The Long Shadow of Feudalism:
Concentration of Land and Labor Market Power in India*

Steven Brownstone† Kartik Srivastava‡

Click here for the latest version.

May 6, 2025

Abstract

Land is power. Governments and revolutionaries have understood this for centuries, but the causal impacts of land concentration are notoriously difficult to study. We study how differences in village land concentration stemming from the granting of feudal titles hundreds of years ago affect service delivery and labor markets in the present day. A fertile literature evaluates the effects of land tenure systems on agricultural productivity and downstream economic outcomes. However, most of this literature focuses on land tenure policies tied to British colonial policy, and evaluates a narrow set of agricultural and policy outcomes. We exploit variation in land tenure systems in an area never under direct British rule at a vastly more granular level than is seen in the literature to evaluate the impacts not only on service delivery but also labor markets. We implement a regression discontinuity along feudal borders that no longer correspond with modern administrative boundaries. Large discontinuities in land concentration persist across these boundaries. These differences are associated with 7% lower agricultural wages for women, but not men who are more able to travel and seek outside options. The main government scheme meant to provide an outside employment option is less well implemented in these areas with 71% fewer person-days offered during peak agricultural months and no difference the rest of the year. This work stresses the effects of land inequality on local labor markets as one of the mechanisms through which historical institutions drive persistent inequities.

*We thank Achyuta Adhvaryu, Sam Bazzi, Emily Breza, Asim Khwaja, Eliana La Ferrara, Sara Lowes, Paul Niehaus, Craig McIntosh, and Karthik Muralidharan for valuable feedback. We gratefully acknowledge funding from the Weiss Fund, the 21st Century India Center at University of California, San Diego, and the Center for International Development at Harvard University.

†University of California, San Diego

‡Harvard University

1 Introduction

Land ownership has historically been the main source of political power and control in agrarian economies. A vast literature finds that historical institutions have lasting and persistent impacts on a wide range of contemporary outcomes (Genicot and Ray 2017; Dell 2010; Kim and Wang 2024). The evaluation of the long-run effects of historical institutions in India has received considerable academic attention, with a range of papers studying traditional rural institutions and instruments of land reform and redistribution (Banerjee and Iyer 2005; Banerjee, Gertler, and Ghatak 2002). In other contexts too, land concentration has long been considered a core driver of rural inequality (Hornbeck and Naidu 2014). However, the mechanisms that drive these persistent inequities, and allow large landowners to derive enjoy higher rents from lower equilibrium wages, are less clear. Market failures can lower wages and depress developmental outcomes either as a consequence of the lower wages or as an instrument to suppress workers' outside options (Muralidharan, Niehaus, and Sukhtankar 2023).

In this paper, we use historic boundaries of feudal land institutions within the South Indian princely state of Hyderabad, active between 1724 and 1948, to compare present-day labor market and service delivery outcomes between nearby villages in the same modern districts with different concentrations of land ownership. We use granular, village-level variation to focus on how historical institutions continue to shape modern labor markets, while also studying the effects of feudal land systems on a range of service delivery and public welfare outcomes.

Evidence from our setting suggests that while moderate increases in the number of small farms in non-feudal areas relative to feudal areas do not meaningfully affect yields or overall labor demand, agricultural wages for women are significantly lower in non-feudal areas. In this setting, gender norms restrict women's labor market opportunities outside agriculture, and women tend to have lower mobility and worse outside options more broadly. This suggests that land distribution can play an important role in wage bargaining. We also find evidence that political power is more concentrated in villages with fewer small farms. We find political leaders in these villages reduce workfare job provision but only during periods of agriculture demand. These results are surprising under the priors of a perfectly competitive market, where even large farms do not have the ability to set wages. However, in this setting, collusion across larger landowners based on caste networks has long been documented (Anderson, Francois, and Kotwal 2015). We find that this plays an active role in our setting, where elected officials share deeply entrenched caste-based networks with the largest landowners in their villages.

This paper relies on variation in land tenure within the princely state of Hyderabad, which encompassed much of modern day south central India, covering more than 72 million people as of 2025. While some areas were directly taxed by the erstwhile ruler (the *Nizam*), other areas were feudal estates (*Jagirs*) established primarily in the early 19th century. These areas, scattered across the state, never developed a land administration system and thus small farmers were unable to take advantage of land reforms in the 1950s which were made in response to a peasant revolution in 1947-48, focused on the exploitative nature of large landowners (Dhanagare 1974; Daily 2023) [1]. A survey of comparable villages on either side of the former feudal borders in 1954 found that small farmers were much less likely to get tenure in the formerly feudal areas (Khusro 1958). We georeference detailed maps from the colonial period to link regions of differential land tenure systems with modern-day administrative maps. We then compare present-day villages on either side of these borders in a spatial regression discontinuity framework, within narrow bandwidths (what we will refer to as "feudal" and "non-feudal"), exploiting variation *within* present-day administrative districts such that contemporary administrative quality is held constant and we are able to isolate village-level effects. We use publicly-available administrative data and data from our own primary survey from a subset of sampled villages to study a range of labor market and service delivery outcomes.

We first show that there are lasting and meaningful differences in the land structure across feudal and non-feudal areas, reflecting stickiness in land markets since the post-independence reforms in the 1950s (Bolhuis, Rachapalli, and Restuccia 2021). As of 2022, land parcels are larger in formerly feudal areas. In particular, the 10th percentile of landholdings in feudal areas is 16% larger than the 10th percentile of landholdings in non-feudal areas just across the border. However, there is no difference in landholdings at the right tail of the distribution: the 90th percentile across feudal and non-feudal areas holds similar amounts of land. Both the total size of cultivated area, and the number of landowners, in feudal and non-feudal areas is similar. This indicates that the distribution of landholdings is shifted to the right in feudal areas (particularly at the bottom of the distribution), and is more compressed. This evidence is consistent historical surveys showing small farmers in feudal areas were unable to register their land and thus that land got divided among larger farmers (Khusro 1958). We also find no differences in the stock or flow of land transactions across feudal and non-feudal areas, and find no differential movement of populations into or out of feudal regions over the previous three census rounds in aggregate and within population sub-groups. In order to test the validity of our spatial regression discontinuity design, we test it on a range of time invariant and geographic outcomes, and show that these vary smoothly at around the border.

One challenge in the literature on land reform is isolating the effect of land distribution from that of other institutions. The detailed nature of the spatial variation

[1] This movement is considered the antecedent to the Maoist movement in India which continued active violence well into the 2010s

in our setting allows us to compare villages that have been part of the same district-level institutions and economies for the past seventy years. Thus, we are able to interpret our results as primarily driven by the effects of relatively subtle differences in the contemporary distribution of landownership. Consistent with this, villages on either side of the border have similar aggregate levels of overall development and poverty once we account for fixed effects at the higher administrative jurisdictions.

We select over 2,000 villages from among the universe of about 20,000 villages in our sample area within the spatial RD bandwidth where we conduct a primary survey. These telephonic surveys are conducted with elected representatives and workers, collecting data on outputs (yield), as well as inputs (labor demand and wages). Importantly, the latter are disaggregated by task type, with a particular focus on the disaggregation of tasks by gender.[2] Moreover, we are always able to account for differences in crop choice and seasonality. We supplement analysis of this data with a range of publicly-available datasets on service delivery commonly analyzed by other paper in this literature.

We find that feudal areas have lower wages for agricultural laborers in general, but the magnitudes of these difference are large enough to support statistical significance only among female agricultural laborers. Females working on relatively more "unskilled" tasks are paid 8% lower wages in feudal areas than non-feudal areas that are separated by short distances on either side of border, and the difference in the treatment effects across genders is significant at conventional levels. [3] Importantly, we see these differences in the realized wages while seeing strong null effects on the labor demand and yield, indicating that the wage effects do not reflect differences in productivity or other aggregate differences in agricultural conditions across feudal and non-feudal areas. We also do not see any differences in aggregate labor demand that could explain these wage effects. We find that employers typically hire the same number of workers, in total and specifically on the gender-specific tasks on which we see wage effects. We also find that cultivation is equally productive in feudal and non-feudal areas. Notably, all our main results are always conditional on the crop and season, meaning the effects we find shut down any variation from the choice of crop and variation at the seasonal level.[4] Another influential strand of the literature suggests that larger land sizes may allow cultivators to build economies of scale and increase productivity, stimulating local economic activity that translates to better developmental outcomes (Foster and Rosenzweig 2022; Janvry et al. 2015). However, these concentration

[2]The key motivation for this granular focus is that agricultural labor markets are segmented by gender, among other cleavages (Brownstone 2025).

[3]Our preferred bandwidth is 20 kilometers, which should be expected to take roughly one hour on a bicycle to traverse, and is thus conceptualized by us as an arbitrageable distance.

[4]In general, we do not find significant differences in extensive margin crop choice. Regardless of feudal status, crop choice very similar at the border segment level, i.e. across either side of 25 km segments of the border, which is another level on which we define fixed effects following Moscona, Nunn, and Robinson 2020. There are 25 unique crops grown in our study region each season, but only 3.4 unique crops grown within a 25 km border segment.

effects likely only kick in at land sizes twenty five times greater than the median land holdings in our sample.

Our results are consistent with female workers having lower mobility and worse outside options than male counterparts, and thus being unable to exploit these wage differences over even very short distances. Women in this context face discontinuous costs around village borders, such that frictions in the labor market may be more binding for them (Cheema et al. 2024). While these constraints are intrinsically tied to social norms, we find somewhat similar effects for mobility constrained men as well. We test this by drawing on prior work on drivers of migration and arbitrage in rural labor markets in India (Jayachandran 2006a). In particular, we use variation induced by the roll-out of local bank branches, with the implicit assumption that villages that got access to a local bank branch earlier would be associated with men in those villages being less credit constrained and thus less dependent on the agricultural labor market. We find that men belonging to villages that got a local bank branch after 2000 – the median year of the roll-out in our sample – have larger wage markdowns. More concentrated land ownership allows these landowners to exert their monopsony power more effectively on those workers who are intrinsically tied to the conditions of the local labor markets.

Given the median village has hundreds of landowning farmers, it may be surprising that landowners can exert monopsony power at all. There are two factors that contribute to this market power. First, as discussed at length in Anderson, Francois, and Kotwal 2015 dominant castes dominate large landholdings and political power. In a sub-sample of our villages, we found 71% of village leaders were the same sub-caste (*jati*) as the top landowner in the village and 91% were connected to one of the top twenty. Second, due to crops being planted at different dates and maturing at different speeds, the number of farmers hiring labor on a given day is surprisingly limited. Muralidharan, Niehaus, and Sukhtankar 2023 show that exogenous improvements in the implementation of the workfare programs increase both wages and employment in the private labor market, consistent with the absence of perfect competition in rural labor markets that overlap with those in our study.

The political dominance of large landowners allows them to affect the implementation of the workfare program, a key feature of the landscape of the rural economy and the most credible outside option for agricultural laborers. Feudal areas have 45% fewer person-days of NREGS work annually, with that difference increasing to 71% in peak agricultural months and disappearing entirely in lean agricultural months. A natural concern with our wage results is that feudal areas have systematically different labor markets. Another test of this is in our non-peak NREGS results: demand for the workfare program is no different between feudal and non-feudal areas during fallow periods when landowners are not competing with the state's workfare program, indicating that the labor market is not compositionally any different, and the treatment effects we see in peak agricultural months are likely driven by the supply side.

