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ABSTRACT

Touch Thee Not: Group Conflict, Caste Power, and Untouchability in Rural India*

We investigate the impact of community power on the practice of untouchability in rural India. We model two-dimensional simultaneous group conflict over social norms, wherein an upper and backward (OBC) caste Hindu bloc contests the 'scheduled' castes (SCs) over the extent to which behavioural norms within the village should legitimise untouchability, even as it seeks to impose Hindu values/rituals on non-Hindus. We find that any increase in the collective resource endowment (power) of this bloc will increase the likelihood of an upper caste or OBC Hindu household practising untouchability. An increase in that of SCs, or, more interestingly, of Muslims and Christians, will reduce it. Strikingly, a marginal redistribution of resources from OBCs to upper castes may reduce it as well. Identifying a community's power with a multiplicative combination of its population share and land share, we find support for these hypotheses in data from the India Human Development Survey 2011-12.

JEL Classification: D72, D74, J71, J78, Z1

Keywords: caste, social norm, ritual purity, discrimination, untouchabilitly, land redistribution, caste power, India

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1. Introduction

This paper seeks to identify the determinants of an extreme form of social discrimination, viz., the practice of caste-based untouchability in India. Specifically, we examine the role played by village-level community power in influencing the practice of untouchability among upper and backward caste Hindus in rural India. We show that a Hindu upper or backward caste household's propensity to practise untouchability vis-à-vis Hindu 'Scheduled' castes is determined not solely by its own characteristics but, crucially, also by the inter-group distribution of resources across both caste and religious divides. We rationalize this as the consequence of village-level conflicts over collective assertions of both caste and religious identities. Our analysis draws attention to the community power of Muslims and Christians, as well social cleavages between upper and backward caste Hindus, as key determinants of the latter's social treatment of Hindu 'Scheduled' castes. Empirically, the village-level distributions of population and land ownership across caste and religious communities jointly turn out to explain much of the incidence of untouchability among upper and backward caste Hindus.

Traditionally, Hindu society has been segmented into a religiously sanctioned hierarchy of various castes. Brahmins were placed at the apex, followed by other 'Forward' castes and the so-called 'Other Backward' castes (OBCs), while the so-called 'Scheduled' castes (SCs) constituted the bottom of the hierarchy. Occupational specialization and endogamy have been the key characteristics of the system, with Brahmins constituting the traditional intelligentsia, Forward castes largely engaged in administration, law enforcement and trade, OBCs constituting the primary component of the peasantry, and SCs confined to menial and low-end artisanal occupations. Norms of ritual purity and pollution, which underlie the system, include the idea that individuals belonging to other castes would be 'polluted' by coming into physical contact with those born into the SC category. This leads to the practice of 'untouchability': the avoidance of physical contact by the former with the latter. Historically, this entailed residential segregation, stringent restrictions on social interaction between SCs and other castes including a complete taboo on inter-marriage, avoidance by other castes of food handled by SCs, non-access of SCs to public spaces and communal facilities such as roads, village wells, schools, temples, and entry barriers against SCs in most professions.[1]

Discrimination against SCs in general and the practice of untouchability in particular were made illegal immediately after Independence, and affirmative action programs instituted for their benefit, as well as that of the so-called Scheduled Tribes (STs). However, despite legal prohibition, the

[1] 'Scheduled Caste' is the term used for these communities in the Constitution of India. The Constitution (Scheduled Castes) Order, 1950 lists 1,108 castes in its First Schedule. The scope and stringency of the restrictions faced by SCs varied across time and space, as well as according to caste divisions among the SCs. The system has been studied extensively by sociologists and historians (e.g. Ambedkar 1946, Srinivas 1952, Dumont 1970, Beteille 1971, Gandhi 1982 and Sharma 1990). Economists' attempts to theorize the presence and persistence of caste differentiation include Akerlof (1976), Scoville (1996), Bidner and Eswaran (2015) and Munshi (2017). Becker's (1957) seminal general analysis of the economics of discrimination and the large literature flowing from it have obvious applications to the issue of caste-based discrimination as well.

practice continues to limit access of SCs to public spaces and facilities, as well as informal social and professional networks, especially in rural areas. This restricts the accumulation of social capital on their part and puts up significant structural barriers to their entry into historically upper caste occupations.[2] It follows that an understanding of the factors that determine the prevalence of untouchability remains of critical importance in reducing caste-based rigidities and entry barriers in India's labour market.

