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History, Institutions and Economic Performance: The Legacy of Colonial Land Tenure Systems in India *

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Abstract

Do historical institutions have a persistent impact on economic performance? We analyze the colonial institutions set up by the British to collect land revenue in India, and show that differences in historical property rights institutions lead to sustained differences in economic outcomes. Areas in which proprietary rights in land were historically given to landlords have significantly lower agricultural investments, agricultural productivity and investments in public goods in the post-Independence period than areas in which these rights were given to the cultivators. We verify that these differences are not driven by omitted variables or endogeneity of the historical institutions, and argue that they probably arise because differences in institutions lead to very different policy choices.

Keywords: history, land tenure, development
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1 Introduction

The question of the role of history is one to which economists keep returning, most recently in the form of a debate about convergence. Is the destiny of a people inscribed in their genes and their geography, or do they also carry around the weight of their peculiar histories? Is the present misery of so many poor nations merely a step in the gradual evolution towards a pre-ordained future or a symptom of an unfortunate history that may keep them in its thrall for a very long time?

At one level this is perhaps an unresolvable question because one can never rule out the possibility that the effects of history will ultimately wash out. But even if we set ourselves the more modest task of determining whether historical accidents have persistent effects, the task is by no means straightforward. In part, this is because of the well-known problems with cross-country comparisons (when do we say that two countries are alike?), in part due to the amorphous nature of history (which aspect of history should we consider?) and in part because it is not easy to decide what would be an acceptable timescale.

Moreover, even if one were to accept the proposition that history is important, there could be at least two alternative (though not inconsistent) views of the nature of the link. In the new institutionalist view,[1] history matters because history shapes institutions and institutions shape the economy. By contrast, in what one might call the "increasing returns" view, historical accidents put one country ahead in terms of aggregate wealth or human capital (or some other comparable aggregate) and this turns into bigger and bigger differences over time because of the increasing returns. The difference between these views is potentially very important: If increasing returns is everything, then a one-time inflow of aid or some other windfall would set the economy on the way to prosperity. If institutions were very important, one would tend to be less sanguine.

Within the institutionalist position there is a further distinction that has the potential to be important: One could hold that institutions are important but essentially manipulable (when there is the will to change them). Or one could be concerned about what one may call *institutional overhang*, the possibility that the effects of institutions persist for a long time after they have been formally changed.

Economists from Marx[2] to Mankiw[3] (and beyond) have grappled with these questions using a variety of tools and approaches, but we are nowhere near a resolution. As is well-known,

[1] See North (1990).

[2] Karl Marx (1885).

[3] Mankiw, Romer and Weil (1992)

the evidence on unconditional convergence in the cross-country growth framework is rather weak[4] and while conditional convergence does significantly better, it does so at the cost of including potentially endogenous variables (savings rate, etc.) as controls. One also does better by giving up the idea of full convergence and focusing on club convergence *a la* Quah (1996), but then the role of history remains a question.

Turning to the other side, a series of papers by La Porta et al (1998a; 1998b; and 2000) have argued that the historical fact of being colonized by the British rather than any of the other colonial powers, has a strong effect on the legal system of the country and through that on economic performance. This evidence is highly suggestive but some obvious doubts about causality remain. The role of history in determining the shape of present-day institutions is also at the heart of two recent sets of papers, one by Acemoglu, Johnson and Robinson (2001; 2002) and the other by Engerman and Sokoloff (1997; 2000; and 2002). Acemoglu et al show that mortality rates among early European settlers is a strong predictor of whether these countries end up with what economists today call "good" institutions and whether their economies are doing well today. They argue that this is because Europeans settled in large numbers in the countries where the early settler mortality was relatively low, and their presence was important in making sure that these countries ended up with the right kinds of institutions. While the facts they report are clearly quite remarkable, it is not entirely clear what we should make of them. In particular, to what extent was early settler mortality a fact of history, in the sense that it could have easily been very different (say, if the settlers had arrived a few years later). To what extent should it be seen as an indirect effect of geography on economic outcomes through its effect on the disease matrix? How important was the effect of population density at the time of conquest, given that it is easier to get infected if there are lots of people around,[5] and if population density was important, should we see the difference in population density as a matter of history or of geography? Furthermore, while they make a strong case, it is not entirely obvious that the channel of causation from settler mortality to current economic performance has to go through the quality of institutions: Population density, for one, influences both the disease environment and the labor supply, and labor supply can certainly have

[4]See Pritchett (1997), for example. Adding a range of geographical controls along the lines suggested by Gallup, Sachs and Mellinger (1999) helps, but it is not always easy to separate the effect of geography from that of European settlement, which is endogenous.

[5]In a later paper, Acemoglu, Johnson and Robinson (2002) report evidence showing that the countries that performed the worst under colonial rule were the ones that were most densely populated under colonial rule.

an independent effect.

Labor supply is in fact central to Engerman and Sokoloff's thesis on why the United States and Canada ended up being so different from Latin America. They suggest that the reason why Brazil is where it is today and the U.S. is where it is, has a lot to do with the fact that in the early years after European conquest Brazil was deemed to be suitable for growing sugar and the U.S. was not. Since sugar cultivation demanded the use of slave labor, Brazil ended up with a much larger slave population and this, they argue, meant that Brazilian society was much more hierarchical than American society, causing a divergence in the types of institutions that evolved in these two areas, and eventually a divergence in the rates of growth. Their discussion is rich in the details of the exact channels through which social inequality affected the process of institutional evolution and the case they make is quite compelling, but they make no secret of the fact that the nature of their data does not permit rigorous hypothesis testing. Moreover, it is not entirely clear from their discussion whether they want to emphasize the innate geographical differences as the ultimate source of the problem or put the blame on the historical fact that growing sugar-cane was particularly profitable during the early years of European colonialism.

In this paper we attempt to answer the same set of questions by studying a very specific set of institutions, the different land revenue systems instituted by the British in India during the early nineteenth century, and examining the impact of these systems on various present-day economic indicators. This strategy has several advantages: First, obviously, we can focus on the impact of history through a very specific instance of institutional change. This specificity makes it easier for us to identify some of the causal mechanisms that link the history to the present-day outcomes. Second, this specificity makes it possible to take advantage of all the information we have about the reasons why there is variation in our explanatory variables. In particular, it enables us to use historical information to construct instrumental variables estimates of the impact of historical institutions. Third, since we are studying the variation of institutions within the same country, under a single political system and ruled by the same colonial power, it enables us to avoid some of the omitted variable problems associated with cross-country studies. Finally, since the land revenue systems that the British introduced departed with the British—there are no direct taxes on agricultural incomes in independent India—we have here a pure example of institutional overhang.[6]

[6]This distinguishes this work from the recent empirical literature on the effects of land reform on economic outcomes (see Banerjee, Gertler and Ghatak (2002), Besley and Burgess (2000) and Lin (1999) among others). The

The British rule in India extended from 1757 to 1947 and during this period land revenue or land tax was a very important source of government revenue. Different areas had different systems for revenue collection: landlord-based systems made a landlord responsible for collecting revenue in a specific area; in individual-based systems, the British government officers collected revenue directly from the actual cultivators without the intermediation of a landlord; in village-based systems, a village community body bore the revenue responsibility.

Our strategy is the following: For each district of British India, we use historical sources to compute a crude measure of the proportion of the district for which the revenue liability was not in the hands of landlords. We then regress post-Independence outcomes in agricultural investments and productivity on this measure, after controlling for a wide variety of geographic variables, as well as for the direct impact of the length of colonial rule. We find that areas which were formerly landlord-controlled have significantly lower agricultural investments as measured by irrigation, fertilizer use and the adoption of high-yielding varieties of rice, wheat and other cereals. The effects we document are surprisingly large, given that we are looking at an institution that no longer exists and the crudeness of the measure we use for our main explanatory variable. Irrigation levels are 25% higher in the non-landlord districts, fertilizer use is 45% higher and the adoption of high-yielding varieties in rice is about 25% higher. Not surprisingly, they also have worse agricultural performance: overall crop yields are 16% higher in non-landlord areas, rice yields are 17% higher and wheat yields are 23% higher.

We use several strategies to control for omitted district characteristics and possible endogeneity of the historical land tenure system. First, we construct a restricted sample of districts that are geographical neighbors, but which happened to have different land systems for historical reasons. On all our observed geographical variables, these districts look very similar, and it is not unreasonable to assume that such neighboring districts would be similar in other unobservables as well. For this restricted sample, we see significant differences in crop yields as well as in the adoption of new agricultural technologies.

Second, we argue on the basis of historical evidence that it is legitimate to use the fact of having been conquered by the British in the 1820-1856 period (rather than earlier or later) as an instrument for the land tenure system, after controlling directly for the length of British rule. We find that our instrumental variables (IV) estimates of the impact of historical land tenure are

Coase Theorem notwithstanding, there are obvious reasons to expect that the choice of land tenure systems would have an effect on *current* economic performance, especially in countries where agriculture is important.

all larger in magnitude than the OLS estimates and usually significant, suggesting that our OLS estimates were downward biased, probably because the non-landlord variable is poorly measured.

Third, we present data to indicate that it was the landlord areas that were more productive during the colonial period, providing further confirmation that our results for the post-Independence period are not driven by some unobserved time-invariant district characteristics. In particular, geography is unlikely to be a driving factor behind our observed differences.

The differences between landlord and non-landlord areas are not restricted to agriculture alone: We find substantial differences in human capital investments and outcomes as well. Landlord areas have much lower levels of local infrastructure such as primary schools, high schools and health centers; the availability of village schools is 20% to 60% higher in non-landlord areas. Not surprisingly, they also have lower levels of literacy and higher levels of infant mortality: OLS estimates indicate that literacy rates are 18% higher and infant mortality rates are 40% lower in non-landlord areas. For these outcomes as well, all our IV estimates are larger in magnitude than the OLS estimates.

Institutions born out of specific histories continue, therefore, to have powerful repercussions long after the institutions have vanished and the history has been half-forgotten. The puzzling persistence of large and often growing differences across the states of India that have been noted by a number of scholars,[7] may well owe something to this or some other half-remembered accident of history.

The paper is structured as follows: Section 2 describes the historical background and the land tenure system under British rule. We discuss the reasons why the tenure system varies from district to district and argue that the choice of tenure system can be reasonably regarded as a source of exogenous variation. Section 3 outlines different mechanisms through which historical land tenure might affect long-term outcomes. Sections 4 and 5 describe our data and empirical strategy. Our empirical results are described in Section 6. Section 7 reports additional results on human capital investments. Section 8 concludes by discussing potential mechanisms that might explain the persistence of the effect of British land tenure systems.

[7] See Chaudhuri (2000), Cashin and Sahay (1996), Clark and Wolcott (2000) and Datt and Ravallion (1998).

2 Historical Background

2.1 British Political Control

The British empire in India lasted for nearly 200 years. The British initially arrived as traders: the English East India Company received their first permit from the Mughal emperor, Jahangir, to build a factory at Surat in 1613. Their empire-building began with their victories in the battle of Plassey in 1757 and the battle of Buxar in 1764, as a result of which they obtained political control of the modern states of Bengal and Bihar (formerly Bengal Presidency). The British were formally granted revenue-collection rights in these areas in 1765. After 1818, the British were the major political power in India and by 1860, a large part of the territories of modern India, Pakistan and Bangladesh was under British government. There were also a large number of princely states in different parts of the country, all of whom were under British political control but had autonomy in administrative matters.

Different parts of the country came under British rule in different periods. After Bengal Presidency came into British hands in 1765, they went on to conquer further territories in the eastern part of the country. Some parts of the modern state of Orissa were conquered in 1803, and Assam was conquered in 1824 and 1826. Meanwhile, in south India, the British obtained four districts (the "Northern Circars") as a grant from the Mughal emperor in 1765. These and other areas conquered between 1792 and 1801 came to form the Madras Presidency. Parts of the western state of Gujarat were conquered in 1803, and the rest, along with large parts of Bombay Presidency, were obtained after conquering the Marathas in 1817-18. Some of these areas formed part of the Central Provinces, to which other parts were added over a long period until 1860. In the north, large parts of the North-West Provinces were obtained from the Nawab of Oudh in 1801-03, but Oudh itself was annexed by the British only in 1856. The northwestern state of Punjab was annexed after the Sikh wars in 1846 and 1849. Appendix table 1 gives district-wise details on the date and mode of acquisition by the British.

The rule of the East India Company came to an end after the revolt of 1857, which started when Indian troops revolted against their British officers. The revolt was soon suppressed, but Indian administration came under the direct control of the British government. The British left India in 1947, when the Indian empire was partitioned into India and Pakistan.[8] Large parts of former Bengal Presidency and Panjab Province are now in Bangladesh and Pakistan respectively.

[8]Bangladesh, formerly East Pakistan, became an independent nation in 1975.

2.2 Pre-British and British Systems of Land Revenue

Land revenue or land tax was the major source of revenue for all governments of India, including the British. During the period of Mughal rule in the 16th and 17th centuries, land revenue was collected by non-hereditary, transferable state officials (the *mansabdari* system introduced by Emperor Akbar). After the collapse of Mughal rule in the early 18th century, these local officials gained power in several areas and often became *de facto* hereditary landlords and petty chiefs in their local areas. By the time British rule was firmly established towards the end of the 18th century, there was considerable doubt as to what the "original land revenue system" of India had been, with different British administrators having widely differing views.

