform on aggregate measures such as the Gini and the GE(1) coefficient is substantial (columns 1 and 2). The mean level of tenancy reform would result in a decrease in the inequality index of nearly 15%. A decrease in the Gini coefficient of this magnitude would move a village that was at the median of inequality across all villages to the 35th percentile of inequality, or move a village from the 65th percentile of inequality to the median.

Columns (3) and (4) show that the proportionate decrease on the percentile land ratios is larger, 4% and 6% respectively for a marginal tenancy reform event. This suggests that the bulk of the redistribution is occurring in the middle of the asset distribution, resulting in relatively more compression in the ratio of land owned by the 75th percentile relative to the 25th percentile as compared to the ratio between the 90th and 10th percentiles. The magnitude of the effect is again, substantial. The implied decrease in the 75-25 ratio for a village at the mean level of land reform would move it from the median level of inequality across all villages to below the minimum level.

We also decompose the GE(1) index to evaluate between-caste group inequality, denoted as BC(1). Between-caste group inequality, $GE_b(a)$, is derived assuming every person within a given caste group owns the mean quantity of land in that caste group, l_k . Column (5) shows a significant decrease in between-caste group inequality. Perhaps most surprisingly, tenancy reform has no significant effect on overall landlessness, a result that again indicates the primary beneficiaries of reforms are not the poorest, landless households (column 6).

Land Inequality by Caste We now use the variant of the model which allowed γ to vary by caste sub-group to explore how land distribution changes and economic changes varies by caste. In particular, the model suggests that tenancy reform should have an impact differentially by sub-group according to whether each group is better placed to purchase land.

To examine whether this is the case, we first examine the distribution of land across upper caste, OBC and SC/ST. Panel B of Table 2 shows two variables for each caste group. The first is a dummy equal to one if the proportion of land owned by the caste group in a village exceeds the median proportion land owned by that group across all villages, and the second is the proportion of households within that caste group that are landless. The results indicate that there is a decrease in the proportion of total land held by upper castes and a corresponding increase in the proportion held by OBC households, with no significant change in total land held by SC/ST households. The implied magnitude is substantial: at the mean of tenancy reform, the probability upper caste landholdings are in the upper half of the distribution decreases to 33%, while the probability OBC landholdings are in the upper half of the distribution increases to 65%.

However, land reform at the mean also increased the proportion of SC/ST households that are landless by around 13 percentage points on a base probability of 49%, while having no significant impact on the proportion of upper caste or OBC households that are landless. This presumably reflects displacement by more productive tenant-turned-landowner as predicted by the model.

A potentially more accurate way to look at the effects of tenancy reform is to examine

evidence from household data. Our core specification is now:

$$Y_{hip} = \beta R_{ip} + \gamma_p + \epsilon_{ip} + \mu_{hip} \quad (8)$$

where Y_{hip} denotes a given outcome for household h in village i and block pair p and μ_{hip} is the household-specific error term. Standard errors clustered at the village level to allow for common shocks.

We consider four outcome variables: the quantity of land owned and leased by the household, and dummies for the primary source of a household's income, specifically whether it is from household cultivation or agricultural labor. We also examine heterogeneity between caste groups which we believe should reflect access to opportunities to acquire land, such as credit market opportunities. Thus, the second specification allows tenancy reform to be interacted whether a household belongs to an OBC or SC/ST caste group. (Upper castes are the omitted base category.) Specifically, we estimate the following specification:

$$Y_{hip} = \beta R_{ip} + \lambda_1 R_{ip} * O_{hip} + \lambda_2 R_{ip} * S_{hip} + O_{hip} + S_{hip} + \gamma_p + \epsilon_{ip} + \mu_{hip} \quad (9)$$

where O_{hip} and S_{hip} are dummy variables denoting household membership in the two caste groups.

The results are reported in Table 3. Column (1) shows that there is no significant effect on the quantity of land owned. However, column (2) shows that this masks some heterogeneity. Summing the level and interaction effects, the impact for SC/ST households is significant and negative: at the mean of land reform, their landholdings decrease around 30%. The point estimate for OBC households is positive but noisy, suggesting their landholdings increase.

Column (3) examines the quantity of land leased. There is a significant decline in the probability of leasing any land as a result of land reform, though no variation in the size of the effect across different caste-groups. This is consistent with tenancy reform reducing the value of leasing land for the landlord.

Taken together, these results suggest that both SC/ST and OBC households experience a decline in tenancy as a result of land reform. Given that tenancy reforms place a variety of restrictions on tenancy relationships that render such relationships less attractive to landowners, it is unsurprising that tenancy rates decline. However, landownership does not necessarily fill the gap. Only OBC households experience a corresponding increase in ownership, while SC/ST households also experience a decline in ownership and are thus more likely to be entirely landless.