A growing literature argues that the social norms of ritual purity constitutive of Hinduism, which legitimise caste hierarchy and caste discrimination, including untouchability, have important negative implications for mortality and sanitation. Geruso and Spears (2018) claim that the higher mortality rates observed among Indian Hindus can be accounted for by the different sanitation environments in which Hindu and Muslim children grow up. Religious beliefs and caste relations closely linked to the practice of Hinduism influence sanitation behaviour (Coffey et al. 2017, Coffey and Spears 2017, Vyas and Spears 2018). Beliefs in purity and pollution contribute to the acceptability of widespread open defecation and the rejection of inexpensive latrines in rural India. Spears and Lamba (2016) and Spears and Thorat (2018) document that households are more likely to defecate in the open in places where a larger proportion of the residents practise untouchability, implying a stronger adherence to and enforcement of the norms of purity. These findings suggest that the practice of untouchability negatively affects its practitioners themselves, as well as their victims, especially in rural areas. In so doing, they provide a broader motivation for investigating the determinants of its prevalence. However, despite its importance, that prior question has rarely been considered. We aim to address this gap in the literature.

Extensive, and often violent, conflicts between SCs and upper castes or OBCs, as well as between Hindus and Muslims, continue to constitute arguably the most salient features of the political landscape in India.[3] Such group conflicts provide the motivating backdrop for our analysis. Our entry-point is the idea that the legitimacy of caste-exclusionary Hindu behavioural norms is *contested* at the village level. It is determined as the outcome of a prior process of group conflict and negotiation between upper castes and OBCs on the one hand, and SCs on the other. The outcomes of such caste contests are however affected by a simultaneous process of religious conflict between Hindus and Muslims (or Christians). Hence, the incidence of untouchability is impacted by village-level differences in the distribution of resources (and therefore political power) across caste and religious communities.

[2] See Deshpande (2011), Munshi (2017) and Mosse (2018) for extended discussions and references to the literature. Shah et al. (2006), in their study of untouchability covering 550 villages in 11 main states, found that SCs were prevented from full participation in local markets and often from entering village shops in 30%–40% of the villages surveyed. In 45%–50% of these villages, SCs were prevented from selling milk to village dairy cooperatives.

[3] For caste conflicts between SCs and upper castes or OBCs in contemporary India, see Teltumbde (2018) and Sharma (2014). A recent article in the New York Times (Gettleman and Raj 2018) provides useful case studies. Varshney (2002) and Willkinson (2005) are notable attempts by political scientists to understand violent Hindu-Muslim conflicts in India, while Mitra and Ray (2014) offer a recent economic analysis of the same.

An upper caste or OBC Hindu household's decision to practise untouchability is determined not solely by its own inherent characteristics (as in Thorat and Joshi 2015), but, crucially, also by the inter-group distribution of collective resources, via the mediation of a process of political contestation. In adopting this perspective, our analysis resembles those of Anderson (2011) and Iversen et al. (2014), who examine how upper caste dominance within a village affects the economic performance of lower caste households (though they do not address untouchability). As such, ours is the first paper that examines how caste power determines the incidence of the practice untouchability by upper caste and OBC Hindus, and we do so both theoretically and empirically.

We develop a model of group contestation over social norms, wherein the combined upper caste and OBC Hindu bloc engages in a contest with the SC community over the extent to which the behavioural norms within the village should legitimise the practice of untouchability, even as it seeks to impose Hindu values and rituals on religious minorities. There are four communities in our model: SCs, upper castes (Brahmins and Forward castes), OBCs and non-Hindus (Muslims and Christians). Each community is assumed to achieve perfect internal coordination, reflecting the presence of effective within-community governance structures, so that it can be modelled as an individual allocating its resource endowment between material consumption and conflict over behavioural norms, in order to best satisfy its preferences. The village social norms, determined as the equilibrium outcome of the simultaneous inter-play of caste and religious contests, determine the cost to an individual from practising untouchability. Hindu upper caste and OBC individuals take this cost as given and decide to practise untouchability if their individual (idiosyncratic) benefit from such behaviour exceeds the cost.[4]