We also find that formerly feudal areas have worse provision of the kinds of public services that might help poorer residents economically diversify. We find that the share of population with primary education in feudal areas is almost 2 percentage points lower. Access to government seed centers and agricultural extension is also worse in formerly feudal areas, since larger landowners presumably are not dependent on the state's provision of these resources.

Our work relates to several literatures. We contribute to a growing literature on monopsony power in labor markets (Felix 2024), with a particular focus on frictional land markets in agricultural settings (Deininger 2003). Our work pushes on finding historical roots for present-day market power, and pays special attention to specific sub-populations of workers who are most exposed to employer market power. In our setting, these happen to be unskilled female agricultural workers who have the worst outside options. We also relate to a literature on tenancy and land reforms in developing countries, discussing the tradeoffs involved between agricultural productivity and the efficiency of labor markets (Besley and Rao 2016; Banerjee, Gertler, and Ghatak 2002). In our setting, we do not see strong evidence of productivity or efficiency gains from larger average land parcels in feudal areas, but do see strong evidence of depressed wages for laborers.

Most directly, we contribute broadly to the literature on long-term effects of historical institutions (Smith 2020), with a specific focus on land ownership in the Indian context (Banerjee and Iyer 2005; Lee 2019; Batra 2024). Our first advance on this literature is better identification. We leverage regression discontinuities across many borders that no longer exist to identify the effect of historical institutions. Thus our estimates are less sensitive to geographic discontinuities across any specific border. Another advantage of the fine-level variation we leverage is that broad development outcomes such as overall poverty have largely converged, helping reveal the outcomes most effected by the persistent differences in land distribution.

We also contribute by focusing on detailed labor marked outcomes not covered by the existing literature focused on present-day service delivery, and the performance of last-mile elected bodies and bureaucracies. Even papers with finer spatial variation (Ratnoo 2024) focus broadly on welfare outcomes from administrative data, which tend to be universally worse, rather than isolating labor market effects. The primary contribution of this paper is highlighting the continued importance of land distribution for wages in rural India through large landowners control of social services and the wage setting process.

The rest of the paper proceeds as follows. In section 2, we discuss the institutional historical background. In section 3 and 4, we discuss the data and empirical strategy respectively. In section 5, we present the first-stage effects on land concentration, while in section 6, we discuss effects on the labor market. In section 7, we discuss effects on other service delivery outcomes. We conclude in section 8.

2 Institutional background

Within Hyderabad state a feudal land tenure and taxation system dating back to the 18th century was allowed to persist until 1949. While most of the land was directly administered and taxed by the *Nizam*, the leader of the Hyderabad presidency, a significant amount of agricultural land was controlled by nobles who were given land grants in exchange for aiding the *Nizam's* ancestors in 18th century battles (Figure 5). Even though Hyderabad state stopped fighting wars by the early 19th century, these fiefs persisted. In general, the boundaries of these fiefs do not coincide with any modern administrative boundaries which allows for a sharper focus on village level variation in institutions. Even the Hyderabad Princely state itself was divided up between three modern Indian states: Maharashtra, Karnataka, and Telangana.

There were broadly four types of feudal estates in princely Hyderabad: *Jagir*, *Samasthans*, *Paigas*, and *Sarf-i-Khas*. Similar to the feudal estates still present in modern Britain, the boundaries of these territories is largely the product of innumerable historical clashes between great families. *Samasthans* were ancient Hindu kingdoms pre-dating the *Nizam's* rise to power in the 1700s. These Hindu rulers were given a degree of feudal autonomy over many aspects of governance including taxation in exchange for helping the first *Nizams* consolidate power. The second type of feudal land was a *Jagir*. A *Jagir* was simply a tract of land whose public revenue was assigned to an individual in exchange for rendering some service to the state. In most cases this had to do with raising troops, but it was possible to be granted a *Jagir* for other services to the Nizam. These grants were often hereditary although sometimes an additional tax needed to be paid to maintain the *Jagir* across generations. The *Paiga* lands were hereditary lands given to a particular *Mughal* general in the early 1700s who was helpful in the first *Nizam's* military campaigns and later divided among his descendants. The final category of land was the *Nizam's* personal estates for the maintenances of his own family, the *Sarf-i-Khas*. These areas typically faced higher land rents and greater land concentration. One account suggests some *Jagirs* had 1,000 of acres and charged tenants 10 times the rents of non-feudal areas. As of 1949, 36% of the area, 34% of the villages, and 29% of the population of the Hyderabad presidency belonged to one of the three types of feudal estates (Khusro 1958: 2). For the purpose of our paper, we pool together *Jagirs*, *Samasthans*, *Sarf-i-Khas* and *Paigas*, since each of these is associated with a degree of feudal control awarded to local elites in the historical record. More importantly, these areas were not part of British advised revenue modernization efforts which included the development of land records and a land administration bureaucracy [5].

When India gained independence from the British in 1947, the Hyderabad presidency refused to join the Indian union and was invaded by the Indian army. At the same time the *Nizam* was facing an armed communist rebellion from peasants

[5] An additional issue is that visual differentiating *Jagirs*, *Samasthans*, *Sarf-i-Khas* and *Paigas* holdings in the primary historical map we use is challenging

opposing domination by the feudal landed gentry. Thus, when Hyderabad state was finally integrated into India, the abolition of the *Jagirdars* and land reform was an early priority. Notably, the peasant revolt became the roots of an armed maoist rebellion in rural Telangana that persisted until the 2000s. Although underpowered, we find no evidence that the formerly feudal areas have more political violence or are systematically more likely to elect left-wing politicians (Tables 14 15). There is some evidence that districts with more feudal land do have more maoist violence (Mukherjee 2021), but this wider regional variation would be controlled for in our primary regression discontinuity specification.

As written, the laws placed ceilings on land ownership levels and established protections for tenant farmers, expecting land titles to be transferred to those who had cultivated these lands in feudal areas for a period of six years leading up to the legislation. In practice, this was not implemented in earnest. As we discuss below, large shares of tenant farmers were eased off of the land they were cultivating, with ownership reverting to local elites. Importantly, the formerly feudal areas including the *Sarf-i-Khas* lacked a modernized revenue system with local revenue bureaucrats. Survey evidence from 1953 suggests farmers in former feudal areas faced more barriers accessing the tenure they were entitled to by the land reforms.

> "A significant degree of evasion is noticeable with respect to tenancy legislation and the law regarding ceilings on land. ... The tendency is for the smaller tenants to be more readily evicted than the larger ones and purchases of land have been undertaken more by the larger tenants than the smaller ones." (Khusro 1958: 167)

The same research surveys showed greater outmigration from the formerly feudal regions at the time of the reforms but also higher birthrates. Thus in the present day, these communities have roughly the same populations but have fewer households farming small landholdings.

Importantly, the boundaries of these feudal areas do not correspond to modern district or constituency boundaries, allowing us to isolate village level effects from other persistence channels that work through higher level institutions. This is a key difference in our setting relative to other work on colonial land tenure systems, wherein the variation resides primarily at the level of administrative districts, the borders of which are largely time-invariant. Instead, we look at fine village-level variation over very narrow geographic bandwidths of up to 20 kilometers on either side of the border.

3 Data

We procured land concentration data from a remote sensing company, who shared with us village-level indicators for our sample area across all three states.[6] We use a range of publicly available datasets to estimate treatment effects on service delivery outcomes, including the population censuses of 1991, 2001 and 2011; the economic censuses of 2005 and 2013, the socio-economic census of 2012; and a village-level report of basic infrastructure (called the Mission Antyodaya data set) from 2020.[7] In addition, we scraped data from the implementation monitoring portal of India's workfare program, the National Rural Employment Guarantee Scheme, detailing the take up and implementation quality in the villages in our sample area.

We also conducted a phone-based primary survey among village elected representatives and residents. This survey was conducted July 2024 - September 2024 among over 2000 respondents across study villages in the state of Telangana, focusing primarily on wages in agricultural labor markets. We stratify our sample across border line segments of 25 kilometers, which are also the level at which we include fixed effects in our main empirical specification listed below. Each survey is conducted with a member of the village elected body, and they are asked to report typical wages and other indicators summarizing labor market dynamics in their respective villages. The sample of villages covered in these phone surveys is shown in the map in Figure 6 and the sample is detailed Table 20. Each elected leader was asked to provide phone numbers of agricultural labors hired. We sampled a subset of these numbers to verify the accuracy of leaders reported wages (Table 7)

A novel aspect of our survey is that we collect wages separately by task and gender. In particular, we chose two common crop-agnostic agricultural tasks. For men, we asked about wages for fertilizer application. For women, we asked about wages for weeding. This disaggregated look at the agricultural labor market is novel relative to the vast literature on agriculture in India. This literature generally tends to consider agricultural laborers as a monolith, but in fact their reliance on these labor markets, what their outside options are, and what wages they are offered are all likely segmented by whether tasks are skilled and the gender of the workers.

[6] We never received access to land parcel or owner-level data. Instead, they were able to run our analysis codes on their raw data to generate village-level aggregate indicators of land concentration, and percentiles of landholding which we use in our primary analysis of concentration.

[7] These data sets were procured from the SHRUG repository Asher et al. 2021. For a subset of villages, we also obtained individual land ownership data with names.

Figure 1: Georeferencing

This figure shows our georeferencing of a historical map depicting different land tenure systems in princely Hyderabad.

4 Empirical strategy

We georeferenced maps from the National Archives of India, drawn by the Superintendent of the Revenue Survey and Settlement of the Hyderabad Presidency in 1854. This georeferencing allows us to delineate territories that belonged to *Jagir*, *Samasthans*, and *Paigas* vs. *Diwan-i-Khas*, i.e. feudal and non-feudal areas respectively, at the time of Indian independence. Since georeferencing is inherently laden with some degree of measurement error, we employ a "donut-hole" design in our main specification, omitting all units of observation 2 kilometers on either side of the border. We present our georeferenced study areas in figure 1, with the original map in figure 5 and the extent of our study area relative to the entire country in figure 8.

We follow Dell 2010; Moscona, Nunn, and Robinson 2020 in implementing a

spatial regression discontinuity design. Our preferred specification uses modern 2022 district fixed since we use them in the outcome regressions to isolate the effects of village level institutions. The pre-independence 1931 districts correspond much more closely to the feudal areas and thus shut down the variation as expected. The preferred specification also includes a distance control mirroring the standard RD specification. In particular, this is the specification used in Moscona, Nunn, and Robinson 2020 who follow Gelman and Imbens 2019. We test a wide variety of different definitions of land concentration.

Our core specification is as follows:

$$Y_{id} = \beta_1 \text{Feudal}_{id} + \beta_2 \text{Distance}_{id} + \beta_3 \text{Distance}_{id} * \mathbb{1}_{Feudal_{id}=1} + \beta_4 X_{id} + \gamma_i + \varepsilon_i$$

where Y_i is a land concentration or outcome variable of interest; Feudal_{id} is an indicator for whether a village i in district d was historically in a *jagir* or feudal area; Distance_{id} is the distance for village i in district d to the historical border separating feudal and non-feudal areas, positive for feudal areas and negative for non-feudal areas; $\text{Distance}_{id} * \mathbb{1}_{Feudal_{id}=1}$ is Distance_{id} censored at 0; X is a vector of controls, including the soil and ruggedness variables that we find are also (weakly) discontinuous at the boundary; and γ_i indicates fixed effects for the nearest line segment, where the border between feudal and non-feudal areas is split into segments of 25 kilometers each. We use robust standard errors.