The coefficients on the dummy variables for the primary source of household income reported in columns (5) through (8) reinforce these findings. Column (6) shows that tenancy reform leads to greater owner-cultivation among OBC households, an increase in probability of 10 points on a base probability of 37%; owner-cultivation among SC/ST households declines. Column (8) shows that while OBCs are less likely to work as agricultural laborers after a tenancy reform, the probability that SC/ST households work as agricultural laborers increases from 44% to 54% at the mean.

This reinforces the importance of studying the heterogeneous impact of tenancy reform at the household level, and suggests the effects plausibly depend on the extent to which potential cultivators can benefit from the possibility of becoming landowners as reform reduces the attractiveness of tenancy to landlords. Estimating the overall welfare effect of tenancy reforms is thus potentially complex.

Labor Demand and Wages The model predicts that labor demand and wages will be affected by tenancy reform. Table 4 shows regressions employing as the dependent variable a dummy variable for participation in paid agricultural and non-agricultural labor at the individual level, the agricultural and construction wage as reported at the village level, and the number of factories as reported at the village level. For the regressions employing individual participation in paid agricultural and non-agricultural labor, we estimate equation (9), used in previous specifications.

Column (1) shows that, on average, tenancy reform increases participation in paid agricultural labor. There is a 1% increase with each tenancy reform against a base probability of 17%. Column (2) shows that, for SC/ST households, the increase is more than twice as big.

Columns (3) and (4) look at non-agricultural labor. On average, there is a decline in the probability of paid non-agricultural labor. This is largest for OBC households (presumably because they are substituting into own cultivation) and also substantial for SC/ST households (who seem likely to be substituting into agricultural labor).

Columns (5) and (6) examine the impact on wages. They show that both the agricultural and construction wage are increased by tenancy reform. The daily agricultural wage increases around 7% with each episode of land reform, or by 47% at the mean level of land reform. An increase in the wage is consistent with the results reported by Besley & Burgess (2000), and consistent with prediction of our model when $\phi > 1$. The increase in the construction wage can be explained by a leftward shift in the supply curve for non-agricultural labor.

Column (7) shows that there is no significant effect of land reform on the number of factories in the village, though the magnitude of the coefficient is substantial (albeit noisily estimated.) This presumably reflects the interaction of two effects. First, the shift in the supply curve for non-agricultural labor and the increase in non-agricultural wages would be expected to result in a decline in the number of factories. On the other hand, higher wages should yield a positive demand effect for factory output. The results here suggest, albeit tentatively, that the demand effect dominates. This is in contrast to other papers that have found that rural industrialization growth is largest in areas where growth in agricultural productivity has been low (Foster & Rosenzweig 2004).

Placebo tests One potential challenge to the identification strategy is that tenancy reform is really proxying for other policies that differ at the state level. In order to gain some reassurance that this is not the case, we estimate a set of regressions that measure the effect of assignment to a state with higher or lower levels of land reform on various measures of village- and household-level provision of public goods, and the interaction between land reform and caste dummies.

We also examine the effect of other types of land reform on measures of village-level inequality.

Specifically, we estimate three parallel equations. The first, at the village level, regresses a dummy for whether the local government, denoted the gram panchayat or GP, provides a certain public good in the village, denoted G_{ip} , on land reform and an interaction term with the proportion of SC/ST households in the village, denoted Pr_{ip} . Block-pair fixed effects γ_p are again employed, and standard errors are clustered at the panchayat level.

$$G_{ip} = \beta R_{ip} + \beta R_{ip} * Pr_{ip} + \gamma_p + \epsilon_{ip} \quad (10)$$

The second equation is at the household level and uses as the outcome a dummy for the provision of governmental assistance to that household. Analogous to the main specifications, this equation is estimated with both block-pair fixed effects and village fixed effects as well as including interaction terms for caste grouping.

$$G_{hip} = \beta R_{ip} + \lambda_1 R_{ip} * O_{hip} + \lambda_2 R_{ip} * S_{hip} + O_{hip} + S_{hip} + \gamma_p + \epsilon_{ip} + \mu_{hip} \quad (11)$$

$$G_{hip} = \lambda_1 R_{ip} * O_{hip} + \lambda_2 R_{ip} * S_{hip} + O_{hip} + S_{hip} + \eta_{ip} + \mu_{hip} \quad (12)$$

The results of the regressions for provision of public goods are shown in Table 5. They show no significant coefficient on either total reform or the interaction between reform and the proportion SC/ST, with the exception of a positive and marginally significant coefficient on the probability that the panchayat provides funds for repairs of the village school. This suggests that differential provision of public goods to villages with a higher or lower proportion of SC/ST households in states with more or less land reform is not a source of bias.

