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On The Colonial Origins of Agricultural Development in India: A Re-examination of Banerjee and Iyer, 'History, Institutions and Economic Performance'

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Abstract

Banerjee and Iyer (henceforth, BI) (American Economic Review, 2005) find that districts which the British assigned to landlord revenue systems systematically underperform districts with non-landlord based revenue systems, especially in agricultural investment and productivity and mainly after the onset of the Green Revolution in the mid 1960s. On this basis BI claim there were long-lasting effects of the institutions established in British India on a variety of development outcomes after independence. We correct a miscoding of the land revenue system in Central Provinces, which BI characterise as mostly landlord based, when reliable historical evidence suggest that this region should have been attributed to a mixed landlord/non-landlord based revenue system. Using a more appropriate classification of the land revenue system of the Central Provinces constructed from documented archival research, we find no evidence that agricultural performance of Indian districts in the post-independence period was adversely affected by the colonial landlord land revenue system. Our results demonstrate that the key BI argument that the more 'oppressive' landlord based colonial land revenue systems mattered for post-independent agricultural development in India rests on fragile historical and statistical foundations.

JEL Classification: N55, O13, O17

Keywords: agriculture, colonisation, institutions, land revenue, India.

Introduction

In a prize winning article published by the American Economic Review, Abhijit Banerjee and Lakshmi Iyer (2005) (BI from now on) attribute variation in agricultural performance, health, education and crime in post-independence India (up to about 1991) to variation in the land revenue institutions put in place during British colonial rule.[1] Their findings rate among the most compelling examples of how present development performance may be shaped and determined by institutions of the past, here dating back a century or more. Their paper contributes to the rapidly growing empirical literature addressing the persistent effects of colonial rule on contemporary economic performance (La Porta et al., 1998, 1999, 2000; Acemoglu et al., 2001, 2002; Engerman and Sokoloff, 1997).

BI's main contention is that in areas of India where the colonial administration implemented land tax collection either directly from cultivators, the so-called *raiyatwari* system, or was organised at the village level, the *mahalwari* system, subsequent agricultural and broader development has outperformed areas with so-called *zamindari* or *malguzari* settlements, which BI classify as landlord-systems.

[1] The paper was awarded the Inaugural Michael Wallerstein Award by the Political Economy Section of the American Political Science Association.

According to BI, the British colonial administration introduced policy changes that had the unintended consequence of placing different parts of India on dissimilar development trajectories with both immediate and latent, long term effects. Remarkably, the most pronounced long term impacts became apparent around 1965 or some two centuries after the East India Company acquired the first revenue collection rights in Bengal and Bihar. They show "that districts in India where the collection of land revenue from the cultivators was assigned to a class of landlords systematically underperform the districts where this type of intermediation was avoided, after controlling for a wide range of geographical differences (BI: 1190)."

In this paper, we revisit the empirical and historical foundations of BI's main findings, and in particular, their classification of the land revenue systems in British India into landlord and non-landlord categories, on which these findings crucially primarily rest. We argue that classification of the Central Provinces (comprising much of contemporary Madhya Pradesh, and parts of Maharashtra and Orissa) as a predominantly landlord revenue system by BI is mistaken since reliable historical evidence (including the sources BI apparently use for coding the land revenue systems of districts in India) suggests that for the most part the *malguzari* settlement of the Central Provinces was very different from the Permanent (*zamindari*) settlement introduced in Eastern India by Cornwallis 70 years earlier (1793), and more closely resembled a village-based land revenue system (BadenPowell 1892, volume 2, pp. 368-499).

BI construct a continuous variable for the proportion of the area of a district under non-landlord land revenue settlement, with most districts in the Central Provinces classified as entirely landlord. They also test their hypothesis on the role of historical land revenue systems in determing post-independence agricultural development in India with a second variable, which is a dichotomous variable, by dividing districts into either landlord and non-landlord based revenue systems, again with the districts in the Central Provinces classified as landlord. We construct a new measure of non-landlord land in each of the district in the former Central Provinces derived from documented archival research, that takes into account the proportion of land area that is under landlord and non-landlord control (as we will argue later, under the *malguzari* settlement, most of the districts in the Central Provinces had parts of the land area under *de facto* landlord control and other parts that were characterised by non-landlord revenue systems). We also use a new dichotomous variable in which the CP districts are classified as entirely non-landlord. Finally, as a robustness test, we omit the Central Provinces from the BI sample.

When we re-run the BI regression specification with these new variables and when we omit the Central Provinces from the BI sample, we find that the positive and significant relationship between non-landlord land revenue systems and post-independence agricultural performance largely disappears. Thus, there is no longer support for BI's key proposition that historical property rights institutions – that is,

the more 'oppressive' landlord based colonial land revenue institutions set up by the British in India – is to blame for sustained differences in agricultural performance in the post-independence period.[2]

The rest of our paper is organised follows. Section 2 provides a brief synthesis of BI's main arguments and results. Section 3 reviews the land tenure and revenue administration systems during different periods of British Colonial Rule focusing, in particular, on BIs classification of the Central Provinces. Section 4 re-examines BI's key finding on agricultural performance, using our alternate and historically more appropriate classifications of the colonial land revenue system. Section 5 concludes.

2. Summary of Banerjee-Iyer's Main Arguments and Results

Banerjee and Iyer present a rich synthesis of the history of revenue administration and reforms during various periods of British rule. In Bengal and Bihar, the East India Company obtained revenue collection rights in 1765; by 1805 the British formally controlled the districts that were to form Madras Presidency, the North-West Provinces (not including Oudh) and parts of Gujarat. Other districts belonging to the soon to be Bombay Presidency and to the Central Provinces, the latter formally established as late as 1861-62, were conquered with the defeat of the Marathas in 1818. The first revenue system implemented in Bengal and Bihar (plus the Benares Province) is popularly known as the Permanent (*zamindari*) Settlement (e.g. Baden-Powell 1892), where landlords' revenue commitment to the government was fixed in perpetuity. According to BI, landlord based revenue systems were also established in Orissa, some parts of the Madras Presidency, and according to BI, the Central Provinces (BI, p. 1193).

Following BI's account, in the landlord areas 'the revenue liability for a village or a group of villages lay with a landlord (p1193)'. Further, 'the landlord was free to set the revenue terms for the peasants under his jurisdiction and to dispossess any peasant that did not pay the landlord what they owed him (ibid).' Further and as a

[2] The present paper undertakes what Iversen and Palmer-Jones (2012) would classify as a partial, scientific replication of BI's (2005) study. While pure replication or 'checking' (Collins 1991) may be useful for detecting errors in data or in computer codes that in the worst instance may be responsible for the main results in a published article (e.g. McCrary's 2002 replication of Levitt, 1997), scientific replication is more demanding on the replicator and requires a willingness to develop contextual understanding. For articles using secondary and historical data, scientific replication involves checking of raw data and of data manipulations and variable constructions. Additional consideration needs to be paid to potential confounders and rival explanations See the critique of the settler mortality rate data used in Acemoglu et al. (2001)'s seminal paper on the colonial origins of economic development by Albouy (2012) as another example of scientific replication.

consequence, the landlord effectively had property rights in the land, and tenants had no security of tenure.[3]

Contrast this with Madras and Bombay Presidency, where in most districts and most of the area, the revenue settlement was made directly with the cultivator (*raiyat*) following extensive cadastral surveys of the land that were accompanied by a detailed record of rights, 'which served as the legal title to the land for the cultivator (ibid, p1193)'.

In the *mahalwari* system, in the North-West Provinces (NWP) and Punjab, 'village bodies that jointly owned the village were responsible for land revenue (ibid. p1194).' 'In some areas it was a single person or family that made up the village body and hence was very much like the Bengal landlord (*zamindari*) system while in other areas the village body had a large number of members with each person being responsible for a fixed share of the revenue (ibid. p1194)'.

BI track the debates addressing experiences with earlier settlements and suggest three explanations for why areas conquered at later dates were less likely to have a landlord system: the intellectual victories of two influential administrators, Munro and Mackenzie, the shifting perceptions among economists and others in Britain in response to the French revolution and other international events, and finally, the perceived (mistaken) presence of landlords in areas to be settled (BI, pages 1195-96). BI describe Oudh, where the settlement was not permanent but was often made with landlords (termed *taluqdars*), as the main setback to this increasingly progressive and enlightened colonial regime. When the Central Provinces were formally established as late as 1861-62, i.e. roughly a century after revenue rights had been secured for Bengal, Bihar and parts of Orissa and almost half a century after *raiyatwari* settlements were introduced in Bombay and most of Madras Presidency, it was also decided to have what was termed a landlord-based system there.[4] Given the apparent increasing enlightenment of colonial administrators and the Mutiny of 1857, why should the British revert to adopting a revenue system that according to

[3] While this accurately describes the proprietary rights vested in the Zamindars of Eastern India in 1793, the franchise extended to the Malguzars of the Central Provinces more than half a century later is, for reasons discussed below, not comparable. BI use the term landlord system as synonymous with the Permanent (*zamindari*) settlement apart from a footnote (fn3 p1193; see also fn 10 p:1197); (Robb, 1988, 1997).

[4] On the nature of the Central Provinces settlement, BI, in footnote 9 (p1196), quote B. H. Baden-Powell (1892): '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.' (volume 2 p:455). Later in the same paragraph, BP writes 'It is however generally recognised that it was a mistake to find proprietors at all; not only have portions of the province been left purely *raiyatwari*, but in all cases the proprietary rights of the malguzar has been much limited (ibid: p456)'.

BI's interpretation most closely resembled the *zamindari* systems of Bihar and Bengal? We return to this issue below.

Empirical Strategy

While BI presents a wide array of results on the possible effects of colonial land revenue systems on contemporary economic and social development in India, their main results and most striking findings relate to the effects of colonial land revenue systems on agricultural performance in the post-independence era. They show that districts where the British assigned proprietary rights in land to landlords (as they classify them) had significantly lower agricultural investments and productivity in the post-independence period than districts where rights were given to cultivators, either directly, or through village bodies; this effect is particularly pronounced after 1965, a date that not only marks the beginning of the Green Revolution but also a period with extensive public investment in rural India. Their main explanatory variable is the extent of non-landlord control in a particular district (termed *p_nland* in their empirical analysis), while the key dependent variables are agricultural investment outcomes (the proportion of gross cropped area that was irrigated, quantity of fertilisers used per hectare of gross cropped area, the proportion of area sown with high-yielding varieties (HYV) of rice, wheat, and other cereals), and agricultural productivity of rice, wheat and an index of 15 crops. BI use two alternative measures to capture the extent of landlord control in a district, a continuous variable defined on the [0,1] interval (*p_nland*, as stated above), which measures the proportion of the district under a *raiyatwari*/*mahalwari* revenue system and a simple binary dummy, landlord versus non-landlord land revenue systems, which is used in some regressions and in BIs map reproduced as Figure 1 below. The areas classified as *raiyatwari* cover Bombay and most of Madras Presidencies, while the *mahalwari* system was found in the North-West Provinces (most of Uttar Pradesh minus Oudh) and Punjab. The areas coded as landlord, as seen in Figure 1, are Bengal, Bihar and Chota Nagpore, Central Provinces, Orissa and the remainder of Madras Presidency.[5]

[5] The origin of this map (Figure 1 in BI) is not provided. However, in an earlier version of this paper Banerjee and Iyer provide a coloured map which has been clipped in such a way that the legend is not completely shown. This image is provided in the appendix as Figure A1. The origin of this coloured image is not given,but we have traced it to Baden-Powell, 1894. In this version it does not have the hatchings for revenue system types present in the Appendix Figure A1. This map does not allocate districts to revenue systems, but it bears a considerable resemblance to the map provided in Baden Powell (1892) a rather poor quality image of which is provided as Figure A2 in the appendix, which does provide such an allocation. A digitised copy of the BP 1892 map is provided below.