Land revenue or land tax continued to be the major source of government revenue during British times as well: In 1841, it constituted 60% of total British government revenue, though this proportion decreased over time as the British developed additional tax resources. Not surprisingly, land revenue and its collection was the most important issue in policy debates during this period. We use the terms "land revenue systems" or "land tenure systems" to refer to the arrangements made by the British administration to collect the land revenue from the cultivators of the land. These systems mainly defined who had the liability for paying the land tax to the British and by implication, who had "property rights" on the land. The British adopted one of three land revenue systems: landlord-based systems (also known as *zamindari* or *malguzari*), individual cultivator-based systems (*raiyatwari*) or village-based systems (*mahalwari*). The map in Figure 1 illustrates the geographic distribution of these areas.

In the landlord areas, there was a landlord in charge of the revenue collection, and the British administration had no direct dealings with the cultivating peasants. Landlords were in effect given property rights on the land, though some measures for protecting the rights of tenants and sub-proprietors were introduced in later years. Landlord systems were established mainly in Bengal, Bihar, Orissa, the Central Provinces (modern Madhya Pradesh state) and some parts of Madras Presidency (modern Tamil Nadu and Andhra Pradesh states). In some of these areas, the British declared the landlords' revenue commitments to the government to be fixed in perpetuity (the "Permanent Settlement" of 1793). In other areas, a "temporary" settlement was implemented whereby the revenue was fixed for a certain number of years, after which it was subject to revision.

In most areas of Madras and Bombay Presidencies and also in Assam, the individual cultivator *raiyatwari* system was adopted in which the revenue settlement was made directly with

the *raiyat* or cultivator. In these areas, an extensive cadastral survey of the land was done and a detailed record-of-rights was prepared, which served as the legal title to the land for the cultivator. Revenue rates were calculated as the money value of a share of the estimated average annual output. This share typically varied from place to place, was different for different soil types and was also adjusted in response to changes in the productivity of the land.

In the North-West Provinces and Panjab, the village-based (*mahalwari*) system was adopted in which village bodies that jointly owned the village were responsible for the land revenue. Village bodies could be in charge of varying areas, from part of a village to several villages. The composition of the village body varied from place to place: In some areas it was a single person or family and hence very much like the Bengal landlord system (*zamindari*), while in other areas, the village bodies were larger and each person was responsible for a fixed share of the revenue. This share was either determined by ancestry (the *pattidari* system), or based on actual possession of the land (the *bhaiachara* system), the latter being very much like the individual-based *raiyatwari* system.

2.3 Choice of Land Revenue System

Why did the British choose different systems in different areas? It is broadly agreed that their major motivation was to ensure a large and steady source of revenue for the Government while also maintaining a certain political equilibrium. It is also plausible that they based their decision on very little hard information, at least in the first round—how were they to know what works best in different places in India? Decisions were therefore often taken on the basis of some general principle, and the ideology of the individual decision-maker and contemporary economic doctrines played an important role, in combination with exigencies of the moment. Appendix Table 2 provides details of how different land revenue systems came to be established in different Provinces of British India. Here we summarize the main channels of influence:

Influence of individual administrators: The ideas of particular administrators seem to have influenced the land revenue systems in whole provinces. For instance, in the 1790's, the administrator, Sir Thomas Munro, tried the individual-based *raiyatwari* system in a few areas of Madras Presidency and was convinced of its superiority. The Board of Revenue of the Province disagreed with him and after considerable argument, their view prevailed and all the villages were put under village-level landlords with 3-year or 5-year leases. These leases were renewed for 10 years in 1811-12. However, Munro traveled to London and managed to convince the Court of Directors

of the East India Company of the merits of *raiyatwari*, and they then ordered the Madras Board of Revenue to implement this policy all over the province once the leases expired (i.e., after 1820). Similarly, the individual system was tried out in Bombay Presidency quite early, mainly because the governor, Lord Elphinstone, was in favor of it and had been a supporter of Munro during the debate in Madras.

Another instance of individual influence occurred in the North-West Provinces. Landlord systems with short-term leases were implemented there initially, and there was considerable debate as to whether or not there should be a Permanent Settlement along the lines of that prevailing in Bengal. However in 1819, Holt Mackenzie, the Secretary of the Board of Revenue, wrote a famous Minute which claimed that historically every village had had a proprietary village body, and felt that no Settlement should be declared in perpetuity which did not give proper recognition to such customary rights. This became the basis for Regulation VII of 1822, which laid the basis for village-level settlements (Misra 1942). However, the previous actions could not always be undone, and in several places the previously appointed large landlords (*talukdars*) retained their positions.[9]

Political events: The most notable example of this occurred in Oudh province. This region was annexed by the British in 1856 and merged with the North-West Provinces to form the United Provinces (state of Uttar Pradesh today). Since the North-West Provinces had a village-based revenue system, it was proposed to extend the same to Oudh. However, the revolt broke out in 1857 and after it was successfully subdued, the British felt that having the large landlords (*talukdars*) on their side would be politically advantageous. There was thus a reversal of policy and several *talukdars* whose land had been taken away under the village-based settlement had it given back to them, and in 1859 they were declared to have a permanent, hereditary and transferable proprietary right. Districts that used to be a part of Oudh thus came to have a larger area under landlord control than the other districts of Uttar Pradesh.

Date of conquest: There are at least three reasons why areas that came under British revenue administration at later dates were in general more likely to have non-landlord systems. First, landlord-based systems required much less administrative machinery to be set up by the British and so areas conquered in the early periods of British rule were likely to have landlord-based systems. However, once a landlord-based system was established, it was costly to change

[9]For instance, the Aligarh settlement officer writes, "So far indeed had the action of our first officials sanctioned the usurpations of the Talukdars, that among other cases they granted to Raja Bhagwant Singh a lease for life of the whole of the pargana Mursan for Rs.80,000 leaving the old communities entirely at his mercy ...."(Smith 1882)

the system (this was most obviously true where there was a Permanent Settlement) and hence the landlord system survived. Second, the increasing popularity of dealing directly with the peasant mirrored shifts in the views of economists and others in Britain: In the 1790s, under the shadow of the French revolution across the Channel, the British elites were inclined to side with the landlords; in the 1820s, with peasant-power long defeated and half forgotten, they were more inclined to be sympathetic to the utilitarians and others who were arguing for dealing directly with peasants.[10,11]

Finally, areas conquered later had some non-landlord precedents to follow and these made it easier to make the case. For instance, Berar was put under an individual-based system because neighboring Bombay had been, and similarly Panjab adopted the village-based system already in place in the North-West Provinces. In particular, two critical events, both around 1820, sealed the ascendance of the non-landlord systems: First, Munro's victory over the Board of Revenue in Madras in the policy debate mentioned earlier ended in a widespread conversion of landlord areas into individual-cultivator areas after this date. Second, Holt Mackenzie made a successful plea for settlements with village bodies in the North-West Provinces in 1819. After these two policy landmarks, there were to be no more landlord settlements in areas taken over after 1820 until the policy reversal in Oudh in 1857. This period 1820-1856 plays a key role in our instrumental variables strategy.

Presence of a landlord class before the British took over: This was probably one of the factors leading to the landlord system being favored, at least in Bengal. As the historian Tapan Ray Chaudhuri says, "... in terms of rights and obligations, there was a clear line of continuity in the zamindari system of Bengal between the pre- and the post-Permanent Settlement era." (Kumar, ed 1982). However, this was not always the case. For instance, it was decided to have a landlord-based system in the Central Provinces, even though there was no pre-existing landlord class.[12]

2.4 Exogeneity

We will be comparing agricultural investment and productivity between landlord-based and non-landlord systems. Our strategy might give biased results if the British decision of which land tenure

[10] James Mill actually worked for the East India Company and George Wingate, who helped set up the individual-cultivator system in Bombay, was heavily influenced by him.

[11] For a discussion of the role of ideology and economic doctrines in the formation of the land revenue system, see Stokes (1959, 1978a).

[12] Baden-Powell (1892) states: "In the Central Provinces we find an almost wholly artificial tenure, created by our revenue-system and by the policy of the Government of the day."

system to adopt depended on other characteristics of the area in systematic ways.

As mentioned in the introduction, we deal with the endogeneity issue principally by using only the variation that comes from differences in the date of conquest. It is however worth emphasizing that there is no reason to think that the choice of land tenure system at the district level was closely tied to the characteristics of the district. First, because the decision was typically taken at the same time for a set of contiguous districts that could be as large as Britain itself, one would expect that the decision to put in place a land-tenure system would be based, at best, on the average characteristics of the area. It is therefore probably reasonable to assume that when two districts lying directly across from each other on either side of the boundary between two settlement regions ended up with different types of tenure systems, it was for reasons mostly unrelated to their innate differences.

Second, because the decisions were often based on relatively little information, a lot of the debate was almost entirely based on a priori arguments. For instance, in his debate with the Board of Revenue, Munro argued for the individual system in Madras by arguing that it would raise agricultural productivity by improving incentives; that the cultivators would be less subject to arbitrary expropriation than under a landlord; that they would have a measure of insurance (via government revenue remissions in bad times); that the government would be assured of its revenue (since the small peasants are less able to resist paying what they need to pay); and that this was the mode of land tenure prevailing in South India from ancient times. The Madras Board of Revenue, in its turn, used more or less the same arguments (in reverse, of course) for favoring landlords: Landlords invest more and therefore productivity will be higher; the peasants' long-term relationship with the landlord would result in less expropriation than the short-term one with a government official, a big landlord would provide insurance for small farmers, a steady revenue would be assured because the landlords would be wealthy and could make up an occasional shortfall from their own resources, and that this was the mode of tenure prevailing from ancient times!(Mukherjee 1962).

Third, while the British often invoked history to justify the choices they made, they frequently misread the history. For example, one reason they favored landlords in Bengal is because they found landlords in Bengal when they arrived. However, as has been pointed out by a number of scholars,[13] these landlords were really local chieftains, and not the large farmers that the British

[13]See Roy (2000) and Ray (1979).

had thought them to be.

One should not however overstate this point—it remains possible that the *decisive argument* was indeed based on the right set of facts. Moreover, some places did switch from one system to another, often because the first system was not working too well. However, it is worth noting that almost all such changes were in districts where a landlord-based settlement was first introduced and later rescinded. As Roy (2000) remarks, "It is noteworthy that usually zamindari areas were highly fertile areas which created enough rent to support a landlord-tenant-laborer hierarchy. In some parts of zamindari, this condition was weak, defaults excessive, and these were later changed to different forms of settlement." For instance, the landlord areas of Madras Presidency which were under the Permanent Settlement were converted to the individual system only if the landlord defaulted on his revenue commitments. Therefore, areas which ended up with non-landlord systems are more likely to be the ones which were inherently less productive, or at least less productive in colonial times.

2.5 Post-Independence Developments in Land Policy

Under the constitution of independent India, states were granted the power to enact land reforms. Several states passed legislation in the early 1950's formally abolishing landlords and other intermediaries between the government and the cultivator. Several other laws have also been passed regarding tenancy reform, ceiling on land holdings and land consolidation measures by different states at different times. Besley and Burgess (2000) provide a good review of these laws and their impact on state-level poverty rates.

3 Why Should the Historical Land System Matter?

Why would we expect investment and productivity outcomes to differ between areas having greater or lesser extent of landlord control? Why would these differences persist and not be wiped out as soon as the landlord class is formally abolished? In this section we list some potential answers to these questions, postponing to Section 8 any discussion of the empirical plausibility of these answers.

Differences in the distribution of wealth: Under landlord systems, landlords were given the authority to extract as much as they could from the tenants, and, as a result, they were in a position to appropriate most of the gains in productivity. Indeed they could even use the judicial and other administrative powers that were vested in them by the colonial state as a part of the

settlement, to coerce the peasants and extract maximal rents. Moreover, landlord areas were also the only areas subject to the Permanent Settlement of 1793, and even where the settlement was not permanent, the political power of the landlord class made it less likely that their rates would be raised when their surplus grew. As the nineteenth century was a period of significant productivity growth, the landlord class grew rich over this period and inequality went up. By contrast, in the individual cultivator areas, rents were raised frequently by the British in an attempt to extract as much as possible from the tenant. There was, as a result, comparatively little differentiation within the rural population of these areas until, in the latter years of the nineteenth century, the focus of the British moved away from extracting as much they could from the peasants. At this point, there was indeed increasing differentiation within the peasant class, but overall one would expect less inequality in the non-landlord areas.

This is indeed what we find in the data: The provinces with a higher non-landlord proportion have lower Gini measures of land inequality in 1885 (Figure 2A). Further, the differences in inequality do not disappear over time: In 1948, districts of Uttar Pradesh that had a higher landlord proportion had a much higher proportion of land revenue being paid by very large landlords, and a correspondingly higher measure of inequality (Figure 2B). Even as late as 1990, the size distribution of land holdings looks quite different across these two areas: 64% of all land holdings in landlord areas were classified as "marginal" (less than 1 hectare), which is about 8 percentage points higher than the corresponding figure in non-landlord areas.[14] Further, 48% of all holdings are small to medium sized (1-10 hectares) in individual-based areas, but only 35% in landlord areas (Figure 2C). There is no significant difference in the *measured* proportion of extremely large holdings, which is probably due to the impact of land ceiling laws passed after Independence.

The distribution of wealth is important for three reasons: First, because it determines the size of the group within the peasantry that has enough land and other wealth to be able to make the many somewhat lumpy and/or risky investments necessary to raise productivity.[15] Second, because it affects the balance between those who cultivate mainly their own land and those who cultivate other people's land. As is well-known, cultivating other people's land generates incentive problems which reduces investment and productivity. Finally, it made it likely that the political

[14]The difference of 8 percentage points is obtained by regressing the proportion of marginal (less than 1 hectare) holdings on the non-landlord proportion, after controlling for geographic variables.