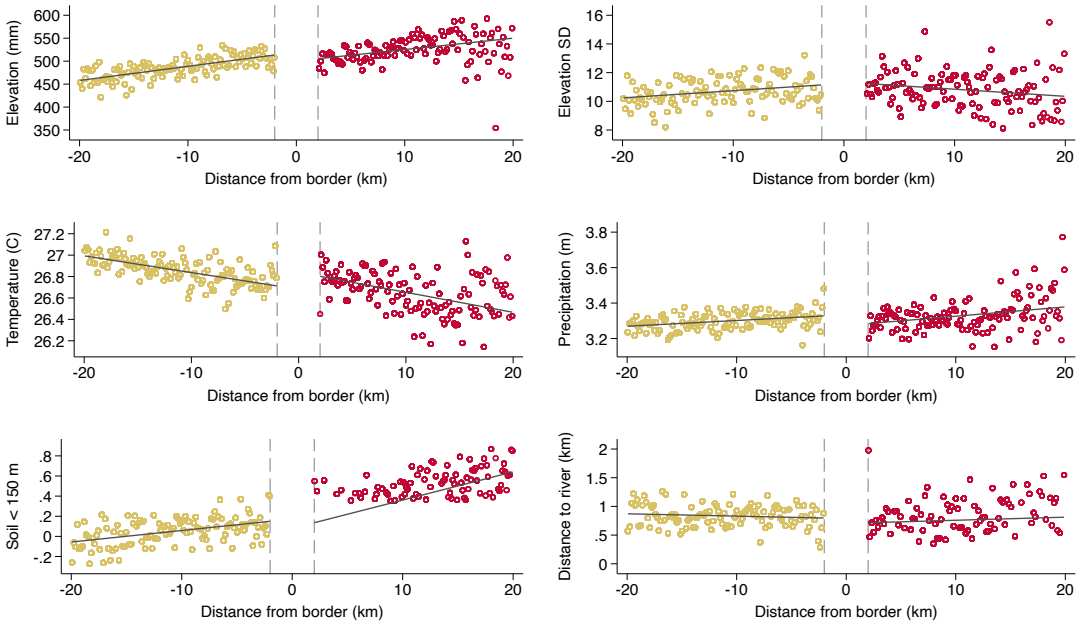
For each unique data source (census, Mission Antyodaya, DHS, NREGS), we attempt to define geographic units separately and estimate distances from the border separating feudal and non-feudal areas, as well as identifying which line segment they are closest to and which present-day district they belong to. This process minimizes the need to create crosswalks across different data sources, as each strand of analysis is fully self-contained.

In figure 2, we present tests of continuity at the border for a range of variables to establish balance. This establishes broadly that most geographic features and time-invariant characteristics of feudal and non-feudal areas vary continuously across the threshold in our bandwidth of interest. Our results remain robust to the inclusion of these variables where appropriate.

5 Effects on land concentration

We focus first on the effects on land concentration. In table 1, we show the treatment effects on a range of land concentration measures, following our primary specification. In columns 1 and 2, we show that treated areas do not have significantly different normalized Herfindahl-Hirschmann Index or GINI indicators

Figure 2: Balance tests on RD specification



This figure shows RD plots from our key specification for a range of geographic and demographic variables to establish balance.

for landholdings. In columns 3 and 4, we report that the pareto shape parameters for the (80-20) and (90-10) splits are both 4% and 3% higher respectively in treated areas. In column 5, we report a novel indicator, the logged difference between the 10th and 90th percentiles as a multiple of the 10th percentile. We find that this indicator is 7% smaller in treated areas, suggesting that the distribution of landholdings is more compressed in treated areas. Overall, we do not see consistent effects on *aggregate* measures of land concentration, though we have suggestive evidence of a more compressed distribution of landholdings in treated areas. Importantly, however, these measures mask differential impacts *across* the distribution of landholdings in both treatment and control areas.

In table 2, we show the treatment effect on key points of the (logged) landholdings distribution in our sample. The first percentile of landholdings in treatment villages is 23% higher than control villages. This effect dampens to being only about 5% for the 75th percentile, but attenuates fully at the very top of the distribution such that the 90th and 99th percentiles across treatment and control villages are not statistically significantly different in magnitude. We also show this dampening in the treatment effect over the distribution of (logged) landholdings in figure 3, and the RD plot on four points of the distribution in figure 4.

Feudal areas see larger land parcels at the left tail of their distribution: the smallest land parcel in feudal areas is approximately 15% larger than the smallest land parcel in non-feudal areas (figure 3). In figure 4, we validate our basic regression discontinuity specification. While there is a sharp discontinuity at the border

	Land concentration measures					
	Norm HHI	GINI	Pareto 80 : 20	Pareto 90 : 10	Ln$\frac{p90-p10}{p10}$	Class HHI
Feudal	-0.001	-0.010	0.019***	0.018***	-0.173***	0.028***
	(0.002)	(0.007)	(0.005)	(0.005)	(0.039)	(0.009)
Non-feudal mean	0.016	0.168	0.450	0.598	2.580	0.466
F-stat	0.161	14.464	10.600	13.034	20.014	4.890
R^2	0.13	0.94	0.37	0.34	0.30	0.30
Observations	9836	9841	9841	9841	9834	9841

Table 1: Aggregate land concentration

This table shows results from our primary specification on a range of land concentration measures. In column (1), we show the effects on a normalized Herfindahl-Hirschmann index for land ownership. In column (2), we show the effects on the GINI index. In columns (3) and (4), we show the Pareto shape parameters for 90-10 and 80-20 splits. And in column (5) we show an intuitive measure of the spread between the 10th and 90th percentile as a share of the 10th percentile. All indicators are created using raw land parcel level data procured from a remote sensing company. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

	Percentiles of landholdings in hectares						
	1st	10th	25th	50th	75th	90th	99th
Feudal	319.648**	1685.451***	3138.052***	3832.719***	3605.519***	-540.583	3897.611
	(125.107)	(347.242)	(633.414)	(940.856)	(1169.158)	(2454.059)	(1.2e+04)
Non-feudal mean	1907.003	7631.200	16175.167	31626.314	52723.627	80647.307	199877.383
R^2	0.29	0.40	0.43	0.45	0.45	0.15	0.13
Observations	9749	9741	9743	9750	9760	9754	9758

Table 2: Differences in the distribution of landholdings

This table shows results from our primary specification on percentiles across the distribution of logged landholdings in our study regions. All indicators are created using raw land parcel level data procured from a remote sensing company. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

when comparing the 1st percentile, the effect dampens somewhat for the 25th percentile, and diminishes markedly for the 75th percentile while disappearing at the right tail of the distribution. This pattern is consistent with the history of this period. The abolition of the *jagirdari* system was implemented imperfectly at best, and seemed to lead to the easing out of smaller tenants disproportionately in feudal areas.

Evidently, as has been documented elsewhere in India the small farmers that received land tenure in non-feudal areas retained their holdings leading to a persistent difference in the number of small farmers between feudal and non-fuedal areas. In the next section, we test how these differences translate to key development outcomes, the implementation quality of arterial public programs, and local labor markets.

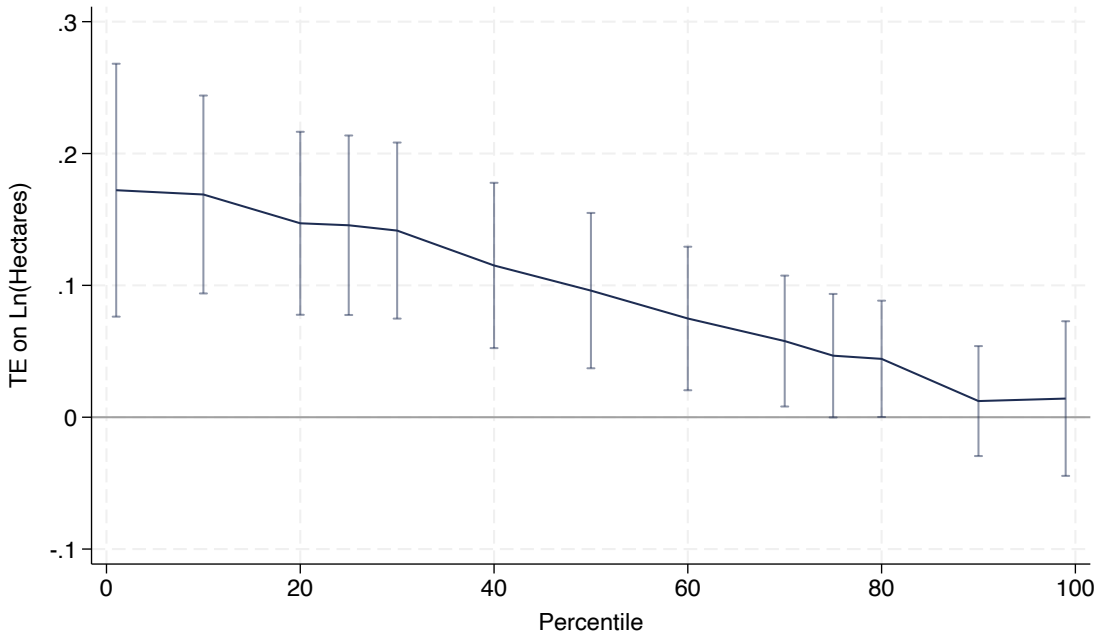


Figure 3: Treatment effects on logged landholdings across distribution

This figure plots the point estimates and 95% confidence intervals from our main regression specification, showing how the differences in landholdings across feudal and non-feudal areas are most pronounced at the left tail of the distribution and taper towards zero towards the right tail.

6 Effects on village labor markets

We conducted detailed wage surveys with village elected leaders in our sample, carefully distinguishing between task and gender combinations. Focusing on these differences in wages is crucial, since agricultural labor markets are not uniform. Wage levels across villages differ by the skill level involved, and we use the task and gender to distinguish between these. In table 3, we report results from outcomes at the village - crop - season level. Each survey respondent is asked to report both peak and typical wages for both male and female tasks, for the primary and secondary crops across the two most recent agricultural seasons. This allows us to apply fixed effects at the crop and season level in our main regression discontinuity specification. We find that while wages are lower in feudal areas across the board, the magnitudes of the differences are much larger and statistically significant among females: women in feudal areas earn an average of 8% lower for the same task on the same crop in the same season in feudal areas, relative to non-feudal areas.