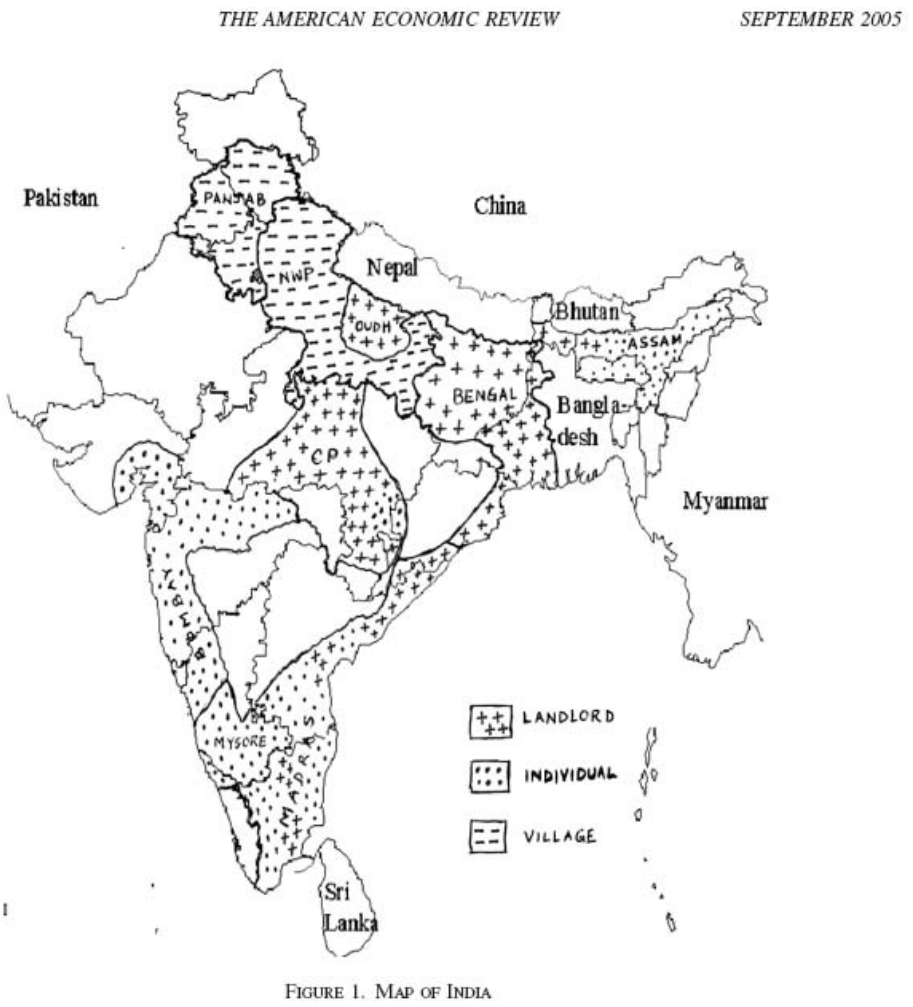

Figure 1: Location of Land revenue Systems in India (from BI)

In their regression analyses, BI study agricultural performance using the India Agriculture and Climate Data Set collated by the World Bank and covering the period 1956-1987 with information on 271 districts, together with data based on original archival research and data production.[6] In their main regressions relating to agricultural performance, they use agricultural data for only 166 of these districts, which were mainly under British rule and for which information on land revenue

[6] The World Bank data set could be downloaded at the date of writing from the source given in our appendix. It contains some errors and misclassifications which are carried over into the BI data set. We do not correct these in this paper to maintain maximum comparability with the BI data set. The sources for much of the rest of the BI data set are given in their web appendix Appendix Table 3 (http://www.aeaweb.org/articles.php?doi=10.1257/0002828054825574), but are not exactly specified. We provide a limited discussion of the attribution of the data in our web appendix to this article (see Table A4 in Online Appendix).

systems were available.[7] BI's results, presented more fully in Section 4, show that non-landlord areas, on a variety of indicators of agricultural performance, including investment, the adoption of High Yielding Varieties and agricultural yields, significantly outperform landlord districts during the period 1965-1987,[8] controlling for geographic variables such as latitude, altitude, soil type, mean annual rainfall, and a dummy for whether the district is on the coast or not. In addition, BI control for the length of time a district has been under British rule (using the date of British takeover), to account for the possibility that "early British rule was particularly rapacious or because the best (or the worst) districts fell to the British first" (BI, p. 1200). Their results suggest a strong and long dormant colonial overhang that extends to educational and health performance indicators. BI's main results survive a series of robustness tests (also discussed in Section 4).

What explains why non-landlord districts do better than landlord districts in India, especially after the onset of the Green Revolution in the mid 1960s? BI contend that the differences in agricultural performance (and in education and health investments and outcomes) can be attributed to differences in the political environment and a possible failure of collective action in the landlord areas or states (chiefly, Bihar, Madhya Pradesh, Orissa, Rajasthan and West Bengal) as compared to the non-landlord states (chiefly, Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Punjab and Uttar Pradesh). Thus, according to BI, 'the masses in the landlord areas, with their memories of an oppressive and often absentee landlord class, may perceive their interests as being opposed to that of the local elite, while those in the non-landlord areas may be more interested in working with that elite (BI, p1210).' While BI do not provide a direct test of this explanation of differences in the political environment and collective action prospects between landlord and non-landlord districts in this paper (but see Banerjee, Somanathan, and Iyer, 2005), they provide some suggestive evidence in support of their argument. First, they show that landlord states had a higher degree of land inequality (which led the landlord states to enact more land reform legislation post-independence which may have hampered growth). Second, they show that landlord states had lower per capita levels of state

[7] Some former princely states are included in the data set (Bastar and Raigarh) while districts under British rule are not included (Nimar) even though data are available in the World Bank data set and the classification of Nimar's land revenue system is straightforward. The results are not meaningfully altered by reversing this.

[8] BI report that their estimation covers the period 1956-1987, but their code and our replication makes it clear that estimation for the growth of irrigation is restricted to 1956-1982. Estimations are restricted to cases where the dependent variables growth of irrigation, and proportions of area under HYVs are <= 1; this makes sense for the proportions of areas planted to HYVs, but not for the growth of irrigation. This restriction drops 13 observations from 4 districts (Balangir (4), Bulamndshahr (1), Meerut (2). Thanjavur (6)). Rather more observations are lost for the proportion of area under HYVs (rice (186); wheat and other cerials(277)).

development expenditures in the post 1965 period as compared to non-landlord states.

While it is not clear how, for example, differences in development expenditures across states can in themselves explain agricultural investments and productivity differences between districts, especially when trends in state development expenditures may be picking up unobserved state-specific trends in omitted variables, we do not, in this paper, explicitly test for the suggestive causal mechanisms responsible for BIs findings. This is in part due to the fact that we find their results to be fragile and in part, because we think the causal mechanisms behind differential agricultural development in India deserve separate attention and scrutiny.[9]

3. Land Tenure and Land Revenue Administration in British India

The Permanent (zamindari) Settlement

The acquisition of the so-called 'Diwani (revenue collection rights)' by the East India Company in 1863 was followed by a period of overzealous taxation. By the time of the Permanent (*zamindari*) settlement in 1793, land revenue had almost doubled (Chaudhuri 1983). In the settlement, the landed aristocracy, which mainly comprised of the heads of large feudal estates, were declared the proprietors of the soil and their dues to the state fixed 'in perpetuity' (Chaudhuri 1983, p88).[10] According to Fuller (1922, p32) 'the settlement conferred the hereditary rights of property over areas sometimes larger than English counties and left the immediate cultivators mere tenants at will'. The perceived harshness of this settlement, especially towards tenants and small cultivators, have subsequently been held responsible for the concentration of poverty and ill-being in Eastern India.

Further and remarked upon by BI, and in stark contrast to subsequent settlements, no cadastral survey was undertaken. This absence of detailed land mapping, the vesting of proprietary rights in large landlords and the complete failure to protect the *raiyats* or tenants are the main distinguishing attributes of the Permanent (*zamindari*) settlement.[11] In a setting already characterised by a strong concentration of control

[9] We address this issue in more depth in a companion paper.

[10] The Bengal and East-India zamindars, according to Roy (2011a: 28) 'were, in theory, tax collectors but also administrators of their territory. They were in charge of law and order and settled local disputes and were required to supply forces to the state when necessary. In other parts of the country exact counterparts of the northern zamindars were rare'.

[11] Attempts to control landlort-tenant relations in the Permanent Settlement areas found enactment in the Bengal Rent Act of 1859, culminating in the Bengal Tenancy Act of 1885, and subsequent revisions;

over land resources, the settlement is thus seen to have cemented the pre-existing feudal structure. When seen from this angle, it is easy to perceive the merit of and be sympathetic to BI's main hypothesis.

The Central Provinces: An Introduction

The erstwhile Central Provinces include districts currently in Madhya Pradesh, Chhattisgarh, Maharashtra and Orissa, and were formally established in 1861-62, but had come under British control during the previous 4-5 decades (see below). The legend to Figure 1 and the above text makes clear that most Central Provinces districts were classified by BI as 'landlord'. While the source of Figure 1 is not reported it resembles a map from a BI (2001) working paper which in turn closely resembles a map from Baden-Powell's popular version (1894) of his influential Land-Systems of British India (1892), a source apparently relied extensively upon by BI.[12]

In the detailed BP map (BP, 1892, Volume 1 reproduced in the Appendix as Figure A2 and digitised here as Figure 2), the Central and NW provinces are classified as belonging to the *mahalwari* (village) revenue system. Thus, Figure 1 runs counter not only to the thrust of BP's maps which portray the 'chief features of the development of (our) revenue systems' (p373) but also to the text of BPs three volume text where the Central Provinces and the *malguzari* settlement adopted from the early 1860s onwards feature in the volume covering the *mahalwari* (village) systems.[13] The historian Tirthankar Roy (2011b: p10-11) dismisses BI's coding of the Central Provinces *malguzari* system as landlord as 'a misclassification'. The next section looks more closely at the history of revenue administration in CP.

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these acts putatively attempted to give some protection from eviction to tenants (see Robb, 1977: 36-75; Robb, 1988). Cadastral surveys were not implemented until the late 19th Century.

[12] As noted above (see end-note 5), we have reproduced these maps as Figures A1 and A2 in the Appendix. Appendix Figure A1 exactly reproduces the map in BI, 2001. It lacks most of the legend, the part of which that is visible is almost identical to that of the BP 1894 map, which has the full legend. The title and sub-titles of the 1892 and 1894 maps are identical; the main differences lie in the presence of a graticule and district and Province boundaries and names in the former. A full version of the underlying (1894) map (Figure A1) is in Baden-Powell, 1894, downloadble from http://archive.org/details/shortaccountofla00bade.