The household-level results are shown in Panel B of the same table, using as the dependent variable a dummy for whether the household received government aid for household construction, toilet construction, or the provision of electricity. The results show a positive and significant coefficient on the interaction between SC/ST and total reform: in other words, SC/ST households are more likely to receive government assistance with household or toilet construction in states that have more land reform. This seems intuitive if we consider that these are likely to be states with more progressive policies in general. The level effect is negative and the OBC interaction term generally insignificant.

These results indicate that insofar as differential provision of public goods or governmental assistance in states with more or less reform introduces bias to our results, the bias should be towards finding a positive effect on the welfare for SC/ST households. The fact that our results show a strongly negative impact on land ownership and welfare of SC/ST households suggests that these results can convincingly be attributed to land reform, rather than other governmental policies.

The third equation of interest simply re-estimates the original equation number (7) used to identify the impact of tenancy reform, employing an index of abolition and ceiling reforms as the independent variable. The results shown in Panel C of 5 indicate that abolition and

ceiling reforms did not decrease inequality, and along some dimensions appear to have increased inequality. The Gini coefficient and the 75-25 ratio in land both increase as a result of these reforms, and the probability that the upper castes hold a disproportionate quantity of land is higher in states with more abolition and ceiling reform events. While evaluating the reasons for the failure of other forms of land reform is beyond the scope of the paper, these results do suggest that tenancy reforms are not picking up the impact of other types of accompanying land reforms.

Summary Taken together, these results suggest an impact of tenancy reform which is consistent with the theoretical model laid out in the last section. There is a fall in overall inequality, with land ownership increasing among OBC households. On the other hand, there is greater supply of labor among SC/ST households who are less likely to be tenants or landowners after land reform. In addition, agricultural wages have increased. Placebo tests indicate that these shifts are not attributable to other policies that may have varied at the state level.

6 Conclusion

Poor rural economies are second-best in many ways. It is no surprise, therefore, that tracing the impact of a single dimension of reform can be complex. The analysis in this paper has looked at a number of dimensions on which we might expect tenancy reform to have an impact, exploiting a natural experiment due to state reorganizations to trace the impact of reform at the village and household level. A novel feature of the analysis is the relatively long time horizon over which we are able to assess the effects of the reform.

While tenancy reform was implemented with the goal of strengthening the position of tenants, several equilibrium responses need to be considered. In the context that we have studied, tenancy reform did produce significant and highly persistent shifts in land distribution. However, the benefits of reform were lopsided and favored relatively wealthier tenants, while SC/ST households saw a decrease in land holdings and generally became more reliant on agricultural labor. On the other hand, we document a substantial increase in agricultural wages, due to an increase in demand for hired labor from large landholders no longer relying on tenants, a shift in the labor supply curve, or both. Thus, while the welfare impacts of tenancy reforms are substantial and long-lasting, their impact is heterogeneous between types of cultivators. These results can best be understood through the lens of a fairly standard model where owners of land are seeking the best opportunities for exploiting their land.

The question of how best to regulate the land market is still a pressing one in many developing economies. Mexico has embarked on major experiments in rural land titling over the last decade (de Janvry, Gonzalez-Navarro & Sadoulet 2011). Rural land rights remain extremely limited in China, where the role of property rights in rural development is hotly contested and has become an increasing source of political unrest. In addition, many other developing countries face challenges in how to appropriately negotiate compensation for rural landowners when industrialization requires the purchase or expropriation of land (Bardhan 2011). In all such

cases, it is essential to understand in detail, as we have done here, the equilibrium responses to reform and the way that these responses create gainers and losers. This can only be done employing a sufficiently long time horizon over which the full effects of reform become visible.

In a broad sense, our findings offer a stark reminder of the hazards of piecemeal policy reform in a second-best world. For example, if tenancy persists in part due to a lack of credit market opportunities to become an owner-cultivator, then increasing the power of tenants may result in some tenants being forced to become landless laborers. However, whether these former tenants are in fact worse off will also depend on the strength of factor market equilibrium responses, primarily the wage response. Asset data suggests that, at least in our context, the wage response was unable to sufficiently compensate the SC/ST households. The complexity of factor market responses should contribute to a recognition by policymakers that, while short-run political imperatives may provide the impetus for reform, the long-run economic changes are what matter for development.¹⁸

¹⁸In this context, it is relevant to point to the rise of Naxal violence in India. Since 2003, more than 2,500 people in India have been killed in Naxalite violence while 7,000 incidents of violence involving Naxalites have been reported. The key policy reform demanded by these groups is increased redistribution of lands to SC and ST groups. Naxalite presence is highest in Indian districts with a high fraction of landless laborers (Planning Commission of India report).