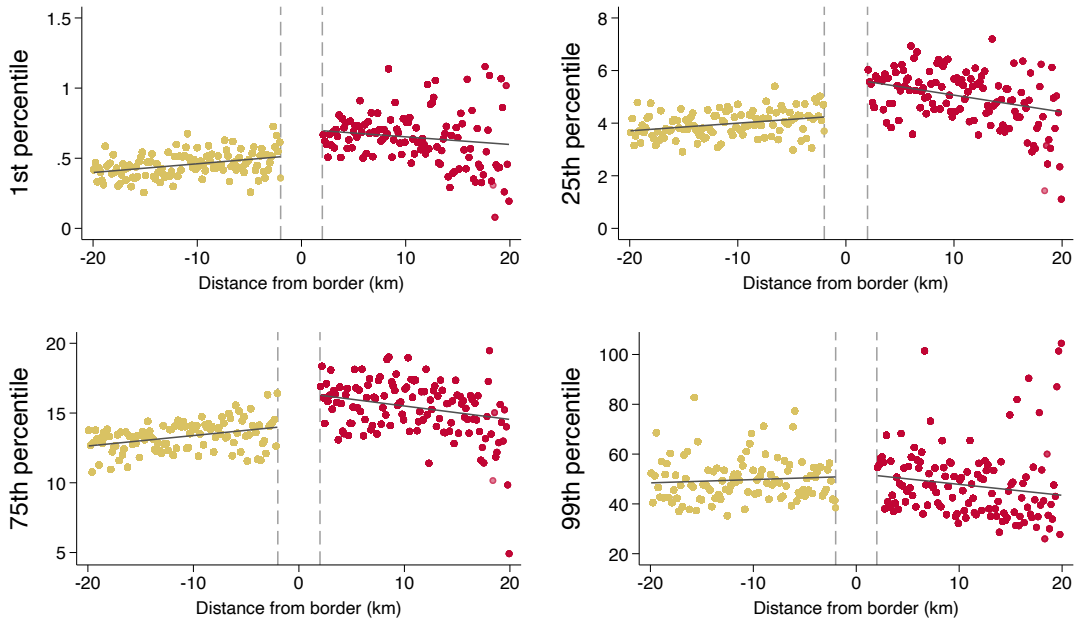


Figure 4: Regression discontinuity plots along landholding distribution

This figure shows RD plots from our key specification for four points along the landholding distribution.

Table 3: Wages for agricultural labor

	Peak male fertilizer		Peak female weeding		Avg male fertilizer		Avg female weeding	
		Ln		Ln		Ln		Ln
Feudal	-13.738	-0.021	-25.939***	-0.067***	-6.334	-0.008	-17.453**	-0.055**
	(10.707)	(0.022)	(9.879)	(0.025)	(9.847)	(0.021)	(7.432)	(0.024)
Non-feudal mean	524.630	6.235	371.358	5.854	475.762	6.128	294.371	5.631
Male vs. Female p-value			0.349	0.067			0.285	0.062
R^2	0.40	0.33	0.53	0.51	0.52	0.47	0.53	0.53
Observations	6935	6935	7313	7313	7603	7603	7792	7792

This table shows results from our main specification on wage data that we collected in our phone survey with a sample of 2000 respondents in our study area. Within each outcome, the first column reports the absolute wages in INR and the second column reports logged wages. Each regression is at the level of a village-crop-season combination, with crop and season fixed effects and standard errors clustered at the village level. The surveys ask both the peak and typical wages for each task-gender combination listed. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

Women in these settings tend to have limited mobility. These mobility constraints may have discontinuous impacts along the village or neighborhood border Cheema et al. 2024 [8]. These mobility constraints faced by women may allow them to be disproportionately more exposed to local monopsony power in these

[8]Cheema et al. 2024 show that rural women in Pakistan are four times as likely to visit a training center when they are based in their own village, with over half the penalty incurred upon crossing the village border. Field and Vyborny 2022 increased women's job search in Pakistan by providing a women-only transport service to and from work. Among rice transplanting women in Telangana, 47% report their husbands would not approve of them working outside their village including neighboring villages Brownstone 2025

labor markets. While the incidence of this monopsony may have reflected in lower wages even for male workers in contexts where male workers also faced constraints on mobility and migration, either due to travel costs or credit frictions Jayachandran 2006a[9].

Is this level of monopsony power reasonable? One approach following Muralidharan, Niehaus, and Sukhtankar 2023 is to compare the markdown to benchmarks in the literature. In Appendix 9.1 we place our results on wages and land concentration in a standard model of oligopolistic competition to calculate markdowns. This procedures highlights that to quantitatively reconcile the results workers in feudal areas need to have worse outside options which we provide evidence for below. We estimate workers receive 84% of their marginal product in feudal areas and 77% in non-feudal areas. To contextualize, a review by Sokolova and Sorensen (2021) estimating elasticities across many global labor markets finds an average elasticity of 7.1, implying that workers receive 88% of their marginal product, with a 95% confidence interval from 64% to 93%. Thus, the markdowns we estimate are well within the global range.

A natural concern following these results is that feudal and non-feudal areas have different labor demand levels and/or different productivity. In the survey, we asked representatives to detail the labor demand (in person-days) across all tasks for the primary and secondary crops in the most recent agricultural season for a typical 10 acre plot in their villages. We find no effects on the total labor demand, or the demand specifically for the tasks that we find the wage effects on. We similarly elicit the yields per acre for the primary and secondary crops across the two most recent seasons, as well as the acreage in the entire village dedicated to planting the crops. Across all of these outcomes, we find no significant differences across feudal and non-feudal areas despite deploying the same specification as in the wage result.

Table 4: Labor demand

	Total	Task-specific	
		Male (fertilizers)	Female (weedeing)
Feudal	-20.680	2.520	-2.211
	(24.848)	(4.274)	(9.456)
Non-feudal mean	213.800	27.758	70.212
R^2	0.17	0.16	0.12
Observations	2393	2053	2053

[9]We currently lack historical data on male wages to evaluate these effects.

Table 5: Productivity

	Yield		Planting acres	
		Ln		Ln
Feudal	-7.789	-0.079	-82.174	0.114
	(6.255)	(0.058)	(136.365)	(0.110)
Non-feudal mean	107.767	4.426	773.851	5.883
R^2	0.56	0.50	0.25	0.46
Observations	4610	4557	7036	6975

We additionally collect information on a range of variables characterizing the aggregate labor markets in rural areas, including the total number of households, the number of employers, workers, and migrants. We find no systematic differences across feudal and non-feudal areas in the size of thickness of the labor markets, as reported in table 18, reinforcing the explanation that any differences in wages are likely downstream of differential monopsony power. We also do not find differences in the number of land transactions in feudal areas, reflecting the stickiness in land markets in this setting.

A key determinant of rural labor market dynamics in this setting is the availability of outside options for workers. We see that the effects of land concentration on wages extend to men in labor markets where they have limited outside options. First, we leverage variation in the roll-out of bank branches which prior literature showed decreased labor supply elasticity dampening wage responses to agricultural productivity shocks (Jayachandran 2006b). Credit access likely improves the range of economic opportunities available in a village over time. Notably, much of the work on bank branch expansion in India focuses on district level variation which we control for. In villages that got bank branches later opportunities we observe wage markdowns for men as well as women (Table 6). This result highlights the role women's lack of outside of opportunities likely play in our main results.

Table 6: Heterogeneity by Bank Access

	Ln Female weeding wages		Ln Male fertilizer wages	
	Peak	Avg	Peak	Avg
Feudal	-0.038	-0.059**	0.019	0.038
	(0.032)	(0.029)	(0.027)	(0.026)
Post 2000 bank	-0.017	-0.056*	0.063*	0.047
	(0.039)	(0.033)	(0.034)	(0.031)
Feudal × Post 2000 bank	-0.030	0.020	-0.078**	-0.097***
	(0.047)	(0.039)	(0.039)	(0.037)
Non-feudal mean (logged)	5.857	5.629	6.241	6.132
Non-feudal mean (INR)	371.524	293.657	527.197	477.239
R^2	0.52	0.56	0.34	0.48
Observations	3499	3733	3301	3634

In table 7 we present a range of outcomes related to NREGS, the rural workfare program that provides a statutory guarantee of 100 days of paid work every financial year to at least one member of any household who seeks it. A vast literature on NREGS shows that demand for this work is high across rural areas and implementation varies substantially (Imbert and Papp 2015). In our setting, NREGS implementation quality serves as a test of how healthy agricultural laborers' outside options are. Muralidharan, Niehaus, and Sukhtankar 2023 show that improving the quality of NREGS implementation drives up households' earnings by 14%, but that 86% of these gains come from increases in real wages *and* employment in the private agricultural labor market. This is reflected in increases in workers' reservation wages. In their setting, these effects on the private agricultural labor market are accentuated in villages where land ownership is more concentrated, suggesting that these labor markets are operating under monopoly power in the status quo prior to the improvement in NREGS implementation quality.[10] In column (2) of table 7, we show that feudal areas, where landownership is more concentrated, has 42% fewer active NREGS job cards, even thought the number of registered job cards is (noisily) similar. In column (3), we show that the number of households employed in NREGS on the extensive margin is 58% lower, and the total person-days employed in feudal areas is 67% lower. These effects point to depressed NREGS implementation quality in feudal areas overall. These results could plausibly be explained by those with monopoly power in agricultural labor markets being able to exert influence on local elected bodies to constrain workers' outside options. The fact that the effects only appear during the peak agricultural months (Table 8) is evidence that the withholding of days may be strategic [11]. This is also consistent with Anderson, Francois, and Kotwal

[10] Muralidharan, Niehaus, and Sukhtankar 2023 is based on a large-scale RCT in the undivided state of Andhra Pradesh, which neighbors (and minimally overlaps with) our study sample.

[11] While there are many pathways to strategically decrease NREGA provision by slowing projects it is difficult for local officials to strategically increase NREGA provision through new projects (Muralidharan, Niehaus, and Sukhtankar 2016)

2015, who evaluate a workfare scheme in Maharashtra which was a precursor to the nationwide NREGS.

Table 7: NREGS implementation: registration and household-level access

	Job cards		Households employed	
	Ln(Registered)	Ln(Active)	Ln(Total)	I{Any for 100 days}
Feudal	-0.568***	-0.741***	-1.386**	-0.508**
	(0.206)	(0.259)	(0.554)	(0.210)
Non-feudal mean (logged)	6.830	5.061	4.560	.
Non-feudal mean (raw)	1265.480	270.067	199.131	0.497
R^2	0.58	0.66	0.67	0.27
Observations	4890	4908	4818	4960
No. of villages	4739	4774	4694	4795

This table shows results from our main specification on NREGS implementation outcomes in 2023, using data scraped by us from the NREGS portal. Columns (1) and (2) depict the total number of registered and active NREGS job cards respectively. Columns (3) and (4) depict the number of households that received any work through NREGS and the number that received the statutory guarantee of 100 days of work, respectively. Column (5) depicts the total person-days of work provided. Regressions control for the total number of households as reported in the Mission Antyodaya 2020 data. Standard errors are robust. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

Table 8: NREGS implementation: log person days per month

	Annual		Peak ag months		Lean ag months	
Feudal	-0.719**	-0.711**	-0.799**	-0.817**	-0.180	-0.179
	(0.340)	(0.340)	(0.360)	(0.364)	(0.256)	(0.255)
Non-feudal mean (logged)	5.543	5.543	5.209	5.209	6.634	6.634
Non-feudal mean (raw)	669.463	669.463	465.784	465.784	2003.883	2003.883
Year FE		✓		✓		✓
R^2	0.58	0.59	0.53	0.55	0.57	0.59
Observations	49228	49228	48656	48656	43042	43042
No. of villages	6003	6003	6003	6003	5978	5978
No. of years	9	9	9	9	9	9

This table shows results from our main specification on (logged) NREGS person-days in the period 2016 - 2023, using data scraped by us from the NREGS portal. Columns (1) and (2) depict the total number of person-days at the monthly level. Columns (3) and (4) depict the number of person-days in peak agricultural months. Columns (5) and (6) depict the total person-days of work provided in lean agricultural months. Regressions have year fixed effects when indicated, and standard errors are clustered at the village level. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

Beyond NREGA, we find a number of systematic differences in village public goods provision across feudal and non-feudal areas. These even translate to notable differences in educational attainment despite these regions similar levels of per-capita consumption. In table 9, we report using census data that those

in feudal areas are 3% less likely to have attained primary and middle school. Among both adults and children, feudal areas demonstrate long-run differences in health and education outcomes. These are also reflected in present-day access to health and education infrastructure. In table 10, we report that feudal areas are 88% less likely to have middle schools, and are 91% farther away from primary and community health centers. Notably, education is important for facilitating workers outside labor market options so landed elites may have interest in suppressing its provision.