[13] Seee also Figure A5 in Online Appendix for an extract from BP which describes the various land revenue systems in colonial India. A succinct summary of Baden-Powell's views cn be found on pages 148-149 of Baden-Powell, 1894.

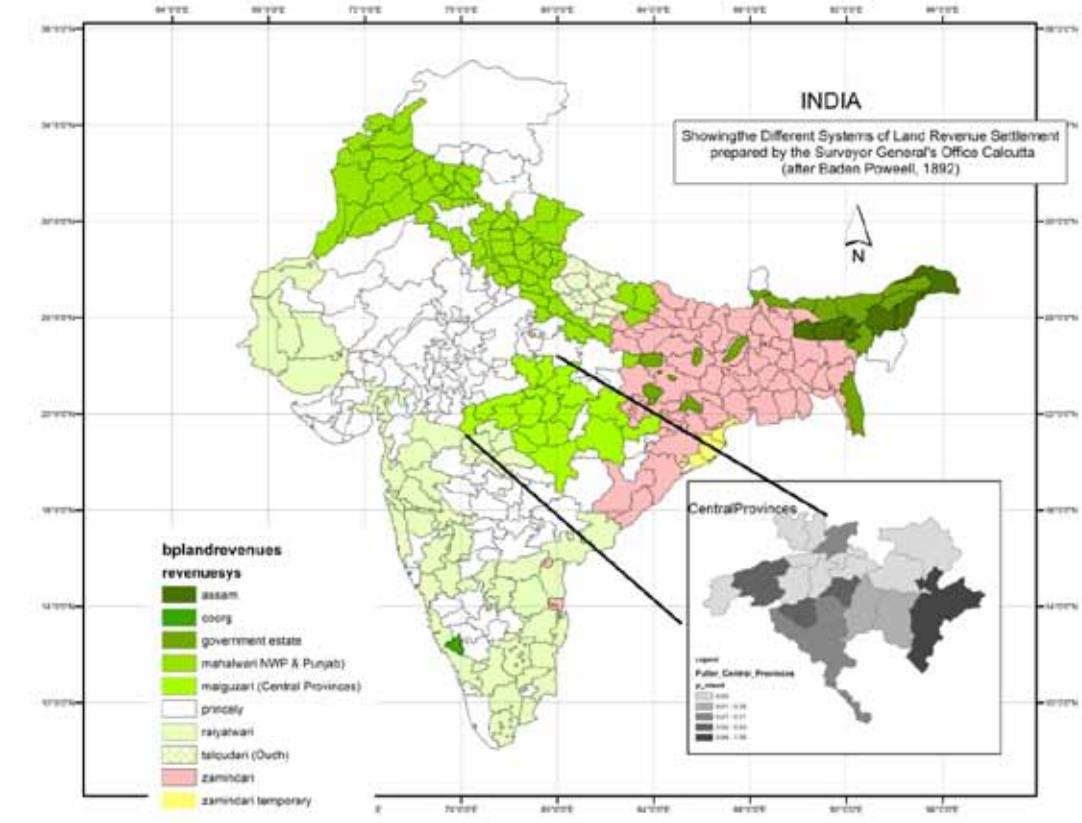

Figure 2: India Showing the Different Systems of Land –Revenue Settlement (after BP, 1892)

Central Provinces: Revenue Collection History

The formal establishment of the Central Provinces (CP) involved, as the authoritative revenue administrator J. B. Fuller put it, 'the piecing together of a veritable territorial puzzle (cited in Baden-Powell 1892, p369)'. While most districts were under Maratha revenue administration prior to the first British takeover in 1818, the regimes preceding Maratha rules were Gond kingdoms in some districts, Mohamedan kings in others and Hindu Rajput kingdoms yet in others. The CP districts can be divided into the Sagar Narbada territories including Nimar, the Nagpur districts, Chhattisgarh and Sambalpur. A district map of the Central Provinces that includes the time of British acquisition is presented in Online Appendix Figure A3.

For the Sagar/Narbada territories, the conquest in 1818 marked the beginning of a period of sustained British rule, while for districts in Nagpur and Chhattisgarh an initial and brief period of direct British rule, from 1818-1830, was followed by an interim of native rule between 1830 and the death of the heirless Raja of Nagpur in 1853 returning these districts to British rule through the so-called doctrine of 'lapse'.

The early settlements varied across districts, were short-term and often involved considerable initial experimentation. A consensus among historians would be that initial revenue demands, and thus taxation burdens, often were unprecedented,

overzealous and unsustainable. In the mid 1830s, the Sagar/Narbada territories were administratively appended to the North-West Provinces and strongly influenced by events and revenue debates there: local officers were often, therefore, recruited from N-W P districts (Fuller 1922, p30). In Nimar, the intermediate period khalsa system was based 'on the model of the Bombay *'Ryotwar'* system and officials acquainted with the *ryotwar* system were procured from Bombay to assist (Memorandum to the Report on the Land Revenue Settlement of British Nimar, 1868-69, by J. Forsyth, p. 5).[14] Meanwhile, the Nagpur province system during the intermediate period with native rule has been described both as 'lax' and as resembling the village system (Fuller 1922, p41).

The 30 year *malguzari* settlement[15] implemented from 1863 onwards, bestowed proprietary rights mainly on village headmen. However, as in Bombay and Madras, the settlement was accompanied by a cadastral survey where each individual field were meticulously measured and assessed.[16] Crucially, as Raghavan (1985, p171) makes clear in his discussion of three districts in the Narmada valley,[17] the strengthening of the village headmen or Patels that the settlement ensured through the granting of proprietary rights was accompanied by the categorisation of peasants as having malik makbuza, absolute occupancy and occupancy rights.[18] There were also tenants-at-will deprived of any such rights. According to Baden-Powell (1892: Vol 2, 388; see also end-note 4 and Figure A5 in Online Appendix), 'the *'Malguzari'* Settlement, therefore, presents this feature - that we have here a system of landlords,

[14] Report on the land revenue settlement of British Nimar : a district of the Central Provinces, 1868-69 / by J. Forsyth. Nagpore : Printed at Chief Commissioner's Office Press, 1870.

[15] Notice that the Central Provinces also included large feudal or semi-feudal estates typically located in forest anor marginal lands that often were remnants of former Gond and other Kingdoms: these were treated separately and are described as *Zamindari* estates in CP district revenue settlement reports. This illustrates the endogenous placement of land revenue systems in Central Provinces districts with low productivity and remoteness correlating with Zamindari status.

[16] The timing of the start and completion of these surveys vary: in some districts they were completed by 1870 in others start and completion were delayed to the late 1880s/early 1890s.

[17] Jabalpur, Narsinghpur and Hoshangabad districts.

[18] The extension of Act X of 1859 to the Central Provinces in March 1864 was an important step towards extensive occupancy rights (Fuller 1922: 47). In the Chhattisgarh tract (Raipur and Bilaspur districts) traditional shifting cultivation posed an additional challenge that made special provisions necessary to protect tenants (Report on the Land Revenue Settlement of Raipur District).

with tenants over a large proportion of whom they have no power of enhancement or interference.'[19]

This is synthesised by Fagan (1940, p. 280): 'In the newly constituted Central Provinces most of the villages were of the ryotwari type. Under the oppressive rule of the Marathas very many of them had been farmed, commonly to their own headmen, who were termed patels. Over groups of others various classes of persons, local tribal chiefs or their relatives, grantees of state revenue, and others, had acquired a proprietary status on quasi-feudal conditions as jagirdar or talukdar. Prior to 1861 summary settlements of various kinds had been made. It was decided at the regular settlement, which began in 1863 and was completed in 1870, to recognise all the above classes as proprietors, under the common designation of malguzar, or revenue-payer, and to make the settlement with them. This arrangement, however, in strong contrast to the Bengal system, was combined with an ample measure of tenant-right, by which a large majority of tenants received substantial protection. This form of settlement was known as *malguzari*.'

Thus, the Report on the Land Revenue Settlement of the Damoh district stated: "it was now decided to recognize the *malguzari*-status as including the proprietorship of the village and proceedings for the conferrer of proprietory rights formed the most important part of the settlement operations. Malguzars were converted to landlords with the ryots as pure tenants, but the exercise of landlords' powers *were substantially limited by the grant of special protection to a large proportion of the ryots*" (Report on the Land Revenue Settlement of Damoh District, 1891, p. 24, emphasis added).[20] In almost all the Central Province districts, substantive shares of the land were in the hands of raiyats whose occupancy status were formally recognised.

Strikingly, in spite of clear historical evidence that suggests otherwise, and with the exception of Sambalpur and to a lesser extent Bhalagat and Narsinghpur, BI classify the 19 districts in their sample drawn from Central Provinces as *wholly* landlord (and thus assign a value of zero in their *p_nland* measure of land revenue systems, effectively equating the land revenue system of the Central Provinces with the Permanent (*zamindari*) settlements of Bengal and Bihar, which are also coded as zero in their *p_nland* measure). This is not only at odds with Baden-Powell (1892) and

[19] To convey an impression of what this meant in practice, we cite Raghavan (1985, p171): 'The *malik makbuza* paid revenue to the government but no rent to the malguzar: The right of absolute occupancy was conferred at the time of the first settlement (1860s) to selected tenants and could not be acquired later. This right was hereditary, transferable and ensured fixity of rent for the term of the settlement. The occupancy tenant was entitled to cultivate his plot at a rent to be fixed by a revenue officer and not the landlord'.

[20] Report on the land revenue settlement of the Damoh District in the Central Provinces: effected during the years 1888 to 1891, Nagpur : Printed at Secretariat Press, 1893

other accounts referred to above but also with Raghavan's (1985) more nuanced reading (see end-note 19) that underscores the limited power of the malguzars over the three classes of protected tenants, namely, those with *malik makbuza*, absolute occupancy or occupancy rights. In compelling contrast to Bengal and Bihar in the 1890s, the protected tenants of the Central Provinces of the 1860s and onwards cannot be credibly represented as 'tenants-at-will' cultivators in a landlord-based revenue system. We address this issue next.

The recoding of the Central Provinces districts

The problem for Banerjee and Iyer's analysis and arguments is that while they test the robustness of their results by running regressions omitting the uncontested *zamindari* arrangements of Bengal and Bihar and report robustness to these omissions, they do not consider how the softer, much later and presumably 'wiser' settlements of the Central Provinces affect their results.

Our discussion of the *malguzari* settlement suggests that it approximated neither a wholly landlord system (as in BI) nor a wholly non-landlord system (by a naïve inversion of the classification of BI, we term this, with perhaps some histotrical injustice, the "Baden-Powell (BP) interpretation"); rather, it was closer to a mixed landlord/non-landlord system, where the pure *malguzari* components of the land areas in each CP district could be regarded as approximating a *de facto zamindari* settlement, given the clearly defined hereditary rights of the village headmen and that they were acting as intermediaries in revenue collection for the British. Thus, a more accurate classification of the land revenue system in the Central Provinces would need to take into account that almost all districts in CP had some land which were under a *de facto* landlord system and some land which were under a non-landlord system. In other areas tenants were clearly awarded some security of tenure. To obtain the proportion of non-landlord area in each Central Provinces district, we add up the land areas over which tenants have *malik makbuza*, absolute occupancy and occupancy rights, and take the proportion of non-landlord land in a district to be the sum of these land areas as a share of the total (khalsa) land held by *malguzars* and tenants (see end-note 15).