Our model predicts that any increase in the collective resource endowment ('power') of non-SC/ST Hindus within the village, by shifting the outcome of the caste conflict against SCs, will increase the proportion of upper caste or OBC households therein which practise untouchability. The opposite holds for an increase in the power of SCs. Interestingly, any increase in the power of Muslims or Christians will reduce this proportion. This happens due to greater diversion of resources from the caste conflict to the religious conflict by non-SC Hindus in response to such an increase. Even more striking is the prediction that increases in the power of upper castes, relative to that of the OBCs, may reduce the prevalence of untouchability among upper castes and OBCs as well. This happens due to free-riding

[4] Dasgupta and Kanbur (2005, 2007), Esteban and Ray (2008, 2011), Caselli and Coleman (2013), Dasgupta (2017), Bakshi and Dasgupta (2018) and Dasgupta and Guha Neogi (2018) are recent contributions to the theoretical modelling of ethnic conflict. These however restrict themselves to conflicts between two ethnic groups. Our model extends this literature to simultaneous conflicts across two dimensions involving at least three groups. Mitra and Ray (2014) provide an empirical analysis of violent conflict between Hindus and Muslims in India, while Sharma (2015) offers that of violence against SCs by upper castes. Our focus on the mutual determination of caste conflict between SCs and non-SC Hindus and religious conflict between Hindus and Muslims distinguishes the present paper from these two contributions as well. Furthermore, unlike these two contributions, our interest lies not in explaining caste or religious conflicts per se, but in explicating how the mediation of such conflicts changes the incidence of untouchability in consequence of changes in the inter-community balance of political power. Caste or religious conflict is merely the explanatory mechanism in our analysis, not the central phenomenon to be explained, as it is in theirs.

by upper castes on OBCs in both caste and religious conflicts, when the former are significantly resource-poor relative to the latter. In those situations, a marginal redistribution of resources from OBCs to upper castes reduces the allocation by OBCs to the caste conflict, without inducing upper castes to enter that conflict. Thus, upper castes continue to contribute nothing to it. Hence, the outcome of the caste conflict shifts in favour of SCs – more non-SC/ST Hindus choose not to practise untouchability in consequence. A community's resource endowment serves as an empirical proxy for its political power in our model, in that, ceteris paribus, a community fares better in every conflict it engages in whenever its resource endowment increases. Identifying a community's resource endowment (or power) with its share of land weighted by its population share,[5] we find broad confirmation of all these predictions in rural data from the India Human Development Survey II – 2011-12 (IHDS 2012).[6] However, the theoretical predictions do not hold empirically if we replace the caste power measure solely by the unweighted land share or unweighted population share of the community, or even by their ratio. The latter highlights the importance of the joint influence of both land share and population share of each caste group in determining the prevalence of untouchability.

Our analysis highlights a role for land redistribution in reducing the incidence of untouchability in specific local contexts characterized by high population shares of SCs. The latter suggests the need for accompanying policies to foster greater locational consolidation of that community. Public investment in rural transport and communications infrastructure appears to constitute another important avenue of policy intervention because it promotes greater interaction with the external world and therefore greater exposure to urban value systems.

Section 2 offers some preliminary observations from IHDS 2012 regarding the prevalence of the practice of untouchability in rural areas of India across different states and caste groups. These findings serve as stylised facts for our analytical model-building exercise in Section 3. In Section 4, we report and discuss the regression results that show the results from IHDS 2012 to be consistent with the predictions yielded by our theoretical model. We conclude with a discussion of some policy implications of our analysis in Section 5. Detailed proofs of propositions are presented in an appendix.

[5] Our measure of a community's resource endowment, and its interpretation in terms of that community's political power, are both closely linked to the notion of a 'dominant' caste introduced by Srinivas (1955) and discussed extensively in the sociological and anthropological literatures. Srinivas (1955) defined a 'dominant' caste as that caste which is both numerically strong and wields preponderant economic and political power within the village. Since land ownership is the principal source of economic power in rural India, and numbers matter in India's electoral democracy, numerical strength and land share constitute the key determinants of caste power in this definition. Our multiplicative combination of population and land shares provides a simple way of formalizing and operationalizing this idea.

[6] Our focus on the rural sector can be rationalised by the fact that the incidence of untouchability is greater in the rural sector (see Thorat and Joshi, 2015). The latter may also indicate that the household bias in reporting the practice of untouchability is likely to be less in rural areas.