Table 9: Aggregate education levels

	Share of population with ... or above		
	Sec school	middle school	primary school
Feudal	-0.004	-0.009*	-0.016**
	(0.004)	(0.005)	(0.006)
Non-feudal mean	0.187	0.294	0.491
R^2	0.46	0.47	0.38
Observations	9153	9153	9153

This table shows results from our main specification on educational attainment outcomes, as reported in the 2011 population census. Standard errors are robust. $*\quad p < 0.1, **\quad p < 0.05, ***\quad p < 0.01$

Table 10: Health and education infrastructure

	School in village	Distance to ... (km)		
	Primary	Non-primary	PHC/CHC	Hospital
Feudal	-0.000	-0.549***	3.948**	2.324
	(0.025)	(0.203)	(1.969)	(2.884)
Non-feudal mean	0.973	0.579	4.299	6.821
R^2	0.18	0.23	0.22	0.26
Observations	5062	5062	5062	5062

This table shows results from our main specification on educational attainment outcomes, as reported in the 2020 Mission Antyodaya dataset. Column titles explain the construction of variables. SSC stands for senior secondary school. PHC and CHC stand for primary health center and community health center respectively. Standard errors are robust. $*\quad p < 0.1, **\quad p < 0.05, ***\quad p < 0.01$

7 Alternate Explanations

One concern is that despite survey reports of similar labor demand, differential agricultural investments lead to different agricultural productions functions in

feudal and non-feudal areas. The lower wages could simply be a result of lower labor productivity. While we do find evidence of weakly lower investments in agricultural equipment and irrigation these differences are not large enough to explain the wage-gap and likely reflect differential provision of agricultural public goods. Using data from the 2012 SECC, we find that feudal areas have a 2 percentage points smaller share of households reporting that their agricultural fields are using any mechanized inputs, and a 2 percentage points smaller share of land irrigated overall (table 11). We also find that feudal areas are less likely to have seed centres and fertilizer shops, which are fundamental sources of support for farmers, aiding them with subsidized inputs as well as information on agricultural best practices (table 13). Feudal areas are also directionally less likely to have soil testing programs and agricultural cooperative societies, though these effects are not significant by conventional standards of statistical significance. In our surveys, we elicit from GP heads information on how many households in their GPs own tractors and have made investments greater than INR 1 lakh (USD 1200) on their land. We do not see any systematic or statistically significant differences across feudal and non-feudal areas (table 12).

These differences in inputs and the quality of agricultural investments have modest impacts on yields themselves, as discussed previously in table 5. While we lack the ability to establish mechanisms for these results conclusively with individual level landholding-linked data on agricultural inputs or yields, we contend that these aggregate effects on agricultural outcomes mask substantive distributional differences that are downstream of land concentration. Larger landowners have the ability to drive higher mechanization in their own fields given economies of scale (Foster and Rosenzweig 2022). At the same time, smaller landowners in these areas may be less able to invest in mechanization if they are closer to subsistence, and public goods that are meant to support cultivation may be weaker in these areas as a result of elite capture. The most important take-away from these results is that the feudal areas are not more productive than the non-feudal ones as a result of their land concentration nor are the productivity differences large enough to explain within season and within crop wage gaps.

Table 11: Investments in agriculture

	Agricultural equipment			Share of total land that is		
	Any	Mechanized	Irrigation	Irrigated	Irrigated for 2 crops	Unirrigated
Feudal	-0.024*	-0.013	-0.019	-0.020**	-0.140*	-0.513
	(0.013)	(0.018)	(0.017)	(0.010)	(0.085)	(0.498)
Non-feudal mean	0.938	0.854	0.884	0.409	1.468	2.795
R^2	0.06	0.18	0.08	0.23	0.06	0.03
Observations	9281	9281	9281	9079	9145	9145

This table shows results from our main specification on a range of outcomes denoting the use of agricultural inputs as reported in the SECC (2012). In columns (2) and (3) we use binaries for whether the village uses mechanized or irrigation equipment respectively, and column (1) equals 1 if they use either. Column (4) reports the share of land that is irrigated, while column (5) reports the share irrigated for 2 crops and column (5) denotes the share of unirrigated land. Standard errors are robust. $*$ $p < 0.1, **$ $p < 0.05, ***$ $p < 0.01$

Table 12: Investments in agriculture

	Households with tractors	Households with investments ≥ INR 1 lakh
Feudal	1.468	-2.722
	(3.152)	(3.232)
Non-feudal mean	25.033	18.841
R^2	0.10	0.15
Observations	2350	2334

This table shows results from our main specification on the number of households that own tractors and the number of households that have made investments of greater than INR 100,000. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

Table 13: Agriculture infrastructure

	Ag infrastructure			Water infrastructure		Other
	Seed centre	Fertilizer shop	Soil testing	Watershed	Rainwater harvesting	Ag coop society
Feudal	-0.300*	-0.408**	-0.119*	-0.005	-0.344	-0.197
	(0.159)	(0.202)	(0.070)	(0.178)	(0.309)	(0.318)
Non-feudal mean	0.127	0.276	0.057	0.302	0.507	0.387
R^2	0.22	0.26	0.23	0.26	0.32	0.31
Observations	5062	5062	5062	5062	5062	5062

This table shows results from our main specification on a range of outcomes denoting infrastructure supporting agricultural practices as reported in the 2011 population census. Columns (1), (2) and (3) report binaries for the presence of a center to buy subsidized seeds, a shop for subsidized fertilizers, and a soil testing center respectively. Columns (4) and (5) denote whether there is a watershed or rainwater harvesting infrastructure available. Column (6) denotes whether the village has an agricultural cooperative society. Standard errors are robust. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

One concern with our results is that changes in the composition of the population and differential migration may be linked to the quality of service delivery. If differential land concentration and agricultural labor market activity pushes certain types of households out of feudal areas, we might expect lower demand for key government programs, affecting the quantity and quality of their delivery. There is some evidence of differential migration in the early years of the reform:

> "There has been a marked tendency for families to leave ex-*jagir* villages and such an exodus has accounted for a reduction in families by 8.6% in these villages" (Khusro 1958: 170)

We address this concern in two ways. First, we normalize indicators by population (either in per capita terms or in terms of the total number of households) where appropriate. Second, we evaluate long-term population trajectories in our study areas, comparing inflows and outflows in feudal and non-feudal villages. We show trends for the overall population in figure 9, and trends specifically for working age population in figure 10. These results suggest that differences by population, both overall and working age, are relatively stable over the course of 1991 and 2011 as reported in three rounds of the population census. The historical literature suggests that the period immediately following the land reform

legislation saw movement out of feudal areas, but there has not been meaningful *additional* movement in the last four decades. This is consistent with a broader literature that finds frictions in agricultural labor markets constraining worker mobility across space and sectors Emerick K. and M. 2022.

8 Conclusion

In this paper, we evaluate the long-run effects of historical differences in land tenure systems in princely Hyderabad, and the flawed application of land reform legislation in this region in the post-colonial period, on a range of rural service delivery outcomes as well as agricultural labor markets. We show that land concentration levels remain persistently elevated more than 100 years later in regions where land parcels were gifted to local elites. These areas also demonstrate poorer service delivery outcomes on a range of health and education variables.

Moreover, we find significant evidence of elite capture and monopsony power in rural labor markets. We find that these regions have worse implementation of the arterial workfare program, meant to provide an outside option for primarily landless agricultural laborers. Scuttling the implementation of this workfare program allows large landowners in feudal areas to sustain dramatically lower wages for agricultural workers in their own lands. The wage markdowns are significantly worse for workers with even poorer outside options owing to constraints on their mobility: in our setting, these are women working on unskilled tasks.

Our work extends recent advances in our understanding of monopsony as well as elite capture in rural labor markets, and highlights the importance of persistent land distributions in understanding the long run effects historical institutions on development.

9 Appendix

9.1 Model

Empirical evidence indicates that although overall labor supply and demand in feudal and non-feudal areas are similar, the composition of workers' outside options differs. There are two channels we explore. First, in non-feudal the greater number of small farms makes collusion in wage setting more difficult, whereas in feudal areas the number of small farmers is lower, so farmers are more able to collude to restrict labor demand and drive up wages. We show in simple ogliplistic framework the difference in land concentration alone is unlikely to generate the wage difference we observe. However, allowing the labor supply elasticity to be lower in feudal villages, relfecting the reduced NREGA provision, rationalizes our results with other estimates of labor supply in this setting.

Ologiplistic wage setting is very natural in agricultural labor markets since farmers know the landholdings and crop choices of their neighbors and thus labor demand to a first approximation. Firms knowing other firms labor demand and optimzinig accordingly is the core assumption for oligopilistic models of the labor market.

In this model firms are chosing employment to maximize revenues.

$$\max_{L_i} R(L_i) - w(L + L_i^*)L_i$$

The intuition in our case is farmers are choosing labor with an understanding of how their labor demand will effect wages because they know other farmers labor demand.

The first order condition of each firm leads to the markdown of:

$$\frac{MRP - w}{w}$$

The key intuition here is that larger farms MRP curves are shifted to the right as they are able to derive more revenue per given level employment. Note that it is still true the marginal worker is more productive on a small firm than a large farm due to diminishing marginal returns. The idea is simply they diminish less steeply the more land a farmer has. Thus the more large farms are in a village the greater the wage markdown.

Note that the MRP translates directly to the employment share of each firm i conditional on the labor supply elasticity

$$\frac{MRP_i - w}{w} = \varepsilon^{-1}\left[\sum_i^n \left(\frac{L_i}{L}\right)^2\right]$$

Notably this is different from the raw HHI in land for two reasons. First, this should be the HHI in labor shares and since small farms use a much greater share of family labor the HHI in land doesn't capture this well. Secondly, larger fields do not operate as individual firms. There is evidence farmers of the same caste work together to restrict hiring to push down wages and optimize profits so these cast groups can be better conceptualized as one firm.

Rather than using individual farms we use land size categories, adapted from the agricultural census, as an approximation for caste groups. In particular, we use cutoffs c of 0.5, 1, 2 ,3, and 4 hectares. Then the markdown becomes:

$$\frac{MRP - w}{w} = \varepsilon^{-1} \left[\sum_{c}^{5} \left(\frac{L_c}{L} \right)^2 \right] = \varepsilon^{-1} H$$

Thus when the employment is more concentrated among the large farmers H increases and the markdown is bigger.

If we assume the labor supply elasticity is the same in feudal and non-feudal areas focusing on the effect of land concentration we get the following system of equations:

Non-Feudal:

$$\frac{MRP - w}{w} = \varepsilon^{-1} H$$

Feudal

$$\frac{MRP - w'}{w'} = \varepsilon^{-1} \alpha^{-1} H'$$

We can then solve for ε by equating the MRP

$$\varepsilon = \frac{wHHI - w'HHI'}{w' - w}$$

We can take w, w', H, H' from our data. w, w' are simply the wages at the discontinuity for feudal and non-fuedal areas. H, H' are the categorical versions of the HHI in feudal and non-feudal area. However, the results ε of -0.1082 is infeasible.