In Table 1 we report our revised statistics of the proportions of non-landlord area (which we term *p_nland*_alt) in each Central Provinces district. All data used in the calculation of *p_nland_alt* is extracted either from the original Land Revenue Settlement Reports for each district, or from the District Gazetteers which were obtained through archival search and the reference point (with two exceptions) is the beginning of the 30 year *malguzari* settlement (1865-69) (see Table 1 for sources of the data).

Table 1. Proportion of non-landlord area in Central Province Districts as in Banerjee-Iyer (BI), in the Baden-Powell interpretation (BP) and our re-coding (*pnland_alt*)

District name	*BI*	*BP*	*p_nland_ alt*	*Source*
Nimar	0	1	1	Report on the land revenue settlement of British Nimar 1868-69, Paragraph 9 (pp. 5-6), Introduction (not in BI sample).
Hoshangabad	0	1	0.53	1865-69, Central Provinces District Gazetteer, Hoshangabad District, (Calcutta 1908), p. 262
Betul	0	1	0.63	Report of the Land Revenue Settlement of Baitool District 1866 (Bombay 1867), pp. 156-57.
Chhindwara	0	1	0.38	1865-69,Central Provinces District Gazetteer, Chhindwara District Gazetteer 1907, pp. 170-73.
Seoni	0	1	0.28	1865-69, Central Provinces District Gazetteer, Seoni District, (Allahabad 1907), pp. 141-43.
Narsinghpur	0.05	1	0.55	Report of the Land Revenue Settlement of Narsinghpur 1867, Appendix, Table 15.
Sagar	0	1	0.39	Central Provinces District Gazetteer, Saugor District, 1907.
Damoh	0	1	0.45	Report on the Land Revenue Settlement of the Damoh District in the Central Provinces, effected during the Years 1888 to 1891, Central Provinces Revenue Department.
Jabalpur	0	1	0.44	1867, Central Provinces District Gazetteer, Jubbulpore District (Bombay 1909), pp. 293-4.
Mandla	0	1	0.098	Report on the Land Revenue Settlement of the Mundlah district 1868-69, (Bombay), Appendix I, p. 107.
Bilaspur	0	1	0.31	Report on the Land Revenue Settlement of the Belaspore district 1868, Appendix III
Sambalpur	1	1	1	Paragraph 17 (p.7) plus pp. 48-54 on the history of Sambalpur. Report on the Land Revenue Settlement of the Sambalpur District 1906, (Patna).
Raipur/Durg	0	1	0.26	1867, Central Provinces District Gazetteer, Raipur district (Bombay 1909), p. 238.
Balaghat	0.4	1	0.61	1890, Report on the Land Revenue Settlement of Balaghat District 1895-98. p. 2 para 6 for total malguzari and p. 3, para 10 for the total ryotwari acres. p. 27 (table) for breakdown of malguzari areas by occupancy status.
Bhandara	0	1	0.42	Report on the Land Revenue Settlement of Bhundara district (Bombay 1867), pp. 124-26.
Nagpur	0	1	0.58	1905-06, Nagpur District Gazetteer, Statistics on holdings.
Wardha	0	1	0.40	1867,Central Provinces District Gazetteers, Wardha District (Allahabad 1906), pp. 197 and 201.
Chanda	0	1	0.51	Report on the Land Revenue Settlement of Chanda District (Nagpore 1870). Table, p. 18 in foreword/cover letter.

Note:Raigarh and Bastar were Princely States coded by BI in the Central Provinces and are included in the BI sample with p_nland = 1 for the former and zero for the latter.

To see how sensitive the BI results are to the coding of the land revenue system as a landlord settlement, we proceed in three steps. Firstly, we use what we termed the "Baden-Powell interpretation" of the Central Province districts as *mahalwari* (Baden-Powell, 1894, p149), and recode the land revenue system in the CP districts as *wholly* non-landlord (that is, *p_nland* takes the value of one for all former CP districts). This could be taken as the polar opposite of the BI land revenue classification for the CP districts. Secondly, we re-estimate BI's model by including our revised continuous

variable of *p_nland* (*p_nland_alt*) as reported in Table 1, where we are allowing for the possibility that parts of the land areas in the Central Provinces districts are under *de facto* landlord control. Finally, we drop the Central Provinces districts to see how sensitive BIs results are to their inclusion, given our argument that BI's classification of the CP districts as wholly landlord is inaccurate. This tests whether there is any *zamindari* effect including only those areas the classification of which is not disputed. We also repeat the BI robustness test using an instrumental variable strategy with our preferred coding of the *p_nland* variable in CP districts (as in Table 1). We now move to a re-examination of the BI findings in the next section.

4. Re-Examining the Banerjee-Iyer Findings

In this section, we re-examine BI's main findings relating to agricultural development, using the re-codings of the land revenue variables (both the continuous variable and the dummy variable) used by BI for the districts in the erstwhile Central Provinces, as described in the previous section. We begin with the plot of the differences in agricultural investments and yields between landlord and non-landlord districts presented in BI as Figure 5 (p. 1207). We use the same BI data-set for this plot and for the rest of the replication exercises.[21] In Figure 3, we present the original BI plots of the annual averages for landlord and non-landlord districts of proportion of irrigated area, fertiliser usage and mean log yield, using the original BI land revenue classification in panels A, B and C, and the same variables, using the Baden-Powell recoded land revenue classification, in Panels D, E, and F.[22] BI find that the gaps in the proportion of gross cropped area, fertiliser usage and mean log yield widen between landlord and non-landlord districts after 1965. This is evident from Panels A, B and C of Figure 3. However, when we use the Baden-Powell interpretation of the land revenue classification for Central Provinces (that is, all Central Province districts are taken as wholly non-landlord), there is no widening of the gap in proportion of irrigated area and mean log yields between landlord and non-landlord districts after 1965, though a widening continues to be observed for fertiliser usage.

[21] This data-set is a STATA data file named *yld_sett_aug03.dta* which is available on the web-site of the *American Economic Review*, with the appropriate README file. We have found some errors in this data set but have not corrected for them in order to maintain as much consistency with the BI data set as possible.

[22] BI also present plots of ten landlord and non-landlord districts in Tamil Nadu from the colonial period onwards. However, we are unable to replicate this figure as the original data are not provided by BI in the online AER data repository, no specific references are given for them by BI, and we have not found them readily available from the archives.

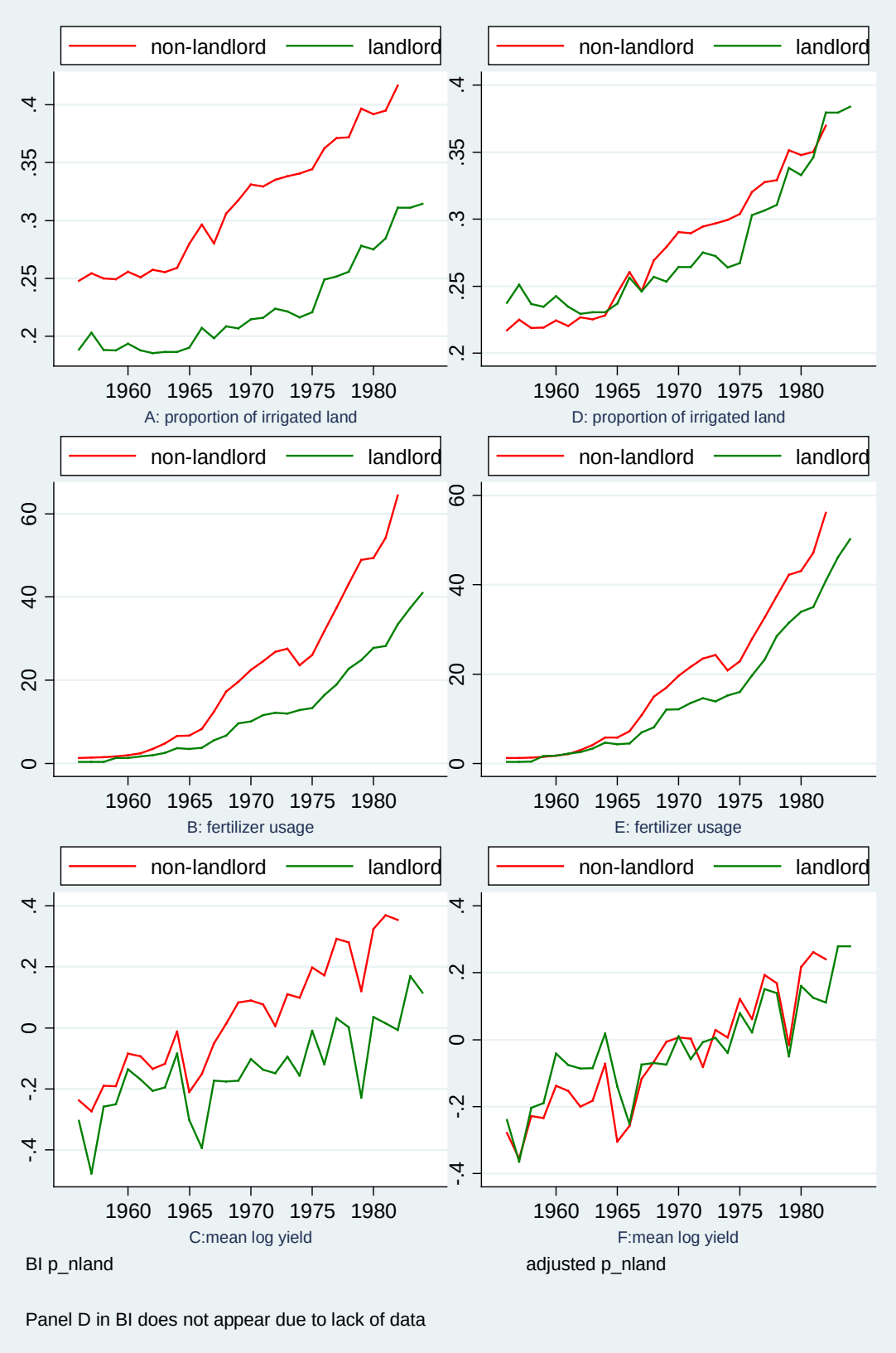

Figure 3: Agricultural Investment and Productivity: Banerjee-Iyer and Alternate Specification

BI provide a more systematic analysis of the relationship between colonial land revenue systems and post-independence agricultural investment and productivity

differentials between districts using multivariate statistical methods. We turn to this next. BI estimate regressions of the form:

$$Yit = \text{constant} + \alpha i + \beta NLi + Xit\,\gamma + \varepsilon it$$

Where Yit is the outcome variable of interest (investment or productivity) in district i and year t, αt is a year fixed effect, NLi is the historical measure of non-landlord control in district i, and Xit are the other control variables (see below). The coefficient of interest is β, which captures the impact of the proportion of a district under a non-landlord land revenue system in the post-independence period (or a dichotomous variable representing the predominance of a non-landlord settlement in the district) on the outcome variable of interest. In all of BI's regressions and in our replications of the BI regressions,[23] geographical variables (latitude, altitude, soil type, mean annual rainfall, and a dummy for whether the district is on the coast or not) and the length of time under British rule are controlled for. In their regressions and in all our replications, the standard errors of the regressions are adjusted for within-district correlation.

BI first estimate equation (1) using Ordinary Least Squares (OLS), using the proportion of a district that is under non-landlord control (the continuous variable *p_nland*) and present the OLS results in col. (1) of Table 3 of their paper. We begin our re-examination of BI's findings by replicating their OLS results, using our .do files and their STATA data.[24] These results are presented in col. (1) of Table 2.