[15]See Banerjee and Newman (1993) or Galor and Zeira (1993) for theoretical models of the link between income distribution and long-run development.

interests of the rural masses would diverge substantially from that of the elite. In particular, it made it very tempting for the peasants to support political programs that advocate expropriating the assets of the rich.

Differences in the Security of Property: It has been suggested that the concentration of power in the hands of the landlords made peasant property relatively insecure in the landlord areas. Investments that made the land more productive were discouraged by the risk of being expropriated by the landlord. In contrast, in the *raiyatwari* areas, proprietary peasants had an explicit, typically written, contract with the colonial state which the colonial state was broadly committed to honor. This may have resulted in better incentives for the peasants in these areas.[16] It is still not clear why this effect would have persisted in the post-colonial era, but it is conceivable that the ex-landlords continue to exercise arbitrary power in many of these areas, despite laws to the contrary.

The Nature of Political Power: It is also plausible that the nature of the settlement affected the nature of political power in the post-Independence era. First, because the history of the landlord areas was often a history of coercion of peasants by local landlords, the political ethos of these areas was one of class-based resentment, undermining the trust that is essential for being able to act together in the collective interest. Given that their interests were probably already substantially misaligned, it is plausible that this made for an environment where the political energies of the masses were directed more towards expropriating from the rich (via land reforms, for example) than towards trying to get more public goods (schools, tap water, electricity) from the state, and the political energies of the rich were aimed at trying to ensure that the poor did not get their way.[17] Second, it was not uncommon for the rural elites in the landlord areas to be quite disassociated from the actual business of agriculture since they were typically more rent collectors than farmers, and even the rent collection rights were often leased out. This would tend to weaken the political pressure on the state to deliver public goods that were important to farmers. Moreover they were often physically absent, preferring to live in the city and simply collect their rents, and as a result had only rather limited stakes in improving the living conditions in rural areas.

The Relationship with the Colonial State: We have already stated that many landlord

[16] On other hand, as pointed out by Roy (2000) and others, the colonial state was more inclined to pass legislations to protect the interests of the tenants in the landlord areas that had a permanent settlement, precisely because their revenue earnings from these areas did not depend on how much was extracted from the peasant. On the other hand, to some extent these regulations might have been a response to the way the landlords had been treating the peasants.

[17] For instance, the rich could undercut democratic processes and resist public policies that would empower the poor, very much along the lines taken by the Latin American elites (see Engerman and Sokoloff 2002).

areas had permanently fixed revenue commitments and also that it was more difficult to raise rents in landlord areas due to the greater political power of large landlords. This meant that the colonial state had more stake in the economic prosperity of non-landlord areas, since this could be translated into higher rents. This is reflected in an increasing number of legislations trying to protect the peasants from money-lenders and others in these areas starting in the second half of the nineteenth century. It also meant that the state had more reason to invest in these areas in irrigation, railways, schools and other infrastructure.[18] In this context, we should note that almost all canals constructed by the British were in non-landlord areas. If indeed these areas had better public goods when the British left, it is plausible that they could continue to have some advantage even now.

4 Data

We use a combination of historical and recent data for our analysis. All data are at the district level, a district in India being an administrative unit within a state. We chose to use district-level rather than state-level data for two major reasons: first, modern Indian state boundaries do not correspond to older British province boundaries due to the integration of several princely states in 1947, as well as the subsequent linguistic reorganization of states in 1956. However, the district boundaries have not changed very much, though many of the older districts have been split into two or more modern districts. Second, using district-level data gives us a larger sample size. The drawback is that we are limited in the kind of data that we can get.

We use district-level data for agricultural investments and productivity over the period 1956-87, from the India Agriculture and Climate Data Set assembled by the World Bank. Each district was then matched to an older British district using old and new maps. We retain only the districts that were under direct British administrative control, because we do not have information on the land systems in districts which were under native princes or tribal chiefs.[19] For each district of British India, we then proceed to compute a measure of non-landlord control as follows: For many areas (the states of Uttar Pradesh, Madhya Pradesh, Panjab, Tamil Nadu and Andhra Pradesh),

[18] Bagchi (1976) also makes this point.

[19] One exception is the princely state of Mysore (part of modern Karnataka state), where the British took over the administration in 1831 and ruled for 50 years, before reinstating the royal family in 1881. During this time, the British instituted an individual-based land revenue system, which the ruler was obliged to continue after his reinstatement. These districts are therefore classified as individual-based.

we have district level information on the proportion of villages or estates or land area which was not under the revenue liability of landlords. For other areas where we do not have the exact proportion (Maharashtra, Bengal, Bihar, Orissa, Karnataka), we assign the non-landlord measure as being either zero or one depending on what was the dominant land revenue system. The details of the data sources and the construction of this variable are in Appendix Table 3.

The agricultural investment outcomes we consider are the proportion of gross cropped area which is irrigated, quantity of fertilizer used per hectare of gross cropped area and the proportion of area sown with high-yielding varieties (HYV) of rice, wheat and other cereals. Our main productivity variables are the combined yield per hectare of 15 major crops, as well as yields for some important individual crops, notably rice and wheat. In a later section, we will also consider village-level investments in health and education facilities, as well as health and education outcomes.

5 Empirical Strategy

We will compare agricultural investments and productivity between landlord and non-landlord areas by running regressions of the form:

$$y_{it} = constant + \alpha_t + \beta\ NL_i + X_{it}\gamma + \epsilon_{it} \tag{1}$$

where y_{it} is our outcome variable of interest (investment, productivity, etc.) in district i and year t, α_t is a year fixed effect, NL_i is the historical measure of the non-landlord control in district i and X_{it} are other control variables. Our coefficient of interest is β, which captures the average difference between a non-landlord district and a landlord district in the post-Independence period.

In all our regressions we control for geographic variables like latitude, altitude, soil type, mean annual rainfall and a dummy for whether the district is on the coast or not. In addition, we also control for the length of time under British rule (or equivalently, the date of British conquest), which may have independent effects, say because early British rule was particularly rapacious or because the weakest and worst districts fell to the British first. Note that we do not include district fixed effects in this regression, since NL_i is fixed for district i over time (it is the historical land arrangement). However, we do adjust our standard errors for within-district correlation, since our data consists of repeated observations over time for each district.

We might be concerned that our estimates of β might not reflect the true impact of

historical institutions for several reasons. First, there could be measurement error in the way we construct our NL measure. Second, there could be some omitted district characteristics that are correlated both with the choice of land tenure systems and with our investment and productivity outcomes. We propose to address these issues using a variety of strategies: First, we check that our results remain robust even when we use only a binary measure of whether a district is mainly landlord-based or non-landlord based. We construct this classification as follows: A district is classified as "landlord" if it was under a landlord-based system, or if it was under a landlord-based system and only partly converted to a different system (several districts of Madras) or if it was in Oudh, which we have argued had a higher proportion of landlords due to the reversal of policy in 1857. All other individual-based or village-based systems are classified as "non-landlord". We should note that in this classification, the "landlord" districts have at most 40% of land under non-landlord control, while some of our so-called "non-landlord" districts in fact have less than 20% of their land under non-landlord control. This classification should therefore make our estimated differences smaller than what we would get using our original measure. We also compute results using a more restricted sample: Since we might be not be fully sure of the classification of village-based districts, we exclude them and do a comparison of only landlord districts with individual-based districts. Table 1 provides state-wise details of this classification.

We use two strategies to control for possible omitted variables and/or endogeneity. The first is an instrumental variables strategy. As mentioned in Section 2, areas which came under British revenue administration after 1820 all have predominantly non-landlord systems, except for the policy reversal which occurred in Oudh (taken over in 1856) after the revolt of 1857. We posited that this is mainly due to ideological changes and the existence of non-landlord precedents, and use a dummy for whether the district was conquered between 1820 and 1856 as an instrument for the non-landlord proportion, after controlling for the length of British rule.[20] Figure 3 shows that all the districts conquered after 1820 and before 1856 in fact ended up having predominantly non-landlord systems. Our second strategy to control for possible omitted variables is to consider an extremely restricted sample: We consider only those sets of districts which happen to be geo-

[20]By "date of conquest", we mean the date when the district came under British revenue administration. The two dates are usually the same, with two exceptions. The first is the kingdom of Mysore, which was under British administration for the period when the revenue systems were put in place, but was never part of the British empire. The second is the kingdom of Nagpur, which was formally annexed in 1854, but had been under British revenue control in 1818 itself.

graphical neighbors (i.e., share a common border) but which happened to have different historical land systems. These were mainly due to historical factors, rather than any major geographical differences. These districts and the reasons for their land system differences are listed in Appendix Table 5. Given the geographic concentration of different land systems (see the map in Figure 1), this is a small sample of only 35 districts.

After establishing some robust differences in investment and productivity between landlord and non-landlord areas, we analyze these outcomes in more detail. We first show that the differences in agricultural productivity are mainly driven by the differences in investment. We then show that differences in investment widened in the mid-1960's, when public action in rural areas became much more important in India.

6 Differences Between Landlord and Non-Landlord Areas

6.1 Differences in Geography

There are significant geographical differences between landlord areas and non-landlord areas (Table 2). Landlord areas have somewhat lower altitudes, higher rainfall and less areas with black soil as compared to non-landlord areas. This is not surprising given that they are concentrated in certain provinces (see map). In particular, we note that landlord areas have a greater depth of topsoil, which together with the greater rainfall and lower altitudes seems to indicate that these areas might be inherently more fertile and productive. Landlord areas also have a higher total population and a greater proportion of minorities like Scheduled Castes and Scheduled Tribes, but there are no significant differences in population density. We also see that non-landlord areas devote less area to rice and wheat and more to cash crops like cotton, oilseeds, tobacco and sugarcane. This could be simply due to different climatic conditions, or could reflect a greater shift towards commercial agriculture in non-landlord areas.

6.2 Differences in Agricultural Investments and Productivity

We mainly investigate investment and productivity differences in the period 1956-85. Even before the start of our sample period, there were some differences in agricultural investments and productivity: For instance, landlord-controlled Bengal Presidency showed a decline in gross agricultural output over the period 1891-1946, while non-landlord-controlled Madras and Punjab showed the

greatest increases in this period (Roy, 2000). Further, Punjab and Uttar Pradesh also showed large increases in the proportion of irrigated area, mostly due to government-sponsored canal irrigation projects during this period. However, these historical differences may have been wiped out once landlords and other intermediaries were abolished by land reform in the 1950s.

Table 3 documents large and significant differences in measures of agricultural investments and productivity. Each entry in this table represents the regression coefficient from the regression of the dependent variable on the non-landlord proportion, controlling for year fixed effects, geographical variables and within-district clustering of errors. We show the detailed regression specification for one of the dependent variables (log agricultural yield) in Appendix Table 4, listing the coefficients on all our control variables. We see that non-landlord districts have a 25% higher proportion of irrigated area, 45% higher levels of fertilizer use and 28% higher proportion of rice area under high-yielding varieties. Overall agricultural yields are 16% higher, rice yields are 17% higher and wheat yields are 23% higher. These are differences after controlling for geographic variables and the length of British rule. Further, column (2) shows that these differences are slightly bigger if we exclude the states of West Bengal and Bihar, the two states which had the longest period of British rule, and where the chances of the land system being determined by pre-existing conditions are the greatest. This table constitutes our base specification, and the rest of this section is devoted to checking the robustness of these results as well as taking a closer look at them.

We should note that these differences are not driven by substitution away from agriculture in landlord districts, nor by a greater shift towards crops other than rice or wheat: As we see in Table 2, landlord areas have a higher proportion of their working population engaged in farming, and they also devote a lower proportion of area to growing cash crops.

6.3 Results Using Binary Measures of Non-Landlord Control

As detailed in section 5, we use a binary landlord/non-landlord classification to check that our results are not driven by issues in computing the non-landlord proportion. The last two columns of Table 3 show that many of these differences continue to be significant even when we restrict ourselves to a binary classification. A few coefficients are no longer significant here, firstly because we are deliberately mismeasuring our regressor, and secondly because some of the "non-landlord" districts in our binary classification nevertheless have large areas under landlords (see section 5 for details). We also see that some of the coefficients in the last column are larger than our base

specification, and this is probably because when we leave out the village-based districts, we are comparing almost wholly landlord areas with the other extreme, the individual-cultivator areas.

6.4 Results Using Instrumental Variables

The OLS results could be an overestimate of the impact of history if the land revenue systems were determined endogenously. On the other hand, there could be measurement error in our measure of the non-landlord proportion, in which case the OLS estimates would be downward biased. As explained earlier, the date of British control over land revenue had a particular impact on the kind of systems which were put into place. Our instrument therefore is a dummy for whether the district was taken over between 1820 and 1856. This is a significant predictor of the non-landlord proportion of the district, after we control for geography and a linear control for the length of British rule (Table 4, Panel A). The first stage is significant even when we include a quadratic control for the length of British rule, as well as when we include state fixed effects.

Our IV strategy is illustrated in Figure 4 (reproduced below), where we plot the kernel regression of the non-landlord proportion and the mean log agricultural yield against the date of conquest. These represent, respectively, the first stage and the reduced form of our IV strategy.