Figure 1: Map of sample districts

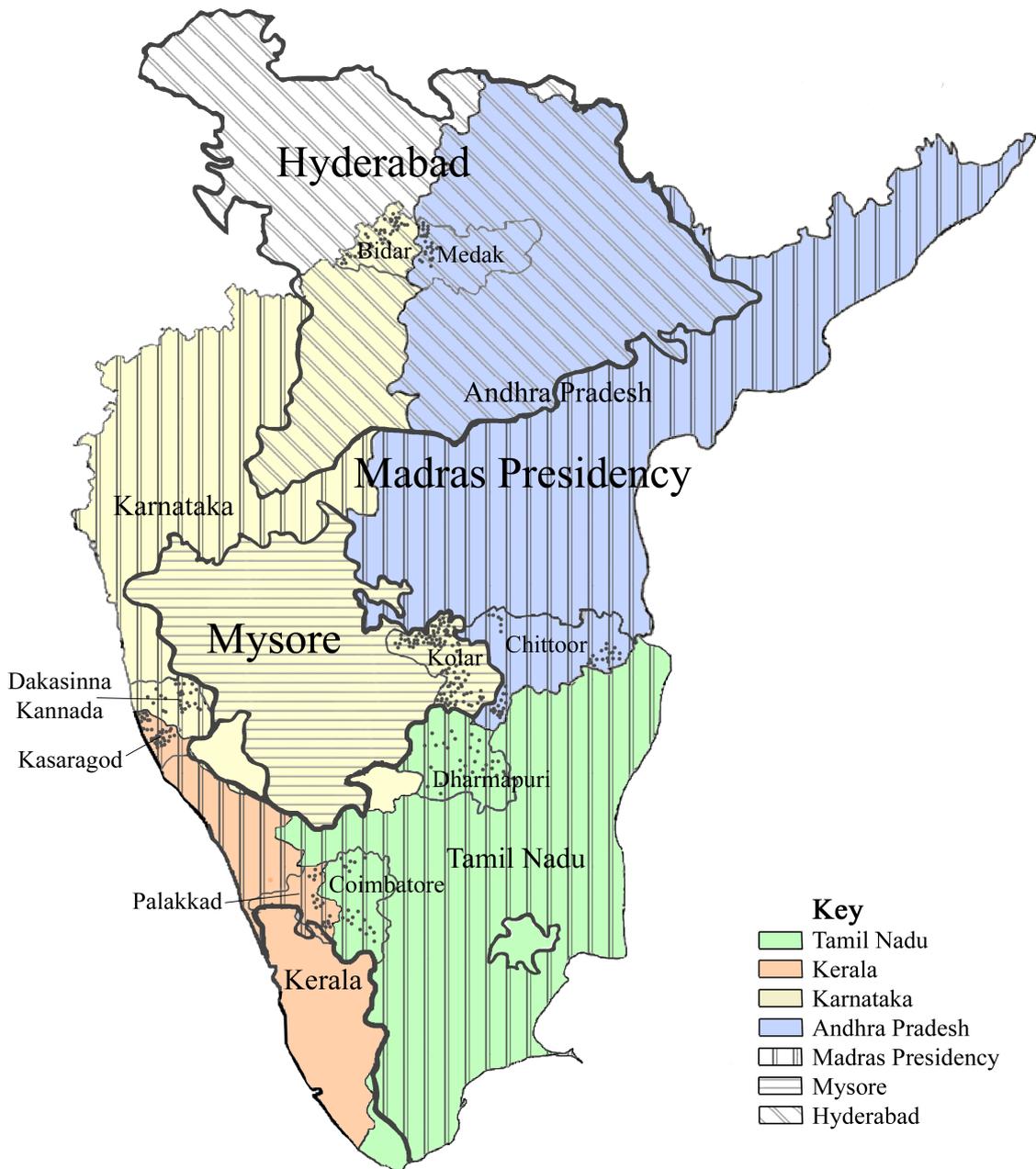


Table 1: Land reform and initial land structure

	Tenancy	All block pairs		Prop. SC/ST			Capital access
	(1)	(2)	(3)	Land structure		(7)	
				(4)	(5)	(6)	
Laborer	.633 (2.247)		.152 (.065)**				
Tenant	-.795 (2.333)			.037 (.094)			
Owner-cultivator	-1.291 (2.082)				-.083 (.055)		
Landlord						-.098 (.127)	
Bank access							-.062 (.034)*
Same block pair		-.032 (.019)*					
Fixed effects	Block-pair	State-pair	Block-pair	Block-pair	Block-pair	Block-pair	None
Obs.	302	302	295	295	295	295	234

Notes: standard errors are in parentheses. Asterisks indicate significance at 1, 5 and 10 percent levels. The first column shows the results of a regression of tenancy reforms post-independence on the the proportion of the agricultural population that falls into the specified occupational category in the 1951 census. The second column tests the linguistic closeness of matched-pair. Columns 3-6 show regressions of the proportion of the population that is SC/ST in the 1961 census on the specified occupational category in the 1951 census. Column 7 shows a regression of the proportion of the population that is SC/ST in the 1961 census on a dummy for whether a cooperative or commercial bank is present in the village in the 1961 census.