[23] We can nearly exactly replicate all BI results from the data provided by BI and our STATA code; these results are available from the authors.

[24] Our .do files are written using different code to BI, but benefitting from a reading of their do files. This is done as part of good replication practice to force checking of the way the code represents the model reported in the text.

Table 2. Banerjee-Iyer Main Results

Dependent Variable	Mean of Dependent Variable	Coefficient on non-landlord proportion (*p_nland*) (1)	Coefficient on non-landlord dummy (2)
Agricultural Investments			
Proportion of gross cropped area irrigated	0.276	0.0654*	0.0775**
		(0.0343)	(0.0266)
Fertiliser use (kg/ha)	24.64	10.71***	9.988***
		(3.345)	(2.301)
Proportion of rice area under HYV	0.285	0.0789*	0.0164
		(0.0437)	(0.0318)
Proportion of wheat area under HYV	0.494	0.0917**	0.0309
		(0.0459)	(0.0359)
Proportion of other cereals area under HYV	0.188	0.0572*	-0.0348
		(0.0309)	(0.0247)
Agricultural Productivity			
Log(yield of 15 major crops)	--	0.157*	0.173**
		(0.0712)	(0.0527)
Log (rice yield)	--	0.171*	0.0993
		(0.0809)	(0.0620)
Log (wheat yield)	--	0.229***	0.188***
		(0.0675)	(0.0538)
No. of districts	--	166	166
Year fixed effects	--	YES	YES
Geographic controls	--	YES	YES
Date of British land revenue control	--	YES	YES

Notes: Standard errors in parentheses, corrected for district-level clustering. *Significant at 10 per cent level; ** Significant at 5 per cent level; *** Significant at 1 per cent level. Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control. Estimation method: Ordinary Least Squares (OLS). Data for irrigation are from 1956 to 1982 (not 1987 as implied in BI), 1956 – 1987 for productivity variables and 1965-1987 for HYVs . 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 (including Central Provinces) and the village based districts of Oudh, the dummy is zero.

The coefficient on the non-landlord proportion is positive and statistically significant at 10 per cent or lower for all the outcome variables. The results show that non-landlord districts have a 24 per cent higher proportion of irrigated area, a 43 per cent higher level of fertiliser use, a 27 per cent higher proportion of rice area and 27 per cent more wheat area under high-yielding seed varieties. Overall, agricultural yields are 16 per cent higher, rice yields 17 per cent higher and wheat yields are 23 per cent higher in non-landlord districts. As noted above, BI also check whether their results are robust to replacing the continuous measure with a binary landlord-non-landlord

classification.[25] It is clear from col. (2) of Table 2, that their results are relatively robust to this alternate specification of the land revenue variable.[26]

We now re-run the BI regressions following the same structure as in Table 2. We use identical STATA code and the identical STATA data file used in Table 2 here (with the same specifications, the same periodization, and the same set of control variables). The only difference between the BI and our regressions is that we use our recoding of the land revenue system in the Central Provinces districts presented in Table 1. We also present results using the "Baden-Powell interpretation", and omitting the CP districts. Our results are given in Table 3.

The differences between BI and our results in Table 3 are striking. Re-estimating equation (1) using the Baden-Powell interpretation of the land revenue system in CP, we find that six of the eight coefficients are not significant, and the remaining two (proportion of gross cropped area irrigated, and log yield of 15 major crops) are *negative* and significant at 5% & 1% respectively (col. (1) of Table 3). When we use our revised continuous land revenue measure (col. (2) of Table 3), we find that only two of the eight coefficients, those of fertiliser and log wheat yields, are positive and significant (5%), and the rest of the coefficients are statistically insignificant.

The differences from the BI results with the revision and re-coding of the Central Provinces districts to be under non-landlord revenue control is remarkable, as only 21 of the 166 districts used in BI's empirical analysis are recoded; this represents a mere 13 per cent of the total sample of districts. Finally, we re-estimate equation (1) without the Central Provinces districts (col. (3) of Table 3), and find that the coefficient on non-landlord proportion is not statistically significant, and in some cases, negative, for the various measures of agricultural development. This provides clear and substantial evidence that the coding by BI of the Central Province districts as a landlord land revenue system is driving BI's main results.[27]

[25] BI classify the district as 'landlord' if it was under a landlord-based system and only partly converted to a different system or if it was in Oudh, which they argue had a higher proportion of landlords due to a reversal of British colonial policy after 1856. See page 1202 and their web appendix, Table 2 of their paper for further details.

[26] It should be noted that when we run the BI do file for col. (2) of Table 3 with their data-set, we obtain results for 107 districts, and not 109 districts as reported in their paper.

[27] We have explored in greater detail which type of land revenue system (*mahalwarii*, *raiyatwari*, *zamindari* and malguzari) mattered for agricultural development in post-independent India, and show that there is considerable heterogeneity in the impact of individual land revenue systems on agricultural performance, which is masked by the dichotomous landlord-nonlandlord classification used by BI. See Table A3 in Online Appendix.

Table 3.Regression Results with Alternate Specifications for Central Provinces districts

Dependent Variable	**Baden-Powell Interpretation**	**Continuous p_nland (*p_nland_alt*)**	**Omitting Central Province districts**
	(1)	(2)	(3)
Agricultural Investments			
Proportion of gross cropped area irrigated	-0.0878*	0.0272	-0.0250
	(0.0450)	(0.0414)	(0.0468)
Fertiliser use (kg/ha)	-3.386	8.257**	3.350
	(4.150)	(4.089)	(4.656)
Proportion of rice area under HYV	0.0347	0.0780	0.0546
	(0.0544)	(0.0541)	(0.0635)
Proportion of wheat area under HYV	-0.0765	0.0604	-0.0144
	(0.0554)	(0.0540)	(0.0606)
Proportion of other cereals area under HYV	-0.0292	0.0432	-0.00439
	(0.0362)	(0.0377)	(0.0430)
Agricultural Productivity			
Log yield of 15 major crops	-0.135*	0.0856	-0.0342
	(0.0780)	(0.0767)	(0.0783)
Log rice yield	-0.109	0.114	-0.0166
	(0.0836)	(0.0880)	(0.0906)
Log wheat yield	-0.0975	0.186**	0.0522
	(0.0847)	(0.0765)	(0.0771)
No. of districts	166	166	145
Year fixed effects	YES	YES	YES
Geographic controls	YES	YES	YES
Date of British annexation	YES	YES	YES

Notes: BI sample; Standard errors in parentheses, corrected for district-level clustering. *Significant at 10 per cent level; ** Significant at 5 per cent level; *** Significant at 1 per cent level. Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control - in column (1) the Baden-Powell dummy, and in columns (2) & (3) the continuous p_nland variable. Column 2 includes the Central Provinces districts taking the values reported in table 1. The non-landlord share is the share of total '*khalsa'* land where tenants have *malik makbuza*, absolute occupancy or occupancy rights. The total '*khalsa'* land comprises, in addition, and mainly of *sir* (or the homeland of the *malguzar*) land and the land cultivated by

'tenants at will' who had no occupancy rights or entitlements in the land and thus effectively were controlled by the *malguzars*. Data are from 1956 to 1982 for irrigation, 156-1987 for productivity, and 1965-1987 for HYVs. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions.

BI undertake two further robustness tests – first, they try and control for possible omitted variables around unobserved district characteristics by using an extremely restricted sample, in which they consider only those districts that happen to be geographical neighbours (that is, share common borders) and second, they estimate equation (1) using instrumental variable (IV) methods, to address the possible endogeneity of British placement of land revenue systems to more productive districts, and possible measurement errors in their land revenue measure (these results feature in Table 4 of their paper). The first of these tests is unconvincing because the clusters of districts with common boundaries are rather artificial. Thus, in the Andhra Pradesh cluster, only one of the two landlord districts has a common border with the non-landlord district.[28] Further, BI compare ten non-landlord (*mahalwari*) with eight landlord (*taluqdari*) districts in present day Uttar Pradesh; five of these 18 districts can be seen as mis-classified if we use the BI *p_nland* cut-off for a district being classified as a landlord district, which is set at *p_nland* = 0.4; in the case of the geographical cluster of Western UP, only one of the nine districts can be legitimately classified as non-landlord, calling into question the validity of this robustness test (see on-line appendix Table A2, and its notes for more details).[29]

We instead replicate the instrumental variable estimate of BI to see whether our results using OLS remain valid when using IV estimation methods. We first present the BI results using their instrumental variable strategy (col. (1) of Table 4), where they use a dummy variable that takes the value of one if the date that the district came under British land revenue control was between 1820 and 1856, as the instrument for their non-landlord land revenue proportion variable.[30] Their coefficient on the non-landlord proportion using IV methods, remains positive and

[28] see Online Appendix Table A2 in BI, available on the web-site of the *American Economic Review*.

[29] See also foot-note 21 in BI, p1202.

[30] BI argue that this dummy variable is a valid instrument as the areas that came under British land revenue control from 1823 onwards were predominantly non-landlord systems, under an explicit British policy from that year, when Thomas Munro became the Governor of Madras Presidency and actively argued for the establishment of a land revenue system which was imposed directly on individual cultivators (the *raiyatwari* system). However, this policy was reversed in 1856 when the British annexed the region of Oudh and brought back landlords as collectors of revenue, as they felt that having landlords on their side would be politically advantageous (BI, p. 1196). BI argue that the placement of non-landlord systems in districts that came under British rule from 1820 to 1856 were due to exogenous political developments and unrelated to any district level characteristics. Therefore, according to BI, a dummy for the date of British conquest being between 1820 and 1856 is a valid instrument for the non-landlord revenue proportion measure.

statistically significant for several of the agricultural outcome variables. Specifically, the coefficient is positive and statistically significant for fertiliser use, proportion of wheat and other cereal areas under HYV seeds, log rice yield, and log wheat yield.

We now re-run the IV estimates using our recoded non-landlord proportion variable, *p_nland_alt*.[31] We find that the coefficient on *p_nland_alt* is negative and statistically insignificant for proportion of gross cropped area irrigated, fertiliser use, log yield of major crops, and log wheat yield. (col. (2) of Table 4). The coefficient is positive but statistically significant for the IV estimate only for the proportion of other cereal area under HYV. Our instrumental variable estimates supports our earlier OLS results that the positive and significant relationship that BI find between non-landlord revenue control and agricultural performance is due to their coding of the Central Provinces as landlord, and, using a more accurate classsification of the land revenue system in this region from original land revenue settlement records, we again find that the BI results no longer hold.[32]

Thus, we find that with what we consider to be the more historically accurate classification of colonial land revenue system prevailing in Indian districts, and the recoding of the non-landlord proportion variable to reflect this classification, there is a dramatic over-turning of BI's key findings on post-independence agricultural development in India.