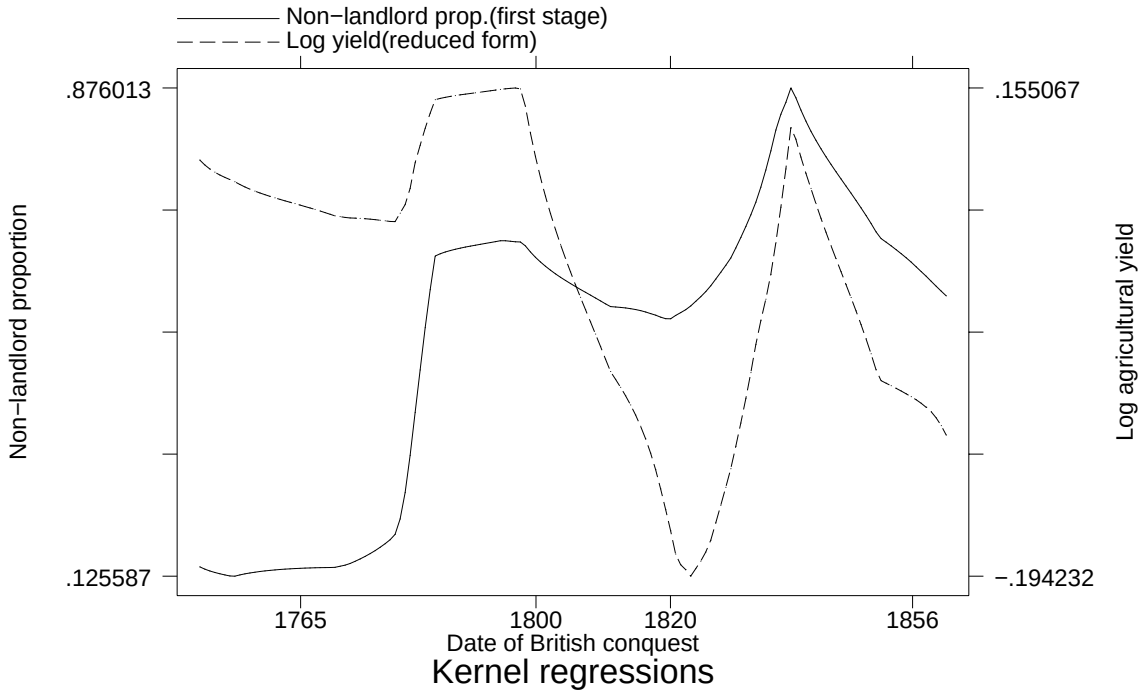

Fig 4: Instrumental variables strategy

It is clear that there is a good fit in the shape of the two graphs, with the yield graph following the ups and downs of the non-landlord proportion graph. We also see that both curves are highly non-linear (we will in any case be controlling directly for any linear effects of the differences in the dates of conquest). In particular, we see that the non-landlord proportion is significantly higher for areas conquered between 1820 and 1856 compared to areas conquered earlier or later. This is exactly what we would have expected given the discussion in Section 2.3. Further, we see that the mean agricultural yield is also higher for these areas, compared to areas conquered earlier or later: This is the relationship our IV estimates will exploit.[21]

Our IV results confirm that non-landlord systems indeed have a large and significant impact on current outcomes (Table 4, Panel B). In fact, all the IV coefficients are larger than their OLS counterparts suggesting that the OLS results are probably downward biased because of the measurement error in constructing our admittedly crude measure of the historical non-landlord proportion. The standard errors for the IV estimates are also larger than the OLS, but we still see statistically significant differences in the adoption of HYV crops, as well as in wheat yields. Fertilizer usage, irrigation levels and rice yields are significantly greater at the 10% level. Specifications involving a quadratic control for the length of British rule typically give coefficients which are smaller in magnitude, but generally of the same level of significance (results not shown).

6.5 Results for Neighboring Districts

Even when we restrict our sample to only geographically neighboring districts, we still see large and significant differences between landlord and non-landlord districts in fertilizer usage and agricultural yields (Table 4, Panel B). In particular, total yields are 14% higher and wheat yields 26% higher in non-landlord areas than landlord areas; these estimates are very close to the estimates in our base specification. The differences in irrigation rates and fertilizer use are also close to the magnitudes obtained in our base specification. We expect that omitted variables, if any, would be much more uniform across geographic neighbors than in our overall sample, and we do verify that there are no significant differences in our observed geographic and demographic variables between these districts (results not shown). These results serve to confirm that our original results are not being driven by some omitted geographic or other variables.

[21]The "hump" (or mode) on the left is mainly due to the districts of Madras Presidency, which were conquered fairly early, but which switched over to a non-landlord system after 1820.

6.6 Does Land Tenure Have an Independent Effect on Productivity?

We have established large and robust differences between landlord and non-landlord districts in terms of agricultural investments and productivity, with the non-landlord districts showing better performance in all of these measures. In table 6, we now establish that the differences in productivity are largely due to differences in investments. We do this by regressing productivity measures on the proportion of non-landlord control, as well as the measures of investment. All the measures of investment (irrigation, fertilizer use and adoption of HYV) are positive and strongly significant as we would expect. Addition of these measures reduce the coefficient on the non-landlord proportion by 78% for total yields, 58% for rice yields and 52% for wheat yields. The historical variable is also no longer statistically significant.

6.7 When Do the Differences Arise?

Non-landlord districts were not historically more productive than landlord-based districts. Looking at data for rice yields in 10 districts of Madras Presidency[22] and rice and wheat yields for 17 districts of Uttar Pradesh during the colonial period,[23] we see in Figure 4 that yields were in fact lower for non-landlord areas in this period.[24] Further, Figure 5 indicates that the differences in investments (irrigation, fertilizer) and yields widen in the mid-1960's. Table 6 (Panel A) formally establishes that the gap between landlord and non-landlord areas is larger after 1965 than in the 1956-65 period. This is further confirmed when we look at a sample of 10 districts of Tamil Nadu for which we have time series data from the colonial period onwards. Figure 5D indicates that the non-landlord areas overtake the landlord areas during the mid-1960's. We check this formally by running regressions of the yield on a post-1965 dummy and its interaction with the non-landlord proportion (Table 6, Panel B).

The period after 1965 saw the state in India becoming much more active in rural areas, through the Intensive Rural Development Programs, the efforts to disseminate new high-yielding varieties of crops (resulting in the "Green Revolution") and the stress on building public goods

[22]Source: Yanagisawa (1996).

[23]The data for Uttar Pradesh come from the same Settlement Reports we use to calculate our non-landlord proportion, and are from the 1870's and 1880's. Very few of the Reports contain data on yields, resulting in a very small sample.

[24]Of course, these numbers do not control for differences in geography, nor is there any effort to control for potential endogeneity—there is simply not enough data to do any more than a simple comparison of means.

in rural areas under the 1971 *Garibi Hatao* (poverty alleviation) program. As we have seen, the landlord areas were slower in the adoption of high-yielding varieties. They also seem to have benefited less from the growth in public investment in irrigation, though our numbers do not distinguish between public and private irrigation facilities. This suggests that the landlord areas were for some reason unable to benefit from the set of new opportunities that became available in the 1960s. We will discuss some reasons for why this was the case in the concluding section.

7 Human Capital Investments and Outcomes

We find that landlord areas lag behind non-landlord areas in human capital investments. Table 7 shows that in 1981, landlord areas had a significantly lower proportion of villages with educational and health facilities. Landlord areas had 21% lower villages (15 percentage points) equipped with primary schools, while the gap in middle school and high school availability are 60% and 43% respectively. Less than 2% of all villages are equipped with primary health centers, but the proportion of such villages is 37% more in non-landlord areas compared to landlord areas. IV estimates of these differences are, as before, larger that the OLS estimates. However, the standard errors are also larger and some coefficients lose their significance. More interestingly, these differences persist even when we include state fixed effects, though the magnitudes are smaller. This seems to indicate that some of these differential investments might be driven by differences in the local demand for public goods.

Given these differences in investments, it is not surprising to see differences in human capital accumulation measures. Literacy rates are 5 percentage points higher in non-landlord areas according to our OLS estimates and 16 percentage points higher according to the IV estimates (Table 7). However, the difference is reduced to a much lower 2.4 percentage points when we control for state fixed effects, indicating that state policies are the main channel of influence on this variable. We also look at infant mortality rates as an important health outcome: Again, we see a very large and significant difference between non-landlord and landlord areas in this regard. Non-landlord areas have 40% lower infant mortality rates (70% lower according to the IV estimates). This difference, though lower in magnitude, is still fairly large (19%) and statistically significant even after we put in state fixed effects.

8 What is Wrong with the Landlord Districts?

In this section, we consider possible channels through which the historical non-landlord proportion might affect current outcomes. Of the three basic channels of influence that we discussed in section 3, the one that seems least plausible is the one that emphasizes the incentives of the colonial state to invest in non-landlord areas. To the extent that we have data on this point it seems that, if anything, the non-landlord areas were behind at the end of the colonial period.

The view that emphasizes the direct effect of inequality on private investment is certainly consistent with the evidence, but it is hard to imagine that it could explain the entire difference between the landlord and non-landlord areas. As we reported earlier, landlord areas have 8 percentage points higher proportion of very small holdings of less than 1 hectare (see Section 3). If we assume that the productivity difference of 16% in agricultural yields arises solely from the difference in the distribution of land, then this implies that small holdings are only about 12% as productive as larger holdings, which seems an implausibly low figure.[25] It is also unclear how, under this view, we would explain the differences in *public* investment. One possibility is that the effect on public investment is entirely the effect of the difference in agricultural productivity. To see whether this is indeed the case, we re-estimated our public goods regressions, controlling for average yield in the 1956-87 period. The estimates we obtain are actually slightly larger than the estimates when we do not control for yield (results not shown here), suggesting that the effect does not come from differences in productivity.

The view that emphasizes differences in the security of property is also problematic, though it is conceivable that it is an important factor at least in some areas (such as rural Bihar), where landlord power seems to have continued unabated. The basic problem with this view is that the landlord areas seem to have been ahead in the heyday of landlord power and have fallen behind *after* landlord power has been formally abolished.

We therefore feel that differences in the political environment in the two areas must have played an important role. There is some evidence that these differences were indeed policy driven. We estimated the investment and yield equations as well as the equations for public goods after including a fixed effect for each state. This reduces the estimated coefficient on the non-landlord

[25] Suppose small farms are δ times as productive as large farms, z is the share of small farms and total productivity is simply the sum of large farm and small farm productivity. Then the percentage productivity difference between non-landlord and landlord areas equals $\frac{(1-\delta)\triangle z}{1-(1-\delta)z_{landlord}}$. Using productivity difference=0.16, $\triangle z = 0.08$ and $z_{landlord} = 0.64$, we obtain $\delta \approx 0.12$.

share substantially (by 50% or so), though the signs are unaltered and several remain significant (Table 8). The instrumental variable estimates show a similar pattern: Once again the estimates are smaller than the corresponding IV estimates without state fixed effects (though always larger than the OLS estimates) and significant only in a subset of cases. This is naturally interpreted as saying that a part of the effect of being a landlord district goes through its effect on state level policies, though there are clearly other possible interpretations.[26] However, we need to be cautious while interpreting these results: Adding state fixed effects effectively drops the states which have no within-state variation in non-landlord proportion. These states (West Bengal, Bihar, Gujarat and Karnataka) account for about one-fourth of our sample, so putting in state fixed effects results in a lack of power in our estimation.

The historically higher inequality of assets in landlord areas might lead to a higher demand for redistribution, which might be articulated through the democratic process or through higher levels of social conflict. Those familiar with recent Indian history will recognize one rather stark difference in the political ethos: The areas most associated with Maoist insurgency movements, clearly the most extreme form of the politics of class conflict in India, are West Bengal, Bihar and the Srikakulam district of Andhra Pradesh, all landlord areas. Looking at crime statistics also points to the landlord areas being more conflict-ridden. Table 9 shows that landlord areas have higher levels of crime than non-landlord areas. Further, the difference is mainly in the levels of violent crime (which includes dacoities[27] and riots, which can be interpreted as indicators of social conflict) and crimes like burglary and robbery, while petty crimes like cheating and counterfeiting are not significantly different across the two types of areas.

We can also look directly at whether there was more redistribution in the landlord areas. Using data from household surveys[28] we find that landlord areas do show a greater decline in inequality (measured by the Gini coefficient of rural income) than non-landlord areas over the period 1972-87 (Table 9), even after we include a range of geographical controls and a fixed effect for the state.[29]

[26]For example, it could be that landlord dominated states evolve a more "feudal" culture, which discourages investment.

[27]Dacoities are armed robberies.

[28]Source: National Sample Surveys (NSS). We should keep in mind that these data are not at the district level but at the NSS region level, usually consisting of 3-10 districts. Our standard errors for these regressions are clustered at the NSS region level to take care of this aspect of our data.

[29]The effect is reduced when we control for inequality in 1972 (significant at 10% level), which is not surprising given that this was the problem they were trying to solve. It is not significantly different from zero when we instrument

A part of the story of the landlord areas thus seems to be that they got redistribution instead of public goods. One can therefore ask whether the poor actually benefitted from these policies. When we regress the change in poverty rates over the 1972-87 period (measured by the head-count ratio)[30] on the non-landlord variable, we find a positive and significant OLS coefficient (though the instrumental variables estimate is not). In other words, inequality fell by more in landlord areas whereas poverty reduction was higher in non-landlord areas, though we cannot be sure that this is a causal effect.[31]

It is tempting to interpret this evidence as saying that the poor in the landlord areas would have been better off if they had not focussed so much on redistribution. This is however unwarranted:[32] It presumes that the same feasible policy choices were available to both areas, which is not necessarily true. There are certainly enough instances of class-based conflicts that started because the elite was against even the most basic reforms of the system (universal schooling, for example).[33] Further, given the history of oppression and the resentment it had created, it is not clear that a reformist path was politically feasible in the landlord areas, before some redistributive actions were taken. It is quite possible that the slower growth over the last half century or so was a part of a necessary blood-letting that will eventually make a take-off possible, though obviously we cannot say anything definite on this point. What seems clear is that the concentration of economic and political power in the hands of an elite, resulting from the landlord-based land tenure system, continues to be a heavy burden on the economic life of these areas.

for the non-landlord share, but it is worth emphasizing that we do not have the inequality data at the district level, so that there are effectively only 41 data points.

