

# Land Rights Without Law

*Understanding Property Rights Institutions, Growth, and Development in Rural India*

**Rachel Brule'**

## Abstract

In this paper, I explore the question of why fertile land lies fallow in order to understand a serious welfare problem: why India's rural poor practice fallowing, and also to study the question of how legal and social institutions jointly enforce property rights in the Indian countryside. I choose to study intra-regional variation, which can control for a common set of environmental, legal, and cultural conditions in order to isolate more nuanced institutional determinants of economic and political outcomes. I make two initial assumptions that I will tease out: first, I assume fallow land is not an intentional strategy, but rather is linked to disputes over the legal title to land occurring between neighbors or family members. Second, I assume social institutions exist at the local level that are used to arbitrate disputes before they reach district-level courts. I refer to caste-based panchayats, that is unelected village councils run by the village's dominant caste, as the social institutions relevant for explaining fallow land. If these assumptions are correct then the incidence of fallow land is an interesting case of failure to coordinate land titles despite significant economic incentives. My hypothesis is that the quality of legal institutions, in particular district courts, explains much of within-country variation in the percentage of a village's land that lies fallow, conditional on two linked factors: village-level social dominance operationalized through social institutions (caste panchayats). I test this hypothesis with a cross-sectional database of village-level land use, economic status, and political coordination across sixteen Indian states compiled in 2001. OLS regressions provide preliminary confirmation for my rough hypothesis but suggest the need for more careful specification of my proposed causal mechanism.

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I believe that both economists and political scientists have missed a startling trend in the Indian countryside. A significant portion of India's fertile land lies fallow for periods of at least three years, and often for ten years or more. Fallowing occurs despite high population density and poverty in the agricultural sector.<sup>1</sup> For the rural poor, fallow land indicates a serious welfare loss. Yet India's political economy problem of fallow land remains unexamined.

In this paper, I explore the question of why fertile land lies fallow. I make two initial assumptions that I will tease out: first, I assume fallow land is not an intentional strategy, but rather is linked to disputes over the legal title to land occurring between neighbors or family members. Second, I assume social institutions exist at the local level that are used to arbitrate disputes before they reach district-level courts. I refer to caste-based *panchayats*, that is unelected village councils run by the village's dominant caste, as the social institutions relevant for explaining fallow land. If these assumptions are correct then the incidence of fallow land is an interesting case of failure to coordinate land titles despite significant economic incentives.

My hypothesis is that the quality of legal institutions, in particular district courts, explains much of within-country variation in the percentage of a village's land that lies fallow, conditional on two linked factors: village-level social dominance operationalized through

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<sup>1</sup> 30.2% of rural Indians were below the national poverty line in 2003. 71% of India's population live in rural areas, and 58% of the total workforce is employed in agriculture. Agricultural growth has declined throughout the 1990s due to increasing intensity of land use, but still constitutes about 20% of national GDP. World Bank (2003, 2006).

social institutions (caste *panchayats*). I suggest that institutions deal with three categories of disputes: the first case occurs in villages with strong social dominance, such that a single caste exists which is superior to all other village castes. The dominant caste leads the caste *panchayat* that hears all disputes except disputes involving two parties from that caste.<sup>2</sup> When *two dominant caste parties* begin a dispute they quickly go to court, sometimes alongside violent escalation by one or both parties. Thus, when a single caste dominates the quality of the legal system explains fallow land amongst upper-caste parties. However the quality of the caste *panchayat* explains fallow land amongst disputes involving at least one party from the non-dominant caste.

The other two types of disputes occur absent a dominant caste. In such villages multiple castes may sit on the caste *panchayat*. Without a dominant caste, influence is derived from multiple sources: caste, wealth, and political connections.<sup>3</sup> I observe that non-influential parties, meaning parties who are neither members of the dominant caste nor possessing influence based on wealth or political connections, rarely use the courts due to the difficulty of assembling extensive resources necessary for litigation. To file a case, parties must assemble documents from land revenue officials, legal aid, coordination with government officials, and so on. Thus, when disputes occur *amongst two non-influential parties*, few parties are utilize the legal system to resolve disputes. In such disputes the quality of the caste *panchayat* as a social institution determines the majority of fallow land. In villages without a dominant caste disputes also occur *between parties of intermediate influence*. Whether these disputes reach the courts depends on the quality legal institutions, since better-quality legal

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2 Much anthropologic evidence suggests that high-caste groups dominate caste panchayats (councils) where they are able to arbitrate all disputes *except* those between upper-castes. In conducting the first Census of India in 1911, James Blunt observed that “amongst the twice-born ... generally no caste panchayat exists” but rather “diffuse authority” rules. Later anthropologists including Luis Dumont (1966) studying Kallar, Kerala, and Gough working in Tanjaore, Tamil Nadu found that high-caste groups take disputes to formal authorities such as the police or courts system rather than relying on caste panchayats. Blunt also notes that where intermediate or lower castes constitute the majority of disputes, either permanent or temporary caste panchayats meet to arbitrate disputes.

3 This assertion is based on interviews with a range of farmers, economists, and politicians in Uttar Pradesh conducted by the author during the summer of 2007.

institutions create clearer property rights and more accessible courts.

Overall, I claim that social dominance at the village level determines the relative importance of legal versus social institutions in resolving land title disputes. Although wealth- and politically-based influence may change for a range of reasons, India's caste system is rigid and influential enough in most rural regions<sup>4</sup> to allow for a discussion of caste dominance as an exogenous determinant of the relative frequency at which village use legal versus social institutions. However, when villages do not have a clear system of social dominance, there is a more complicated relationship between influence and legal institutions quality that drives the use of legal versus social institutions.

My argument is premised, first and foremost, on the assumption that we should study fallow land because it represents a political economy problem: reduced income for marginal farmers in rural India. To be sure, fallowing does not necessarily imply a welfare loss. In Ghana, recent scholarship (Goldstein and Udry 2005) finds that farmers with local political power intentionally fallow land as an investment in agricultural production. Fallowing is optimal in West Africa, given low population density, arid climate, and expensive fertilizers. However India's dense population, climatic range, and broadly accessible fertilizers create equally strong pressures for minimal to nonexistent fallowing.<sup>5</sup> Given the high human need for agricultural land in rural India, fallow land indicates local problems in harnessing productive resources. However people of different wealth have differing access to resources, suggesting that we should consider two distinct issues: land use by resource-constrained poor households and land use by resource-abundant wealthy households. Fallowing may indeed be an investment strategy amongst the wealthy, as Goldstein and Udry find. Yet amongst the

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4 Regions with large tribal populations such as the North East are an exception to this generalization.

5 Personal interviews conducted by the author with 100 farmers, land revenue administrators and high court officials during the summer of 2007 confirm that fallowing is almost never considered by agriculturalists in either North or South India. One exception to this pattern is the practice of jhum, or shifting cultivation by tribal populations in Arunachal Pradesh, Assam, Meghalaya, Manipur and Nagaland. Land use in Assam tends toward a low mean of only five percent fallow land and low variation of 10% in fallow land. See Surekha Sule (2006) "Jhum Cultivation Under Sharper Scrutiny," [www.indiatogether.org/2006/dec/agr-jhum.htm](http://www.indiatogether.org/2006/dec/agr-jhum.htm) .

poor who constitute the majority of rural India, fallowing is very likely to be a suboptimal production strategy.<sup>6</sup>

In the following paper I attempt to map the causal relationship between fallowing and political institutions at the national and local level. I will first trace the wide variation in fallow land across and within Indian states. I will then explain how fallowing is tied to local disputes over land title that cannot be adjudicated easily through social institutions, rather than an interest in replenishing soil nutrients or market failures that restrict farmers' access to credit, in order to show the formal institutional foundations of development failure.

I conclude by summarizing my results and suggesting further research into the links between social and legal institutions in explaining intra-state variation along economic outcomes. I am still searching for appropriate proxies for formal and informal institutions, so my tests of causal relationships are better seen as an initial exploration of basic correlations between rough proxies for variables of interest.