Table 2: Inequality and land distribution

	Gini	GE(1)	90/10	75/25	BC(1)	Prop. landless
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Tenancy	-.009 (.003)***	-.018 (.006)***	-1.335 (.672)**	-.772 (.310)**	-.014 (.004)***	-.004 (.004)
Mean	.527	.620	34.493	13.048	.336	.211
Obs.	504	504	504	504	504	504
Panel B						
	Upper caste		OBC		SC/ST	
	(1)	(2)	(3)	(4)	(5)	(6)
Tenancy	-.025 (.005)***	-.004 (.005)	.019 (.006)***	-.003 (.006)	.006 (.004)	.019 (.010)*
Mean	.505	.215	.516	.456	.507	.499
Obs.	504	504	504	504	504	504

Note: standard errors are in parentheses. All regressions include block-pair fixed effects. Asterisks indicate significance at 1, 5 and 10 percent levels. In Panel A, the outcome variables are the Gini coefficient, GE(1) coefficient, 90-10 ratio, 75-25 ratio, and between-caste GE(1) ratio in land inequality, and the proportion of the population that is landless. In Panel B, for each caste group the first column shows results for a dummy variable equal to one if the proportion of land owned by the given caste group exceeds the median proportion owned by the same caste group across all villages. The second column shows the coefficient for the proportion of households in that caste group that are landless.

Table 3: Land ownership by household

	Land owned		Land leased		Own cultivation		Agri. labor	
	Level (1)	Int. effects (2)	Level (3)	Int. effects (4)	Level (5)	Int. effects (6)	Level (7)	Int. effects (8)
Tenancy	-0.053 (.050)	-0.062 (.052)	-0.017 (.009)*	-0.011 (.007)	-0.007 (.005)	-0.015 (.006)**	.003 (.005)	.001 (.005)
SC/ST int.		-0.041 (.057)		-0.007 (.010)		.010 (.006)		.015 (.006)**
OBC int.		.116 (.073)		-0.036 (.028)		.030 (.007)***		-0.016 (.007)**
SC/ST	-1.947 (.221)***	-1.764 (.447)***	-0.002 (.043)	.037 (.076)	-0.316 (.021)***	-0.376 (.050)***	.455 (.022)***	.363 (.047)***
OBC	-1.207 (.238)***	-2.102 (.643)***	.134 (.080)*	.399 (.269)	-1.138 (.022)***	-0.381 (.057)***	.193 (.024)***	.339 (.060)***
Mean	3.501	3.501	.164	.164	.377	.377	.438	.438
Obs.	2858	2858	2858	2858	4579	4579	4579	4579

Note: standard errors are in parentheses. All regressions include block-pair fixed effects. Asterisks indicate significance at 1, 5 and 10 percent levels. The dependent variables are the quantity of land owned, the quantity of land leased, and dummies for the primary source of household income being either own cultivation or agricultural labor. A large number of households gave no response to the question on leasing, leading to a large number of missing variables in that regression.

Table 4: Labor supply and wages

	Agri. labor		Non agri. labor		Ag. wage	Cons. wage	Factories
	Level	Int. effects	Level	Int. effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tenancy	.009 (.001)***	.004 (.001)***	-.009 (.001)***	-.006 (.001)***	4.565 (.283)***	4.407 (.539)***	.028 (.019)
SCST int.		.016 (.002)***		-.004 (.001)***			
OBC int.		-.001 (.002)		-.012 (.001)***			
SC/ST	.216 (.006)***	.114 (.013)***	.002 (.004)	.024 (.007)***			
OBC	.077 (.007)***	.098 (.018)***	.026 (.005)***	.124 (.013)***			
Mean	.166	.166	.057	.057	58.906	81.568	.306
Obs.	24016	24016	24016	24016	478	402	480

Note: standard errors are in parentheses. All regressions include block-pair fixed effects. Asterisks indicate significance at 1, 5 and 10 percent levels. The dependent variables are first, dummy variables for participation in paid agricultural and non-agricultural labor, followed by village-level regressions employing the agricultural wage, the construction wage and the number of factories as reported in a survey on village facilities.

Table 5: Placebo tests

Panel A: Village provision of public goods

	School repair		Health center repair		Health salaries		Health materials	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tenancy	-.002 (.012)	-.002 (.015)	.009 (.006)	.017 (.011)	-.003 (.002)	-.003 (.003)	-.002 (.002)	-.004 (.004)
SC/ST prop. int.		.003 (.029)		-.027 (.022)		.0006 (.003)		.004 (.004)
Mean	.441	.441	.078	.078	.004	.004	.006	.006
Obs.	504	504	504	504	504	504	504	504