2. The structure of untouchability in rural India

We begin with a general empirical investigation into the following questions: how extensive is the practice of untouchability in rural India, and how do different communities, defined on the basis of caste and religion, vary with regard to their propensity to engage in this practice?

The India Human Development Survey-II (2011-12) is a nationally representative, multi-topic survey of rural and urban households drawn from across Indian states. It is the first nationwide survey that includes information on whether the respondent households practise untouchability. This information was not available in the India Human Development Survey-I (2004-05). Hence we are unable to exploit the panel dimension of IHDS I and II. Focusing on rural households of the IHDS 2012, we have an estimation sample of over 26000 households drawn from about 1200 villages.

Table 1 below shows, for each state, the proportion of respondent households who admitted to practising untouchability, expressed as a percentage of the total number of rural households interviewed in that state within our sample. The percentages in Table 1 can thus be interpreted as the likelihood of untouchability being practised, or its incidence, in the rural areas of the major Indian states. As shown in Table 1, 24.3% of households in the full sample admitted to practising untouchability in some form. This country-wide incidence however disguises sharp state-level differences. Kerala, West Bengal and Maharashtra appear outliers, in that, at less than 3.5%, the rural incidence of untouchability appears negligible in all these states, as compared to the above 10% incidence registered by the next best performer, Andhra Pradesh (including Telengana[7]). The country-wide incidence accordingly increases to 28.4% if we drop the three outlier states from our sample. With above 40% self-reported levels of incidence, Madhya Pradesh, Himachal Pradesh and Bihar appear the worst performers, with Rajasthan, Uttar Pradesh and Gujarat following close behind, clustered as they are tightly around 35%.

Insert Table 1

Table 1 shows that, despite a constitutional ban, the practice of untouchability in some form remains extensive in the rural areas of every large state except Maharashtra, Kerala and West Bengal. Are there important cross-community variations in the incidence of this practice? Our data-set allows us to partition the population into the following communities: (a) among Hindus, we have Brahmins, Forward Castes, Other Backward Castes (OBC), Scheduled Tribes (ST), and of course, the victims of the practice of untouchability, viz., Scheduled Castes (SC); (b) among non-Hindus, we have Muslims, and Others, i.e. Christians, Sikhs, Parsees, Jains and Buddhists, with Christians forming the largest component.

[7] Telengana was carved out of Andhra Pradesh as a separate state in 2014.

Table 2 below presents the community-specific population shares (column 1), land shares (column 2), shares of community households practising untouchability (column 3) and the community-specific likelihoods of practising untouchability (column 4). Note that the column 4 figures are obtained by dividing column 3 figures by those in column 1.

Insert Table 2

As noted in Table 1, about a quarter of the households admitted to practising untouchability. Table 2 reveals that every community practises untouchability to some extent. Strikingly, SCs have about 11% likelihood of practising untouchability themselves. This reflects the continuing hold of caste hierarchies within the SC community itself and the discrimination against certain SC castes practised by other SC castes. Muslims and Others, who all profess religions with neither untouchability nor, indeed, a formal caste hierarchy, exhibit similar propensities. However, these communities are all far less likely to practise untouchability than the overall population. STs, who have traditionally been placed outside the Hindu caste hierarchy and constitute the most disadvantaged social group according to almost every social indicator, appear to be about as prone to the practice as the overall population.

Brahmins, Forward castes and OBCs all exhibit much greater susceptibility to the practice than the population as a whole. About a third of the OBC population in our sample admitted to practising untouchability. The corresponding proportion for Forward caste households was about a third as well. Thus, Forward castes and OBCs appear quite similar in their propensities to engage in the practice. Unsurprisingly, Brahmins are most likely to engage in the practice, with almost 6 out of every 10 Brahmin households admitting to it. However, the Brahmin population share at about 4% appears too small for them to be considered as the primary driving force behind the practice. Furthermore, the socio-hierarchical, economic and cultural distances between Brahmins and Forward castes are all generally small, compared to those between these communities and the OBCs. Brahmins and Forward castes together constitute the main component of the category officially termed 'General Castes', whose members fall outside the ambit of caste-based affirmative action programs, whereas OBC individuals qualify for such programs (subject to a generous household income ceiling). Accordingly, in our theoretical model presented in Section 3, we shall model Brahmins and Forward castes as constituting one unified group, while OBCs will be assumed to constitute another. The practice of untouchability will be driven by the combined efforts of these two caste blocs. Non-Hindus will play a passive role in this regard, reflecting their low propensities to practise untouchability, as reported in Table 2.