## **I. Context**

This project relies on survey data provided by the village-level schedule of the Rural Economic and Demographic Survey (REDS) conducted by India's National Council of Applied Economic Research and two American economists, Mark Rosenzweig and Andrew Foster. The survey collects cross-sectional, time series data on 253 villages in sixteen states, which are all purposively selected because they are beneficiaries of the Indian government's Integrated Rural Development Programme (IRDP). The IRDP targets the poorest villages in each state for long-term projects ranging from credit access to sanitation and public health education. As a result, these villages are not a representative sample of the Indian population, but they provide a relevant sample for tackling development issues. Incidence of fallow land in the poorest villages suggests that farmers in the lowest income tier are unable to access

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<sup>6</sup> I thank Oliver Kaplan and Rikhil Bhavani for emphasizing this distinction.

productive assets.

I analyze the most recent published REDS survey round of 1998/98, which has the most extensive set of questions on political governance and economic development. I also use qualitative surveys conducted by myself and Indian surveys that I describe in section II.

The 253 REDS villages surveyed are located in 100 districts, where the average village comprises 1791 acres (with a standard deviation of 2153), 3877 people (5510), with 26.7% of households landless (25.6%), 75% (43.5%) have a finished or pucca road, and 64% (72%) have a public secondary school. 75.5% (43.1%) of villages are governed by elected panchayats, as opposed to 65.2% (47.7%) governed by them in 1982. However only 17% of panchayat members are themselves landless, suggesting significant political inequality.<sup>7</sup>

Villages have an average of 1426 (standard deviation = 1631) hectares of agricultural land and 173 (401) hectares of fallow land. Thus, on average 12 (16.7) percent of a village's land is fallow. See Figures 2 and 3 and Table 1 for the state-level distribution of fallow land. There is high variation in the mean and standard deviation of percent fallow land across states, ranging from 22% in Punjab to 1% in neighboring Haryana. Given the particularly strong legal, economic, and climatic similarities across states such as Punjab and Haryana, these summary statistics suggest that fallow land is caused by factors other than environmental variation.

## **II. Exploring Fallow Land**

There are many variables that could plausibly cause fallow land, such as soil quality, climate, customs governing property use, precolonial governance, colonial land tenure practices, and/or a locality's contemporary cultural makeup, distribution of wealth, access to financial institutions, or legal institutions. I will first explain the rationale for my proposed hypothesis by proposing a link between disputes and fallow land, then outline the methodology by

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<sup>7</sup> Foster and Rosenzweig 2004: 45.

which I developed my hypothesis, and finally introduce the set of hypotheses I will test.

### *On Informal Dispute Resolution*

The village-level social process of dispute-resolution generally begins with both parties to the dispute speaking face-to-face in an attempt to reach a nonviolent, quick settlement. If the parties can not settle privately, one or both approaches the village elders for negotiation. In response to such requests, elders of the dominant caste or set of castes assemble as a local council or caste *panchayat* consisting of about five to ten members. Once assembled, they listen to both parties, sometimes asking for further evidence or corroboration by additional parties. Once the elders have heard what they consider to be adequate information they make their ruling. If the elders are considered non-influential and/or either party is extremely influential (measured by economic status, political connections, and by caste status) then *panchayat*-based negotiation often fails, followed by either violent expropriation or legal arbitration.

### *Categorizing Disputes*

In this section I will elaborate on the three categories of disputes I proposed in the introduction. The first category of disputes occurs in a system where a single, dominant caste exists. The caste *panchayat* is the overriding source of coordination between nearly all parties where a set of private individuals have a socially-sanctioned place at the apex of society which is accompanied by dominant, nearly exclusive access to resources. Social dominance creates a vast power differential between those at the top and everyone else. A Hindi metaphore used in Uttar Pradesh aptly describes this situation: "The man with the stick owns the buffalo."

Disputes that occur in systems of strong informal institutions do not result in fallow land as long as at least one party is not in the dominant group. In this case, disputes are solved quickly without any fallowing. The dominant party simply confiscates the weaker party's

property, sometimes with additional displays of force. Amongst two non-dominant parties, the caste *panchayat* arbitrates disputes and has the power to enforce *panchayat* dictates.

Category I disputes involving at least one non-dominant party are common in Kotana, a village of 12,000 that is Pervez Musharraf's ancestral village, located a few hundred kilometers north of Delhi. Multiple respondents told of selling or giving away their *patta* land, e.g. land that the government gives to marginal groups, due to coercion by both upper-caste and politically-connected individuals. As soon as a dominant party shows interest in a piece of property he/she frequently resorts to coercion. Coercion includes everything from threats to physical force, where multiple individuals mentioned the Pradhan's (village chief) use of a tractor to dig up lower-caste villager's land and claim it as his own. Following never occurs because the dominant party has complete control over property, such that they either cultivate or destroy the property.

In villages with clear social dominance disputes also occur between two dominant parties. Given the high level of power maintained by each party, disputes are generally resolved by the only arbiter more powerful than the individuals: the state. However violence sometimes occurs alongside the use of the formal system. Cases between the dominant group are common amongst members of the Brahmin (highest) caste in Talupur Village, about 40 km south of Delhi in Uttar Pradesh. There, when Brahmins enter into disputes “no one dares say anything” and instead submit their dispute directly to the courts.<sup>8</sup> When parties approach the court, land often lies fallow for the duration of the ten years necessary to resolve land disputes.<sup>9</sup>

Two dominant-caste parties in Hewa Village, Meerut district carried out a typical Category II dispute over land. The dispute began as a question over the boundaries of land between neighboring families. First one party, Fuul Singh, extended his boundary one to two feet into

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8 Interview by the author on 13 August, 2007.

9 Fifty surveys conducted by AMS/Lucknow and the World Bank's 2006 report confirm this figure.



his neighbor, Rajaran's land. Rajan responded by extending his property a few feet into Fuul Singh's. As the dispute continued, Rajaran's family murdered Fuul Singh's son. At that point Fuul Singh approached the police, who arrested four members of Rajaran's family. The District Court sentenced all four members to life in prison, but one family member escaped. No family member has cultivated the land since 2004, the time of the murder. Thus fallow land results from the combination of disputes between dominant castes and a laborious legal system.

The second and third types of land disputes occur between parties in villages without a socially-dominant caste. As a result, access to social resources is relatively decentralized such that no single group monopolizes power. Whereas influential people may utilize both formal and informal institutions, the majority of rural Indians are poor enough that they exclusively use informal institutions.

In the second dispute type, two non-influential parties interact. Such disputes are arbitrated by social institutions, mainly because non-influential parties lack the resources to approach the legal system, as explained in the introduction. The link between influence and choice of institutional systems may seem illogical. However a High Court Justice forcefully stated: *Nyaya bikta hai*, that is, "justice is being sold."<sup>10</sup> Although there are relatively few stories of corrupt court justices, the process of accessing legal documents and coordinating court hearings requires saavy negotiation between the litigant and multiple state officials, which often requires monetary resources and the use of influence to convince officials to be cooperative. Villagers in Ratampura, Uttar Pradesh verified the need for monetary resources to get legal documents from the local administrator. Ratampurans claim their Land Revenue Official belongs to *the party of paise*, e.g. at best he follows those who bribe him.<sup>11</sup> I assume that all non-influential individuals are deterred from using the legal system because excessive resources are required for legal access regardless of institutional quality.

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10 Personal correspondence on 24 July, 2007.

11 Interviews with more than ten villagers and the Land Revenue Administrator confirm this.

In the third dispute type, parties of *intermediate influence* interact in villages without a dominant caste. In such cases, parties draw from multiple sources of influence: caste, wealth, and political connections. As a result of their ability to access resources from multiple bases of social power, parties may approach both social and legal institutions for dispute resolution. In these cases, the quality of legal institutions determines how frequently parties bring disputes to court. Thus, fallow land is determined by the quality of legal institutions and the level of social competition amongst parties resulting from the available sources of social influence when parties of intermediate influence interact. In Ratampura, disputes between low-caste individuals and those with political connections are common. The stronger party often takes the case to court, expecting that they can use their resources to prevail legally. However the Kashyaps (an Other Backward Caste or OBC) began a self help group called *Amar Jyothi* not only to provide members with credit but also with dispute-resolution services. As a result, OBCs are able to access resources through multiple avenues, which may or may not require use of the formal legal system. Thus the quality of both legal and social institutions should determine levels of fallow land, conditional on social sources of dominance. This third type of interaction is obviously more complex and requires further specification of a clear causal mechanism.