The second channel land concentration effects workers wages is through large landowners control of local governments. The large landowners are able to reduce workers access to the government workfare scheme which provides a credible outside option. This can be thought of as reducing workers labor supply elasticity ε by a multiplier $\alpha < 1$ further increasing the markdown on wages.

We now have a system of two equations describing wages in the feudal and

non-feudal areas. Non-Feudal:

$$\frac{MRP - w}{w} = \varepsilon^{-1} H$$

Feudal

$$\frac{MRP - w'}{w'} = \varepsilon^{-1} \alpha^{-1} H'$$

Now rather than solving for ε we can take ε as the 3.07 estimated in Muralidharan, Niehaus, and Sukhtankar 2023 and solve for α that rationalizes are data.

$$\alpha = \frac{wHHI - w'HHI'\varepsilon^{-1}}{MRP - w'}$$

$$\alpha = \frac{wHHI - w'HHI'\varepsilon^{-1}}{wHHI\varepsilon^{-1} + w - w'}$$

The resulting value for α, .73, suggests that labor supply elasticity is 27% lower in-feudal villages which provide 70% fewer NREGA person days during the peak agricultural season. This value aligns with the limited literature exploring the sensitivity of labor supply elasticities to outside options. **cadeolsen** estimate and α of .53 with the elasticity ride-hailing firms decreases from 1.5 to .8 when workers have no outside firm option.

