THE LONG-TERM EFFECTS OF COLONIAL LAND TENANCY: MICRO EVIDENCE FROM INDIA

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ABSTRACT

This paper uses household survey data from India to examine the impact of historic land tenure institutions on economic and social outcomes for households today. It offers evidence on specific channels through which the structure and quality of land tenure (i.e. revenue collection) systems could persist today. We find that districts where land ownership was dominated by landlords, today have lower annual income, per capita consumption, and cumulative household asset levels than districts which were characterized by non-landlord tenure systems. Households in landlord districts are more likely to have narrower social networks and lower levels of memberships in community organizations, weaker propensity to work collectively in solving communal problems, and are more likely to be subject to crime than district where non-landlord systems were prevalent. Our results are significant and robust to a diverse set of controls.

I. Introduction

A series of recent studies find that India's colonial past had persistent effects on current regional performance. The seminal work on this topic is that by Abhijit Banerjee and Lakshmi Iyer (2005). They show that differential colonial land tenure institutions gave rise to distinct patterns of development, the effects of which persist even today. Parts of India where proprietary rights were concentrated among landlords (i.e. elites) have significantly lower levels of agricultural investments and lower productivity compared to areas where the rights were much more widespread (i.e. individual cultivators or village bodies). They also find significant differences in health and educational infrastructure. They argue that serious differences in collective action due to the political antagonism, lower levels of investments in agricultural technologies, and lower levels of investment in human capital account for such a divergence.

Various complementary studies have added onto the empirical examination of the structure of land tenure systems and public goods availability in India. Banerjee, Iyer, and Somanathan (2005) have explored the role played by colonial power, landowner-peasant relations, and social fragmentation based on Hindu caste system on the availability of public goods. They find a negative relationship between concentration of power among the elites and caste fragmentation with availability of public goods. Banerjee and Somanathan (2006) study the mechanism of allocation of public goods by a centralized state using the example of India in the 1970s and 1980s. A model outlined by Banerjee, Iyer, and Somanathan (2006) argue the efficacies of a "top-down" intervention in solving collective action problems, in contrast to the popular "bottom-up" model, in improving access to pubic goods.

Separately, Iyer (2010) compares economic outcomes between areas in India governed directly under British administration and those under indirect rule. She finds significantly lower

levels of access to public goods in the post-colonial period for areas that were under direct rule. Taking the opposite direction in history, Chaudhary (2008, 2010) finds that there were considerably different patterns of investments in public education during the colonial period. While investments show a significant positive effect in increasing literacy, large inter-regional differences which existed can be attributed to the differences in the amount of land revenue collected, and indirectly the method it was collected in as well. Yet another study by Pandey (2010) finds that local governance and education outcomes in Oudh (in present-day Uttar Pradesh) are worse in villages that belonged to the landlord-based system. The effect is attributed to a history of concentration of political power among the landed elite.

This study is an extension of that agenda, but where it differs is in offering evidence at the micro-level. Inspecting at a finer disaggregation than previous related studies, we are able to examine carefully the exact channels through which historical institutions may persist. In particular, we estimate the differences between landlord and non-landlord areas in household income, consumption per capita, and cumulative asset levels. We find large, positive, and significant differences for households in non-landlord areas. We examine the social capital of households to test channels which proxy for collection action. We find significant differences in the extent of their social networks, civic participation, confidence in institutions, and propensity to work collectively to solve communal problems. This potentially provides some evidence on the channels through which the effect of land tenure institutions continue to persist.

The paper is structured as follows. In the following section, we provide a brief historical background, a description of the various land tenure systems, and the conceptual framework and motivations for undertaking the study. Section 3 describes the sources of data, and in Section 4 the empirical approach and estimates are discussed. Section 5 concludes.

II. Historical Background and Conceptual Framework

A. Company Raj

The British East India Company's dominion began rather humbly with securing rights to construct a trading post in the port of Surat in 1612 from the Mughal emperor Jahangir. The Company expanded over the remainder of the 17th century most notably with a land grant in 1639 to establish trading posts on the Coromandel Coast (present-day Chennai) and the leasing of Bombay island in 1668 and Kalikata (present-day Kolkata) in 1698. International trade under the Company flourished as the markets for spices, silk, indigo, and cotton expanded. In 1717, recognizing the growing economic role the Company played, emperor Farrukhsiyar granted the British exemption, by *firman* or decree, from paying custom duties in Bengal.

The Company's victories against *Nawabs* under Robert Clive at Plassey in 1757 and at Buxar in 1764 led to the Treaty of Allahabad in 1765 grating it *diwani* or sole revenue collection rights in Bihar, Bengal, and Orissa. Majority of these newly acquired areas were placed under landlord systems which were eventually subject to nominally fixed amounts of revenue under the Permanent Settlement Act.

Victories during the Anglo-Mysore Wars (1766 to 1799) and Anglo-Maratha Wars (1772-1818) enabled the expansion of the British Empire over much of southern and western India. Unlike the wars in eastern India, the turmoil lasted nearly half a century. The resulting environment of conflict might have played a role in delaying and in some cases preventing the rise of a landlord or landed elite class in these areas (Peers 2006). Over the next half century, the Company asserted it's growing power through annexation or treaties over the remaining parts of the Indian subcontinent, allowing for a handful of princely states to maintain administrative

autonomy. As the Company's share of territory increased, land revenue became one of the principal sources of funds.