Overall, my hypothesis is that disputes between (1) dominant parties in systems of social dominance, and (2) parties of intermediate influence in systems without caste-based social dominance, conditional on a minimal level of legal functionality should always lead to more fallow land than (3) disputes between non-influential parties in systems without social dominance. This is because legal institutions take on average ten years to resolve a land dispute, whereas social institutions resolve disputes in a matter of days, or at most weeks.<sup>12</sup>

To generalize, disputes occurring in areas with higher percentages of influential villagers should result in lower levels of fallow land as the quality of both legal and social (caste

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<sup>12</sup> Evidence taken from 50 surveys of land disputes conducted by AMS/Lucknow throughout Western Uttar Pradesh, 2007.

panchayat) institutions improves. However, as the percentage of influential persons drops, social institutions should be the most significant predictor of fallow land. This follows from my assumption that powerful parties are much more likely to use the formal system for dispute arbitration than are disputes exclusively between weak or noninfluential parties.

### *On Hypothesis Formulation*

In order to avoid selection bias I began by conducting broad surveys about the causes of fallow land, asking individuals across regions (north and south India), classes, castes, and occupations.<sup>13</sup> Surveys began with two general questions: (1) where and when the respondent observed fallow land, and (2) why they observe fallow land in those cases, and why not in other cases. These informal surveys led me to form three hypotheses. Hypothesis one: fallow land is generally caused by ongoing disputes between neighbors and family members, which may or may not be taken to court. Hypothesis two: fallow land is sometimes linked to barren and/or poorly irrigated land, particularly when cultivators are too poor to irrigate their land. Hypothesis three: fallow land is also common where land prices are high, such as in high-tech development corridors across south India. However such land is converted from agricultural into commercial land as quickly as possible. As a result, I have good reason to believe that commercially-viable land outside metropolitan areas is rarely classified as fallow agricultural land for any significant length of time.<sup>14</sup>

In my second round of surveys I targeted villages and individual cultivators with fallow land *either* in the past or at present, to avoid the bias of considering only cases of persistent fallow land. In total, I rely on 107 qualitative surveys. These surveys include fifty surveys of fallow land and disputes I carried out in Uttar Pradesh across a range of environmental and political

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13 Initial informal surveys comprised approximately twenty academics, journalists, and farmers in South India (Tamil Nadu and Karnataka), a few academics in the east (West Bengal), and about thirty farmers, journalists, local and national politicians, and survey groups in North India (Uttar Pradesh and Haryana).

14 Interviews by the author with journalists in Bangalore and Chennai in July 2007 alongside articles including Praful Bidwai's (2006) "The Great Land Grab," *Frontline* Vol. 23(18); Mundha Khera's (2007) "'Great Land Grab' Sidelines India's Farming Industry," *Taipei Times* of 29 July 2007; and Imran Ahmed Siddiqui's (2008) "Land Grab in Nandigram's Name, Law be Damned," *The Telegraph* on 2 April, 2008 confirm this hypothesis.

conditions.

According to the fifty surveys I conducted in Uttar Pradesh, disputes led to 33 out of 42 cases of fallow land. The government initiated 13 of these disputes, whereas private parties initiated 20 disputes. Less frequent sources of disputes include poor soil or changes in river courses (8) and attempts to shift from farming to other types of land development (1). Fallow land preceded only two of 33 disputes. In 31 cases fallow land occurred *directly following* the beginning of a dispute, where 7 of these disputes resulted from government-initiated land redistribution. This evidence supports my hypothesis that fallow land results from disputes, rather than the reverse causal claim.

Out of 29 cases where both parties' caste is known, four out of nine disputes between upper castes went to court. In contrast, none of the four disputes between lower castes went to court. Out of the 18 inter-caste disputes, nine were brought to court. This evidence supports my claim that upper-caste disputes are much more likely to reach court than lower-caste disputes. However without knowing a great deal more detail about the inter-caste disputes it is difficult to test my claim that access to social resources determines when a particular party brings an inter-caste dispute to court.

The Lucknow-based AMS survey group contacted an additional fifty claimants in twenty-five land rights disputes occurring in REDS villages in Uttar Pradesh. We found that 21 out of 25 land disputes led to fallow land throughout the period of dispute. The surveys also reveal that land was cultivated prior to nearly 90% (22) of the disputes that led to fallow land.

### *A Caveat*

Although title disputes do not always result in fallow land, nearly all fallow land is associated with ongoing disputes over land title. At the minimum, fallow land is positively correlated with disputes over land titles. If these total of 107 surveys in Uttar Pradesh, Haryana, Karnataka, and Tamil Nadu are representative, land disputes lead to fallow land rather than

the reverse. However it's possible that I have only captured a subset of all cases of fallowing, which are the cases caused by disputes. If this is true, I may have omitted a causal variable from my analysis that drives both disputes and fallow land more generally.

Ideally, I would resolve the question of omitted variable bias by reviewing a large set of land use data where I can not only isolate cases of fallow land that are and aren't linked to disputes, but also study cases of disputes that are and aren't linked to fallow land. If I could distinguish the pattern of disputes that lead to fallow land I could pin down the distinctive elements of such disputes (and their context). If I were to find that a significant portion of fallow land is unrelated to disputes, I would look for more appropriate patterns that explain fallowing.

As it stands, I can only tease out the connections between fallow land and disputes through the qualitative surveys I conducted. The open-ended nature of these surveys, which asked both about fallow land and disputes amongst respondents with and without fallow land allows for some assurance that I have avoided a biased sample. However the small sample leaves room for uncertainty about the causal relationship between disputes and fallow land.

Additionally, REDS quantitative surveys of 253 villages allow me to analyze land use patterns across India. However these surveys do not include questions about disputes, so I can only test the causal connection between disputes and fallow land through qualitative surveys. In the future, I will be able to test the hypothesis that disputes cause fallowing through the 2006/2007 REDS survey, which includes questions about village-level disputes over land title.

### *On Disputes' Significance*

How frequent are land disputes? Reported evidence seems too overwhelming to be entirely true. According to the World Bank, "ninety percent of land parcels are subject to reported disputes over ownership, which take decades to resolve in court." (2006: 154) Recent news reports suggest that half of existing court cases involve land disputes (Times of India, 8 June

2007) However, the World Bank has a plausible reason to explain disputes' frequency: formal institutions are uncoordinated - existing land records (*khazra*) are kept with the Revenue Department, while land deed registration (*khetauni*) occurs with the Department of Stamp Duties. These departments' databases are not linked, so land registration isn't necessarily consistent with land records. Bureaucratic coordination becomes meaningless because land can be registered without proof of ownership, and the government takes no responsibility for contradictory land records. (World Bank 2006:134)

Given the widespread inability of many officials to enforce formal land titling, transfers, and even inheritance rights, the legal system's ability to enforce property rights is variable at best. So who arbitrates disputes absent leadership by the state bureaucracy? In the 1998/99 round of REDS, elected panchayats and traditional panchayats are equally frequent sources of village-level dispute arbitration.

I argue that we must examine social dominance in a given area before we can predict the frequency at which people use legal and social institutions. Social institutions do not simply fill the place of legal institutions in dispute arbitration, such that social institutions impose solutions when formal institutions ineffective. Instead, I suggest that when villages have a clear system of social dominance, e.g. when a single high caste dominates and thus runs the caste *panchayat*, then legal institutions are used more frequently as the dominant caste becomes a larger portion of the village, making legal institutions increasingly relevant for explaining fallow land. When there is no system of social dominance, use of legal institutions is a function of the percentage of villagers who can access a source of social influence as well as the quality of legal and social institutions. Thus I will try to pinpoint indicators of social dominance, legal institutions' quality, and social institutions' quality at the local level. Given the literature's lack of consensus on identifying and measuring the role of either legal or social institutions, which are often referred to as informal institutions, I use rough proxies provided by the REDS 1998/1999 village-level survey of land use, public goods allocation, and

indicators of state-level legal quality provided by Bibek Debroy of the Delhi-based National Council of Applied Economic Research to analyze institutions' role in explaining fallow land.