9.2 Figures

Figure 5: Map of Hyderabad Princely State Showing Different Tenure Systems

Figure 6: Phone survey sample

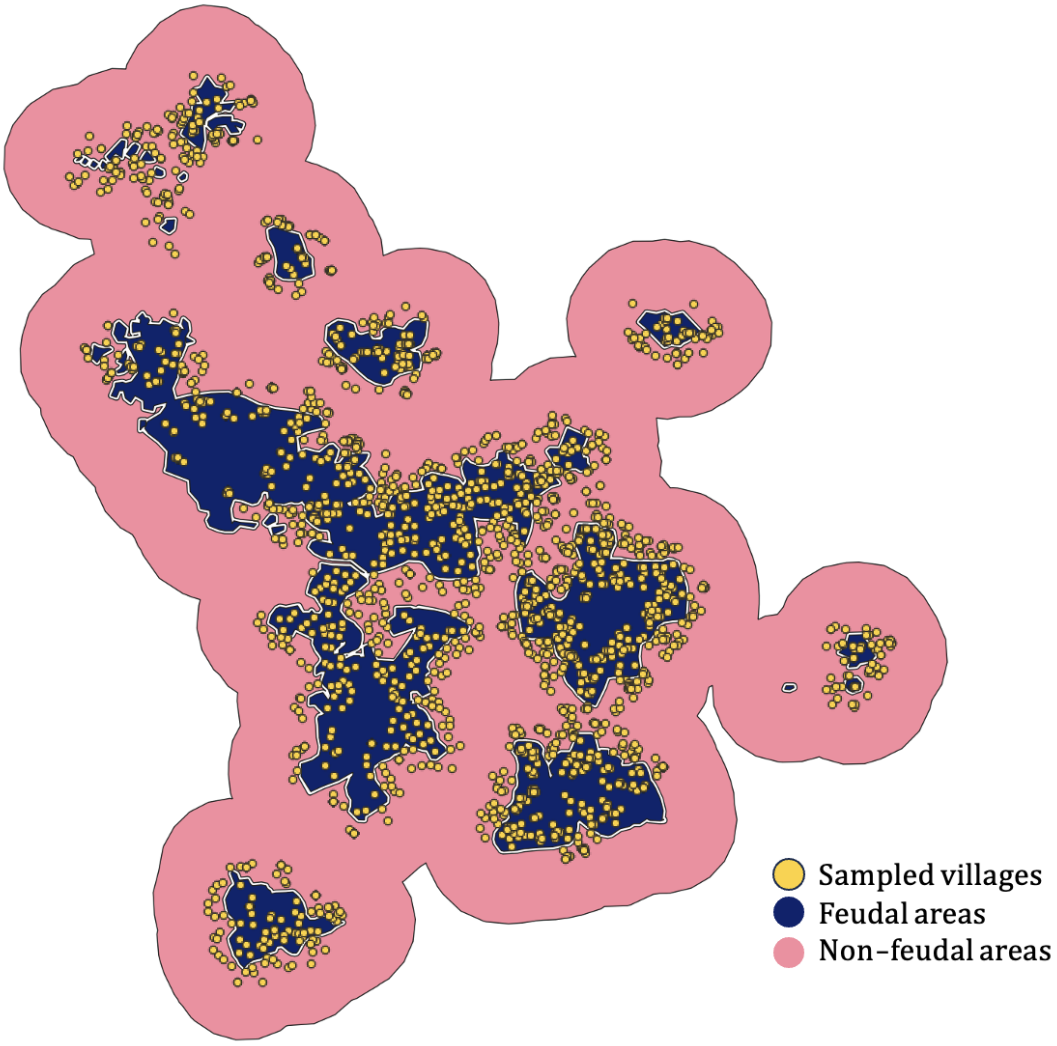


Figure 7: Accuracy of Wages

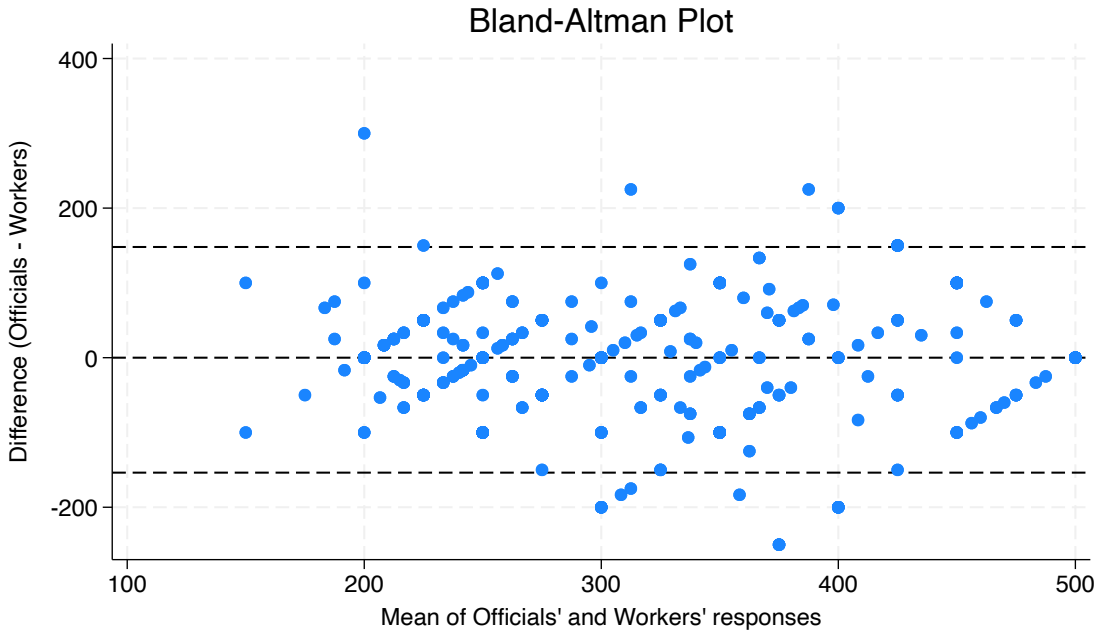


Figure 8: Jagirs within India

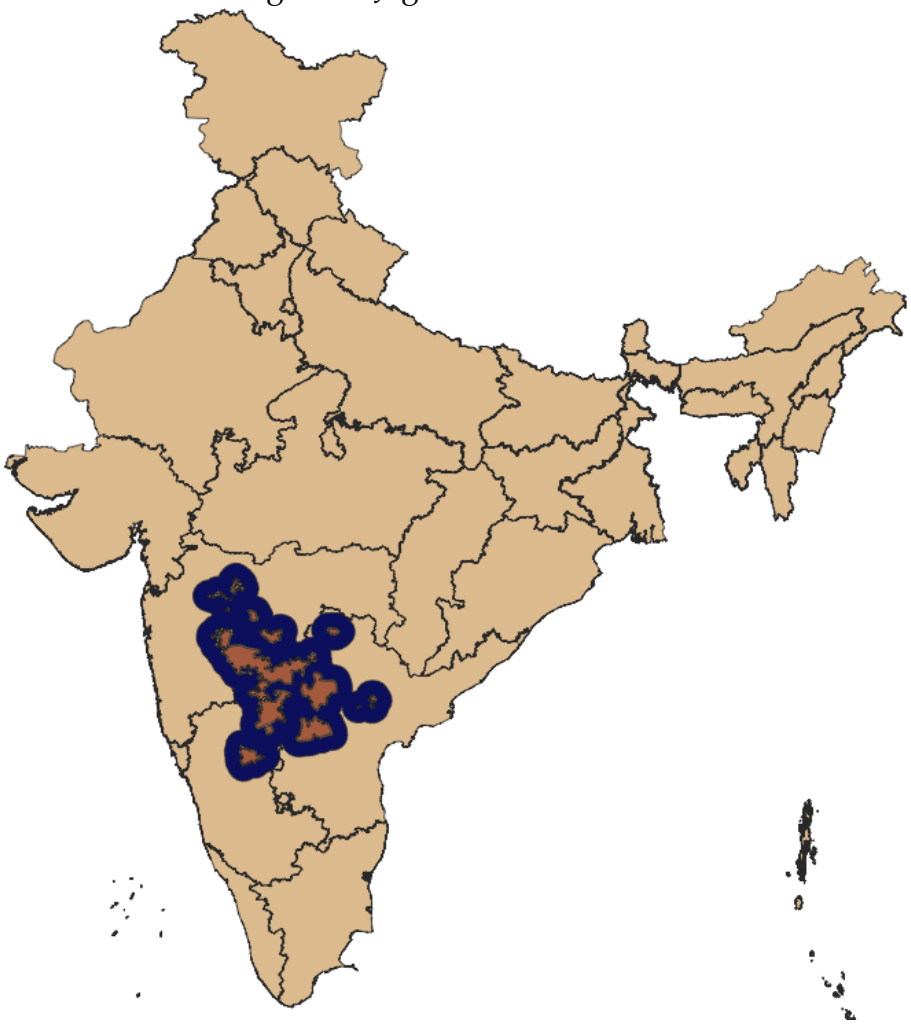


Figure 9: Population dynamics

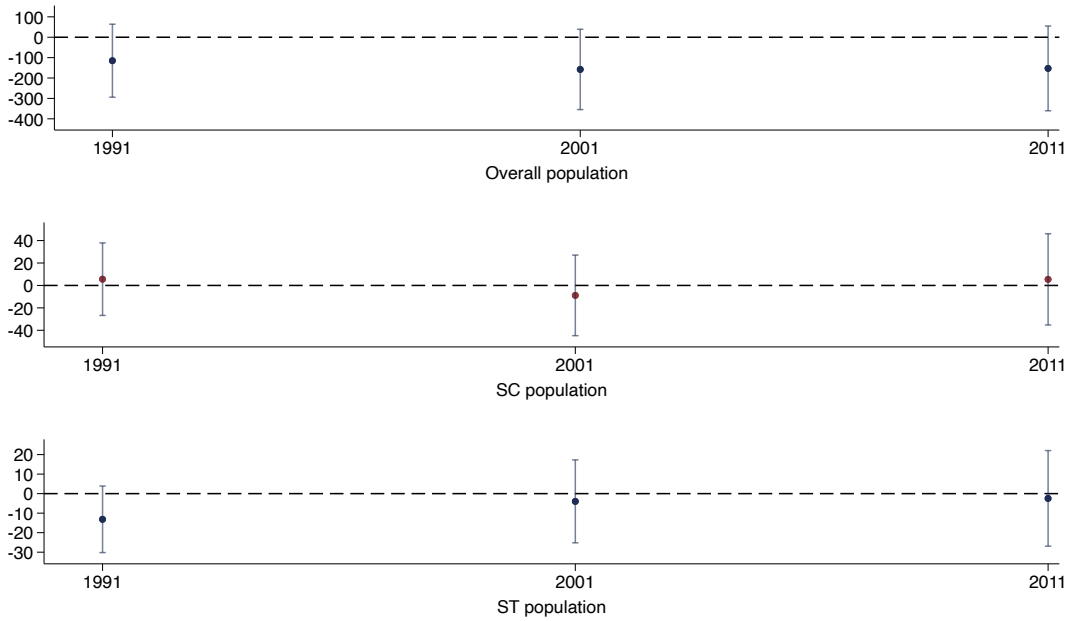


Figure 10: Working population dynamics

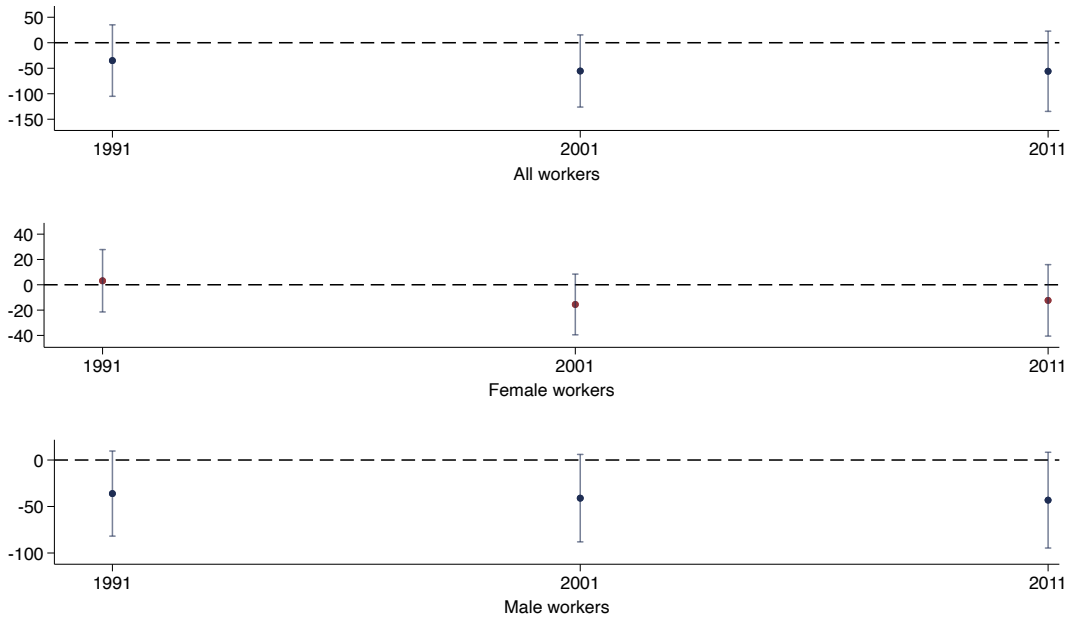
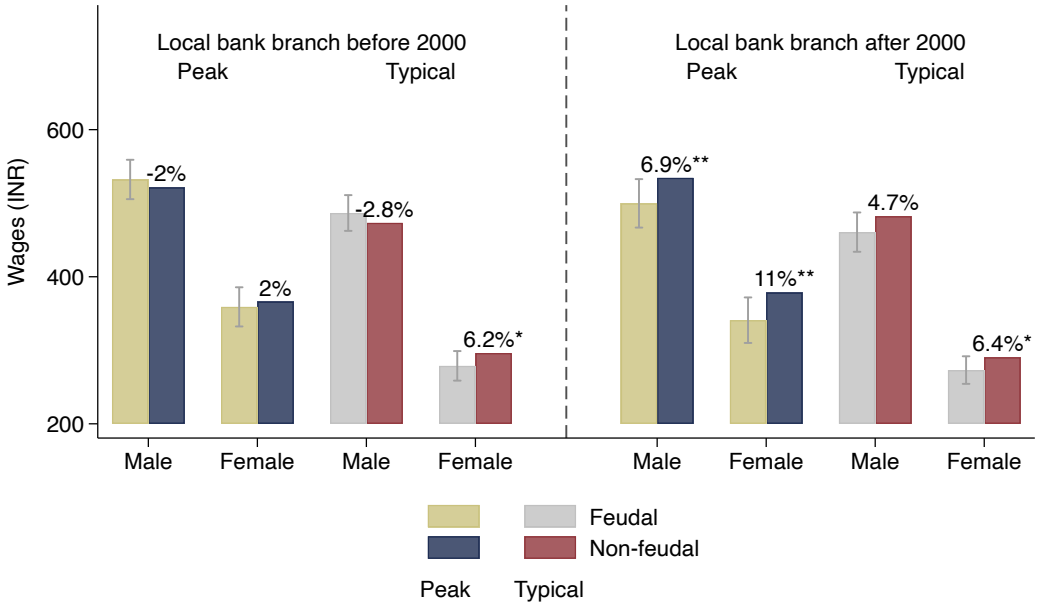


Figure 11: Wage HTEs by bank exposure



9.3 Tables

Table 14: Differences in violent events

	ACLED			UCDP		
	Total conflict	Land conflict	Fatal conflict	All conflicts	All deaths	a
Treatment	-0.005	-0.001	-0.001	-0.002	-0.219***	-0.123
	(0.004)	(0.001)	(0.008)	(0.008)	(0.031)	(0.118)
Dep var mean	0.005	0.002	-4.591	-4.590	2.564	0.204
R^2	0.01	0.01	0.04	0.03	0.26	0.01
Observations	18583	18583	18583	18583	18566	18583

This table shows results from our primary specification on geo-coded violence data from ACLED. A major limitation is that many ACLED events appear to be coded to district centroids inducing measurement error. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

Table 15: Differences assembly election results

	Leftist party won assembly election = 1		
Treatment	-0.000	-0.001	0.003
	(0.007)	(0.007)	(0.007)
District FE	✓	✓	✓
Year FE		✓	✓
Constituency type			✓
Dep var mean	0.030	0.030	0.030
R^2	0.10	0.12	0.17
Observations	56525	56525	56525
Constituencies	123	123	123

This table shows results from our primary specification on state assembly elections. Unfortunately, there are a limited number of unique state assembly seats in our area of interest. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

Table 16: Linking large landowners and village leaders through caste

	Any match		Number of matches		Average match rank		Highest match rank	
	Last name	Caste	Last name	Caste	Last name	Caste	Last name	Caste
Treatment	0.022	-0.039	-1.045	-6.479	-0.001	0.917	-1.115	0.231
	(0.068)	(0.045)	(1.544)	(4.991)	(1.037)	(0.783)	(1.183)	(0.833)
Non-feudal mean	0.689	0.948	6.704	45.556	10.792	4.061	9.452	2.815
R^2	0.16	0.12	0.16	0.32	0.20	0.20	0.20	0.15
Observations	238	238	238	238	238	238	238	238

For 238 villages compared the names of ward members to the names of the top 20 landowners. Matching done by local enumerators. Ambiguous cases are treated as not matches.

Table 17: Balance table

	Elevation		Temperature	Precipitation	Soil depth (sd)	Distance to river (ln km)
	Mean	SD				
Feudal	-1.687	-0.058	0.017	-0.053***	0.015	-0.287***
	(1.794)	(0.252)	(0.011)	(0.006)	(0.023)	(0.057)
Non-feudal mean	456.872	10.751	26.999	3.292	0.000	0.787
R^2	0.89	0.26	0.88	0.84	0.53	0.36
Observations	17916	17916	18561	18561	18561	16814

Tests for balance across geographic characteristics. Note that some differences are statically significant, but very small in magnitude.

Table 18: Treatment effects on village composition

	# HHs			# workers	# land txns	# migrant HHs	
	Current	Recent exits	Employers			Cyclical	Permanent
Feudal	17.772	1.956	53.735	237.664	-6.220	-11.509	-13.761
	(91.131)	(4.108)	(38.439)	(344.169)	(10.488)	(18.527)	(16.551)
Non-feudal mean	1010.216	22.623	142.883	1146.251	67.671	140.532	82.028
R^2	0.49	0.11	0.18	0.09	0.07	0.41	0.18
Observations	2366	2339	2330	2321	2209	2346	2356

This table shows results from our primary specification on the composition of village populations in feudal and non-feudal areas. $*\ p < 0.1, **\ p < 0.05, ***\ p < 0.01$

Table 19: Wage agreement between workers and leaders in survey

Variable	Concordance correlation coefficient		95% CI	Mean difference		Observations
	Estimate	SE		INR	%	
Peak male wages	0.544	0.034	[0.477, 0.610]	14.822	2.34	426
Peak female wages	0.598	0.031	[0.538, 0.658]	33.675	6.88	425
Typical male wages	0.631	0.029	[0.574, 0.689]	6.641	1.29	425
Typical female wages	0.688	0.026	[0.638, 0.738]	2.851	0.91	425

Concordance correlation coefficient ranges from -1 to 1 and refers the degree of agreement between wo leaders reports for the same villages.

Table 20: Characteristics of survey

Variable	Mean	SD	Min	Max	Observations
Panel A: *Workers survey*					
Number of surveys/village	1.475	0.768	1	5	459
Share of male respondents	0.961	0.182	0	1	459
Average respondent age	40.990	9.556	18	76	456
Share of married respondents	0.928	0.244	0	1	459
Share of respondents in cultivation last season	0.902	0.279	0	1	459
Share of upper caste respondents	0.209	0.387	0	1	459
Share of SC/ST respondents	0.196	0.376	0	1	459
Share of other caste respondents	0.400	0.463	0	1	459
Panel B: *Officials survey*					
Number of surveys/village	1.460	0.869	1	5	1641
Village head surveyed	0.593	0.457	0	1	1641
Village vice-head surveyed	0.057	0.212	0	1	1641
Village elected member surveyed	0.350	0.443	0	1	1641

Characteristics of respondents for wage survey. Not all officials were asked if they were knowledgea agricultural issues before being surveyed.

Table 21: Wage survey with workers and officials

	Peak male fertilizer		Peak female weeding		Avg male fertilizer		Avg female weeding	
		Ln		Ln		Ln		Ln
Feudal	-8.763	-0.006	-27.704*	-0.058*	-5.504	-0.000	-18.538**	-0.058**
	(12.988)	(0.024)	(14.254)	(0.030)	(10.571)	(0.022)	(8.512)	(0.027)
Non-feudal mean	567.073	6.297	405.867	5.912	490.715	6.151	294.894	5.632
Male vs. Female p-value			0.434	0.066			0.702	0.125
R^2	0.46	0.41	0.54	0.55	0.51	0.46	0.48	0.49
Observations	9318	9318	7809	7809	9619	9619	7882	7882

Note there are very few female worker respondents so those estimates do not change substantially.