Company *Raj* came to an end in 1858 following the Sepoy Rebellion and the administration and military in India was reorganized and governed directly by the British government, marking the beginning of British *Raj*. India would not become an independent nation for another 90 years.

B. Land Revenue Systems

The British installed three forms of land revenue systems in India: (1) landlord (*zamindari* or *malguzari* or *talukdari* in North-West Provinces), (2) village-body (*mahalwari*), or (3) individual cultivator (*raiyatwari*). The landlord system was implemented in parts of present day states of Bihar, West Bengal, Orissa, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, Uttar Pradesh (i.e. Oudh) and Assam. Virtually all agricultural land in these areas were under the proprietorship of a single landlord. They were responsible for all revenue collection and directly responsible for paying a portion of that revenue to the British. Although in some parts the amount of revenue owed to the British was permanently or temporary settled, the amount collected by the landlord was self-determined and variable over time allowing for arbitrary extraction of rents from landless peasants.

The village-body based system was implemented in parts of present day states of Punjab, Haryana, Himachal Pradesh, and Uttar Pradesh. The village-body's jurisdiction over area, it's size, and composition varied from place to place. In some places, the village-body consisted in essence of a landlord family, and in others, it was composed of many members with each member responsible for a fixed share of the revenue (Banerjee and Iyer 2005).

Unlike the previous two systems, under the individual cultivator system, cultivators were given legal rights over their land and were directly responsible for paying the British revenue

demand. Due to this direct relationship with state and cultivator, the revenue amount was responsive to changes in annual yields of the cultivator. The present day states of Maharashtra, Gujarat, Karnataka, and Tamil Nadu comprised most of the historical districts under the individual cultivator system.

Banerjee and Iyer (2005) argue that decisions to install one form of land revenue system over another were often based on the influence of individual administrators, political events, the date of annexation, and the pre-annexation or pre-colonial presence of a landlord class (i.e. Bengal). It is noteworthy that districts annexed at a later date had political precedent for favoring non-landlord arrangements whereas in districts annexed at a earlier date, the cost of delegating the role of revenue collection to an intermediary was low leading to the empowerment of those privileged individuals. The argument used to defend a non-landlord system were along the lines of prevailing principle or ideology of the time[1] than factors directly related to agricultural productivity. They conclude that the choice of land revenue system can thus be treated as largely exogenous.

To address remaining concerns of exogeneity of the choice of land revenue systems they pursue two alternative strategies: (1) by comparing contiguous non-landlord and landlord districts and (2) comparing districts that were brought under British revenue control between 1820 and 1856 with districts outside of this period. The support for the strategy is derived from the fact that districts annexed after 1820 were for the most part installed with non-landlord system due to political influences of individual administrators (i.e. Holt Mackenzie in North-West Provinces, Sir Thomas Munro in Madras Province, and Lord Elphinstone in the Bombay Presidency). They find similar results from both strategies as from assuming that the choice of revenue collection system was exogenous.

[1] James Mill's *Elements of Political Economy* was influential in advocating the "ryotwari" or individual cultivator system (Brown 1994).

C. Conceptual Framework

Can contemporary household-level data on political behavior and economic conditions of individuals shed light on the mechanisms through which institutional quality persists? Can we infer from such an analysis what role the "long hand of history" plays in determining growth patterns and social climate? These are the primary questions which drive the motivation for this paper. Given both the political and economic aspects of the question, separate angles of analysis are needed.

We look at the economic aspect using a framework similar to that established in Banerjee and Iyer (2005), but the fineness of our data allows us to extend the analysis much further. While there is some overlap between the approach and interpretation of many of our results, we are able to examine some of the channels that result in different productivity outcomes in aggregate. In their paper, they find that states with a higher landlord population have higher Gini coefficients of land inequality in 1885 than non-landlord population and the difference persisted as recently as 1947. As the landed elite grew richer, the inequality in those areas grew higher. While inequality grew in the non-landlord areas also, it happened at a much slower pace and at a later date. One of the channels through which the effect of revenue collection institutions could persist today is the inequality in the distribution of wealth. The theoretical link between income distribution and long-run development is well established in the empirical literature. One example is Banerjee and Newman (1993), which finds that the initial distribution of wealth is a crucial determinant of prosperity or stagnation of the economy in the long-run. Growth in economies with high initial inequality in wealth distribution flatten over time to a low employment, log wage equilibrium whereas economies with low initial inequality (although poor in aggregate) prosper to a high employment, high wage steady state. We look for the effects of

inequality resulting from the landlord system in current households' income, consumption per capita, and asset accumulation. While income and consumption per capita provide a short-term measure of economic wellbeing, it is likely that they are determined by the long-term institutional environment established in those areas. This is not to suggest that short-term shocks or reforms are unimportant. India's rapid growth over the last decade may as well ameliorate much of the institutional deficiencies in the future. Asset accumulation is thought of in terms of the household's accumulated level of consumer goods and housing (i.e. investments made to improve quality). This enables us to look at the long-term economic levels of each household and its potential as asset accumulation requires sustained employment and/or income.