## II. Literature Review

One consensus amongst theorists of institutions is the notion that both legal and social institutions require enforcement mechanisms to function. Whereas legal institutions rely on formal contracts with specified roles for third-party enforcement, social institutions rely on norms or social codes with voluntary or 'altruistic' third-party enforcement.<sup>15</sup> Studies of individual behavior capture the widespread use of altruistic enforcement and the strong effects of formal enforcement mechanisms on the volume of cooperation amongst individuals and its efficiency.

The question becomes when and why we see particular blend of formal and informal cooperation. Sugden suggests that "spontaneous order" or organization of informal institutions occurs around simple decision rules - what Schelling calls focal solutions. In their Framework for Recorded Human History (forthcoming), North, Wallace, and Weingast suggest that *open access* to impersonal contracts, e.g. broad use of formal institutions throughout complex organization, occurs only after a set of doorstep conditions are met for a society's governing elite: rule of law, perpetual forms of organization, and political control of the military. Yet how does a particular mixture of formal and informal institutional coordination occur? North, Wallace, and Weingast argue that there is an incremental transition, which is neither uni-directional nor linear, from a closed access order governed by informal elite organizations into an open access order governed by contractual, competitive organizations.

Models of the transition from informal to formal organization have been well-developed as a

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15 Greif 2005, Bendor and Swistak 1997, 2001.

means to explain contemporary economic development. North and Weingast's (1989) model of the British Crown's incorporation of lenders into the state is the seminal work on development of formal institutions. They suggest formal, legal institutions solve the elite's problem of credibly committing to restrain their power through informal social contracts. Additionally, Greif provides a detailed historical analysis of formal institutions' ability to promote successful trade networks in medieval times, relative to informal kinship institutions. Bates (2001) applies a similar argument to a broader geographic and temporal analysis.

Yet legal institutions are never the exclusive arbiter of contracts – social institutions are a significant component of well-functioning organizational systems. Kreps (1990) argues that corporate culture is invaluable means of separating the successful firms from the failures. Ellickson (1997) shows that ranchers in northern California develop informal institutions that are far more efficient than the formal rules they supercede.

Thus, distinguishing the role of legal and social institutions in political and economic systems is not simply a process of separating efficient (or wealthy or developed) systems from their less-evolved kin. Instead, legal and social rules and enforcement mechanisms are interdependent. This makes the process of identifying the cause(s) of variation in systems' effectiveness much more complex than prior theory implies. Recent work by North et al. (forthcoming) suggests that political and economic institutions exist establish a “double balance”, such that systems can be both competitive and efficient in either the closed access order ruled by informal institutions or the open access order ruled by formal institutions. Yet the analytical frame of closed access orders versus open access orders vastly simplifies the interaction of formal and informal institutions across both systems.

Currently, theory and formal models guide analysis of legal and social institutions in terms of which institutional system dominates transactions, yet we are still unable to test either the



extent or interaction of formal and informal institutions' role in systems of varied economic and political effectiveness.

I study the problem of fallow land to clarify how legal and social institutions jointly enforce property rights in India. I choose to study intra-regional variation, which can control for a common set of environmental, legal, and cultural conditions in order to isolate more nuanced institutional determinants of economic and political outcomes. This research leads to me to confront two major challenges: first, identifying successful property rights enforcement mechanisms as well as the unsuccessful enforcement dilemmas that I posit lead to fallow land. Second, this work is only a preliminary step to explaining the causal mechanisms that lead to fallowing across India.

### **III. Alternative Explanations**

Why should fallow land indicate unresolved disputes resulting from institutional failure? One alternative explanation is purely environmental: if land quality is correlated with land use, fallow land may be the direct result of soil type, rainfall, and/or climate. For example, poor soil may be inefficient to cultivate because it requires expensive inputs such as fertilizer, and/or irrigation. I test this hypothesis firstly using qualitative surveys about the causes of fallow land, where nearly all respondents claim that fallow land results from unresolved disputes over land titles. The few exceptions are fallow land due to poor soil (10 out of 67 including 25 AMS surveys) and due to plans for alternate development (2 of 67). Secondly, I test the environmental hypothesis through regression analysis of quantitative surveys of 253 villages across sixteen Indian states.

Assuming that environmental factors can't explain the majority of variation in fallow land, several types of institutions may lead to coordination failures. Either imperfect credit markets, costly or nonfunctioning legal institutions, and/or ineffective informal institutions

used to arbitrate village-level disputes could cause fallow land. I will elaborate on each of these alternative hypotheses and test them through regression analysis. The empirics suggest there is significant variation *within* legal systems that predicts variation in fallowing beyond the variation predicted by legal and financial institutions. I suggest one causal mechanism that might explain variation of fallowing: in systems with caste-based social dominance, a greater percentage of dominant-caste individuals in the village population should be correlated with frequent use of legal institutions. Thus legal institutional quality should better-predict levels of fallow land as the dominant caste represents a larger portion of the population. However in systems without social dominance, the greater the sources of local influence, the more important legal institutional quality should be relative to social institutions in predicting fallow land.

#### **IV. Data**

In addition to using REDS survey data I conducted 107 interviews of cultivators, land revenue officials, barristers, judges, and a handful of Indian researchers, land rights activists, and journalists on patterns of fallow land in rural Uttar Pradesh, Haryana, and Karnataka states. With the help of the Lucknow-based AMS survey company I also conducted fifty surveys with parties to 25 land disputes in Uttar Pradesh during the summer of 2007.

My strategy is the following: for each of 253 REDS villages located in the sixteen Indian states,<sup>16</sup> I create a rough measure of the percentage of each village's agricultural land that lies fallow. Area of fallow land is recorded in *khetauni* registers kept by the village-level land revenue official (*Pattwari*). I measure the amount of agricultural land that lies fallow for more than a year. I calculate the area of agricultural land as a village's total area excluding forest land, which cannot legally be cultivated, inhabited land, and "tree area," which mainly includes trees used as land boundaries. I use percentage fallow land as a proxy for household

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<sup>16</sup> States include: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.

disputes over land title, which was the main stated reason for fallow land in 55 out of 67 surveys I conducted in Uttar Pradesh and Haryana during the summer of 2007.

I regress four sets of independent variables on my logged measure of percent fallow land to test competing hypotheses about what predicts fallow land. I will provide the results of initial regressions across all sixteen states with a careful review of the findings. In the appendix I also include regressions of sets of four neighboring states in the North and South that experience a range in fallow land. These regressions would ideally capture region-specific variation in socio-economic structures. However they have too few observations to provide conclusive results. The first set of restricted regressions cover Haryana (1% fallow land), Uttar Pradesh (9%), Punjab (36%), and Rajasthan (18%). The second set of restricted regressions cover Karnataka (9%), Kerala (12%), Tamil Nadu (8%), and Andhra Pradesh (6%).

### ***Hypothesis 1: Environmental Variation***

If fallow land is caused by environmental factors, the set of environmental controls should be significant predictors of fallow land. I suggest two rough measures of environmental variation: (1) land quality, measured as the “agricultural suitability” of the land by Ramankutty et al. (2002). They assemble worldwide data in grid format where each .5 degree latitude by .5 degree longitude of the earth's surface is given a value between 0 and 1. This value represents the probability that a given grid cell may be cultivated. Probability is calculated based on climate indices and soil characteristics,<sup>17</sup> as shown in Figure 1; and (2) exogenous production shock, recorded as a dummy variable indicating whether the harvest yield was worse than average.

Column 1, labeled “Environment” in the regression (Figure 3) finds that an area's suitability for cultivation (“land quality”) is a significant negative predictor of (logged) percent fallow

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17 Data set is published by the Atlas of the Biosphere accessible at:

<http://www.sage.wisc.edu/atlas/data.php?incdataset=Suitability%20for%20Agriculture>. I use this data for the second set of four states, whereas the first set of regressions instead use the ratio of the price of irrigated to unirrigated land.

agricultural land. The more suitable land is for cultivation, the less fallow land exists. As annual yields decrease below average, ("bad yield") there is no significant difference in the amount of land that lies fallow. This is probably because I only calculate fallow land as agricultural land that has not been cultivated for more than a year. Farmers generally leave land fallow for at most a few months, unless a disaster is so severe that a household has zero ability to cultivate throughout a given year. Although the "environment" regression supports the hypothesis that environmental conditions predict fallow land, it is only able to explain two percent of variation in fallow agricultural land.