Table 22: Heterogeneity by SEZ Placement

	Ln Female weeding wages		Ln Male fertilizer wages	
	Peak	Avg	Peak	Avg
Feudal	-0.065**	-0.047**	-0.043*	-0.055***
	(0.026)	(0.021)	(0.022)	(0.021)
Low SEZ exposure	0.034	0.022	-0.016	-0.052**
	(0.027)	(0.024)	(0.023)	(0.022)
Feudal × Low SEZ exposure	-0.004	-0.014	0.036	0.083***
	(0.032)	(0.028)	(0.027)	(0.026)
Non-feudal mean (logged)	5.854	5.631	6.235	6.128
Non-feudal mean (INR)	371.209	294.302	524.602	475.710
R^2	0.51	0.53	0.33	0.47
Observations	7317	7796	6939	7607

Low SEZ exposure is defined as having more than the median number of SEZs within a 200km radius. SE from (Gallé et al. 2024)

Table 23: Heterogeneity by Road Access

	Ln Female weeding wages		Ln Male fertilizer wages	
	Peak	Avg	Peak	Avg
Feudal	-0.081***	-0.124***	-0.028	-0.038*
	(0.025)	(0.023)	(0.023)	(0.021)
No major road	-0.014	-0.094***	0.038	0.036
	(0.028)	(0.026)	(0.025)	(0.024)
Feudal × No major road	-0.005	0.097***	-0.021	0.025
	(0.034)	(0.031)	(0.029)	(0.028)
Non-feudal mean (logged)	5.869	5.645	6.240	6.136
Non-feudal mean (INR)	377.868	299.102	528.046	480.216
R^2	0.52	0.54	0.34	0.48
Observations	5962	6389	5641	6219

Village with access to a district road in the village census.

Table 24: Heterogeneity by low non-farm employment

	Ln Female weeding wages		Ln Male fertilizer wages	
	Peak	Avg	Peak	Avg
Feudal	-0.039	-0.018	0.009	0.015
	(0.025)	(0.023)	(0.022)	(0.021)
Low non-farm employment	-0.023	0.031	0.069***	0.048**
	(0.027)	(0.026)	(0.024)	(0.024)
Feudal × Low non-farm employment	-0.009	-0.037	-0.057*	-0.046
	(0.034)	(0.032)	(0.029)	(0.029)
Non-feudal mean (logged)	5.787	5.561	6.204	6.077
Non-feudal mean (INR)	342.290	272.446	507.086	449.805
R^2	0.46	0.47	0.28	0.40
Observations	5215	5433	5053	5339

Data from the 2013 Economic Census, which records the total amount of non-agricultural employment in th
We test for heterogeneous treatment effects for village with below-median non-agricultural enterprises

References

Anderson, Siwan, Patrick Francois, and Ashok Kotwal (2015). "Clientelism in Indian Villages". In: *American Economic Review* 105.6, pp. 1780–1816. DOI: 10.1257/aer.20130623. URL: https://www.aeaweb.org/articles?id=10.1257/aer.20130623.

Asher, Sam et al. (2021). "Development research at high geographic resolution: an analysis of night-lights, firms, and poverty in India using the SHRUG open data platform". In: *The World Bank Economic Review* 35.4.

Banerjee, Paul Gertler, and Maitreesh Ghatak (2002). "Empowerment and Efficiency: Tenancy Reform in West Bengal". In: *Journal of Political Economy*.

Banerjee and Iyer (2005). "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India". In: *American Economic Review* 95.4, pp. 1190–1213. ISSN: 0002-8282. DOI: 10.1257/0002828054825574. URL: https://pubs.aeaweb.org/doi/10.1257/0002828054825574 (visited on 08/03/2023).

Batra, Kartikeya (2024). "Long-run effects of land redistribution: evidence from India". In: *Working Paper*.

Besley Leight, Pande and Rao (2016). "Land Markets in Developing and Transition Economies: Impact of Liberalization and Implications for Future Reform". In: *Journal of Development Economics*.

Bolhuis, Marijn A., Swapnika R. Rachapalli, and Diego Restuccia (Oct. 2021). *Misallocation in Indian Agriculture*. Tech. rep. 29363. Revised March 2025, JEL No. O11, O13, O4. National Bureau of Economic Research. DOI: 10.3386/w29363. URL: http://www.nber.org/papers/w29363.

Brownstone, Steven (2025). "The Labor Market Effects of Agriculture Mechanization: Experimental Evidence from India". In: *Working Paper*.

Cheema, Ali et al. (2024). "Glass Walls: Experimental Evidence on Constraints faced by Women in Accessing Valuable Skilling Opportunities". In: *Working Paper*.

Daily, The Siasat (2023). *Operation Polo 1948: How Hyderabad's last Nizam agreed to give up his land for reform*. Accessed: 2025-02-10. URL: https://www.siasat.com/operation-polo-1948-how-hyderabads-last-nizam-agreed-to-give-up-his-land-for-reform-2696498/.

Deininger, K (2003). "Land Markets in Developing and Transition Economies: Impact of Liberalization and Implications for Future Reform". In: *American Journal of Agricultural Economics*.

Dell, Melissa (2010). "The persistent effects of Peru's mining mita". In: *Econometrica* 78, pp. 1863–1903.

Dhanagare, D.N. (1974). "Social origins of the peasant insurrection in Telangana (1946-51)". In: *Contributions to Indian Sociology* 8.1, pp. 109–134. DOI: 10.1177/006996677400800107. eprint: https://doi.org/10.1177/006996677400800107. URL: https://doi.org/10.1177/006996677400800107.

Emerick K. Sadoulet E., Li Z. and Dar M. (2022). "The agricultural wage gap within rural villages". In: *CEPR Discussion Papers*.

Felix, M (2024). "Trade, labor market concentration, and wages". In: *Working Paper*.

Field, Erica and Kate Vyborny (2022). "Women's Mobility, and Labor Supply: Experimental Evidence from Pakistan". In: *Asian Development Bank Economics Working Paper Series* 655.

Foster, Andrew D. and Mark R. Rosenzweig (2022). "Are There Too Many Farms in the World? Labor Market Transaction Costs, Machine Capacities, and Optimal Farm Size". In: *Journal of Political Economy* 130.3, pp. 636–680. DOI: 10.1086/717890.

Gelman, Andrew and Guido Imbens (2019). "Why High-Order Polynomials Should Not Be Used in Regression Discontinuity Designs". In: *Journal of Business & Economic Statistics* 37.3, pp. 447–456. ISSN: 0735-0015, 1537-2707. DOI: 10.1080/07350015.2017.1366909. URL: https://www.tandfonline.com/doi/full/10.1080/07350015.2017.1366909 (visited on 08/03/2023).

Genicot, Garance and Debraj Ray (2017). "Aspirations and Inequality". In: *Econometrica* 85.2, pp. 489–519. DOI: https://doi.org/10.3982/ECTA13865. eprint: https://onlinelibrary.wiley.com/doi/pdf/10.3982/ECTA13865. URL: https://onlinelibrary.wiley.com/doi/abs/10.3982/ECTA13865.

Hornbeck, Richard and Suresh Naidu (2014). "When the Levee Breaks: Black Migration and Economic Development in the American South". In: *American Economic Review* 104.3, pp. 963–990. ISSN: 0002-8282. DOI: 10.1257/aer.104.3.963. URL: https://pubs.aeaweb.org/doi/10.1257/aer.104.3.963 (visited on 08/03/2023).

Imbert, Clément and John Papp (Apr. 2015). "Labor Market Effects of Social Programs: Evidence from India's Employment Guarantee". In: *American Economic Journal: Applied Economics* 7.2, pp. 233–63. DOI: 10.1257/app.20130401. URL: https://www.aeaweb.org/articles?id=10.1257/app.20130401.

Janvry, Alain de et al. (Oct. 2015). "Delinking Land Rights from Land Use: Certification and Migration in Mexico". In: *American Economic Review* 105.10, pp. 3125–49. DOI: 10.1257/aer.20130853. URL: https://www.aeaweb.org/articles?id=10.1257/aer.20130853.

Jayachandran, Seema (2006a). "Selling Labor Low: Wage Responses to Productivity Shocks in Developing Countries". In: *Journal of Political Economy* 114.3, pp. 538–575. ISSN: 00223808, 1537534X. URL: http://www.jstor.org/stable/10.1086/503579 (visited on 09/30/2024).

– (2006b). "Selling Labor Low: Wage Responses to Productivity Shocks in Developing Countries". In: *Journal of Political Economy* 114.3, pp. 538–575. ISSN: 00223808, 1537534X. URL: http://www.jstor.org/stable/10.1086/503579 (visited on 10/24/2024).

Khusro, A M (1958). *Economic and social effects of Jagirdari abolition and land reforms in Hyderabad*. Department of Publication & University Press, Osmania University, Hyderabad.

Kim, Oliver and Jen-Kuan Wang (2024). "Land Reform in Taiwan, 1950-1961: Effects on Agriculture and Structural Change". In: *Working Paper*.

Lee, Alexander (2019). "Land, State Capacity and Colonialism: Evidence from India". In: *Comparative Political Studies* 52, pp. 412–444.

Moscona, Jacob, Nathan Nunn, and James A. Robinson (2020). "Segmentary Lineage Organization and Conflict in Sub-Saharan Africa". In: *Econometrica* 88.5,

pp. 1999–2036. ISSN: 0012-9682. DOI: 10.3982/ECTA16327. URL: https://www.econometricsociety.org/doi/10.3982/ECTA16327 (visited on 08/03/2023).

Mukherjee, Shivaji (2021). "Maoist Insurgency in Andhra Pradesh: The Nizam's Shadow on Telangana". In: *Colonial Institutions and Civil War: Indirect Rule and Maoist Insurgency in India*. Cambridge Studies in Contentious Politics. Cambridge University Press, pp. 246–298.

Muralidharan, Karthik, Paul Niehaus, and Sandip Sukhtankar (Oct. 2016). "Building State Capacity: Evidence from Biometric Smartcards in India". In: *American Economic Review* 106.10, pp. 2895–2929. DOI: 10.1257/aer.20141346. URL: https://www.aeaweb.org/articles?id=10.1257/aer.20141346.

– (2023). "General Equilibrium Effects of (Improving) Public Employment Programs: Experimental Evidence From India". In: *Econometrica* 91.4, pp. 1261–1295. ISSN: 0012-9682. DOI: 10.3982/ECTA18181. URL: https://www.econometricsociety.org/doi/10.3982/ECTA18181 (visited on 08/03/2023).

Ratnoo, Vigyan D. (2024). "Persistent effects of colonial land tenure institutions: Village-level evidence from India". In: *Journal of Development Economics* 168, p. 103247. ISSN: 0304-3878. DOI: https://doi.org/10.1016/j.jdeveco.2023.103247. URL: https://www.sciencedirect.com/science/article/pii/S0304387823002031.

Smith, C (2020). "Land Concentration and Long-Run Development in the Frontier United States". In: *Working Paper*.