[31] The only difference between our IV strategy and that of BI is that we use as an instrument a dummy variable which takes the value of one if the date of British revenue control is between 1813 and 1856, while BI's instrument takes the value 1 if a district came under British rule after 1820 when, according to BI, the proponents of the *raiyatwari* became dominant as reflected in the adoption of MacKenzie's famous minute (dated 1 July 1819, passed into law in 1822). However, historical records suggest that the *raiyatwari* system became the preferred system much before 1823, and closer to 1813. Indeed, the whole subject came to be looked at from a new point of view between 1807 and 1820, not only as a consequence of the inquiries made in the North-Western Provinces, but of the general interest in the subject excited by the strong '*Raiyatwari*' minutes of Sir T. Munro in Madras, and his visit home and conferences with the Directors in 1807 (Baden-Powell 1892; 17)'. Thus we use the earlier date to construct our instrument. Substantively this changes the value of the instrument for the districts that were conquered between 1813 and 1818 and which are predominantly in Bombay Presidency, Berar and the subsequent Central Provinces (of the 30 districts affected by this reclassification, 14 are in present day Madhya Pradesh, and 10 in Maharashtra).

[32] In the Online Appendix (Figure A4 and Table A1), we provide further justification of our instrumental variable, as well as present the first stage regression results for BI and our specifications.

Table 4. Results of Instrumental Variable Estimates, Banerjee-Iyer (*p_nland*) and Our Specification (*p_nland_alt*))

Dependent Variable		
	BI IV Results	Our Specification, IV Results
	(1)	(2)
Proportion of gross cropped area irrigated	0.216	-1.488
	(0.137)	(1.527)
Fertiliser use (kg/ha)	26.20**	-116.5
	(13.24)	(122.7)
Proportion of rice area under HYV	0.411**	0.630
	(0.163)	(0.779)
Proportion of wheat area under HYV	0.584***	-0.226
	(0.163)	(0.632)
Proportion of other cereals area under HYV	0.526***	1.124
	(0.129)	(1.132)
Log(yield of 15 major crops)	0.409	-2.807
	(0.261)	(3.151)
Log (rice yield)	0.554*	-0.653
	(0.285)	(1.250)
Log (wheat yield)	0.706***	-2.971
	(0.214)	(5.010)
No. of districts	166	166
Year fixed effects	YES	YES
Geographic controls	YES	YES
Date of British land revenue control	YES	YES

Notes: Standard errors in parentheses, corrected for district-level clustering. *Significant at 10 per cent level; ** Significant at 5 per cent level; *** Significant at 1 per cent level. Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control. Data are from 1956 to 1987. Data for area under high yielding varieties (HYV) is after 1965. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions. The instrument is a dummy that equals one if the date of British revenue control is after 1820 and before 1856 in the case of the Banerjee-Iyer specification, and is

a dummy that equals one if the date of British revenue control is after 1813 and before 1856 in the case of the alternate specification.

5. Conclusions

A large and influential literature argues that institutions are the fundamental cause of long-run economic progress, and BI's seminal contribution to this literature was to identify the role of, in particular, more 'oppressive' colonial land revenue systems in explaining widely differing agricultural development across districts in India in the post-independence era and especially after 1965, when the Green Revolution brought about significant increases in agricultural investments and output in some regions of the country, but not in others. BI purport to show that property rights institutions that were the product of colonial times mattered for comparative economic development within India, and that areas where proprietary rights were historically given to landlords performed far worse than areas where proprietary rights were allocated to village bodies or individual cultivators.

In this paper, we re-examine the empirical basis of the key proposition put forward by BI that there is a causal role of landlord based land revenue systems on lack of agricultural development in the post independence India, especially after 1965. We argue that the classification of the Central Provinces as a landlord revenue system is mistaken since reliable historical evidence suggests that the *malguzari* settlement of the Central Provinces implemented in the 1860s was accompanied by cadastral surveys and extensive protection of tenants and is interpreted both in the colonial literature and by modern historians to more closely resemble a village based or a mixed landlord/non-landlord land revenue system. Drawing on historical texts and original land revenue settlement records, we re-estimate from historical records, and re-code the key explanatory variables used by BI in their empirical analysis for the districts which were in the former Central Provinces to reflect what we consider to be a more accurate classification of colonial land revenue systems. Using the new measures of land revenue systems we re-run the regression specifications used by the BI and find dramatic over-turning of their key results. A similar overturning occurs if we drop the Central Provinces districts. We show that, contrary to expectations, it is the Central Provinces and not the harsh Permanent (*zamindari*) settlements of Eastern India that are responsible for BIs results. Hence, we argue that BI's argument that colonial land revenue systems mattered for post-independent agricultural development in India rests on fragile historical and statistical foundations.

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Appendix for "On The Colonial Origins of Agricultural Development in India: A Re-examination of Banerjee and Iyer, 'History, Institutions and Economic Performance'"

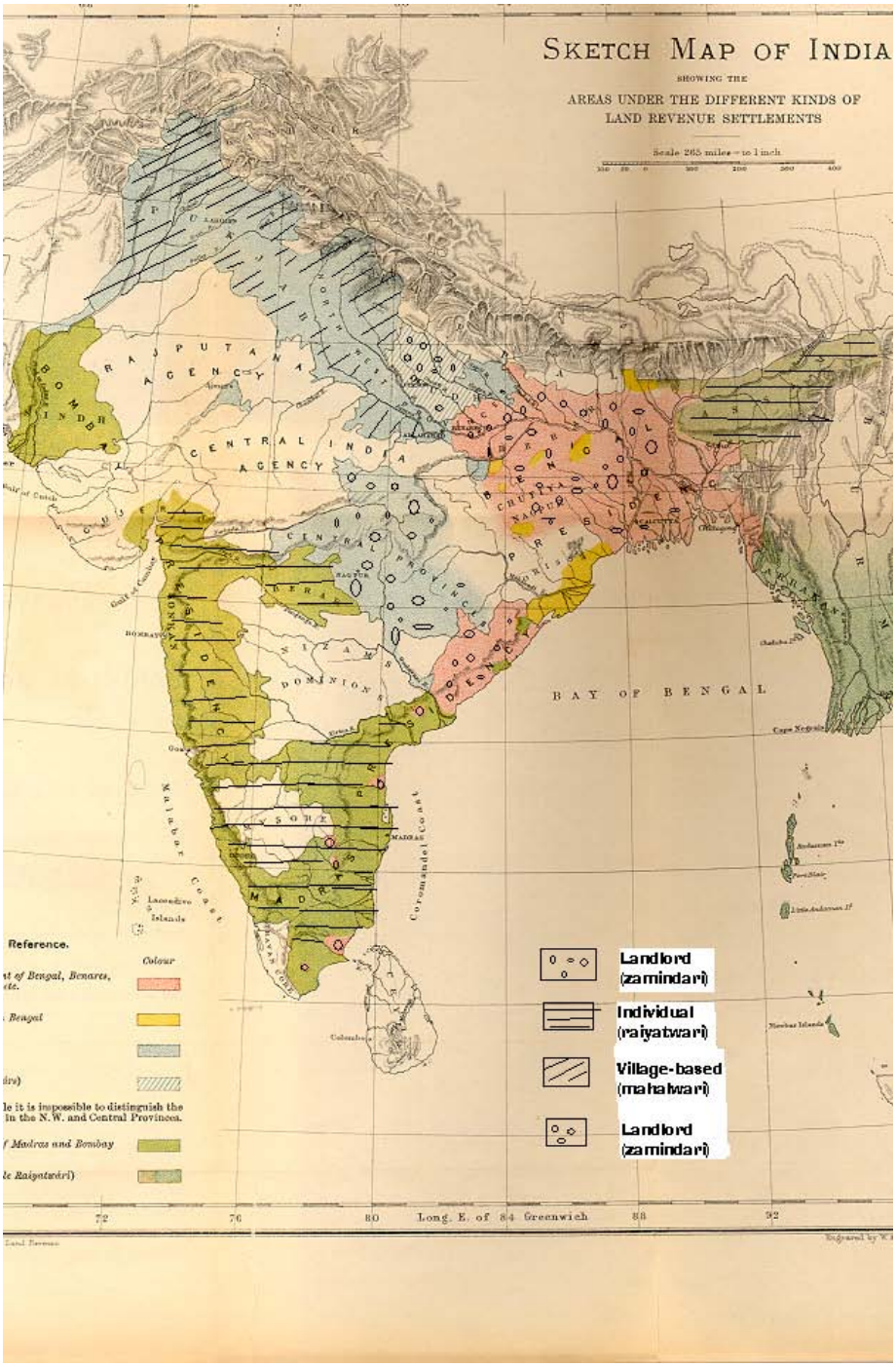

Figure A1: Location of Land Revenue Systems (from BI, 2001)[1]

[1] This map is found in Banerjee, A., and L. Iyer (2001): The Imperial Legacy: Colonial Land Tenure Systems and Independent India (processed). We can no longer find this document but can provide a copy on request.

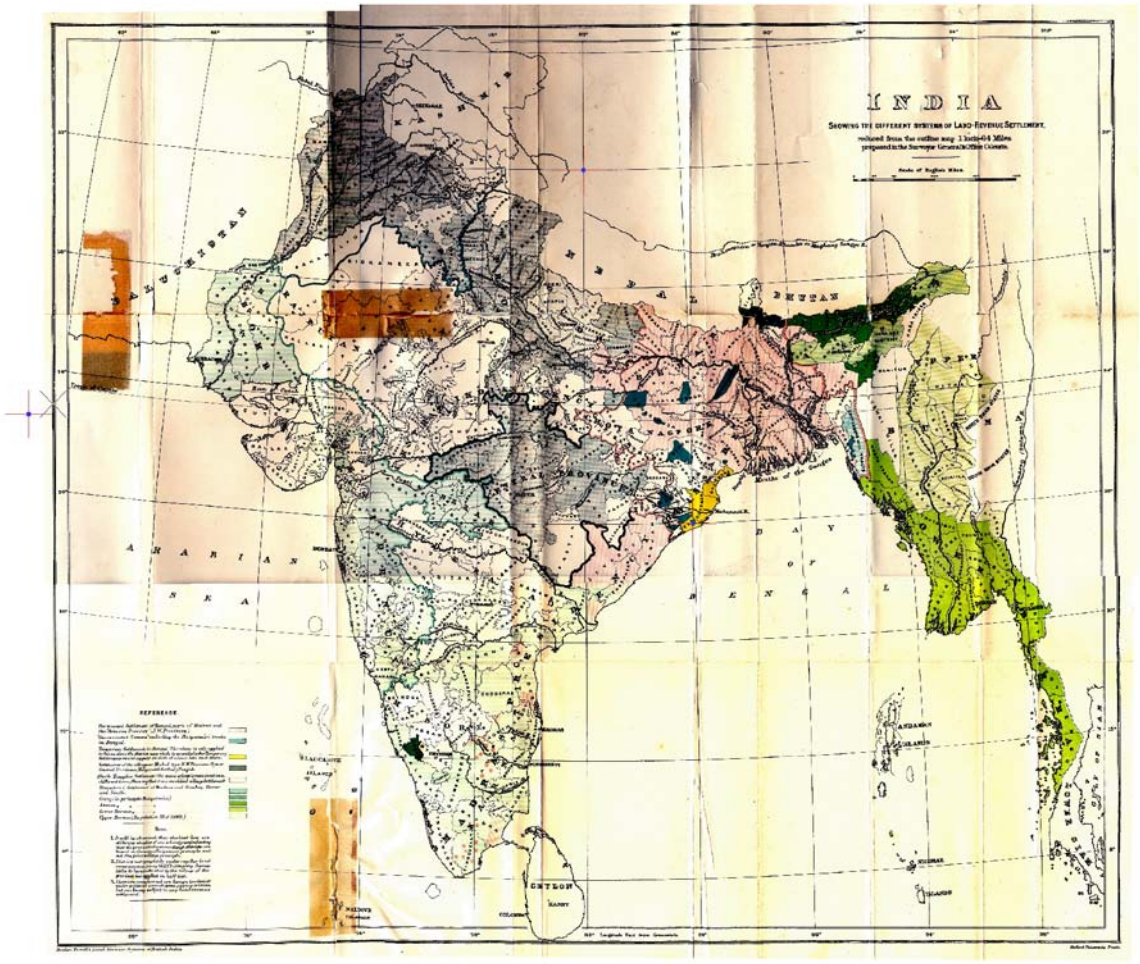

Figure A2: Location of Land Revenue Systems (from Baden-Powell 1892)

A digitised version of this map is Figure 2 in the paper.