I conclude that environmental factors cannot explain the majority of fallow land in rural India. This may be due to pressure on farmers to cultivate even the least fertile soil due to widespread rural poverty and high population density. Alternately, the combination of Green Revolution production technology and government-subsidized irrigation may allow farmers to overcome most environmental constraints. Either way, we must look to other variables to predict variation in fallow land.

### ***Hypothesis 2: Financial Institutions***

Imperfect market institutions could predict fallow land. One type of market imperfection may relate to credit markets. If a village has limited access to credit, farmers may be unable to buy inputs necessary for production.<sup>18</sup> When credit markets are incomplete or nonexistent people may compensate by relying on savings to finance investment and buy insurance to minimize their vulnerability to risk. Yet in rural agriculture, risk is high and income is often too low to allow significant savings. As a result, farmers change their use of land, labor, and capital assets to minimize exposure to risk, which could include under-cultivating land. (Deaton 1992, Rosenzweig and Wolpin 1993, Ray 1998, Udry 1995)

Additional market imperfections could be due to the spatial dispersion of individuals in rural

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<sup>18</sup> Rural access to credit ranges from 40%-100% across states. (World Bank 2006)

India, which leads to imperfect information in remote locations. Land rights policies and transactions are often negotiated in administrative district headquarters or talluk centers, whereas affected villages may be located hundreds of miles away from the administrative headquarters. Such distance prevents individuals from accessing up-to-date news about the security of their land title and/or the effective market price for their land. Without access to appropriate information, some cultivators may choose suboptimal production strategies while other cultivators may see high variation in prices across distinct markets as an opportunity for arbitrage. Fallow land could either result from suboptimal or strategic behavior in cases where price information is limited.

I use distance from the nearest bank as a rough proxy for a range of failures in financial markets. This measure of access to financial institutions is only a proximate cause of variation. Identifying the underlying determinants of varying financial institutions requires far more analysis than the simple proxy I test here. (Haber and Menaldo forthcoming)

Logged distance from a bank does not predict a significant portion of variation in fallow land. Adding this measure does not significantly change the regression's ability to predict fallow land, suggesting that I have either a poor measure of constraints to financial access or, if it is an appropriate measure, that changes in financial access have no direct impact on fallowing strategies.

### ***Hypothesis 3: Formal (Legal) Institutions***

Legal institutions codify property rights, e.g. title to land and the processes for temporary or permanent transfer of title. Institutions specify mechanisms for enforcement of these rights. As North (1981) and many others before him (Coase 1960) explain, a stable, predictable framework for enforcing property rights is necessary for long-term growth and development. Absent effective property rights institutions, individuals have multiple reasons to forego productive investment. For example, individuals may fear that others will expropriate their

property or their returns to production, or simply that the costs of protecting future wealth outweigh the gains in increased wealth. Grief (2005) suggests that long-distance medieval trade increased only after the creation of formal property rights. Bates (2001) presents rough historical patterns where growth follows the growth of state-enforced property rights. North, Wallace and Weingast (forthcoming) argue that the move to formal systems with competitive access to property marks a major stage in development. If these theories hold, better-developed property rights, with better-functioning enforcement mechanisms should be correlated with higher production and lower fallow land.

I hypothesize that the quality of formal institutions predicts fallow land increasingly well as members of the single socially dominant caste become a larger percentage of the population, or absent social dominance, as a larger portion of the population can access sources of social influence. As either type of social power becomes less prevalent, the quality of informal institutions should better-predict fallow land.

My primary measure of legal institutions is based on 1999 state-level data on the total number of cases pending in district and subordinate courts gathered by Bibek Debroy and colleagues at the National Council of Applied Economic Research. I construct a measure of each state's legal institutions as the ratio of pending cases to processed cases. Figure 2 shows the range of disputes pending and processed cases across the sixteen Indian states I study. The ratio of disputes completed to pending ranges from .54 in Tamil Nadu, indicating a highly-effective legal system with relatively quick processing time, to 3.4 in Bihar, known to possess one of the most moribund legal systems in the country. In regressions I apply state-level fixed effects using the state-specific indicator of legal effectiveness, labeled with each state's name. I predict that more effective legal systems should be correlated with relatively less fallow land, e.g. there should be a positive correlation between more pending: resolved disputes and fallow land. In Figure 2's "legal institutions" regression I find a positive, significant correlation between state-level legal institutions and fallow land in seven states spanning

north and south India: Himachal Pradesh, Kerala, Maharashtra, Orissa, Punjab, Uttar Pradesh, and Assam. This is as I predict. One out of 16 states, Karnataka, has a negative correlation between legal institutions and fallow land that I cannot explain.

I employ three related measures of public goods distribution at the local level. It is my hope that these measures can provide a more precise test of local legal institutions' quality, if better state provision of services occurs across the provision of multiple public goods. My measures of public goods include: (1) a dummy variable noting if a village is a district headquarters. This variable could be associated with two things: (i) Higher-quality formal institutions, since judicial and administrative infrastructure is well-developed in district centers thanks to the location of district magistrates (who rule on civil cases including land disputes) and zilla panchayats (who have administrative authority over 29 funding areas including agriculture, irrigation, and maintenance of community assets<sup>19</sup>), and (ii) more formal litigation, since district courts are located at district headquarters; (2) the percentage of a village's households that have domestic access to electricity. We can assume that if the government is able and willing to provide basic public goods such as electricity it is more likely that the government will provide other public goods including law enforcement; (3) district-level fixed effects. The final indicator is not included in my figures because the regression includes far too many independent variables to predict any significant variation.

State-level legal indicators explain 25 percent of variation in fallow land across 16 states. In general, states with better administration have significantly less fallow land than the intercept (Andhra Pradesh) such as Hyaryana, Karnataka, and Tamil Nadu. Neither distance from district headquarters nor the percentage of households with electricity predict significant variation in fallow land. The ability of formal institutional quality to predict fallow land may simply drown out any minor differences in fallow land predicted by variation in the provision of unrelated public goods such as infrastructure.

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19 The Hunger Project, Chattopadhyay and Duflo 2004, Duflo and Topalova 2004.

In examining the descriptive statistics available in figures 1 and 2 it's clear that states notorious for their poor formal institutions have significantly more fallow land, including Bihar, Madhya Pradesh, and Uttar Pradesh. However it's striking that well-administered states such as Punjab also have significant amounts of fallow land whereas poorly administered states such as Assam have little fallow land.

#### ***Hypothesis 4: Informal Institutions***

If my hypothesis on the varying importance of legal and social institutions is correct, then the first question to ask is not about the quality of a given state's legal institutions. Conditional on the existence of social dominance, the percentage of socially dominant individuals should have a primary role in determining how many members of a given village approach legal versus social institutions. Conditional on significant percentages of either socially dominant or socially influential individuals (the later relevant in systems without social dominance), better-administered formal institutions should lead to less fallow land than poorly-administered systems. As villages have smaller percentages of socially dominant or socially influential individuals, then the quality of informal institutions should be an increasingly significant predictor of the speed of dispute resolution, and hence of fallow land.

Due to my conditional hypothesis about the role of legal institutions, it makes sense to test the importance of additional measures of legal institutions *conditional on a given level of social dominance*. I thus test the effect of social institutions conditional on three types of social dominance. I also consider the predictive power of state-level legal institutions' quality once I control for variation in social dominance. These regressions are extremely preliminary. While binary measures of caste-based social dominance would be much easier to interpret, I currently measure each type of dominance on a scale between 0 and 100 percent. This allows me to study the effect of social institutions conditional on a given percentage of dominant or



influential individuals. Unfortunately I'm unable to parse out what I hypothesize to be an important distinction: interactions between parties of the same or differing levels of influence. I hope to investigate the variation in fallow land dependent on type of dispute once I can access the next round of the REDS survey, which includes detailed data on disputes.