Table 2 further reveals that the caste blocs most susceptible to the practice of untouchability, viz., upper/general castes and OBCs, are also those who own most of the land in rural India. Together, these castes own about 70% of the total land in our sample, but their population share is marginally over 50%. The land share of the upper castes is almost double their population share. Conversely, SCs

are the most land poor community in relative terms – their land share is about half their population share. Since land remains the primary form of wealth in rural India, inequality in the distribution of land largely reflects wider caste-based inequalities in wealth or asset ownership in general. Since wealth constitutes a major source of political power, and since community land shares diverge significantly from the corresponding population shares, the inter-community distribution of land in rural India would intuitively play an important role in determining the inter-community balance of political power. In the next section, we shall accordingly develop a model of group conflict where land shares will interact with numerical strength, i.e., population shares, of key caste and religious groups to determine the incidence of untouchability as an equilibrium outcome.

3. A theoretical model of within-village group conflict over social norms

We now develop a theoretical model to highlight how the inter-community distribution of resources within a village may jointly determine the prevalence of untouchability therein. We visualize a scenario wherein different caste and religious blocs within a village initially engage in multiple simultaneous contests over a matrix of social values and attendant behavioural norms. The equilibrium outcome of such contests provides the broad structure governing individual behaviour in the village. Greater success of Hindu 'general' or backward castes in these contests implies greater legitimacy for the norms of ritual purity traditionally espoused by such communities. All individuals take this normative structure as given and choose their behaviour according to a personal cost-benefit calculus – they trade off their benefit from indulging their idiosyncratic 'taste' for practising untouchability against the cost of doing so. The cost is determined by the collective value-system espoused by the village, arrived at through the initial process of inter-group contestation. Greater success of non-SC Hindu communities in such contests lowers the cost from engaging in this practice, thereby increasing its prevalence.

3.1. Group conflict and equilibrium determination of village norms

Suppose the population of a village can be partitioned into four communities: Hindu general (or upper) castes (U), Hindu OBCs (B), Hindu SCs (S) and non-Hindus (M). Brahmins and Forward castes together constitute U, while Muslims and Christians are the primary constituents of M. We leave out STs partly for the sake of simplicity, partly to reflect their largely outsider status in the Hindu social hierarchy, and partly due to their small numbers. We abstract from the issue of preference differences and coordination problems within each community, by assuming that each community can be modelled as an individual.[8] We shall denote by H the set of all non-S Hindu individuals, i.e., all individuals who

[8] Apart from analytical convenience, this assumption is motivated by the empirical reality of Indian villages. Within a village, castes typically govern themselves and organise their internal affairs through traditional bodies,

are either upper caste or backward caste: $H = [U \cup B]$. Each community $i \in \{S, U, B, M\}$ is endowed with ρ_i amount of resources, which it generates by combining its land endowment δ_i with its labour endowment L_i according to a symmetric Cobb-Douglas production function:

$$\rho_i = \delta_i L_i.$$

Define $\theta \equiv \frac{\rho_U}{\rho_H}$, where $\rho_H \equiv \rho_U + \rho_B$. The parameter θ measures the extent of *dominance* of upper castes within the non-SC Hindu community (*H*) in terms of share of community resources. Community $i \in \{S, U, B, M\}$ can allocate its resource endowment ρ_i between material consumption and conflict with other communities over the sharing of two different extra-economic 'normative' goods; $\rho_i > 0$. The normative goods are denoted *T* and *R*. The amount of each normative good is unity.