[30]Source: National Sample Surveys (NSS); see footnote 28.

[31]This is similar to the finding in Besley and Burgess (2000) that the states in India that undertook more land reforms had slower agricultural productivity growth.

[32]Redistribution could in fact increase productivity: see Banerjee, Gertler and Ghatak (2002) for example.

[33]See Engerman and Sokoloff (2002) for some examples from the Latin American context.

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TABLE 1 : STATE-WISE DISTRIBUTION OF LANDLORD AND NON-LANDLORD DISTRICTS

State	Mean non-landlord proportion	Classification of revenue systems				Total districts
		Landlord based	Individual based	Village bodies		
				Landlord	Non-landlord	
Andhra Pradesh	0.66	2	8	0	0	10
Bihar	0.00	12	0	0	0	12
Gujarat	1.00	0	7	0	0	7
Haryana	0.85	0	0	0	5	5
Karnataka	1.00	0	15	0	0	15
Madhya Pradesh	0.10	14	1	0	0	15
Maharashtra	0.78	4	14	0	0	18
Orissa	0.32	6	2	0	0	8
Punjab	0.87	0	0	0	6	6
Rajasthan	0.00	1	0	0	0	1
Tamil Nadu	0.75	2	9	0	0	11
Uttar Pradesh	0.42	0	0	12	35	47
West Bengal	0.00	11	0	0	0	11
Total	0.51	52	56	12	46	166

Notes: This table lists only districts which used to be part of British India. Areas where the British did not set up the land revenue system are excluded.
Districts of British India which are currently in Pakistan, Bangladesh or Burma are excluded.
The table also excludes the states of Assam and Kerala, for which agricultural data is not available in the World Bank dataset.
The table lists 1960 districts, some of which were split into two or more districts over time. We use un-split districts in all our analysis.

TABLE 2 : DIFFERENCES IN GEOGRAPHY AND DEMOGRAPHICS

		Mean	Standard deviation	Difference[a]	Standard error of difference
Geography					
Latitude		22.19	5.60	-4.35***	(0.961)
Altitude		366.41	148.14	93.64***	(25.98)
Mean annual rainfall (mm)		1263.09	471.64	-373.99***	(80.83)
Coastal dummy		0.1497	0.3579	0.084	(0.065)
Top 2 soil types:	Black soil	0.2096	0.4082	0.244***	(0.072)
	Alluvial soil	0.1677	0.3747	-0.135**	(0.067)
	Red soil	0.5689	0.4967	0.075	(0.090)
Top-soil depth	<25 cm	0.0181	0.1336	0.016	(0.024)
	25-50cm	0.1145	0.3193	-0.076	(0.058)
	50-100 cm	0.2289	0.4214	0.193	(0.075)
	100-300 cm	0.0904	0.2876	0.135***	(0.051)
	>300 cm	0.5482	0.4991	-0.268***	(0.088)
Area share of various crops:1956-1987					
area share of rice		0.366	0.298	-0.194***	(0.054)
area share of wheat		0.149	0.157	-0.058**	(0.026)
area share of other cereals		0.205	0.172	0.128***	(0.031)
area share of oilseeds		0.067	0.088	0.065***	(0.013)
area share of cotton		0.041	0.096	0.066***	(0.018)
area share of tobacco		0.003	0.015	0.005**	(0.002)
area share of sugarcane		0.031	0.053	0.005	(0.008)
Cash crops to cereals ratio		0.149	0.257	0.152***	(0.048)
Demographics: 1961, 1971, 1981, 1991					
log(Population)		14.26	0.634	-0.088	(0.109)
Population density		36.44	85.92	-32.99***	(9.15)
Proportion of scheduled castes		0.1598	0.0733	-0.034**	(0.014)
Proportion of scheduled tribes		0.0980	0.1630	-0.010	(0.031)
Proportion rural		0.8102	0.1237	-0.066***	(0.023)
Proportion of working population in farming		0.7119	0.1352	-0.050*	(0.027)

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors in parentheses, corrected for district-level clustering.

[a]Difference represents the average difference between non-landlord and landlord districts, computed as the regression coefficient on the non-landlord proportion.
For the area under different crops and demographics, the difference is calculated after controlling for year fixed effects.

TABLE 3 : DIFFERENCES IN AGRICULTURAL INVESTMENTS AND YIELDS

Mean non-landlord proportion = 0.5051 (s.d.=0.4274)

Dependent variable	Mean of dependent variable	Coefficient on non-landlord proportion		Coefficient on non-landlord dummy	
		OLS Full sample	OLS Excluding Bengal and Bihar	OLS Full sample	OLS Excluding village-based districts
AGRICULTURAL INVESTMENTS					
Proportion of irrigated area	0.277	0.069*	0.070*	0.083***	0.010
		(0.035)	(0.036)	(0.027)	(0.035)
fertilizer use (kg/ha)	24.594	10.953***	11.245***	10.290***	10.945***
		(3.355)	(3.424)	(2.316)	(3.038)
% rice area under HYV	0.284	0.080*	0.096**	0.018	0.082**
		(0.044)	(0.043)	(0.032)	(0.039)
% wheat area under HYV	0.495	0.090*	0.119***	0.029	0.095*
		(0.046)	(0.045)	(0.036)	(0.053)
% other cereals area under HYV	0.189	0.056*	0.084***	-0.035	0.110***
		(0.031)	(0.024)	(0.025)	(0.041)
AGRICULTURAL PRODUCTIVITY					
log(yield of 15 major crops)		0.158**	0.153**	0.173***	0.090
		(0.071)	(0.074)	(0.053)	(0.083)
log(rice yield)		0.168**	0.194**	0.100	0.177**
		(0.081)	(0.081)	(0.062)	(0.077)
log(wheat yield)		0.228***	0.228***	0.188***	0.139
		(0.067)	(0.070)	(0.053)	(0.096)
No. of districts		166	143	166	109
Year fixed effects		YES	YES	YES	YES
Geographic controls		YES	YES	YES	YES
Length of British rule		YES	YES	YES	YES
Clustering for errors		YES	YES	YES	YES

Standard errors in parentheses, corrected for district-level clustering. * significant at 10%; ** significant at 5%; *** significant at 1%
Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control.
Data are from 1956-87. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.
The non-landlord dummy is assigned as follows: the dummy equals one for all individual-based districts and all village-based districts except those in Oudh. For landlord-based districts and the village-based districts of Oudh, the dummy is zero.

TABLE 4: ROBUSTNESS OF OLS RESULTS

PANEL A: FIRST STAGE REGRESSIONS FOR IV

Dependent variable : Non-landlord proportion

Coefficient on	(1)	(2)	(3)
Instrument	0.331***	0.430***	0.419***
(=1 if district conquered between 1820 and 1856)	(0.086)	(0.092)	(0.087)
R-squared	0.40	0.43	0.63
No. of observations	166	166	166
Geographic controls	YES	YES	YES
Date of British rule	YES	YES	YES
Date of British rule squared	NO	YES	NO
State fixed effects	NO	NO	YES

PANEL B: ROBUSTNESS CHECKS

Dependent Variable	Coefficient on non-landlord proportion	
	IV	OLS
	Full sample	Neighbors only
AGRICULTURAL INVESTMENTS		
Proportion of irrigated area	0.235*	0.100**
	(0.139)	(0.043)
fertilizer use (kg/ha)	25.994*	10.391**
	(13.183)	(4.893)
% rice area under HYV	0.410**	-0.016
	(0.164)	(0.081)
% wheat area under HYV	0.603***	0.079**
	(0.167)	(0.035)
% other cereals area under HYV	0.531***	-0.021
	(0.130)	(0.024)
AGRICULTURAL PRODUCTIVITY		
log(yield of 15 major crops)	0.402	0.141**
	(0.259)	(0.060)
log(rice yield)	0.552*	0.127
	(0.283)	(0.098)
log(wheat yield)	0.704***	0.258***
	(0.214)	(0.079)
No. of districts	166	35
Year fixed effects	YES	YES
Geographic controls	YES	YES
Length of British rule	YES	YES
Clustering for errors	YES	YES

Standard errors in parentheses, corrected for district-level clustering.
* significant at 10%; ** significant at 5%; *** significant at 1%
Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control. Data are from 1956-87. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.

TABLE 5: ARE YIELDS EXPLAINED BY INVESTMENTS?

	Dependent variables		
	Log total yield	Log rice yield	Log wheat yield
	OLS	OLS	OLS
	(1)	(2)	(3)
Proportion non-landlord	0.035	0.070	0.109
	(0.053)	(0.063)	(0.063)
Proportion of irrigated area	0.693**	0.439**	0.435**
	(0.112)	(0.096)	(0.117)
fertilizer use (kg/ha)	0.007**	0.004**	0.001
	(0.001)	(0.001)	(0.001)
% area under HYV	4.274**	0.580**	0.618**
	(1.122)	(0.063)	(0.070)
Adjusted R-squared	0.60	0.52	0.56
No. of districts	166	166	166
Year fixed effects	YES	YES	YES
Geographic controls	YES	YES	YES
Length of British rule	YES	YES	YES
Clustering for errors	YES	YES	YES

Standard errors in parentheses, corrected for district-level clustering.
* significant at 10%; ** significant at 5%; *** significant at 1%
Data are from 1956-87.
Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.

TABLE 6: WHEN DO THE DIFFERENCES APPEAR?

PANEL A : FULL SAMPLE

Dependent variable	Coefficient on non-landlord proportion		Difference
	1956-65	After 1965	
	(1)	(2)	(3)
AGRICULTURAL INVESTMENTS			
Proportion of irrigated area	0.046	0.079**	0.033**
	(0.033)	(0.036)	(0.016)
fertilizer use (kg/ha)	1.026**	15.581***	14.55***
	(0.425)	(4.763)	(4.44)
AGRICULTURAL PRODUCTIVITY			
log(yield of 15 major crops)	0.066	0.201***	0.135***
	(0.065)	(0.076)	(0.033)
log(rice yield)	0.108	0.196**	0.088**
	(0.069)	(0.089)	(0.044)
log(wheat yield)	0.146**	0.268***	0.122*
	(0.058)	(0.079)	(0.063)
No. of districts	166	166	166
Year fixed effects	YES	YES	YES
Geographic controls	YES	YES	YES
Length of British rule	YES	YES	YES
Clustering for errors	YES	YES	YES

Standard errors in parentheses, corrected for district-level clustering.
* significant at 10%; ** significant at 5%; *** significant at 1%
Data are from 1956-87. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions. Estimates in column (3) are computed from a regression of the dependent variable on the interaction of the non-landlord proportion and a dummy for year>1965, after controlling for the main effects of these variables, as well as geographic controls.

PANEL B: RICE YIELDS FOR TAMIL NADU DISTRICTS

Sample : 10 districts of Tamil Nadu
Data are for 1870, 1901, 1911, 1917, 1919, and five-yearly intervals from 1922 to 1982

Dependent variable	Coefficient on non-landlord proportion		
	Before 1965	After 1965	Difference
Log rice yield	-0.099	0.415	0.514**
	(0.172)	(0.366)	(0.217)
No. of districts	10	10	10
Year fixed effects	YES	YES	YES
Errors clustered at district level	YES	YES	YES

Standard errors in parantheses, adjusted for district-level clustering.
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 7 : EDUCATION AND HEALTH

Dependent variable	Mean of dependent variable	Coefficient on non-landlord proportion				
		OLS Full sample	IV Full sample	OLS Neighbors only	OLS State FE	IV State FE
EDUCATION AND HEALTH INVESTMENTS 1981						
Proportion of villages having:						
Primary school	72.70	14.398***	35.411**	3.632	9.751***	-14.558
		(3.476)	(14.132)	(7.931)	(3.363)	(12.118)
Middle school	17.56	8.466***	12.402	4.934	5.448**	-18.075*
		(2.393)	(8.843)	(3.245)	(2.433)	(9.631)
High school	7.24	3.553**	10.915	3.222	2.158	-5.086
		(1.441)	(11.888)	(2.217)	(1.320)	(5.598)
Primary health center	1.98	0.709*	2.237	-0.032	0.855***	-2.483*
		(0.373)	(1.436)	(0.460)	(0.311)	(1.286)
Primary health subcenter	3.73	3.530**	3.766	0.216	0.461	-0.326
		(1.434)	(5.253)	(0.236)	(1.257)	(3.896)
EDUCATION AND HEALTH OUTCOMES						
Literacy rate (1961, 1971, 1981, 1991)	0.2945	0.0524**	0.1562**	-0.0008	0.0241	0.0391
		(0.0190)	(0.0624)	(0.0235)	(0.0176)	(0.0445)
Infant mortality rate (1991)	82.17	-32.71***	-56.93***	-0.316	-15.55***	-14.83
		(5.38)	(19.00)	(14.35)	(5.42)	(14.44)
No. of districts		168	168	28	117	117
Year fixed effects		YES	YES	YES	YES	YES
State fixed effects		NO	NO	NO	YES	YES
Geographic controls		YES	YES	YES	YES	YES
Length of British rule		YES	YES	YES	YES	YES

Standard errors in parentheses, corrected for district-level clustering. * significant at 10%; ** significant at 5%; *** significant at 1%
Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control.
Data are from 1956-87. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.
Instrument is a dummy which equals one if the district was conquered by the British between 1820 and 1856, and zero otherwise.
States which have no within-state variation in the non-landlord proportion (West Bengal, Bihar, Gujarat and Karnataka)are effectively dropped from regressions involving state fixed effects, and the number of districts is for states which have within-state variation in the non-landlord proportion.