I suggest three hypotheses about the effects of social dominance: first, villages with more heterogeneous ethnic communities will have less socially-dominant individuals, and thus be more reliant on social, caste *panchayat* institutions. Thus, the greater the amount of caste-based fractionalization, the more important social institutions should be in predicting fallow land. Additionally, the notion that heterogeneous communities are less able to coordinate dates back to Mancur Olson's theory of collective action. This theory has been further bolstered by work on public goods by Alesina, Baqir and Easterly (1999), Bardhan and Mookherjee (2000), and Habyarimana, Humphreys, Posner, and Weinstein (2006). If this is true, social institutions should be increasingly necessary to coordinate disputes resolution as caste fractionalization rises.

I test this hypothesis with a measure of caste-based fractionalization and a separate measure of religiously-based fractionalization. I construct a Herfindhal index of fractionalization by calculating the sum of the squared fraction of the population each relevant group constitutes. In Figure 4's "social composition" regression I find no significant impact of religious fractionalisation. However caste fractionalization is a significant, positive predictor of fallow land. This finding confirms Olson and his colleague's hypothesis on heterogeneity.

One potential measure of social institutions' quality is the existence of a communal hall. A community hall provides a location where community elders can gather to arbitrate village-level disputes in such halls. The strategy of using community hall's existence to proxy for strength of social institutions emerges from Lily Tsai's (2002) work on development in rural China. Tsai suggests that villages with a communal hall have strong informal institutions,

because the community hall provides an opportunity for village-level meetings where the community enforces norms. Meetings provide a forum for distributing blame to individuals who violate local norms and praise for those who voluntarily enforce them. I suggest that Tsai's hypothesis can travel to India, where villages have (at most) one community hall for panchayat meetings.

Although caste elders could still arbitrate disputes absent a community hall, the presence of a hall could make social arbitration (1) more accessible, such that interested parties can simply show up at the hall when other disputes are being resolved, (2) more predictable by guaranteeing a consistent location for arbitration, and/or (3) more legitimate, by conducting arbitration within a setting used exclusively for "civic" or public purposes.

I hypothesize that community halls can make resolution faster conditional on social dominance. I first test this hypothesis by studying the effect of community halls conditional on a given level of caste fractionalization. In Figure 4's "social composition" regression I find a negative, nearly statistically significant effect of the community hall – caste fractionalization interaction term. This provides preliminary confirmation of my hypothesis that with decreasing levels of social dominance, e.g. increasing caste fractionalization, quality of informal institutions should predict levels of fallow land. The state-level indicators of legal institutional quality are still significant for six states, suggesting that variation in both legal and social institutional quality are important predictors of fallow land.

Another implication of a link between greater social dominance and more frequent use of legal institutions is that villages with larger numbers of wealthy farmers should be more likely to leave land fallow. I attempt to measure average village-level wealth based on the average number of high-yield variety (HYV) seeds used in a village. This follows from the assumption that wealthier villages will purchase the highest-performing seeds possible. If this measure captures wealth, then villages with a higher number of HYV seeds should also have

more fallow land given that their economic power leads them to opt out of informal institutions. In the “social composition” regression there is a positive but insignificant correlation between use of HYV seeds and fallow land. This finding does confirm my hypothesis that intentional decisions to let land lie fallow, here because of incentives linked to wealth *do not* predict a significant portion of the variation in fallow land.

Second, I suggest two alternative measures of social dominance: percentage of upper caste members of the village population, and social inequality. I operationalize social inequality as the ratio of the percentage of upper caste panchayat members : percentage of upper caste members in the general population. I would predict that decreases in either percentage upper castes or social inequality would lead to weight on informal institutional quality as a predictor of fallow land. However neither indicator of social dominance is significant according to Figure 4's “percent upper caste” and “social inequality” regressions. This may be either because I am unable to construct a definitive measure of a single caste's social dominance and instead rely on a measure of percentage of generalized upper-caste presence. Without a better measure of social dominance my hypothesis testing is limited at best.

Overall, I find two indicators of institutions' significant ability to predict variation in fallow land. Regressions in Figures 3 and 4 confirm the hypothesis that state-level indicators of district court's legal ineffectiveness are positively correlated with fallow land. Secondly, I find weak confirmation for the notion that more caste fractionalization leads to more reliance on social institutions, such that *better-quality caste panchayats with access to a community hall* are a significant, negative predictor of fallow land.

This suggests is weak initial confirmation for my hypothesis that levels of social dominance and influence predict the frequency with which disputants approach legal versus social institutions, but this hypothesis requires further testing before I can draw firm conclusions.

## **VII. Conclusion**

I have provided evidence that we must look to the *interaction* between social dominance and use of legal and social institutions to understand a pressing economic problem: the fallowing of fertile agricultural land. Environmental indicators such as land quality explain only a small portion of variation in villages' percentage of fallow agricultural land. Differential access to financial institutions is an insignificant predictor of fallow land. However the role of legal institutions and caste panchayats explain between 25 and 43 percent of variation in the logged percentage of a village's agricultural land that lies fallow. I find partial confirmation of my hypothesis that the combination of social dominance, e.g. the existence of a single, dominant caste, and social influence, composed of access to high caste, wealth, and political connections, predicts the frequency of legal institution's use. Quality of social institutions becomes an increasingly significant predictor of effective, although not egalitarian, coordination as caste dominance becomes less possible, that as caste fractionalization increases. Thus quality of legal and informal institutions predicts fallow land *conditional on a village-level social dominance*.

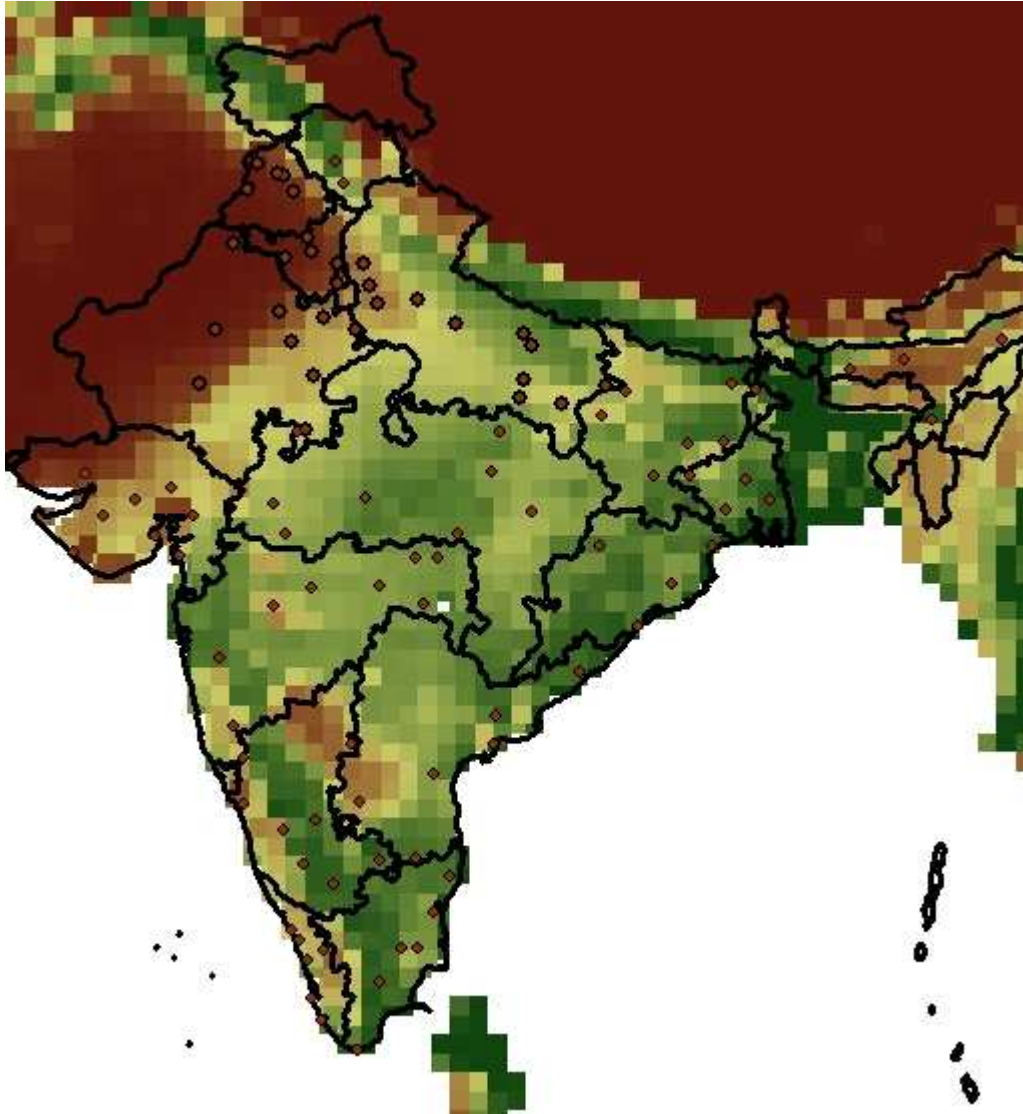
These partial explanations of social institutions' role resolving disputes over land title that lead to fallow agricultural land are not completely satisfying. Yet this uncertainty emphasizes the importance of future research into the process of informal institutional creation, coordination, and influence over economic and political outcomes. Studying how, when, and why younger social institutions such as communal halls are formed and what role they serve can provide additional leverage in understanding the role of many sorts of informal institutions in property rights coordination.