The normative good *T* is to be interpreted as the composite of social norms, rituals and conventions which govern all social interaction within the extended Hindu community, consisting of upper castes, backward castes and SCs. A larger share of this good accruing to the non-SC subgroup, *H*, implies that the social norms and conventions within the village reflect, to a greater extent, the values and prejudices of upper and backward caste Hindus, as opposed to those of scheduled castes. As noted earlier, the practice of untouchability vis-à-vis the SCs is legitimised by, and is thus a behavioural consequence of, norms of ritual pollution adopted primarily by non-SC Hindus. Hence, a larger share of *T* accruing to the *H* group will be taken to mean greater tolerance or legitimacy of the practice of untouchability within the Hindu community, and consequently, greater segregation of SCs from the daily collective life of upper castes and OBCs. For brevity, we shall term *T* the *caste* good. The share of the normative good *R* accruing to *M* measures the relative extent to which public spaces within the village, and its collective life, accommodate collective acts of symbolic and religious assertion by non-Hindus. We shall term *R* the *religion* good.[9]

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headed by caste elders and otherwise influential members, called caste 'panchayats'. Though the decisions and judgements of these panchayats have no official or legal sanction, in practice they usually carry great weight, and are complied with by individual caste members. Enforcement is ensured by the threat of social ostracism and even violence against those who fail to comply. Given the large benefits in many different contexts accruing from membership of caste networks (Munshi 2017), caste ostracism carries major economic costs, so that compliance is usually individually rational. While of course not eliminating them, caste panchayats reduce free-riding and resolve collective action problems within their respective castes to a great extent. Admittedly, caste panchayats typically pertain to individual castes rather than caste blocs, which constitute the agents in our model. However, it is very often the case that a single caste dominates each caste bloc within a village, so that nothing substantial is lost, and much analytical simplicity is gained, by modelling each caste bloc within a village as an individual.

[9] Intuitively, a larger share of *T* accruing to the *H* group may be identified with greater denial of access to SCs in matters such as participation in Hindu religious festivals, rituals, collective feasts and marriage celebrations; as well as greater restrictions on their use of communal facilities such as wells, health centres, public spaces, thoroughfares and eating houses. More stringent enforcement of the traditional obligation of SCs to provide menial labour (especially for 'unclean' services such as toilet cleaning, handling of corpses and removal of carcasses) on call may also be so identified. A larger share of *R* accruing to *M* may be identified with more extensive use of public spaces by Muslims and Christians for their collective worship rituals, religious festivals and processions, or as their burial grounds, greater use of loud-speakers and public address systems during the

Let $D \equiv \{T, R\}$. The pay-off function of community $i \in \{S, U, B, M\}$ is given by:

$$\pi_i = \sum_{j \in D} g_{ij} V_{ij} + F(n_i); \tag{3.1}$$

where V_{ij} is community i's valuation of the normative good j, g_{ij} is the share of the normative good j accruing to community i, and n_i is that community's material consumption. We shall assume that the function F is increasing, strictly concave and satisfies the standard Inada conditions, i.e., $F' > 0, F'' < 0, \lim_{n_i \to 0} F'(n_i) = \infty$ and $\lim_{n_i \to \infty} F'(n_i) = 0$. We shall also assume that the community valuations of the caste and religion goods satisfy the following additional restrictions.

Assumption 1. (i) $V_{MT} = 0 < V_{MR}$; (ii) $V_{SR} = 0 < V_{ST}$; (iii) $V_{UT}, V_{UR} > 0$; (iv) $V_{BT}, V_{BR} > 0$ and (v) $V_{UT} = V_{BT}, V_{UR} = V_{BR}$.

As noted in Section 2 (Table 2.2), upper castes and OBCs are most prone to practising untouchability, and Muslims/Others the least. Furthermore, the propensity to discriminate for OBCs is about the same as that exhibited by Forward castes. Assumption 1 builds into the model these broad stylized facts. By Assumption 1, *M* derives no benefit from *T*. Hence *M* does not participate in the contest over *T*. This incorporates the idea that non-Hindus are neutral towards conflicts within the Hindu community. Similarly, *S* derives no benefit from *R*, and therefore does not participate in the contest over its division. This builds in the idea that SCs, being confined to the margins of Hindu society, do not identify much with the dominant belief systems of the latter, which legitimize their own marginalization. Consequently, SCs do not share the antagonism towards non-Hindus that a strong and exclusive personal identification with Hindu society typically entails. Both *U* and *B*, however, have positive and identical valuations of the two normative goods.[10] They may both, therefore, potentially engage in a contest over the division of *T* with *S* and another over the division of *R* with *M*.