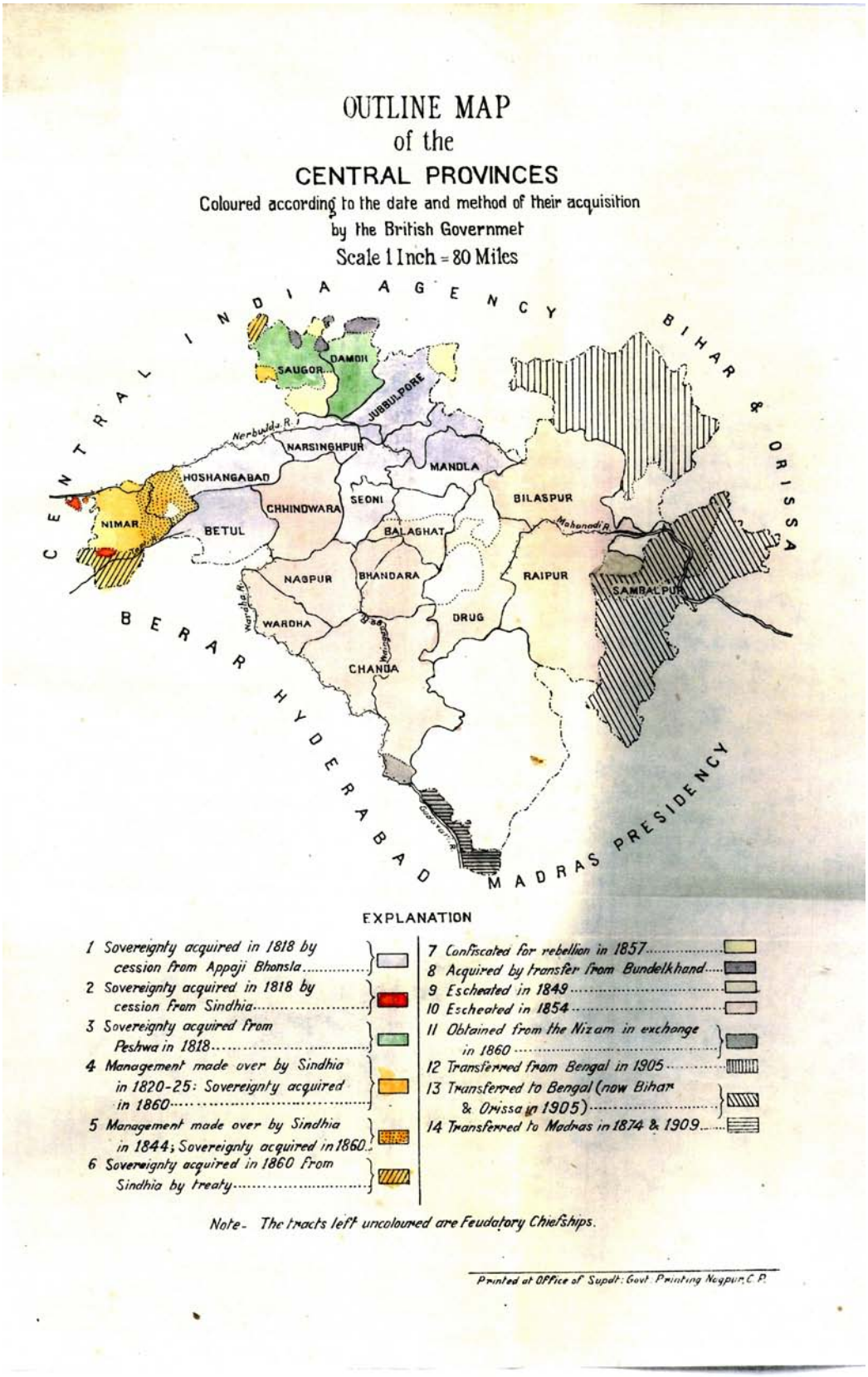

Figure A3: Central Provinces (from Fuller, 1922)

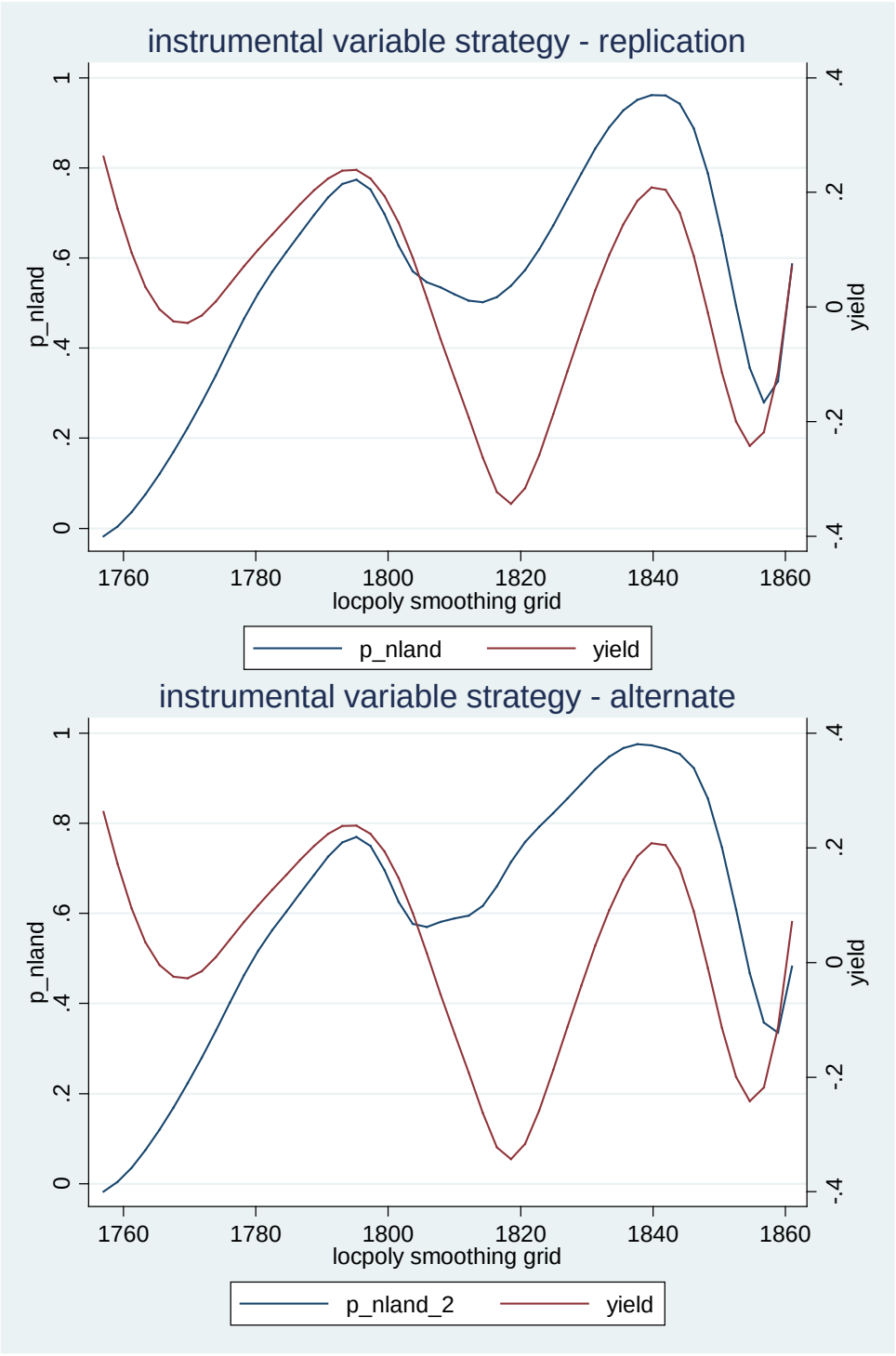

Figure A4. Instrumental Variables Strategy, as in Banerjee-Iyer and Alternate p_nland Specification

Plotting the kernel regressions of our recoded non-landlord proportion and the mean log agricultural yield against the data of conquest and comparing the plot to that of a similar kernel regression of BI's non-landlord proportion and the mean log agricultural yield against date of conquest in figure 4 (Panel A of this figure corresponds to Figure 4, p. 1206, of BI's paper), we find that there is a good fit in the shapes of the two lines in both our case and in BI's. Thus, in our case, a dummy with the date of conquest from 1813 to 1856 serves as a good instrument of non-landlord revenue control. We present the first stage regressions of the IV strategy as in BI and with our recoded non-landlord revenue control proportion variable in Panels A and B of Table A1. The table suggests that the coefficient on the instrument is positive and statistically significant for both BI and in our case, underscoring the validity of the dummy for British conquest, 1820-1856 in BI and 1813-1856 in our case, as an instrument for non-landlord proportion.

Figure A5: Extract from Baden Powell, 1892: p 374.