Delving more deeply into the process of local conflict and cooperation around scarce land resources can provide insight into the causes of an extremely problematic economic outcome: fallow agricultural land. I believe that answering the question of why fallow land exists can help scholars and policymakers identify the progressive and regressive role of informal institutions. Searching for answers will bring us one step closer to fostering growth and

development in rural India as well as in the wide range of other countries where both social and legal institutes are important sources of economic, political, and social coordination.

**Figure 1: Suitability of Land for Agricultural Cultivation**

*ArcGIS district-level analysis, India*



**Value range:** 0 - .99 where 0 represents land unsuitable for cultivation (dark brown), and .99 represents highly fertile agricultural land (dark green).

**Districts:** each red dot represents a district in the data set. In total, the 253 villages studied comprise 110 districts, where about 100 have easily-accessed geographic coordinates.

Figure 1. Variation in Fallow Land by State

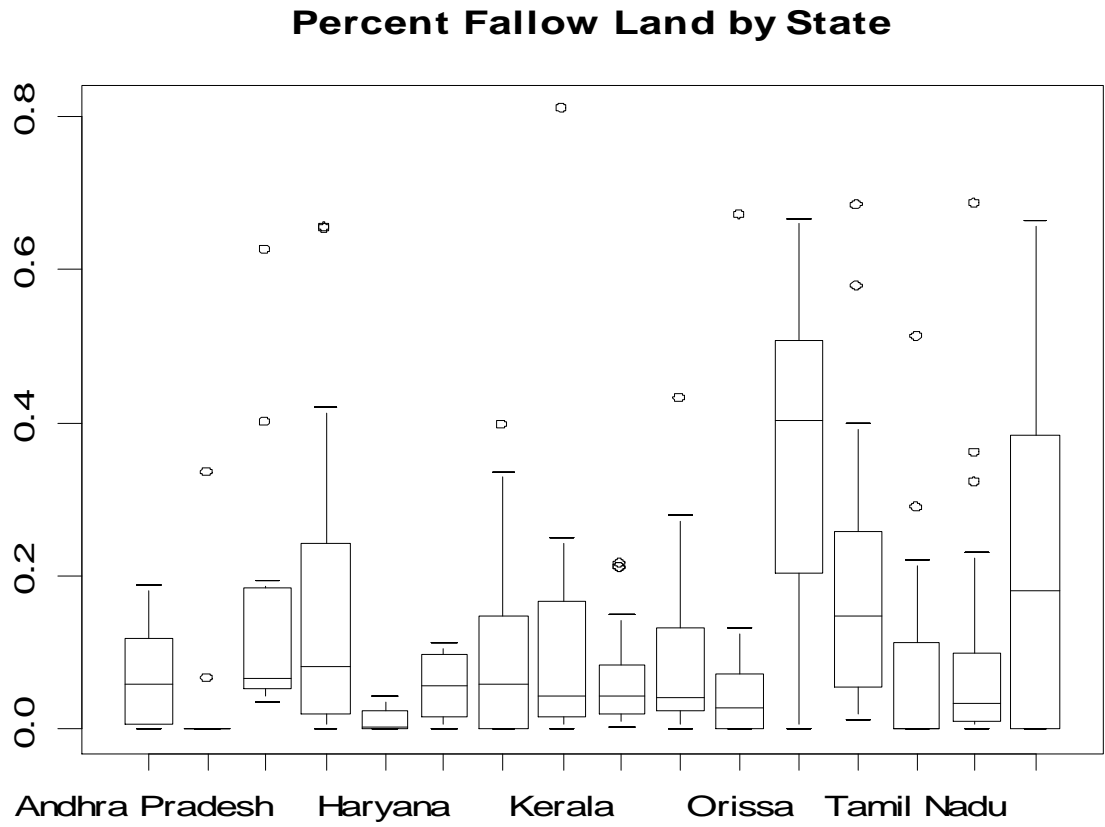


Table 1: Mean State-level % Fallow Land

<u>Mean % Fallow Agricultural Land by State</u>		<u>Standard Deviation in % Fallow</u>	
Andhra Pradesh	0.06405103	Andhra Pradesh	0.05974839
Assam	0.03613840	Assam	0.10030418
Bihar	0.16572087	Bihar	0.18678811
Gujarat	0.16990259	Gujarat	0.20624023
Haryana	0.01280535	Haryana	0.01653455
Himachal Pradesh	0.05573091	Himachal Pradesh	0.04995360
Karnataka	0.09710540	Karnataka	0.12302981
Kerala	0.12132390	Kerala	0.21172549
Madhya Pradesh	0.06445611	Madhya Pradesh	0.06577347
Maharashtra	0.10396012	Maharashtra	0.12564537
Orissa	0.09182636	Orissa	0.19647313
Punjab	0.36405557	Punjab	0.22244626
Rajasthan	0.18337520	Rajasthan	0.17416189
Tamil Nadu	0.08822767	Tamil Nadu	0.13865808
Uttar Pradesh	0.09253046	Uttar Pradesh	0.14808854
West Bengal	0.21026396	West Bengal	0.21981847

**Figure 2. Descriptive Statistics by State**

**Legal Institutions by state: number of cases complete, pending, and by state population**

state	complete	pending	case ratio	cases/person	%upper	wealth
Andhra Pradesh	1015635	994874	1.61278	639.1086	.2083793	.5345238
Assam	112926	161771	1.43254	185.1057	.0435972	.5349567
Bihar	405430	1331679	3.43438	318.4887	.2337766	.5127378
Gujarat	1183290	3140156	2.65375	731.1617	.1957802	.6956674
Haryana	294793	527885	1.790697	247.5016	.0724802	.81
Himachal Pradesh	146853	139123	.9473623	217.1929	.2320971	.
Karnataka	742557	1083315	1.458898	1170.385	.1531111	.4931954
Kerala	805748	595530	.7391021	73.65791	.1100009	.5657934
Madhya Pradesh	835371	1390906	1.665016	1050.953	.0420346	.7025426
Maharashtra	1578729	2689475	1.70357	1832.445	.070935	.6220737
Orissa	213228	623641	2.924761	119.4064	.1195222	.5146104
Punjab	328756	390673	1.188337	56.58276	.2660794	.8266955
Rajasthan	577563	837428	1.449934	376.2645	.1328065	.7976965
Tamil Nadu	1576952	843634	.5349776	283.9157	.1786704	.7565402
Uttar Pradesh	2270786	3385655	1.490962	10778.31	.1273917	.6594639
West Bengal	747863	1331293	1.78013	481.4707	.1221426	.9138889
Total	973609.3	1477992	1.65684	1856.988	.1549148	.6660986

**Hypothesis 1. Environment predicts fallow land**

state	%fallow	land quality
Andhra Pradesh	.064051	.7328571
Assam	.0361384	.5233636
Bihar	.1657209	.6938182
Gujarat	.1698026	.413
Haryana	.0128053	.068
Himachal Pradesh	.0557309	.7255
Karnataka	.0971054	.5875882
Kerala	.1213238	.4314286
Madhya Pradesh	.0644561	.64256
Maharashtra	.1039601	.6198824
Orissa	.0918264	.7860909
Punjab	.3640556	.1016
Rajasthan	.1833752	.2495
Tamil Nadu	.0882277	.7388667
Uttar Pradesh	.0925305	.4648667
West Bengal	.210264	.7428333
Total	.1205268	.5287982