Political contestations among communities may play out in many forms in practice. Most transparently, these may involve lobbying to influence the decisions of the local police and civil administrations or the judiciary. For example, the non-SC Hindu community may lobby/pressurize the administration (or fight court cases), to deny permission to Muslims, for the use of public spaces within the village as their prayer or burial grounds. Muslims in turn may lobby the administration or approach

performance of Muslim/Christian religious events, greater consumption of beef or pork (by Christians), more onerous restrictions on the consumption and sale of alcohol (imposed by Muslims) etc.

[10] The assumption that $V_{SR} = 0$ is made for algebraic ease and is not essential for our formal results. Identical results can be generated regardless of the value of V_{SR} when ρ_S is sufficiently low. The assumption that [$V_{UT} = V_{BT}$, and $V_{UR} = V_{BR}$] is likewise convenient but not essential.

the judiciary for such access, or to prevent Hindu religious processions from passing through Muslim localities. Similarly, the SC and the non-SC Hindu communities may separately lobby the administration or the judiciary to adjudicate in their favour in inter-community disputes over access to public spaces and facilities. Such lobbying may take the form of law suits, bribery, petitioning, opinion building or direct mass political action (including strikes, violence and destruction of public property). These contestations may also take the form of rival electoral mobilizations to influence the composition and policy agenda of representative governance institutions (especially those at the village level – the so-called village 'panchayats'). In extreme cases, they may even involve the straightforward use of economic boycott, generalized violence and intimidation against rival communities as a means of dispute resolution. Regardless of their exact mechanism, all such contestations involve the use of real resources to influence an essentially political outcome: the division of a valuable item between rival communities. We now proceed to formally model this political outcome.

The division of the caste good, *T*, between *H* and *S* is determined according to the standard Tullock (1980) contest success function:

$$g_{ST} = \frac{x_{ST}}{x_{ST}+x_{HT}} \text{ if } (x_{ST} + x_{HT}) > 0$$

$$= \frac{1}{2} \text{ otherwise;} \tag{3.2}$$

where x_{ST} and x_{HT} are the amounts of resources allocated by *S* and *H*, respectively, to the contest over *T*; $x_{HT} \equiv x_{UT} + x_{BT}$. Similarly, the division of the religious good, *R*, between *H* and *M* is given by:

$$g_{MR} = \frac{x_{MR}}{x_{MR}+x_{HR}} \text{ if } (x_{MR} + x_{HR}) > 0$$

$$= \frac{1}{2} \text{ otherwise;} \tag{3.3}$$

where x_{MR} and x_{HR} are the amounts of resources allocated by *M* and *H*, respectively, to the contest over *R*; $x_{HR} \equiv x_{UR} + x_{BR}$. Furthermore, we shall assume that:

$$g_{UT} = g_{BT} = (1 - g_{ST}); g_{UR} = g_{BR} = (1 - g_{MR}). \tag{3.4}$$

By (3.4), both *T* and *R* involve non-rival and non-excludable consumption within the *H* group (*U* and *B*): these are both pure public goods for non-SC Hindus taken as a whole. However, neither *U* nor *B* can internalize the benefits accruing from *T* and *R* to the other. The two constituents of the non-SC Hindu bloc cannot therefore coordinate their conflict participation with one another. This feature of our model is meant to capture the consequences of deep social cleavages between upper castes and OBCs – social cleavages that both cause and are in turn perpetuated by low levels of inter-marriage. All communities $i \in \{S, U, B, M\}$ simultaneously choose the allocation of their respective resources ρ_i

between material consumption and contest expenditures, so as to maximize the pay-off function in (3.1), subject to Assumption 1, the contest success functions (3.2)-(3.4), and the budget constraints:

$$n_i = \rho_i - x_{iT} - x_{iR}. \tag{3.5}$$

The model outlined above bears a family resemblance to those studied in the literature on conflict in multiple battlefields.[11] As in that literature, one set of combatants (viz., *U* and *B*) maximizes an aggregation of the pay-offs from the different battlefields. However, unlike the standard practice in that literature, the same agents do not confront one another in multiple battlefields in our model – *U* and *B* confront *S* in the conflict over enforcement of norms of ritual pollution and caste hierarchy, whereas they confront *M* over the privileging of Hindu symbols, values and practices over those of other religions. If we assume that SCs do experience antagonism towards non-Hindus, i.e., $V_{SR} > 0$, then our model will become a variant of those analysing simultaneous between and within group contests (e.g. Choi et al. 2015, Dasgupta 2009, Munster 2007 and Hausken 2005). Our substantive comparative static conclusions will remain unchanged under this alternative formulation, so long as SCs are sufficiently resource-poor relative to non-SC Hindus (recall footnote 9).