Panel B: Village provision of public assistance to households

	Construction		Toilet		Electricity		Water	
	Level	Int. effects	Level	Int. effects	Level	Int. effects	Level	Int. effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tenancy	.007 (.004)*	-.005 (.003)	-.006 (.003)*	-.015 (.003)***	-.014 (.004)***	-.018 (.004)***	-.0002 (.0007)	-.00009 (.0007)
SC/ST int.		.036 (.006)***		.025 (.004)***		.007 (.006)		-.00008 (.0006)
OBC int.		.002 (.005)		.013 (.004)***		.015 (.004)***		-.0004 (.0007)
Mean	.186	.186	.059	.059	.156	.156	.009	.009
Obs.	4579	4579	4579	4579	4579	4579	4579	4579

Panel C: Other land reform legislation

	Gini	GE(1)	90/10	75/25	Prop. landless	BC(1)	Upper prop.	OBC prop.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Other reform	.005 (.009)	-.012 (.020)	.669 (2.132)	.931 (.982)	-.025 (.012)**	-.005 (.013)	.006 (.019)	-.038 (.020)*
Tenancy	-.008 (.003)***	-.020 (.008)***	-1.223 (.858)	-.615 (.389)	-.018 (.005)***	-.005 (.005)	-.024 (.006)***	.013 (.007)*
Mean	.527	.620	34.493	13.048	.336	.211	.505	.516
Obs.	504	504	504	504	504	504	504	490

Note: standard errors are in parentheses. All regressions include block-pair fixed effects. Asterisks indicate significance at 1, 5 and 10 percent levels. In Panel A, the dependent variables are dummies for whether the panchayat provided any funds toward the specified educational or health public good, and SC/ST prop. int. is an interaction between the proportion of the village population that is SC/ST and the tenancy variable. In Panel B, the dependent variables are dummies for whether a household participated in a public assistance scheme for the specified home improvement. In Panel C, the dependent variables are the indices of land inequality employed in Table 2, and a dummy for whether the proportion of land held by OBC and SC/ST is above the median, as in Panel B of the same table. The independent variables are an index of abolition and ceiling reforms and an index of tenancy reforms.

Appendices

A Sampling methods

We selected four pairs of districts formerly in the same princely state that were incorporated into two different states. Bidar and Medak in Hyderabad were incorporated into Karnataka and Andhra Pradesh, respectively. In the Madras presidency, there are three such pairs: South Kanara (Karnataka) and Kasaragod (Kerala), Pallakad (Kerala) and Coimbatore (Tamil Nadu), and Dharmapuri (Tamil Nadu) and Chittoor (Andhra Pradesh.) Given that Mysore was completely incorporated into Karnataka, there are no district-pairs in which both districts were formerly part of Mysore state. However, Kolar district in Mysore and subsequently in Karnataka was also surveyed, and matched on the basis of language, as detailed below, with Chittoor district in Andhra Pradesh and Dharmapuri in Tamil Nadu. All three districts form a contiguous geographic region. The core of the sample thus constitutes

In order to select the block pairs employed in this analysis, blocks within the paired districts were matched on the basis of linguistic compatibility. For each block pair of block i and block j , a measure of linguistic compatibility L_i was constructed using the following formula. P_{li} denotes the proportion of the population in block i speaking a given language,¹⁹ and N_i denotes the population in a given block. Thus L_i equals the sum of the difference in the proportion of population speaking each language across the two blocks, each weighted by the proportion of the population that speaks that language in both blocks taken as a whole. The minimum possible value of the index of linguistic compatibility, indicating the best possible match, is zero; the maximum is one.

$$L_i(v_i, v_j) = \sum_{l=1}^{18} (P_{li} - P_{lj}) * \frac{P_{li} * N_i + P_{lj} * N_j}{N_i + N_j} \quad (13)$$

For each district pair, the set of all possible block pairs is ranked and the top three unique pairs are chosen. Table 1 shows summary statistics for the quality of match for all possible block pairs for each pair of districts. On average, block pairs show the highest degree of linguistic compatibility across Kolar and Chittoor districts, and the lowest degree of compatibility in Coimbatore and Palakkad districts. The other four district pairs have similar levels of language matching. The high quality of the matches between Kolar and Chittoor and Kolar and Dharmapuri districts indicates that despite the fact that these district pairs were not previously part of the same princely state, their ethnolinguistic composition is comparable.

Blocks are divided into village government units or gram panchayats (GPs), consisting of 1 to 6 villages. In the states of Andhra Pradesh, Tamil Nadu, and Karnataka, six gram panchayats were randomly sampled from each block selected. Gram panchayats in Kerala are larger than those in other states, and thus three GPs were sampled in each block in Kerala. All villages

¹⁹The languages reported are Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Marathi, Malayalam, Manipuri, Nepali, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu, and Urdu.