We take up the issue of differences in political environment by looking at the culture of participation through household memberships in social organizations and voting, levels of confidence in institutions, and levels of social capital (particularly social networks and collective action). The impact on individuals' beliefs is another channel through which history can affect current outcomes (Hoff and Stiglitz 2001). The landed elite's control over the terms and collection of revenue naturally increased it's political clout. Exploitation and oppression by landlords of the landless peasants created an environment of insecurity in which political participation was not only discouraged but wholly prevented. Bose (1993) argues that the political atmosphere created by class-based conflict shaped much of policies and politics in pre- and post-independent landlord communities. While class-based conflict was not entirely absent from non-landlord areas, their total magnitude was much smaller. In non-landlord areas, particularly where individual cultivators held titles to the land, the incentives to participate and have aligned political interests were highly beneficial in negotiations with the state.

In contrast, the landed elites and peasants were misaligned in their political agendas resulting in a culture of mistrust. Banerjee and Iyer (2005) argue that collective action most likely failed in landlord areas due to this misalignment. Additionally in India, class-based conflict has most often been along the lines of the caste system[2]. Almost all of the landed elites were comprised of *Brahmins*, who are high-caste individuals, while the landless peasants were mostly lower caste and tribal members. Hoff, Kshetramade, and Fehr (2009) find that mistrust is more prevalent in lower caste members who are less likely to take punitive action against violators of cooperation. The cultural legacy of caste system on individual trust levels is also documented in Hoff and Pandey (2005). Tabellini (2008) models the persistence of mistrust using norms of cooperation that are passed on from generation to generation. These norms in turn determine the quality of institutions created by individuals in a society. Individuals with lower levels of trust tend to choose weaker institutions which sanctions uncooperative behavior less often, thus setting the stage for the persistence of mistrust in following generations. Nunn and Wantchekon (2010) is another such study which finds individuals whose ethnic groups' bore the brunt of the slave trade today display significantly lower levels of trust. They conclude that the slave trade through it's effects on individual trust levels is partly to blame for Africa's current underperformance. While we do not have exact measures of trust like that used in their study, we do have a weaker correlated measure of confidence in various institutions. Newton and Norris (1999) argue that while there is a relationship between trust and confidence, it is most likely indirect. If performance of political institutions are the outcome of the levels of social capital (partly determined by trust levels), better performance will be positively correlated with higher levels of confidence. This essentially means that while we are able to gauge the level of confidence

[2] Castes can be described either as *varnas* or *jatis*. *Varnas* are derived from ancient Hindu society which classifies individuals in terms of occupations into five groups: *Brahmins*, *Kshatriya*, *Vaisya*, *Sudras*, and *Ati Sudras*. The *jati* system fits the contemporary social structure better and classifies individuals into five groups: *Brahmins*, *Scheduled Castes* (SC), *Scheduled Tribes* (ST), and *Other Backward Castes* (OBC).

households have in political institutions, we are unable to disentangle the added effect from individual's perception of institutional performance.

The hypothesis that we test is whether non-landlord areas which were characterized by clusters of "good" institutions perform better in political and economic outcomes at the household level. The aim of our analysis and intended contribution is to estimate empirically the extent to which the political behavior and economic structure of households continue to be impacted by the colonial land tenure systems.

3. Data

Our data is a combination of historical data at the district-level with recent survey data at the household-level. In 2001, India had 593,731 inhabited villages, 384 urban agglomerations, and 5,161 towns making up in aggregate 593 districts[3]. An average district is about 5,200 square kilometers in size with 1.73 million residents. The total number of households in India was 193,579,954, with the mean household size being 5.3 individuals. While the 2005 statistics are most likely higher in some categories, we can assume that the increase in not substantially different for this analysis.

A. Colonial Land Tenure Data[4]

The measure of the proportion of non-landlord area in each district is taken as constructed in Banerjee and Iyer (2005). They matched modern districts to older British districts that were under direct administrative control. For each of these districts, they use historical evidence of land revenue systems between 1870 and 1890 about villages, estates, and/or land area to compute the proportion of the district under non-landlord control during the colonial period. For districts

[3] In India, a district or *Zill-Parishad* is the level of disaggregation finer than state. A village (*Gram Panchayat*) or urban neighborhood (*Wards*) comprised of municipal corporations (*Mahanagar-Palika*), municipalities (*Nagar-Palika*) or town councils (*Nagar-Panchayats*) are the lowest level of disaggregation.

[4] The land tenure dataset is publicly available at http://www.aeaweb.org/aer/data/sept05_data_banerjee.zip.

without exact information on district-wise non-landlord control, they assign values of 0 (completely landlord) or 1 (completely non-landlord) depending on the prevailing colonial land revenue system. See Web Appendix tables 1, 2, and 3 of Banerjee and Iyer (2005) for detailed information on historical sources and construction of the measure for each district. We use the measure unedited for this analysis.

B. Indian Human Development Survey (IHDS 2005)[5]

The household level data is from the 2005 Indian Human Development Survey (IHDS) conducted during 2004 and 2005. The nationally representative survey was designed and conducted by the University of Maryland and the National Council of Applied Economic Research covering 1503 villages and 971 urban neighborhoods in 383 (of 626) districts in India. Local interviewers were employed in translating and administering the survey in 13 Indian languages. The survey yields a potential sample of 41,554 Indian households. The IHDS (also known as HDPI-2) is a continuation of the 1994-95 Human Development Profile of India (HDPI-1) survey and thus includes 13,900 re-interview households. The dataset is constructed from two one-hour interviews in each household covering education, employment, economic status, health, political behavior, and social capital. From the eight sections[6] of the survey, only the household section is used for this paper. The summary statistics are available in table 1.