TABLE 8 : IMPACT OF STATE FIXED EFFECTS

Dependent variables	Coefficient on non-landlord proportion	
	OLS	IV
	(1)	(2)
AGRICULTURAL INVESTMENTS		
Proportion of irrigated area	0.037	0.088
	(0.039)	(0.095)
fertilizer use (kg/ha)	5.272	14.741
	(3.222)	(8.942)
% rice area under HYV	0.002	0.062
	(0.042)	(0.095)
% wheat area under HYV	0.029	0.044
	(0.039)	(0.119)
% other cereals area under HYV	0.044*	0.171**
	(0.026)	(0.073)
AGRICULTURAL PRODUCTIVITY		
log(yield of 15 major crops)	0.058	0.249
	(0.072)	(0.259)
log(rice yield)	0.012	-0.343
	(0.077)	(0.245)
log(wheat yield)	0.153***	0.301**
	(0.045)	(0.137)
No. of districts (within states)	120	120
State fixed effects	YES	YES
Year fixed effects	YES	YES
Geographic controls	YES	YES
Length of British rule and	YES	YES
Clustering for errors	YES	YES

Standard errors in parentheses, corrected for district-level clustering.
* significant at 10%; ** significant at 5%; *** significant at 1%
Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control. Data are from 1956-87.
Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.
Column (2) represents instrumental variables estimates, where the instrument is a dummy which equals one if the district was conquered by the British between 1820 and 1856.
States which have no within-state variation in the non-landlord proportion (West Bengal, Bihar, Gujarat and Karnataka)are effectively dropped from regressions involving state fixed effects, and the number of districts is for states which have within-state variation in the non-landlord proportion.

TABLE 9 : CRIME RATES AND CHANGES IN POVERTY AND INEQUALITY

Dependent variable	Mean of dep.var	Coefficient on non-landlord proportion				
		OLS Full sample (1)	OLS Full sample (2)	OLS Neighbors only (3)	IV Full sample (4)	OLS State FE (5)
CRIME RATES: 1971, 1981, 1991						
Total crime/'000 population	2.024	-0.733***		-0.178	-1.998**	-0.461**
		(0.239)		(0.423)	(0.888)	(0.223)
Dacoities+riots/ '000 population	0.161	-0.046**		-0.022	-0.084	-0.007
		(0.018)		(0.022)	(0.060)	(0.012)
Violent crime/'000 population	0.246	-0.070***		-0.045*	-0.178**	-0.021
		(0.023)		(0.026)	(0.083)	(0.019)
Stealing/'000 population	0.824	-0.358***		0.137	-0.967*	-0.210*
		(0.112)		(0.316)	(0.503)	(0.119)
Petty crimes/'000 population	0.055	-0.002		-0.007	-0.059	-0.007
		(0.009)		(0.010)	(0.039)	(0.009)
CHANGE IN POVERTY AND INEQUALITY BETWEEN 1972 AND 1987						
Change in Head Count Ratio from 1972 to 1987	-10.95	-3.491	-6.844***	-4.951	8.187	-5.701**
		(3.108)	(2.466)	(2.965)	(13.235)	(2.275)
Change in Gini coefficient from 1972-1987	-0.0018	0.033**	0.019*	0.011	-0.013	0.018**
		(0.013)	(0.010)	(0.010)	(0.026)	(0.007)
No. of districts[a]		218	218	37	218	150
Year fixed effects		YES	YES	YES	YES	YES
Control for geography and length of British rule		YES	YES	YES	YES	YES
Control for initial 1972 level[b]		NO	YES	YES	YES	YES
State fixed effects		NO	NO	NO	NO	YES
Clustering for errors		YES	YES	YES	YES	YES

Standard errors in parentheses, corrected for district-level clustering for crime rates and at NSS region level clustering for poverty and inequality.

* significant at 10%; ** significant at 5%; *** significant at 1%

Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.

Violent crime includes murder, homicide, rape, kidnap, dacoity and riots. Stealing includes robbery, burglary and theft. Petty crime includes cheating and counterfeit.

States which have no within-state variation in the non-landlord proportion (West Bengal, Bihar, Gujarat and Karnataka)are effectively dropped from regressions involving state fixed effects, and the number of districts is for states which have within-state variation in the non-landlord proportion.

[a]This refers to 1991 districts. The number of districts is 184 for 1981 and 150 for 1971.

[b]Applies only for changes in poverty and inequality.

APPENDIX TABLE 1: DISTRICTS OF BRITISH INDIA, WITH DATES AND MODE OF ACQUISITION BY THE BRITISH

Province	Region	Date and mode of acquisition	Districts included
Bengal Presidency	Calcutta	Set up by British in 1690 on land obtained from Mughal emperor	Calcutta
	First conquests	Came under British political control from 1757 to 1761	24-Parganas (parts), Burdwan, Midnapore (parts), Chittagong
	Bengal and Behar	Revenue collection rights granted by Mughal emperor in 1765	Bankura, Birbhum, Hooghly, Howrah, Malda, Murshidabad, Nadiya(modern West Bengal); Bhagalpur, Champaran, Darbhanga,Gaya, Hazaribagh, Lohardagga, Munger, Patna, Purnea, Santal Parganas, Saran, Shahabad, Singhbhum (modern Bihar); Bakirganj, Bogra, Dacca, Faridpur, Dinajpur, Jessore, Khulna, Maimansingh, Noakhalli, Pabna, Rajshahi, Rangpur, Tipra (modern Bangladesh)
	Jalpaiguri and Darjeeling	Came under control in 1826 and 1838 respectively.	Jalpaiguri, Darjeeling.
	Orissa	Conquered in 1803	Balasore, Cuttack, Puri (rest of Orissa under tributary chiefs)
Madras Presidency	Jagir	Granted by Nawab of the Carnatic in 1750-63	Chingleput, Madras
	Northern Circars	Granted by Mughal emperor in 1765, grant confirmed by Nizam of Deccan in 1768.	Vizagapatam, Ganjam, Kistna, Godavari
	Territories obtained from Mysore	Obtained from Mysore after the Second Mysore War 1792	Salem, Coimbatore, Malabar, Kanara, some areas of Madura
	Ceded Districts	Obtained by Nizam of Deccan after Mysore War and then ceded to British in 1800	Anantapur, Bellary, Cuddapah, Karnul
	Carnatic Districts	Ceded to British by Nawab of Carnatic in 1801	Nellore, North Arcot, South Arcot, Madura, Trichinopoly, Tinnevelly
	Tanjore	Taken over by British due to incapacity of Hindu ruler in 1799	Tanjore
Princely states	Mysore	Taken over by British in 1831 due to mismanagement of ruler, given back to Wodeyars in 1881	Mysore

Province	Region	Date and mode of acquisition	Districts included
United Provinces	Benares	Ceded by the Nawab of Oudh in 1775	Benares, Mirzapur, Jaunpur, Ghazipur, Ballia,
	Ceded Districts	Ceded by the Nawab of Oudh in 1801	Azamgarh, Gorakhpur, Basti, Allahabad, Fatehpur, Kanpur, Farukhabad, Etawa, Mainpuri, Etah, Shahjahanpur, Badayun, Bareli, Pilibhit, Moradabad, Bijnaur, Tarai Parganas
	Conquered Districts	Conquered by Lord Lake from Scindia and others in 1803	Agra, Mathura, Aligarh, Bulandshahr, Meerut, Muzaffarnagar, Saharanpur
	Bundelkhand	Conquered in parts from 1803-17.	Banda, Hamirpur
	Taken over	Taken over due to lapse, forfeiture etc. in years after 1840.	Jalaun, Jhansi, Lalitpur
	Dehradun	Ceded after the Nepal war in 1815	Dehradun.
	Oudh	Annexed from Nawab of Oudh in 1856.	Kheri, Sitapur, Hardoi, Lucknow, Unao, Barabanki, Rai-Bareli, Partabgarh, Sultanpur, Faizabad, Gonda, Bahraich
Bombay Presidency	Surat	Obtained from Nawab of Surat in 1800	Surat
	Gujarat	Conquered from Baroda in 1803 and Marathas in 1818.	Ahmedabad, Kaira, Broach
	Maratha territory	Conquered from Peshwa in 1818	Thana, Khandesh, Nasik, Ahmednagar, Poona, Sholapur, Kolaba, Ratnagiri, Belgaum (some parts obtained in 1827), Bijapur, Dharwar
	Satara	Taken over by lapse in 1848	Satara
	Kanara	Transferred from Madras in 1862	Kanara
	Sindh	Conquered in 1843	Karachi, Haidarabad, Shikarpur, Upper Sindh Frontier, Thar & Parkar (modern Pakistan)
	Panch Mahals	Obtained in 1861	Panch Mahals
Assam	From Bengal	Obtained as part of diwani in 1765, later transferred to Assam	Goalpara (modern Assam), Sylhet (modern Bangladesh)
	Assam	Conquered in 1824	Darrang, Kamrup, Lakhimpur, Naugong, Sibsagar
	Hill districts	Brought under control in 1830-35	Cachar, Cachar Hills, Eastern Dwars (1866), Jaintya Parganas, Khasi and Jaintyas, Naga Hills.
Central Provinces	Maratha territory	Conquered from Bhonsle in 1818; some areas left under Bhonsle till 1854	Balaghat, Betul, Bhandara, Bilaspur, Chanda, Chhindwara, Damoh, Hoshangabad, Jabalpur, Mandla, Nagpur, Narsinghpur, Nimar (1820), Raipur, Sagar, Seoni, Wardah
	Sambalpur	Conquered in 1818, under local chief till 1849	Sambalpur

Province	Region	Date and mode of acquisition	Districts included
Panjab	Delhi	Conquered in 1803	Delhi, Gurgaon, Hisar, Karnal
	Sikh territory	Obtained after Sikh War in 1845-46	Ambala, Firozpur, Hoshiyarpur, Jalandhar, Kangra, Ludhiana
	Sikh territory	Obtained after Sikh War in 1849	Amritsar, Gurdaspur, Rohtak (India); Bannu, Dera Ghazi Khan, Dera Ismail Khan, Gujranwala, Gujrat, Hazara, Jhang, Jhelum, Kohat, Lahore, Montgomerty, Multan, Muzaffargarh, Peshawar, Rawalpindi, Shahpur, Sialkot (Pakistan)
	Shimla	Obtained in 1815	Shimla

Source: Baden-Powell (1892,1894), Kumar (1982)

APPENDIX TABLE 2: ESTABLISHMENT OF LAND REVENUE SYSTEMS IN BRITISH INDIA

Province	Dates of British conquest/ land revenue control	Formation of land tenure system
Bengal Presidency	1757, 1765	Revenue auctions in early 1770s; old landlords dispossessed, several defaults and famine;old landlords reinstated in 1784; Lord Cornwallis announces Permanent Settlement in 1793: landlords' rents fixed in perpetuity with stiff penalties for default.
Madras Presidency	1765, 1790-1801	1765 territories came under Permanent Settlement. Munro and Read tried individual system in some districts from 1796-1805; in 1807 all districts put under landlords for 3 years, leases renewed for 10 years in 1810-11; Munro went to England and convinced the Directors of the East India Company to order an individual settlement in the whole of Madras;order implemented after 1820 when leases expired; all future defaulting landlord estates also converted to individual system.
Bombay Presidency	1803, 1817-18	Individual system tried in Poona in 1820's, but failed; Wingate and Goldsmid start Bombay Survey System in 1835 for individual settlement system; a few long-standing landlords left in place in certain areas.
North-West Provinces	1775, 1801-03	Permanent Settlement in 1775 areas. 3 and 4-year landlord leases in 1802-1819. Question of Permanent Settlement widely debated; revenue secretary Holt Mackenzie's 1819 Minute recognized the existence of village bodies and asked for their rights to be protected in any settlement; regulation passed in 1822.
Oudh	1856	Lord Dalhousie announced settlement with village bodies wherever possible; Mutiny in 1857 before this could be done; Lord Canning reverses policy in 1858 and brings back landlords (*talukdars*) with full proprietary rights.
Central Provinces	1818, 1849	No fixed policy until landlord settlement ("malguzari") announced in 1853, implemented in 1850s. Sambhalpur district however put under individual cultivator system.
Berar	1856	Was under Nizam till 1856; first landlord system was tried and it failed; then Bombay Survey System (individual cultivator) was applied.
Assam	1765, 1824-26	Some areas transferred from Bengal had Permanent Settlement; others got individual-cultivator systems.
Panjab	1846, 1849	Village-based system put into place everywhere; practically no big landlords.

APPENDIX TABLE 3: DATA SOURCES AND CONSTRUCTION OF VARIABLES

Post-Independence data

Data on district geography, crop areas, yields, irrigation, fertilizer use, adoption of high-yielding varieties: India Agriculture and Climate Data Set (World Bank) http://www-esd.worldbank.org/indian/home.cfm

District level data on literacy, occupation classes, proportion of scheduled castes etc: Indian Database Project Vanneman, Reeve and Douglas Barnes (2000) Indian District Data, 1961-1991: Machine-readable data file and codebook, Center on Population, Gender, and Social Inequality, College Park, Maryland. URL: http://www.bsos.umd.edu/socy/vanneman/districts/index.html

Districts and maps of modern India: http://www.mapsofindia.com

Village infrastructure variables: State statistical abstracts of 1981

Land-holdings by size category: Agricultural census of 1990-91.

Data on poverty and inequality (1972, 1987): based on National Sample Surveys.