Table 1: Linguistic compatibility across district-pairs

District pair	Mean L_i	Median L_i	Std. dev.
Bidar-Medak	0.47	0.46	0.09
Chittoor-Dharmapuri	0.58	0.65	0.20
Dakasinna-Kasaragod	0.47	0.43	0.21
Coimbatore-Palakkad	0.74	0.73	0.13
Chittoor-Kolar	0.28	0.27	0.16
Dharmapuri-Kolar	0.52	0.57	0.19

in each GP were sampled in AP, TN and KA if the GP had three or fewer villages; if there were more than three villages, then the village that was the home of the president of the gram panchayat was sampled in addition to two other randomly selected villages. (For the purposes of the sampling frame, villages with a population of less than 200 were excluded; all hamlets with a population over 200 are considered independent villages.) In Kerala, villages are again much larger and thus wards, the subunit of villages, were directly sampled. Six wards in each GP were randomly selected. This generates a total sample of 527 villages.

B Inequality Measures

The Gini measure is defined as follows, where l_i denotes the land owned by household i , r_i is the ranking of household i according to land holdings among all households in the village, \bar{l} is mean land held in a village and n is the total number of households:

$$Gini = 1 + \frac{1}{n} - \frac{2}{\bar{l}n^2} \sum_{i=1}^n (n - r_i + 1)(l_i) \quad (14)$$

The general entropy measures with $a=1$ and $a=2$ are calculated using the following equations:

$$GE(a) = \frac{1}{a(a-1)} \left[\left[\frac{1}{n} \sum_{i=1}^n \left(\frac{l_i}{\bar{l}} \right)^a \right] - 1 \right] \quad (15)$$

C Land reform in southern India

Table 2: Summary statistics on land reform

State	District	Total reform pre-1956	Total reform post-1956	Abolition		Ceiling		Tenancy	
				Pre	Post	Pre	Post	Pre	Post
KA	Bidar	6	3	3	1	0	2	3	2
AP	Medak	6	6	3	1	0	2	3	3
AP	Chittoor	5	6	0	1	0	2	5	3
TN	Dharmapuri	5	7	0	1	0	2	5	4
KA	Dakasina Kannada	5	3	0	1	0	2	5	2
KE	Kasaragod	5	10	0	2	0	1	5	9
TN	Coimbatore	5	7	0	1	0	2	5	4
KE	Palakkad	5	10	0	2	0	1	5	9
KA	Kolar	3	3	2	1	3	2	1	2

Note: the total number of reforms for Karnataka and Kerala, all post-1956, differs from the sum of the categories given that they incorporate legislation that can be jointly categorized. For Karnataka, the 1961 and 1974 acts include both tenancy reforms and land ceilings. For Kerala, the 1969 Kerala Land Reforms Act includes all three types of provisions.

Table 3: Land reform in southern India

State	Year	Title	Description	Type
Hyderabad	1950	Telegana Agency Tenancy and Agricultural Lands Act	Tenants received protected tenancy status; tenants to have minimum terms of lease; right of purchase of nonresumable lands; transfer of ownership to protected tenants in respect of nonresumable lands; as a result 13,611 protected tenants declared owners. ^a	Tenancy
	1954	Amendment of Telegana Agency Tenancy and Agricultural Lands Act	Also gave tenants ability to mortgage rented land for credit. ^b	Tenancy
	1956	Tenancy Act (amended 1974)	Limits a landlord's right of resumption. ^c Tenancy continues up to 2/3 of ceiling area; law does not provide for conferment of ownership right on tenants except through right to purchase; confers continuous right of resumption on landowners. ^d	Tenancy
Madras Presidency	1929	Malabar Tenancy Act	Confers a qualified fixity of tenure on cultivation Veruumpattomdars holding wet lands and a right to demand a renewal of their lease. Also proscribed rates of "fair" rent. Since this act only took effect in the Malabar region of Madras Presidency, in our sample it only applies to Palakkad district. ^e	Tenancy
	1954	The Malabar Tenancy Amendment Act	Prohibits eviction of tenants who have had land-possession for 6 years; lowered the amount of maximum rent that could be paid.	Tenancy
	1955	The Madras Cultivating Tenants Protection Act (Madras Act XXV of 1955).	In our sample this act only applies to Palakkad District in Kerala. ^f	Tenancy
	1956	The Madras Cultivating Tenants (Payment of Fair Rent) Act	Prohibits any cultivating tenant from being evicted, except in the case of non payment, but allows for resumption of up to one-half land if land leased out to tenant. ^g	Tenancy
				Abolishes usury and rack-renting; ^h Fixes the percentage of produce that can be charged as rent. ⁱ