Household.—The IHDS asked each household questions on a wide range of topics, of which we focus on three economic measures and four measures of social capital.

The three measures of a household's economic levels included in the IHDS are (a) income, (b) monthly consumption expenditures, and (c) assets (i.e. consumer goods owned) and housing quality. The income measure was constructed from a rich array of questions based on 50

[5] The IHDS dataset is available through ICPSR at http://www.icpsr.umich.edu/icpsrweb/DSDR/studies/22626.
[6] Eight sections include individuals, households, medical facility, non-resident, primary school, birth history, village, and crops.

Table 1
Summary Statistics

Variable	Mean	Std. dev.	Min	Max	*N*
Economic indicators					
ln income	10.327	0.978	6.908	15.691	24904
ln consumption per capita	6.515	0.685	4.605	10.578	25337
Household asset index	11.651	6.173	0	30	25407
Social indicators					
Social network position	1.131	1.217	0	4	24893
Community memberships	0.565	1.048	0	9	25345
Vote in 2004 election	0.916	0.278	0	1	25368
Conflict in village	1.375	0.739	0	2	25265
Conflict between *jati*	1.664	0.555	0	2	25267
Confidence in institutions	23.313	3.406	10	30	22486
Local crime	0.073	0.319	0	3	25340
Village infrastructure					
Access to road	1.602	0.592	0	2	16605
Access to electricity	0.692	0.324	0	1	16605
Access to telephones	0.579	0.494	0	1	25407
Access to public programs	15.358	4.922	1	25	16605
Access to community groups	3.427	2.155	0	9	16597
Access to efficient fuel	0.061	0.238	0	1	16605

State	Mean altitude (Std. dev)	Mean latitude (Std. dev)	Mean rainfall (Std. dev)	Mean non-landlord proportion (Std. dev)
Andhra Pradesh	291.68	16.77	877.10	0.664
	(90.21)	(1.60)	(160.40)	(0.288)
Bihar	295.35	24.89	1733.58	0.000
	(105.69)	(1.17)	(402.13)	(0.000)
Gujarat	212.94	22.33	618.89	1.000
	(92.61)	(1.02)	(257.79)	(0.000)
Haryana	535.16	29.03	1149.21	0.852
	(76.27)	(0.89)	(260.01)	(0.154)
Karnataka	462.63	14.31	1171.28	1.000
	(35.92)	(1.71)	(683.59)	(0.000)
Madhya Pradesh	369.6	23.33	1125.85	0.097
	(102.29)	(1.46)	(145.37)	(0.261)
Maharashtra	401.84	19.38	1117.83	0.778
	(44.77)	(1.40)	(417.04)	(0.416)
Orissa	177.07	20.69	1402.22	0.320
	(51.98)	(0.91)	(176.31)	(0.404)
Punjab	661.41	30.95	1119.92	0.872
	(98.44)	(0.64)	(177.10)	(0.178)
Rajasthan	327.46	26.16	664.09	0.000
	(53.06)	(1.60)	(201.54)	(0.000)
Tamil Nadu	318.39	10.79	895.85	0.751
	(70.64)	(1.39)	(246.03)	(0.217)
Uttar Pradesh	384.54	26.97	1377.66	0.424
	(139.39)	(1.66)	(246.54)	(0.317)
West Bengal	213.61	24.11	2284.38	0.000
	(147.39)	(1.54)	(1090.90)	(0.000)

different sources of income. These were classified into eight categories: (1) farm income, (2) agricultural wages, (3) non-agricultural wages, (4) monthly salaries and/or daily wages, (5) net business income, (6) household remittance received from non-residents, (7) government benefits, (8) unearned sources of income like property, pensions, etc. The annual totals were estimated using the number of days worked as reported by individuals in the household. For our sample, the household mean income was Rs. 49,936 (in 2004-05 Rupees), with a standard deviation of Rs. 79,906. We restrict our sample to incomes greater than or equal to Rs. 1000.

The consumption per capita measure was constructed using 47 questions[7] about household consumption. The first 30 items were basic household items which are frequently purchased on a monthly basis, and the remaining seventeen items used an annual frame and included items which are more expensive. The household mean consumption per capita for our sample was Rs. 880, with a standard deviation of Rs. 909. We restrict our sample to consumption greater than or equal to Rs. 100. The household assets measure is a sum of 30 dichotomous items[8] which measure the household possessions and housing quality. Each household's index ranges from 0 to 30. The household mean asset level was 11.86, with a standard deviation of 6.1.

Questions regarding social capital consist of (a) the extent of social network in medical, education, and government institutions, (b) memberships in groups or organizations and political activity, (c) local conflict and collective action, and (d) confidence in institutions. For all questions on social capital, the log of household income is included as part of the controls. This

[7] Rice, wheat, sugar, kerosene, other cereals, cereal products, pulses, meat, sweeteners, edible oil, eggs, milk, milk products, vegetables, salt/spices, other food, paan or tobacco, fruits/nuts, eating out, fuel, entertainment, telephone, personal care, toiletries, other household items, conveyance, housing/other rent, consumer taxes/fees, domestic services, medical out-patient, medical in-patient, school fees, school books, clothing/bedding, footwear, furniture, crockery, household appliances, recreation goods, jewelry, transport equipment, therapeutic, other personal, repair/maintenance, insurance premiums, vacations, and social functions.