Historical data

Districts and maps of British India: Baden-Powell (1892)

Non-landlord proportion:

For Uttar Pradesh, Madhya Pradesh and Panjab: computed from district-level Land Settlement Reports as the proportion of villages, estates or land area not under the revenue liability of landlords. The Settlement Reports were compiled by British administrators in the 1870's and 1880's.

For Madras Presidency: non-landlord proportion obtained from Baden-Powell (1892).

For Bombay Presidency, Bengal Presidency, Orissa, Berar and districts for which we do not have district-level settlement reports: Non-landlord measure is assigned as zero or one based on historical accounts of the dominant land tenure system in the district. Sources of information include Baden-Powell (1892), Gupta (1940), Kumar (1982), Misra (1942), Mukherjee (1962) and Patel (1957).

Land revenue inequality 1885: Digital South Asia Library (http://dsal.uchicago.edu)

Land revenue inequality 1948 for districts of Uttar Pradesh: Report of the United Provinces Zamindari Abolition Committee, 11 (Allahabad, 1948) pp. 12-17. Reproduced in Stokes (1978b).

APPENDIX TABLE 4: DETAILED REGRESSION SPECIFICATION

Dependent variable: Log agricultural yield (based on 15 major crops)

	No controls	Control for altitude, and latitude	Control for mean annual rainfall	Control for soil dummies	Control for coastal dummy	Control for date of British conquest
	(1)	(2)	(3)	(4)	(5)	(6)
Proportion non-landlord	0.118	0.103	0.162*	0.146**	0.144**	0.158**
	(0.076)	(0.087)	(0.084)	(0.071)	(0.072)	(0.071)
Altitude		0.000	0.000	0.001***	0.001***	0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lat		0.004	-0.000	-0.009	-0.008	-0.006
		(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Mean annual rainfall			0.000***	0.000	0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
Black soil dummy				-0.399***	-0.397***	-0.392***
				(0.085)	(0.086)	(0.085)
Red soil dummy				0.137**	0.144**	0.106
				(0.068)	(0.070)	(0.069)
Alluvial soil dummy				0.198***	0.192***	0.191***
				(0.054)	(0.053)	(0.052)
Coastal dummy					0.037	0.037
					(0.094)	(0.092)
Date of British conquest						-0.002***
						(0.001)
Constant	-0.329***	-0.522***	-0.714***	-0.505***	-0.535***	3.603**
	(0.040)	(0.145)	(0.166)	(0.173)	(0.189)	(1.504)
No. of districts	166	166	166	166	166	166
R-squared	0.18	0.19	0.22	0.41	0.41	0.43

* significant at 10%; ** significant at 5%; *** significant at 1%
Standard errors in parantheses, adjusted for within-district clustering.
Data for from 1956-87.

APPENDIX TABLE 5 : LIST OF NEIGHBORING DISTRICTS

Group	States	Landlord districts	Non-landlord districts	Reason for difference in tenure
1	Andhra Pradesh	Srikakulam Vishakhapatnam	East Godavari	Areas put under landlords and Permanent Settlement before the rest of Madras Presidency was converted to individual system.
2	Tamil Nadu	Madurai Ramanathapuram	Coimbatore Thanjavur Tiruchirapalli Tirunelveli	Areas put under landlords and Permanent Settlement before the rest of Madras Presidency was converted to individual system.
3	Madhya Pradesh, Orissa	Bilaspur Raipur	Raigarh Sambalpur	Sambalpur district was put under individual cultivator system, unlike the rest of the Central Provinces.
4	Maharashtra, Madhya Pradesh	Chandrapur Wardha Betul	Amravati Yavatmal	Berar province was individual-based while Central Provinces was landlord-based.
5	Uttar Pradesh (East)	Faizabad Gonda Pratapgarh Sultanpur	Allahabad Azamgarh Basti Gorakhpur Jaunpur	Oudh districts have greater % of landlords because of change of policy after 1857 Mutiny.
6	Uttar Pradesh (West)	Hardoi Kheri Rae Bareli Unnao	Farrukhabad Fatehpur Kanpur Nagar Pilibhit Shahjahanpur	Oudh districts have greater % of landlords because of change of policy after 1857 Mutiny.

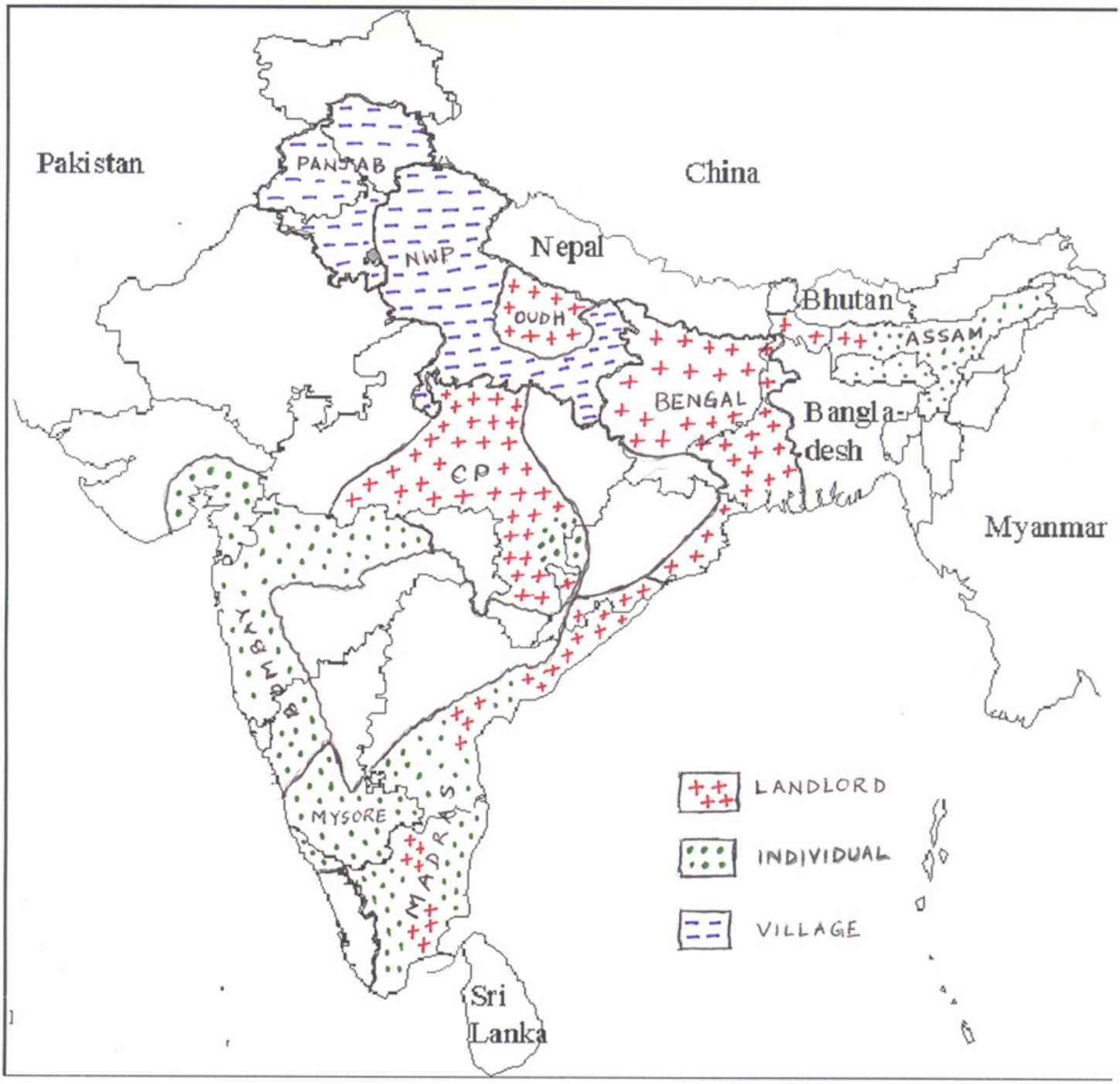
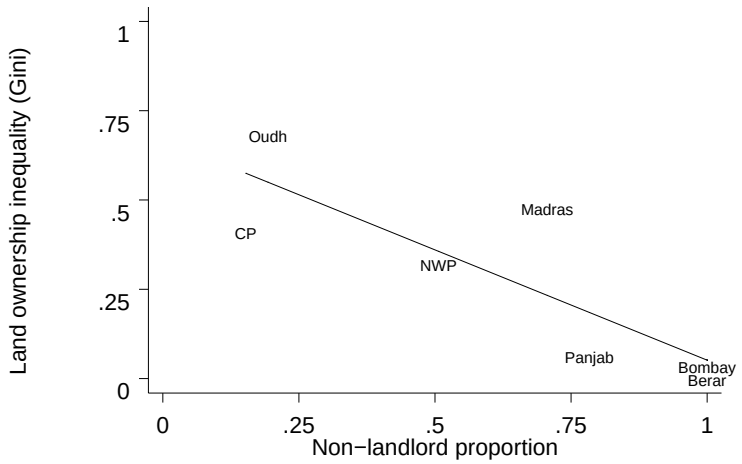
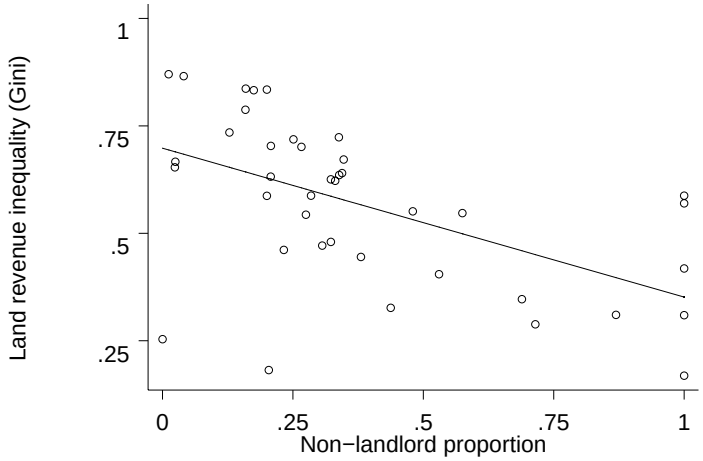