^a Besley & Burgess (2000), p.396

^b Bergmann (1984), p.118-9

^c Commission (1959), p.26

^d Besley & Burgess (2000), p.396

^e Behuria (1997), p.55

^f Bergmann (1984), p.51

^g Behuria (1997), p.55

^h Behuria (1997), p.55

ⁱ Besley & Burgess (2000), p.400

Mysore	1952	Mysore Tenancy Act (Mysore Act XIII of 1952)	Restricted rent to 1/3 of crop and granted permanent tenancy right to those who had occupied the land for 12 years or more. Also provided for the eviction of tenants for non-payment of rent and for resumption for self cultivation by landlord. ^a	Tenancy
Karnataka	1961	Land Reforms Act, 1961 (10 of 1962) Amended 32 times (1965-2001)	Provides fixed tenure subject to landlord's right to resume one-half leased area; grants tenants optional right to purchase land on payment of 15-20 times the net rent; imposition of ceiling on land holders. ^b	Tenancy, Ceiling
	1974	The Mysore Land Reforms Amendment Act	Imposition of ceiling on landholdings of 4.05-21.85 hectares (after 1972); removal of all but one of the exemptions from tenancy regulations; ^c reduces the landlords right of resumption. ^d	Tenancy, Ceiling
Andhra Pradesh	1957	The Andhra Tenancy Act	A stop-gap measure to stay evictions of tenants in the Andhra area until new state-wide legislation could be drafted. ^e In our sample this act, and its amendment (listed below), only applies to Chittoor.	Tenancy
	1971	Andhra Pradesh Record of Rights in Land Act	Provides for the recording of names of all occupants and tenants. ^f	Tenancy
	1974	Amendment of Tenancy Act	Applied the 1956 tenancy laws to the whole state; reduced the maximum rent tenants paid; limits a landlord's right of resumption. ^g (In our sample this amendment only applies to Chittoor.)	Tenancy

^a Aziz & Krishna (1983), p.398

^b Besley & Burgess (2000), p.396

^c Besley & Burgess (2000), p.396

^d Bergmann (1984), p.93

^e Commission (1966), p.2

^fBehuria (1997)

^g Bergmann (1984), p.118-9

Kerala	1957	Kerala Stay of Eviction Act	Provides temporary protection to tenants, kudikidappukars and persons cultivating land on minor sub tenures. ^d	Tenancy
	1963	Kerala Land Reforms Act Amended 9 times (1969-1989)	Concedes tenants right to purchase land from landowners. ^b	Tenancy
	1963	Kerala Tenants and Kudikidappukars Protection Act	Provides temporary protection to tenants in the matter of eviction. ^c and recovering of arrears of rent.	Tenancy
	1966	The Kerala Prevention of Eviction Act (Kerala Act 12 of 1966)	Protected tenants against eviction; stopped recovery of rent arrears. ^d from before April 1966.	Tenancy
	1968	The Kerala Records of Rights Acts	Establishes records of land/tenancy rights. ^e	Tenancy
	1969	The Kerala Land Reforms Amendment Act (Kerala Act 35 of 1969)	Conferment of full ownership rights on tenants; 2.5 million tenants could become land owners; right of resumption expires; although far reaching on paper, law "not conducive to social justice" because of concealed tenancy; imposition of ceiling on land holdings of 6.07-15.18 hectares (1960-1972) and of 4.86-6.07 hectares (after 1972); abolition of intermediary rights. ^f	Tenancy, Abolition, Ceiling
	1972	The Kerala Land Reforms Amendment Act (Kerala Act 17 of 1972)	Changes the way the government processed land-titles; requires that statements be filed by large land holders. ^g	Tenancy
	1976	The Kanam Tenancy Abolition Act (Kerala Act 16 of 1976)	Abolishes a form of intermediary. ^h	Tenancy
	1989	The Kerala Land Reforms Amendment Act	Extends the benefits of tenancy and security of tenure to two more classes of tenants.	Tenancy
	Tamil Nadu	1961	Madras Public Trusts Regulation of Administration of Agricultural Lands Act	Provides that no public trust can evict its cultivating tenants. ⁱ
1969		Agricultural Land-Records of Tenancy Right Act	Limits the amount of land a public trust can personally cultivate. ^j	Tenancy
1971		Occupants of Kudiyiruppu Act	Provides for preparation and maintenance of complete record of tenancy rights. ^k	Tenancy
1995		Amendment to the Tamil Nadu Act Cultivating Tenants Protection Act	Provides for acquisition and conferment of ownership right on agriculturists, agricultural laborers, and rural artisans. ^l	Tenancy
			Provides former cultivating tenants who had possession of land on Dec 1, 1953 the right to resume that land on the same term as held in 1953. ^m	Tenancy

^aBehuria (1997), p.55

^bBesley & Burgess (2000), p.396

^cBehuria (1997), p.59

^dBergmann (1984), p.57

^eBergmann (1984), p.62

^fBergmann (1984), p.120-1

^gBergmann (1984), p.62

^hConstitution of India, Schedule 9

ⁱBehuria (1997), p.55

^jBesley & Burgess (2000), p.400

^kBehuria (1997), p.55

^lBehuria (1997), p.55

^mBehuria (1997), p.97

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