[8] Bicycle/scooter, sewing machine, mixer/grinder, motor vehicle, b&w tv, color tv, air cooler/conditioner, clock/watch, electric fan, chair/table, cot, telephone, cell phone, refrigerator, pressure cooker, car, washing machine, computer, credit cards, 2 clothes, footwear, piped indoor water, separate kitchen, flush toilet, LPG, electricity, pucca wall, pucca roof, pucca floor.

is necessary as to make sure we are not simply repeating the results of table 1 and thus interpreting spurious correlations.

Social networks of households are gauged by asking whether "among [their] acquaintances and relatives, are there any who are" in medical institutions (i.e. doctors, nurses, or hospital/clinic staff), educational institutions (i.e. teachers, school officials, or school staff), or government (i.e. officers or above, clerks, or staff). In addition, the survey also asks whether anyone in the household or someone close to the household is an official of the village council or ward committee. Following the strategy used by Vanneman et. al. (2007) for the same dataset, we construct a positional generator of social networks which indexes how many ties a household has to the four categories mentioned above. The index ranges from 0 (no connections) to 4 (connected to all four). The household mean for our sample was 1.19 and the median was 1. About 20% of the households had 3 or more connections whereas almost 41% had no connections.

Political participation by households are measured using questions on memberships in groups or organizations and whether they voted in the 2004 national election. Households are inquired about memberships in nine organizations: (1) *mahila mandal* (women's empowerment group), (2) youth club, sports group, or reading room, (3) self help groups, (4) credit or savings group, (5) religious or social group or festival [organizing] society, (6) caste associations, (7) development group or NGO, and (8) agricultural, milk, or other co-operative. We generate a cumulative index from 0 to 9 to account for gender-specific, age-specific, and occupation-specific differences in memberships within a household. In our sample 32% of households had memberships in 1 or more organization, whereas 68% of the households in our sample did not have any affiliation with the groups or organization surveyed.

Direct questions on trust were not asked in this survey. Instead households' opinions on the level of conflict, collective action, and confidence in institutions were gauged. Two questions were asked on local (i.e. village or neighborhood) conflict: (1) "do people generally get along with each other or is there some conflict or a lot of conflict?", and (2) "how much conflict would you say there is among communities/*jatis* that live here?". The answers for the second question followed the same format as the first, in which respondents chose among "a lot of conflict", "some conflict", or "not much conflict". Responses for both questions were assigned a value of 0, 1, or 2, respectively. In our sample, 14% reported that there is a lot of conflict in their village and only 4% reported there is a lot of conflict among *jatis*. The third question on a different but related topic was whether "people bond together to solve [a community] problem … or take care of their own families individually". The respondents chose between "bond together to solve problem" or "each family solve individually". The responses were assigned a value of 1 or 0, respectively. 57% of our sample reported that they bond together to solve communal problems.

The last measure of social capital concerned the confidence in institutions. Respondents were asked whether they had a "great deal of confidence" (a value equal to 1), "only some confidence" (=2), or "hardly any confidence at all" (=3) in ten institutions: (1) politicians, (2) military, (3) police, (4) state government, (5) newspapers, (6) village councils, (7) schools, (8) hospitals and doctors, (9) courts, and (10) banks. We reversed the scales to indicate greater confidence, and summed values over the nine questions to create an index with a 30-point maximum. The mean value of our index was 23.4, with a standard deviation of 3.3.

Despite the breadth of the IHDS data, the analysis is constrained to 271 potential districts for which the non-landlord proportion measure exists. In addition, 69 districts for which the non-landlord measure exists there is no corresponding IHDS data. After removing these observations,

a final sample of 202 districts from 13 states[9], with 971 primary sampling units (576 rural villages and 395 urban neighborhoods) are cleanly matched with districts for which the non-landlord proportion is constructed.

4. Empirical Approach and Estimates

A. OLS Estimation

We estimate the relationship between a district's historic non-landlord control and households' political and economic outcomes today in that district. Our baseline estimating equation is:

$$y_{ijk} = \alpha + \beta PNL_k + \gamma FRAC_j + X'_{ijk}\varphi + X'_{jk}\phi + \varepsilon_{ijk} \quad (1)$$

where *i* indexes individual households, *j* villages/neighborhoods, and *k* districts. PNL_k measures the proportion of district *k* under non-landlord control during colonial India. This estimating equation is similar to that used by Banerjee and Iyer (2005), but we include controls for household characteristics and village caste fractionalization. Neither district-fixed nor state-fixed effects are used in our baseline estimation for two reasons: (1) the proportion of a district under non-landlord control is historically determined for each district; and (2) the proportional measure also varies more between-states than within-states thus adding state-fixed effects would effectively drop states that were either completely under landlord or non-landlord systems. For each village/neighborhood there are observations for at least two or more households and we account for variation by clustering at that level.