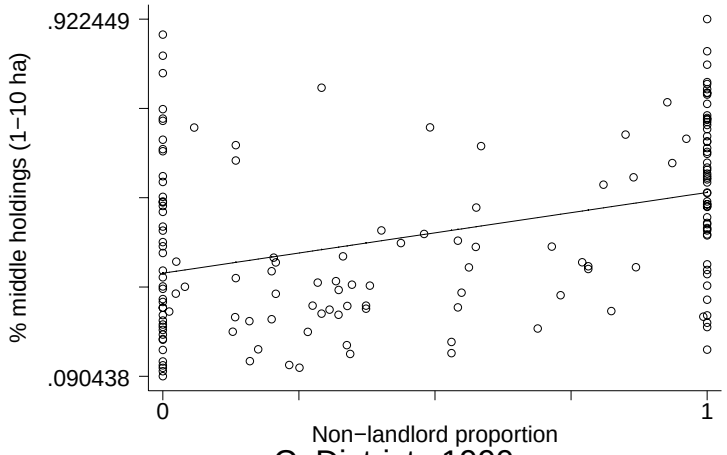
Fig 1 : Map of India



A. Provinces 1885



B. Uttar Pradesh districts 1948



C. Districts 1990

Fig 2: Land tenure and land inequality

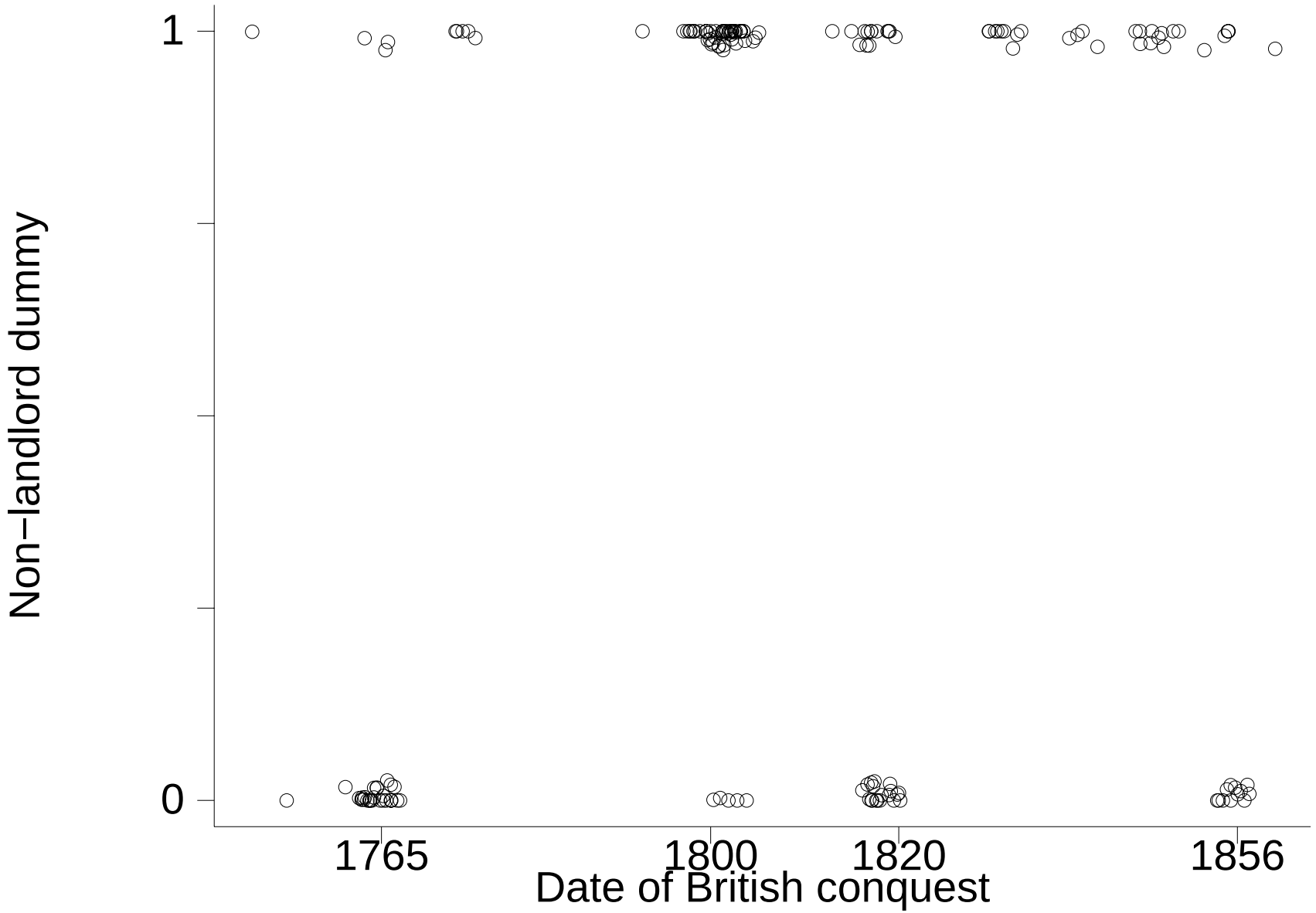


Fig 3: Land tenure and date of conquest

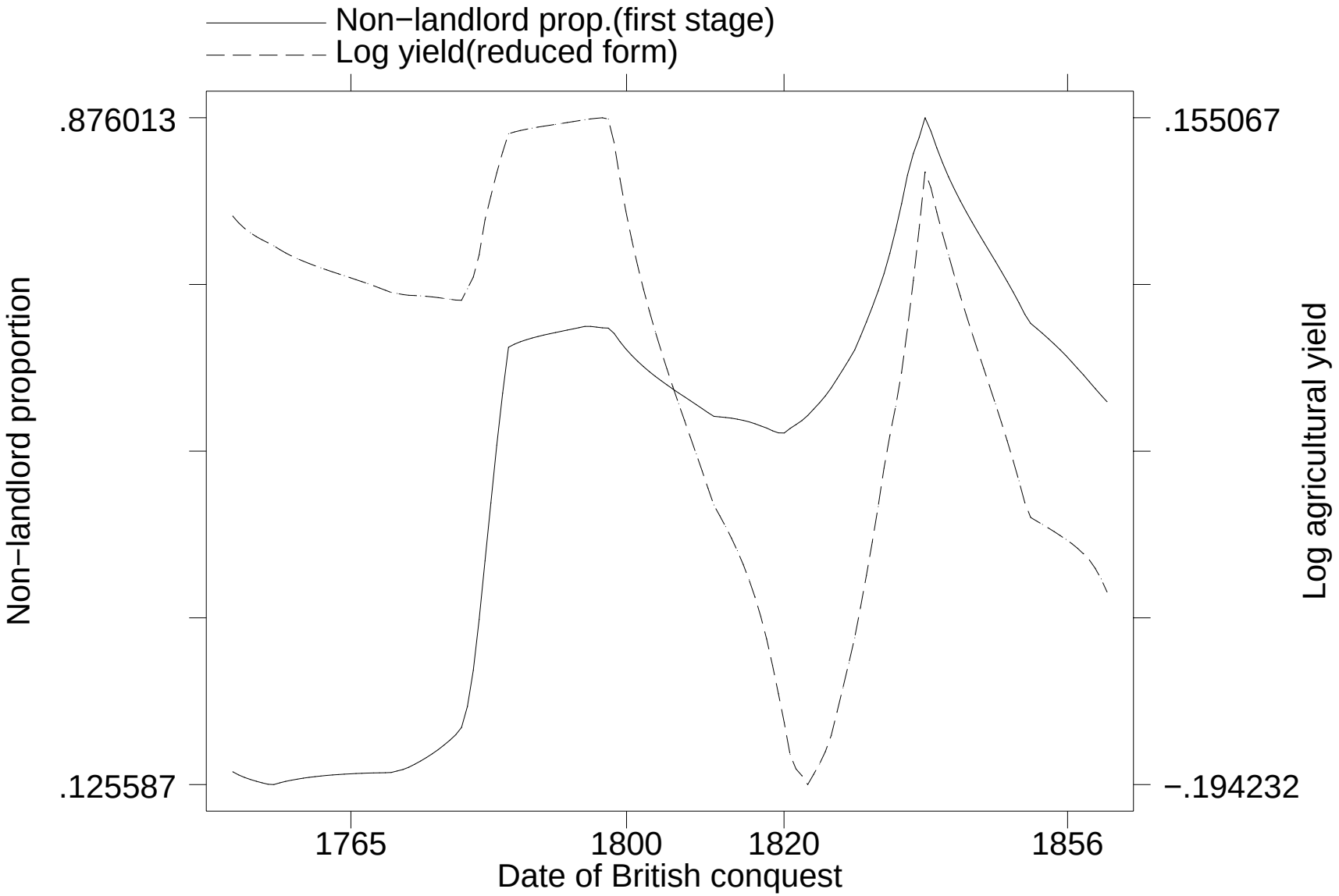
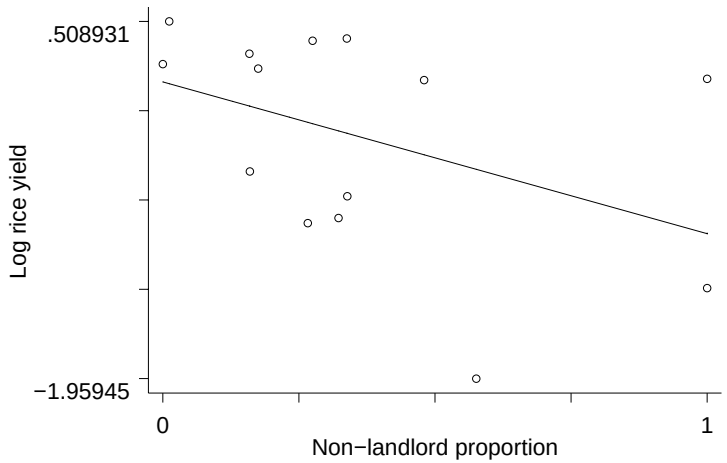
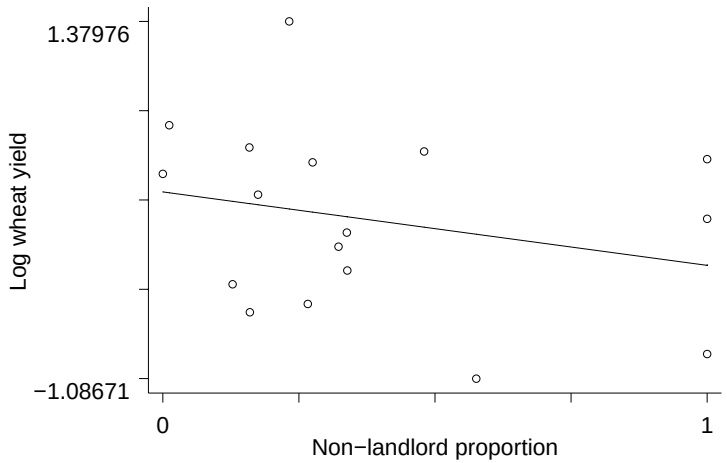


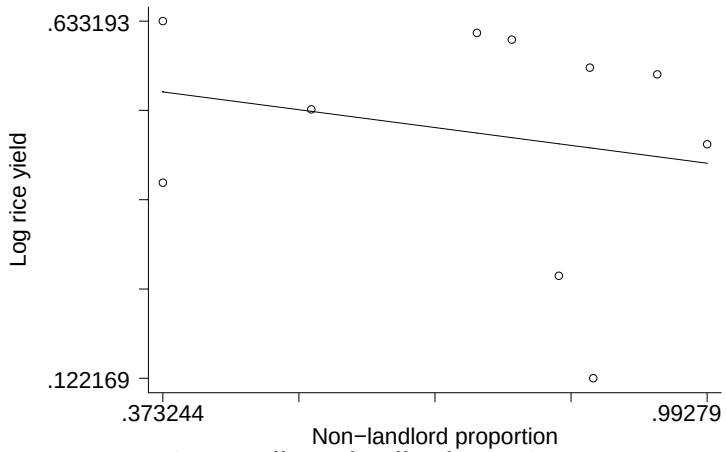
Fig 4: Instrumental variables strategy



A. Uttar Pradesh rice yields: 1870's

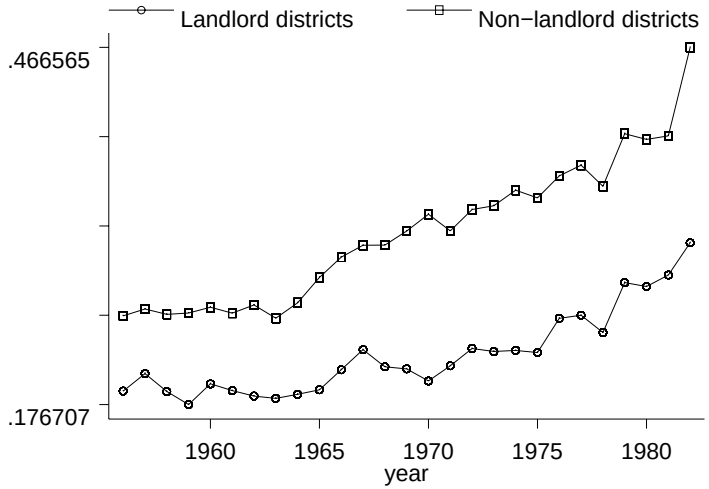


B. Uttar Pradesh wheat yields: 1870's

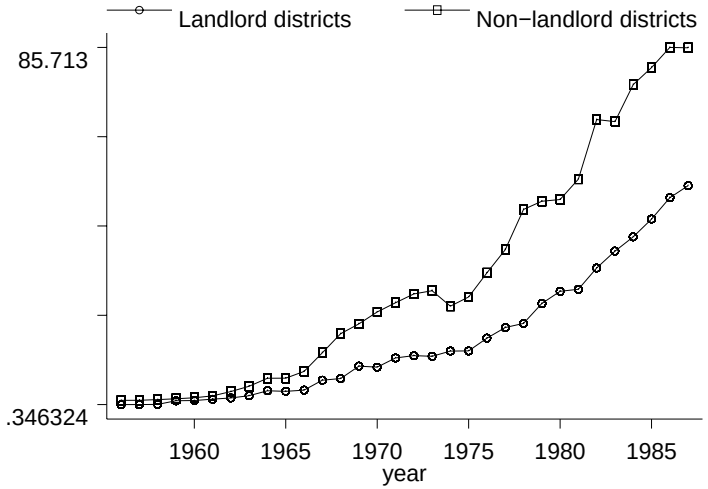


C. Tamil Nadu districts 1911

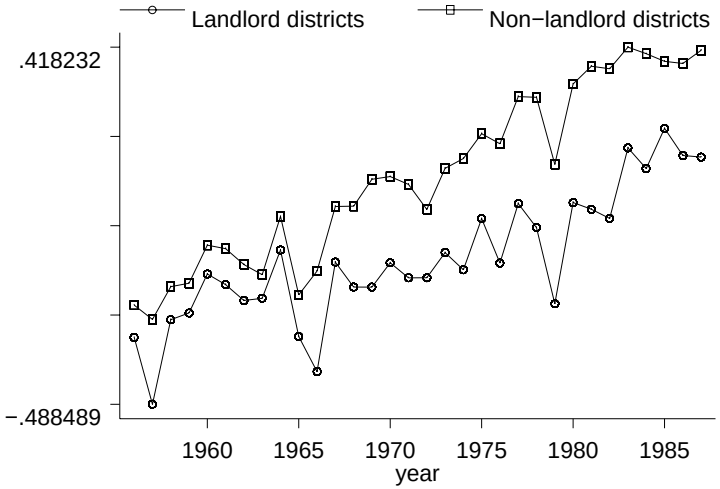
Fig 5: Agricultural yields in Colonial period



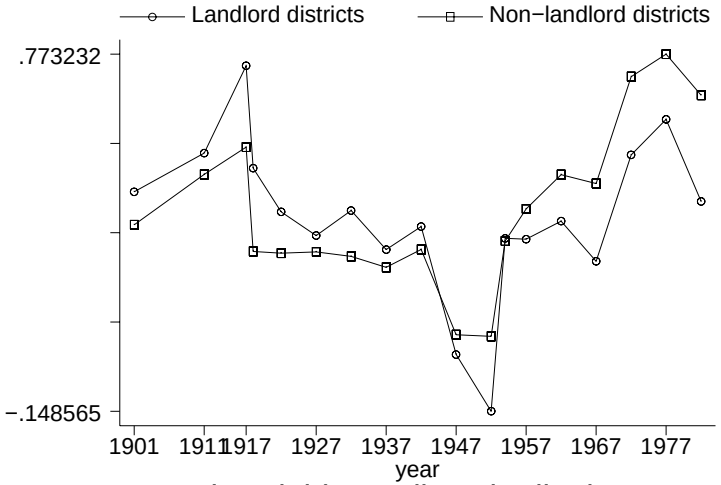
A. Proportion of irrigated area



B. Fertilizer usage



C. Mean log yield



D. Log rice yield: Tamil Nadu districts

Fig 6: Investment and productivity time series