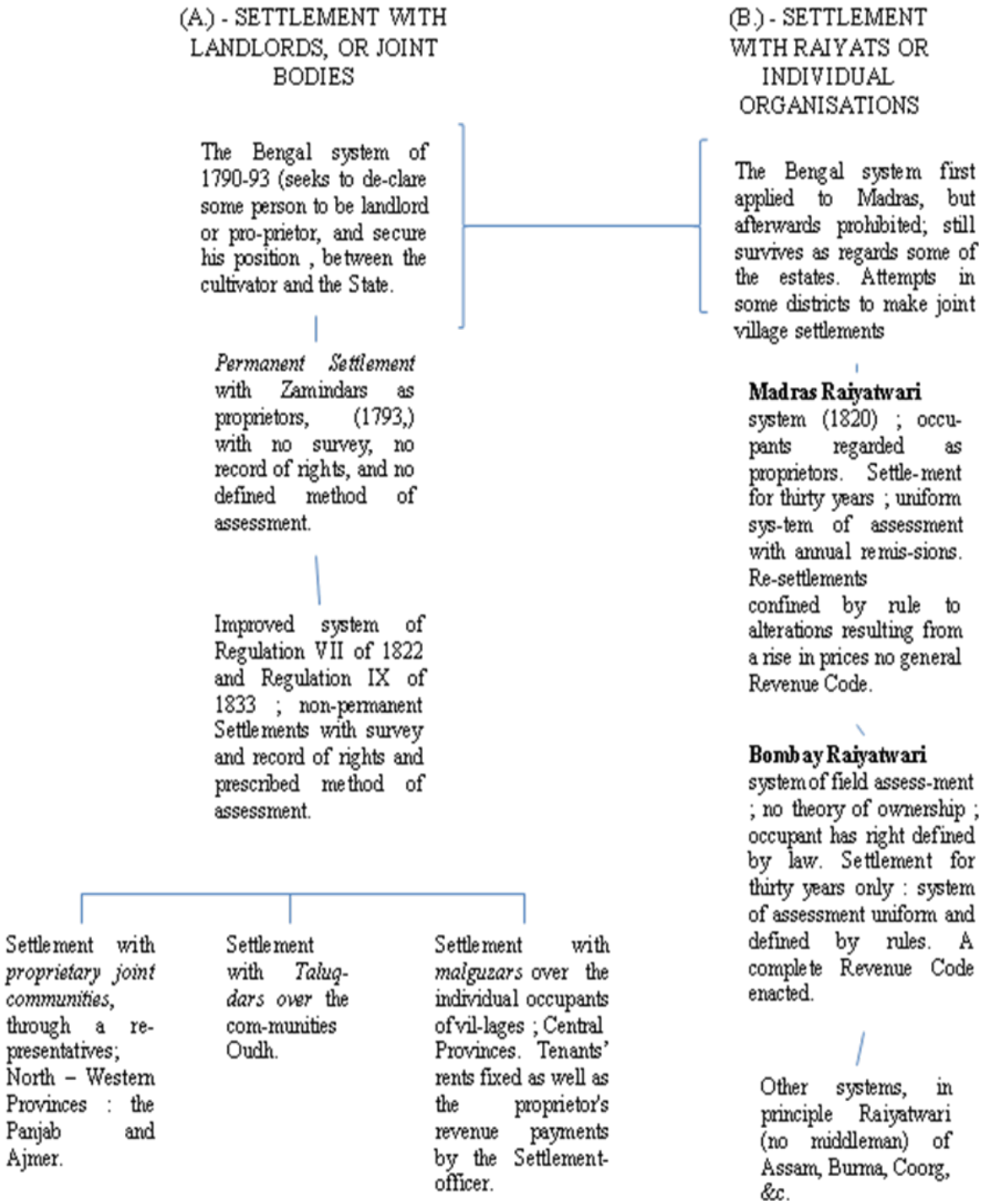

Table A1. First Stage Regressions for IV, Banerjee-Iyer and Our Results

A. First Stage Results for IV estimation of Equation 1

Dependent Variable: Non-landlord proportion, as in Banerjee-Iyer			
Coefficient on	(1)	(2)	(3)
Instrument (=1 if date of British revenue control is between 1820 and 1856)	0.330***	0.430***	0.419***
	(0.0160)	(0.092)	(0.087)
R-squared	0.439	0.437	0.63
No. of districts	166	166	166
Geographic controls	YES	YES	YES
Date of British land revenue control	YES	YES	YES
Date of British land revenue squared	NO	YES	NO
State fixed effects	NO	NO	YES

B. First Stage Results for Alternate Specification

Dependent Variable: authors' non-landlord proportion of area in district			
Coefficient on:	(4)	(5)	(6)
Instrument (=1 if date of British revenue control is between 1813 and 1856)	0.0725***	0.0694***	0.0738***
	(0.0122)	(0.0112)	(0.0134)
R-squared	0.498	0.495	0.61
No. of districts	166	166	166
Geographic controls	YES	YES	YES
Date of British land revenue control	YES	YES	YES
Date of British land revenue squared	NO	Y ES	NO
State fixed effects	NO	NO	YES

Notes: Standard errors in parentheses, corrected for district-level clustering. *Significant at 10 per cent level; ** Significant at 5 per cent level; *** Significant at 1 per cent level. Each cell represents the coefficient from a regression of non-landlord specification (Banerjee-Iyer, in Panel A, and alternate specification in Panel B) on the date of British land revenue control (=1 if the date is between 1820 and 1856 in Banerjee-Iyer, and =1 if between 1813 and 1856 in the alternate specification). Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions. This table differs from BI Table 4 Panel B in that here we report the actual first stage regressions (from STATA ivreg) for the three periodisations used – for irrigation growth 1956-1982; for % area under HYV 1965 – 1987; and 1956 – 1987 for log yields.

Table A2: Neighbouring districts comparison (Districts in North-Western Provinces and Oudh)

	BI p_nland	Landlord (L) or non-landlord (NL) as in BI	Mis-classificaton?	Cluster	Province
Faizabad	0.174951	L		Uttar Pradesh-East (UPE)	Oudh
Gonda	0.200038	L		UPE	Oudh
Partabgarh	0.159703	L		UPE	Oudh
Sultanpur	0.344224	L		UPE	Oudh
Allahabad	0.337912	NL		UPE	North-West Provinces (NWP)
Azamgarh	1	NL		UPE	NWP
Basti	0.688866	NL		UPE	NWP
Gorakhpur	0.530357	NL		UPE	NWP
Jaunpur	0.232432	NL	M	UPE	NWP
Hardoi	0.380418	L		Uttar Pradesh, West (UPW)	Oudh
Kheri	0.040446	L		UPW	Oudh
Rai-Bareli	0.128456	L		UPW	NWP
Unao	0.306323	L		UPW	Oudh
Farukhabad	1	NL		UPW	NWP
Fatihpur	0.275058	NL	M	UPW	NWP
Pilibhit	0.024731	NL	M	UPW	NWP
Shahjahanpur	0.284688	NL	M	UPW	NWP
Kanpur Nagar	0.322889	NL	M	UPW	NWP

The Table covers districts in North-Western Provinces and Oudh used in the neighbouring districts robustness test in Banerjee and Iyer, Table 4. See BI On-Line Appendix, Table 5, for a list of the neighbouring districts used in their analysis, along with the geographical cluster and their landlord/non-landlord classification.

BI state in their paper that that they use the cutoff value of pn_land=0.4 and above to classify districts as non-landlord, except if the district is in Oudh province, in which case it is classified as landlord, regardless of the value of p_nland (see foot-note 21 of their paper, and page 1202). Using the BI cutoff, the number of inconsistent landlord/non-landlord classifications among these 18 districts would be 5 (marked by the letter M). In the case of Uttar Pradesh West, only one district remains as non-landlord, while 8 are landlord, rendering the comparision between landlord and non-landlord districts in the same geographical cluster meaningless.

Table A3: Regression Results for alternate classification of districts

	Dependent Variables							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
□	irr_g	pfert	phrce	phwht	phcer	lyld	lyrice	lywht
Zamindari	1.029	49.67	1.155	0.253	3.941***	1.127	4.362**	-3.069*
	(1.005)	(84.09)	(1.108)	(0.973)	(0.771)	(1.516)	(1.742)	(1.641)
Raiyatwari	0.891	49.90	1.210	0.220	3.978***	0.969	4.300**	-3.360**
	(1.010)	(84.84)	(1.120)	(0.971)	(0.773)	(1.562)	(1.769)	(1.603)
Mahalwari	1.138	57.71	1.103	0.173	3.743***	1.316	4.329**	-2.936*
	(0.994)	(83.54)	(1.113)	(0.966)	(0.769)	(1.505)	(1.721)	(1.626)
Malguzari	0.829	36.32	1.117	0.0496	3.832***	0.820	4.071**	-3.489**
	(1.006)	(84.59)	(1.120)	(0.969)	(0.770)	(1.540)	(1.768)	(1.607)
Marginal effects at global means of X_i								
Zamindari	0.314	24.03	0.287	0.552	0.248	0.0501	0.0744	0.0004
Raiyatwari	0.177	24.25	0.342	0.520	0.285	-0.108	0.0121	-0.291
Mahalwari	0.424	32.06	0.236	0.472	0.0499	0.239	0.0413	0.133
Malguzari	0.115	10.68	0.250	0.349	0.139	-0.256	-0.217	-0.420
Statistics								
N	4460	5293	3708	3541	3611	5311	5293	4484
r2	0.772	0.674	0.678	0.851	0.641	0.476	0.419	0.554
N_clust	166	166	166	166	166	166	166	158
yfe	Y	Y	Y	Y	Y	Y	Y	Y
geog	Y	Y	Y	Y	Y	Y	Y	Y
brit	Y	Y	Y	Y	Y	Y	Y	Y
Standard errors in parentheses								
="* p<0.1 ** p<0.05 *** p<0.01"								

This table reports the results of estimating the following equation reflecting an alternate 4 way classification of districts:

(A1) $$y_{it} = \alpha_{zam} zam + \alpha_{mah} mah + \alpha_{mal} mal + \alpha_{rai} rai + \gamma_j \boldsymbol{X}_{i,t} + \boldsymbol{\delta}_t + \boldsymbol{\varepsilon}_{i,t}$$

Where:

y_{itj} is outcome *i* of interest in district *j* and year *t.*

$\alpha_{zam, rai, mah \& mal}$ are coefficients on 0/1 dummies for districts (*zam, mah, mal, rai*) that are predominantly *zamindari*, *raiyatwari*, *mahalwari or malguzari* (*Taluqdari* classified with *Zamindari*) respectively (equivalent to intercepts for the different systems). ***X*** is the set of (geographic, year and time since annexation) controls as in all the BI specifications), and δ_t are year fixed effects. If a settlement system had consistent adverse effects we would expect smaller intercepts for this type. We also tested a version of equation (A1) with slopes and another without the intercepts for the different land revenue types, and with a five way classification – subdividing the landlord districts into permanent settlement (zamindari) and taluqdari; results are available from the authors

Data Sources used by BI

TABLE A4: DATA SOURCES AND CONSTRUCTION OF VARIABLES

BI Appendix	***Comments***
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:	This source in no longer working. The data are currently (03/05/2012) available at: http://ipl.econ.duke.edu/dthomas/dev_data/datafiles/india_agric_climate.htm We can provide code to read the data into STATA.
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: :	This reference is correct in so far as it goes. Careful attention is needed to the notes to tables to correctly extract the data from the Vanneman data set.
Districts and maps of modern India: http://www.mapsofindia.com:	We cannot find any of the maps in BI from this source.
Village infrastructure variables: State statistical abstracts of 1981:	More detailed referencing desirable.
Land-holdings by size category: Agricultural census of 1990-91:	More detailed referencing desirable.
Data on poverty and inequality (1972, 1987): based on National Sample Surveys:	This source is inexactly specified. It seems that the authors use secondary analyses of the NSS HES surveys.
Data on state development expenditure: Database on Poverty and Growth in India compiled by Berk Ozler, Gaurav Datt and Martin Ravallion (World Bank):	This source does not seem to be presently available (http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20699301~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html) but can be obtained from the authors.
Data on state land reforms: Besley and Burgess (2000):	this source is available at: http://sticerd.lse.ac.uk/eopp/_new/data/indian_data/default.asp
Historical data	
Districts and maps of British India: Baden-Powell (1892):	The map we find in BP 1892 is reproduced as Figure 2 above
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.	Exact sources and page number are not provided.
For Madras Presidency: non-landlord proportion obtained from Baden-Powell (1892):	We cannot verify this source. The figures given by BP for Madras (volume 3 p: 24, following the report of Dr. Mclean) do not correspond to the figures given in BI. The figures given in BI are very close to those found in the Report of the Indian Irrigation Commission 1901, Appendix, p. 374 (Madras Presidency).
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):	We have not attempted to verify these sources. Ideally the exact sources for each figure would be given as in Table 2 of our JDS paper – ie. with the full source including page.
Land revenue inequality 1885: Digital South Asia Library (http://dsal.uchicago.edu):	It is not clear what this source refers to as there are many resources available through this page.
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).	This source occurs on pages 224-5 of Stokes 1978.