The variable $FRAC_j$ is intended to capture the sub-caste or *jati* composition of the household's village/neighborhood. The motivation to measure sub-caste heterogeneity arises

[9] Andhra Pradesh, Bihar (including Jharkhand), Gujarat, Haryana, Karnataka, Madhya Pradesh (including Chhattisgarh), Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh (including Uttaranchal), and West Bengal. States formed after 1991 are included as part of old states.

from empirical research on population heterogeneity and its consequences for citizenship behavior. Easterly and Levine (1997) find cross-country evidence in Sub-Saharan Africa which suggests that high ethnic fragmentation may explain a significant part of depressed economic growth. Alesina and La Ferrara (2002, 2005) find that in more heterogeneous communities, individual trust levels and social participation are significantly lower. We calculate fractionalization in a village or neighborhood of our sample using the Hirschman-Herfindahl index:

$$FRAC_j = 1 - \sum_{c=1}^{n} p_c^2 \tag{2}$$

where p_c is the share of sub-caste c over the total population. We construct the index using percent share of sub-castes in each village/neighborhood from the IHDS Village Questionnaire. Measure (2) ranges from perfect homogeneity (equals 0) where every individual is from the same *jati* to perfect heterogeneity (equals 1) where every individual is from a different *jati*. The measure assumes a shared identity among individuals which can be thought of as an objective category but does not make value assumptions about caste standing (Anderson and Paskeviciute 2006). For our sample, the average fractionalization index is 0.63.

The vector X'_{ijk} denotes a set of household-level covariates, which include a gender indicator variable that equals one if the head of the household is a female, an indicator variable that equals one if the household is in an urban location, five caste fixed effects, twelve fixed effects for principal source of income for the household or the dominant occupation of the household, a native indicator variable that equals one if the household has been residing there longer than 70

years[10], the number of individuals within a household, and nineteen fixed effects for the highest level of education completed by an adult (defined as 21 or years older)[11].

The vector X'_{jk} denotes the set of district-level geographic controls and an additional variable that equals the year when the district came under British revenue control. Geographic controls include climatic, topographic, soil, and a coastal indicator variable which equals one if the district is on the coast. The date of British land revenue control is intended to capture the length of British rule in the district. Both the timing of the revenue control and the duration of revenue control often determine unique characteristics and the nature of the land revenue system in some districts. These independent effects are picked up using this control. The vector is taken from Banerjee and Iyer (2005).

Estimates of equation (1), for income, consumption per capita, and asset levels of households, are reported in table 1. The difference in all three measures are large and significant between non-landlord and landlord areas. In column (1) we test for differences using the full sample of districts. Using our base specification, we find that households in non-landlord areas have 25% higher income, 39% higher per consumption levels, and 24% higher levels of asset accumulation. The linear relationship is also shown in figure 1. We follow a second strategy in column (2) by restricting our sample to only districts where there was a historic mixture of non-landlord and landlord revenue systems. While the sign of the coefficient on household income stays positive, it decreases in effect and loses it's significance alluding to the fact that our results are perhaps partly driven by the districts in our sample where the revenue system was wholly

[10] The original variable records the number of years the household has resided in that village. The values range from 1 to 90. We intentionally use the 70-year cutoff to place the household's first appearance in the village around 1935, a little more than a decade before the formal abolition of the landlord system.

[11] Alternative measures of education attained include highest education completed by a male who is 21 or years older and highest education completed by a female who is 21 years or older. The difference in estimates using either of these alternate measures are negligible. We prefer to use the highest education completed by an adult who is 21 years or older to capture the effects of the most educated person in that household without disaggregating into gender differences.

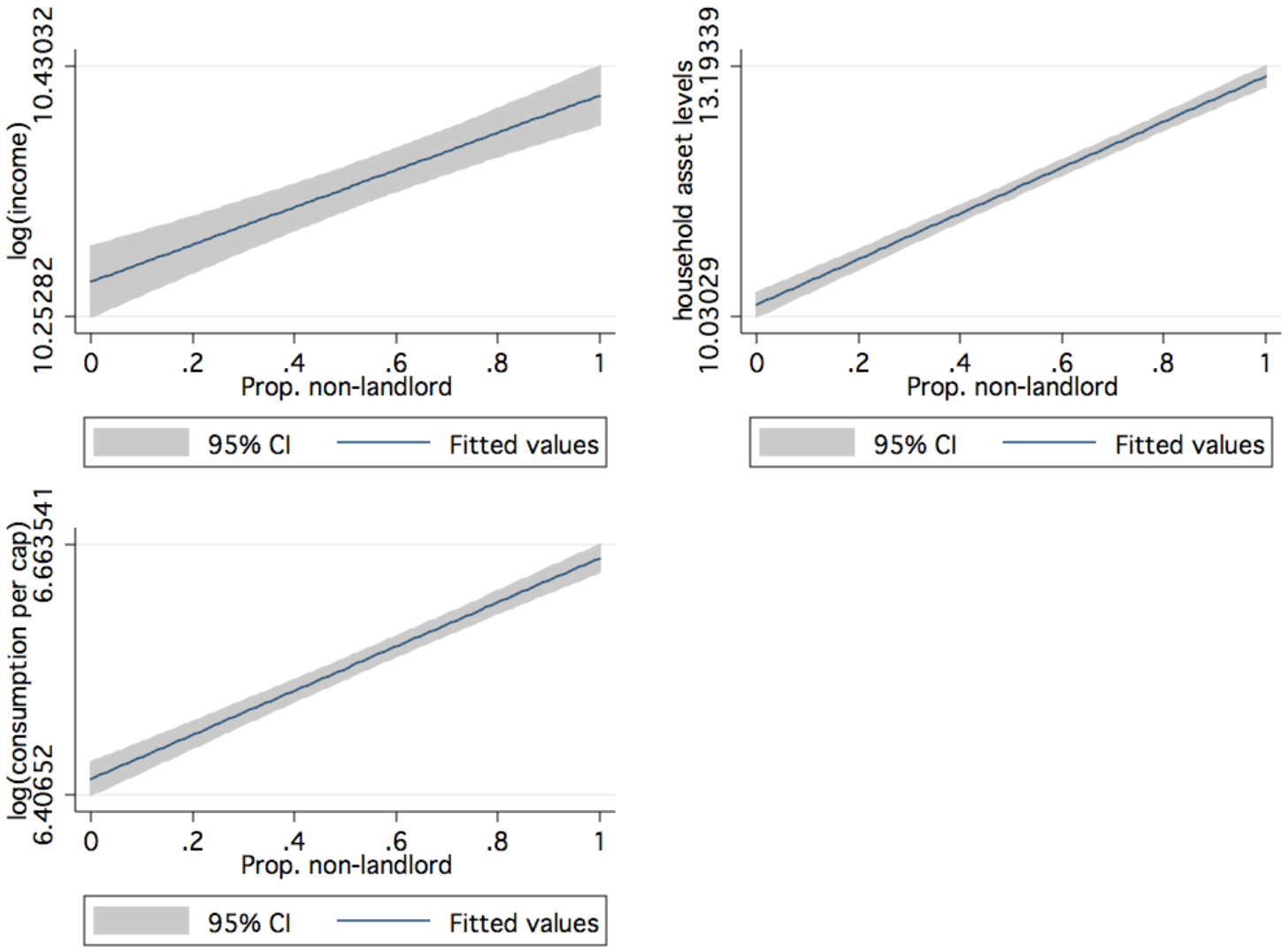
Table 1: OLS Estimates of Household Economic Outcomes