## Hypothesis 2. Financial Access predicts fallow land

state	%fallow	bank distance
Andhra Pradesh	.064051	5.5
Assam	.0361384	3.181818
Bihar	.1657209	6.363636
Gujarat	.1698026	2
Haryana	.0128053	5.6
Himachal Pradesh	.0557309	3.75
Karnataka	.0971054	9.736842
Kerala	.1213238	1.071429
Madhya Pradesh	.0644561	9.2
Maharashtra	.1039601	15
Orissa	.0918264	4.090909
Punjab	.3640556	3.083333
Rajasthan	.1833752	8.083333
Tamil Nadu	.0882277	5.352941
Uttar Pradesh	.0925305	5.433333
West Bengal	.210264	1.583333
Total	.1205268	6.079051

## Hypothesis 3. Quality of Public Goods Distribution predict fallow land

statename	%fallow	legal	%HH w/electricity
Andhra Pradesh	.064051	1.61278	.5014847
Assam	.0361384	1.43254	.1252512
Bihar	.1657209	3.43438	.0577652
Gujarat	.1698026	2.65375	.7415402
Haryana	.0128053	1.790697	.593646
Himachal Pradesh	.0557309	.9473623	.2645503
Karnataka	.0971054	1.458898	.6790974
Kerala	.1213238	.7391021	.1949289
Madhya Pradesh	.0644561	1.665016	.4802001
Maharashtra	.1039601	1.70357	.4262748
Orissa	.0918264	2.924761	.2069314
Punjab	.3640556	1.188337	.8364335
Rajasthan	.1833752	1.449934	.4771698
Tamil Nadu	.0882277	.5349776	.5377097
Uttar Pradesh	.0925305	1.490962	.1223432
West Bengal	.210264	1.78013	.2483544
Total	.1205268	1.65684	.419846

#### Hypothesis 4. Social Institutions predict fallow land

state	%fallow	complete	legal	hall	castefrag	inequality
Andhra Pradesh	.064051	1015635	1.61278	.8125	.7315526	1.368515
Assam	.0361384	112926	1.43254	.0909091	.6937581	20.914
Bihar	.1657209	405430	3.43438	.2727273	.7867283	3.024947
Gujarat	.1698026	1183290	2.65375	.65	.7383702	8.809141
Haryana	.0128053	294793	1.790697	.5	.6643861	19.3125
Himachal Pradesh	.0557309	146853	.9473623	.75	.5731604	1.226653
Karnataka	.0971054	742557	1.458898	.3157895	.6250826	7.164861
Kerala	.1213238	805748	.7391021	.6428571	.809685	14.54167
Madhya Pradesh	.0644561	835371	1.665016	.68	.6846956	24.30278
Maharashtra	.1039601	1578729	1.70357	.5294118	.8066252	4.454167
Orissa	.0918264	213228	2.924761	.4545455	.7318624	5.66412
Punjab	.3640556	328756	1.188337	.75	.7167139	3.726042
Rajasthan	.1833752	577563	1.449934	.5416667	.7805204	7.961912
Tamil Nadu	.0882277	1576952	.5349776	.7058824	.7912511	0
Uttar Pradesh	.0925305	2270786	1.490962	.6333333	.7415572	26.89187
West Bengal	.210264	747863	1.78013	.3333333	.777637	2.675065
Total	.1205268	973609.3	1.65684	.5573123	.7377138	10.2862

**Figure 3.****Regression I.***Dependent variable: Logged % fallow agricultural land*

	<b>Environm't</b>	<b>Legal Inst</b>	<b>Finance</b>	<b>Public Goods</b>
land quality	-2.897 (2.09)*	-0.924 (0.42)	-0.983 (0.45)	-0.828 (0.38)
bad yield	0.529 0 (1.14)	.414 (0.93)	0.379 (0.84)	0.345 (0.77)
bank distance			0.078 (0.70)	
distric HQ dist				0.001 (0.95)
% HH w/electricity				1.234 (1.00)
Bihar		4.043 (1.82)	4.232 (1.88)	6.346 (2.65)**
Gujarat		3.136 (1.20)	3.222 (1.23)	0.938 (0.27)
Haryana		2.706 (1.49)	2.757 (1.52)	2.895 (1.61)
Himachal Pradesh		5.819 (2.47)*	5.941 (2.51)*	5.731 (2.43)*
Karnataka		-4.000 (2.07)*	-3.874 (2.00)*	-3.114 (1.54)
Kerala		6.220 (3.33)**	6.163 (3.29)**	6.396 (3.37)**
Madhya Pradesh		1.869 (1.12)	1.763 (1.05)	1.834 (1.10)
Maharashtra		4.977 (3.12)**	4.904 (3.07)**	5.780 (3.39)**
Orissa		5.338 (3.42)**	5.193 (3.29)**	5.546 (3.58)**
Punjab		5.024 (2.98)**	4.961 (2.94)**	5.263 (3.13)**
Rajasthan		2.944 (1.63)	3.078 (1.69)	3.460 (1.88)
Tamil Nadu		0.162 (0.07)	0.116 (0.05)	1.039 (0.42)
Uttar Pradesh		4.365 (2.21)*	4.589 (2.29)*	4.348 (2.22)*
West Bengal		0.369 (0.19)	0.423 (0.22)	0.861 (0.44)
Assam		6.422 (3.55)**	6.326 (3.48)**	7.089 (3.77)**
Constant	-4.771 (3.67)**	-9.085 (4.21)**	-8.955 (4.13)**	-10.138 (4.29)**
Observations	228	228	228	222
R-squared	0.02	0.27	0.28	0.29

Absolute value of t statistics in parentheses

\* significant at 5%; \*\* significant at 1%

Figure 4. Regression II. Including Indicators of Social Dominance

Dependent variable: Logged % fallow agricultural land

	Social Composition	% Upper Caste	Social Inequality
land quality	-0.254 (0.11)	1.294 (0.45)	1.380 (0.47)
bad yield	0.496 (1.07)		
wealth	0.797 (0.54)		
caste frag	3.699 (2.04)*		
common hall	-0.898 (0.88)	-0.254 (0.21)	0.767 (0.80)
hall*caste frag	-4.100 (1.72)		
%upper		-3.116 (0.75)	
common hall* % upper		6.322 (1.10)	
social inequality			0.004 (0.36)
commhall*social ineq			-0.006 (0.19)
Bihar	5.015 (2.08)*	1.465 (0.38)	1.440 (0.37)
Gujarat	0.000 (.)	-1.713 (0.43)	-1.591 (0.40)
Haryana	1.723 (0.84)	-2.510 (0.71)	-2.251 (0.64)
Himachal Pradesh	-5.049 (0.99)	2.228 (0.56)	2.454 (0.61)
Karnataka	-2.687 (1.16)	-3.084 (0.68)	-2.748 (0.61)
Kerala	4.823 (2.28)*	2.918 (0.81)	2.888 (0.80)
Madhya Pradesh	1.228 (0.55)	-0.888 (0.25)	-0.827 (0.23)
Maharashtra	4.425 (2.39)*	1.015 (0.29)	0.910 (0.26)
Orissa	4.030 (2.20)*	0.408 (0.10)	0.270 (0.07)
Punjab	4.299 (2.07)*	2.127 (0.47)	2.216 (0.49)
Rajasthan	2.612 (1.29)	-3.089 (0.82)	-2.934 (0.77)
Tamil Nadu	1.266 (0.45)	-2.131 (0.54)	-2.192 (0.55)
Uttar Pradesh	3.885 (1.75)	2.232 (0.61)	2.058 (0.56)
West Bengal	-1.214 (0.56)	-4.943 (1.35)	-5.097 (1.39)
Assam	6.246 (3.05)**	2.129 (0.61)	2.136 (0.61)
Constant	-0.620 (0.06)	-5.163 (1.36)	-5.775 (1.55)
Observations	207	122	122
R-squared	0.42	0.24	0.23