Mean non-landlord proportion = 0.5802, standard deviation = 0.4393

		Coefficient on non-landlord proportion			Coefficient on non-landlord indicator	
Dependent variable	Mean of dependent variable	OLS Full Sample (1)	OLS Restricted Sample (2)	OLS Excluding West Bengal, Orissa, and Bihar (3)	OLS Full Sample (4)	OLS Individual Cultivator Only (5)
log (household income)	10.327	0.201***	0.031	0.232***	0.186***	0.038
		(0.047)	(0.093)	(0.045)	(0.040)	(0.063)
log (household consumption per capita)	6.515	0.329***	0.198**	0.354***	0.167***	0.257***
		(0.041)	(0.067)	(0.042)	(0.037)	(0.058)
Household asset index	11.65	2.846***	4.974***	3.078***	1.733***	1.314***
		(0.308)	(0.669)	(0.304)	(0.274)	(0.362)
Number of districts		91	32	75	91	61
Number of villages (primary sampling unit)		524	171	436	525	361
Geographic controls		Yes	Yes	Yes	Yes	Yes
Base controls		Yes	Yes	Yes	Yes	Yes
Date of British revenue control		Yes	Yes	Yes	Yes	Yes
Fractionlization index		Yes	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses, corrected for village/neighborhood-level clustering. * Significant at 10-percent level; ** significant at 5-percent level; *** significant at 1-percent level. The restricted sample in column (2) only includes districts where there is variation in the non-landlord proportion (i.e. greater than 0 but less than 1). The non-landlord indicator variable equals 0 for landlord dominated districts and 1 otherwise. The individual cultivator indicator equals 1 if the district is largely individual cultivator dominated. Base controls include a gender indicator variable that equals one if the head of the household is a female, an indicator variable that equals one if the household is in an urban location, five caste fixed effects, twelve fixed effects for principal source of income for the household or the dominant occupation of the household, a native indicator variable that equals one if the household has been residing there longer than 70 years , the number of individuals within a household, and nineteen fixed effects for the highest level of education completed by an adult (defined as 21 or years older). Geographic controls include climatic, topographic, soil, and a coastal indicator variable which equals one if the district is on the coast. The date of British land revenue control is intended to capture the length of British rule in the district.

Figure 1: Relationship between current economic performance and proportion of non-landlord areas



Relationship between log of income (top-left), log of consumption per capita (bottom-left), household asset index (top-right) and the non-landlord proportion per district. Data for economic indicators are from 2005 IHDS and historic measures are from 1870s and 1880s from Banerjee and Iyer (2005).

landlord or non-landlord. We still find that consumption per capita in this sample is 22% higher, and household asset levels are 43% higher in non-landlord areas. We pursue yet a third strategy in column (3) by restricting our sample by excluding West Bengal, Bihar, and Orissa as these were the first areas to come under British revenue control and were almost entirely landlord areas. We want to be sure that this particular historic characteristic is not the larger part of our result. Banerjee and Iyer (2005) pursue a similar strategy but only exclude West Bengal and Bihar from their sample. However, the Treaty of Allahabad in 1765 states that the British East India Company was given rights to collect revenue from areas in present-day Orissa as well. We find that all three effects grow given this exclusion. Household income is 29% higher, household consumption levels are 42% higher, and household asset levels are 26% higher for non-landlord areas in this second restricted sample compared to our base estimation.

We conduct two additional robustness checks of our results by using indicator variables instead of proportional measures to account for the extent of non-landlord areas. The indicator is constructed following the method outlined in Banerjee and Iyer (2005): a district is non-landlord if it was never under a landlord system including changes in revenue system. Alternatively, districts with higher proportions of non-landlord systems converge to the value of 1. This method is coarser than our proportion method as many districts where the non-landlord indicator takes on the value of 1, in fact had had landlord-based revenue systems as well. Our results remain significant in all three measures, but their effect is much smaller. Household income is 19% higher, consumption per capita is 18% higher, and asset levels are 15% higher. In the next check, we compare between individual cultivator areas and non-individual cultivator areas. The income measure loses its significance but maintains a positive sign. The consumption per capita (29%

higher) and asset levels (11% higher) both remain highly significant and positive following this restriction.

These results are consistent with our framework. In non-landlord areas, the historic distribution of wealth is less unequal than landlord areas. We see the manifestation of this inequality in the long-term growth of those areas. Despite various restrictions on our sample, the difference between non-landlord areas and landlord areas are large and highly significant in both short-term and long-term economic wellbeing of households. Income and consumption, being short-term measures, show between 18% and 42% increase for households in districts that were historically under non-landlord systems. There is a large and significant effect on asset level accumulation as well, reflecting long-term depressed economic wellbeing, as non-landlord areas have between 11% and 43% higher amount of accumulated assets. While we do not pursue an instrumental variable (IV) specification as Banerjee and Iyer (2005), it is important to keep in mind that the OLS estimates are likely biased downwards and not upward due to omitted variables. In their IV results, they find that the IV coefficients are larger than OLS estimates, and conclude that while the IV estimates could be artificially higher, the estimates are still larger than OLS.

We estimate equation (1) for various measures of social capital and report them in table 2. Using our base specification, we find that there are significant positive effects in network position, community memberships, cooperation between *jatis*, collection action, confidence in institutions, and lack of local crime in non-landlord areas when compared to landlord areas. More specifically, households in non-landlord areas have 26% more connections with individuals in the medical, educational, and governmental institutions. They are also likely to have 40% more memberships. As discussed before, while we do not have exact measures of trust

Table 2: OLS Estimates of Social Capital

		Coefficient on non-landlord proportion
Dependent variable	Mean of dependent variable	OLS Full Sample (1)
Network position	1.13	0.299***
		(0.084)
Membership in community groups	0.56	0.222**
		(0.093)
Vote in 2004 election	0.92	0.029
		(0.024)
Lack of conflict in village	1.37	-0.032
		(0.060)
Lack of conflict between jati	1.66	0.115**
		(0.039)
Collective action	0.57	0.116**
		(0.040)
Confidence in institutions	23.3	0.755***
		(0.240)
Local crime	0.07	-0.068***
		(0.014)
Geographic controls		Yes
Base controls		Yes
Date of British revenue control		Yes
Fractionlization index		Yes

Notes: Standard errors in parentheses, corrected for village/neighborhood-level clustering. * Significant at 10-percent level; ** significant at 5-percent level; *** significant at 1-percent level. Base controls include a gender indicator variable that equals one if the head of the household is a female, an indicator variable that equals one if the household is in an urban location, five caste fixed effects, twelve fixed effects for principal source of income for the household or the dominant occupation of the household, a native indicator variable that equals one if the household has been residing there longer than 70 years , the number of individuals within a household, and nineteen fixed effects for the highest level of education completed by an adult (defined as 21 or years older). Geographic controls include climatic, topographic, soil, and a coastal indicator variable which equals one if the district is on the coast. The date of British land revenue control is intended to capture the length of British rule in the district.

for districts, using an array of proxies, we can infer that individuals in non-landlord areas likely have higher levels of trust as well. Some proof can be found in the likelihood of local crime and inter-caste conflict, confidence in institutions, and propensity towards collective action. Collective action is a channel that Banerjee and Iyer (2005) hint towards as a determinant for lower levels of public goods availability and poorer economic performance. We find that collective action is indeed significantly higher in non-landlord areas. This channel, along with membership levels, local crime and conflict, describe the environment that is likely a result of the differential environment of cooperation and political control created by the land revenue systems.

Robust historic institutions create an environment of trust and efficiency which lead to robust institutions in the future. In non-landlord districts individuals were more likely to be vigilant of the quality of local institutions and the participation of individuals was likely a necessary condition for this outcome.

5. Conclusion

This paper adds to the important work by Banerjee and Iyer (2005) and other related studies that seek to better understand the role that historic institutions play on the political structure and economic wellbeing of individuals in the long-run.

We have shown that in India, depressed levels of economic performance at the micro level and low levels of social capital can be traced back to the legacy of the colonial land tenure system. Income, consumption per capita, and asset outcomes are worse for households in districts that were historically under landlord systems. In addition, in landlord areas we observe anemic social participation and low levels of other forms of social capital, while levels of victimization and communal violence are likely to be higher.

The answer likely lies in the political environment developed as a result of class-based antagonism in landlord areas. We can infer that misaligned interests between groups exacerbated collective action problems. In non-landlord areas, the need to work collectively in representing mutual interests helped cultivate clusters of "good" institutions. An empirical examination of the channel of collective action is overdue in the literature. While isolated case studies exist at the district or state-level, there is to-date no all-India study which examines the effect of historic land tenure systems on collective action. The management of common property resources for districts is good candidate for this examination. The study would have to answer the question of how rules on the usage of common property resources like watersheds, forests, and grasslands are created and enforced. While such a study might be limited in its influence on public policy or interventions in alleviating collective action problems, it will serve to inform their source. Since states in India have undergone a wide array of land reforms in the post-independence era as outlined in Besley and Burgess (2000), future research should examine specific state policy impacts on channels of collective action, and more specifically trust.

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