It is easy to check that the game specified above must have at least one Nash equilibrium. Recalling that $F'' < 0$, $\lim_{n_i \to 0} F'(n_i) = \infty$, $\theta \equiv \frac{\rho_U}{\rho_H}$ and $\rho_H \equiv \rho_U + \rho_B$, (3.1)-(3.5) immediately yield the following observation.

Lemma 1. Let Assumption 1 hold. Given any $\rho_H, \rho_S, \rho_M > 0$, there exist $\overline{\theta}, \underline{\theta} \in (0,1), \underline{\theta} < \frac{1}{2} < \overline{\theta}$, such that in any Nash equilibrium: (i) $[x_{BR}, x_{BT}, x_{MR}, x_{ST} > 0$ and $x_{UR}, x_{UT}, x_{SR}, x_{MT} = 0]$ if $\theta \in [0, \underline{\theta}]$, (ii) $[(x_{BR} + x_{BT}), (x_{UR} + x_{UT}), x_{MR}, x_{ST} > 0$ and $x_{SR}, x_{MT} = 0]$ if $\theta \in (\underline{\theta}, \overline{\theta})$, and (iii) $[x_{BR}, x_{BT}, x_{SR}, x_{MT} = 0$ and $x_{UR}, x_{UT}, x_{MR}, x_{ST} > 0]$ if $\theta \in (\overline{\theta}, 1]$.

Lemma 1 implies that, when upper castes control a relatively small share of non-SC Hindu resources, so that OBCs form the dominant bloc within this group (*H*), the former will free ride on the latter in both religious conflict and caste conflict. The *U* community will allocate its entire resource to its own material consumption. *B* will however allocate positive amounts of resource to both caste and religious contestations. These roles will be reversed when the upper castes are sufficiently more resourceful relative to the backward castes. In the intermediate zone, where the two communities are not too unequal in terms of resource endowment, both will contribute positive amounts to conflict. In these

[11] See Kovenock and Roberson (2012) for a recent survey.

cases, multiple Nash equilibria will exist. The total amount of resources contributed by any community to conflict will be positive and uniquely determinate. However, the division of that deployment between religious conflict and caste conflict will be indeterminate for both *U* and *B*. Obviously, *M* and *S* will always participate in, i.e., contribute positive amounts to, religious and caste conflict, respectively.

In light of the discussion above, Lemma 1 yields the following proposition.

Proposition 1. Let Assumption 1 hold. Then, given any $\rho_H, \rho_S, \rho_M > 0$, there exist $\overline{\theta}, \underline{\theta} \in (0,1), \underline{\theta} < \frac{1}{2} < \overline{\theta}$, such that a Nash equilibrium is characterized by the following set of conditions:

$$\left(\frac{x_{ST}}{X_T{}^2}\right) V_{BT} = \left(\frac{x_{MR}}{X_R{}^2}\right) V_{BR} = \min\{F'\big((1-\theta)\rho_H - x_{BT} - x_{BR}\big), F'(\theta\rho_H - x_{UT} - x_{UR})\}; \quad (3.6)$$

$$\left(\frac{x_{HR}}{X_R{}^2}\right) V_{MR} = F'(\rho_M - x_{MR}); \quad (3.7)$$

$$\left(\frac{x_{HT}}{X_T{}^2}\right) V_{ST} = F'(\rho_S - x_{ST}); \quad (3.8)$$

and

$$[F'\big((1-\theta)\rho_H - x_{BT} - x_{BR}\big) < F'(\theta\rho_H)] \text{ if } \theta \in (0, \underline{\theta}),$$

$$[F'\big((1-\theta)\rho_H - x_{BT} - x_{BR}\big) = F'(\theta\rho_H - x_{UT} - x_{UR})] \text{ if } \theta \in [\underline{\theta}, \overline{\theta}],$$

$$\text{and } [F'\big((1-\theta)\rho_H\big) > F'(\theta\rho_H - x_{UT} - x_{UR})] \text{ if } \theta \in (\overline{\theta}, 1). \quad (3.9)$$

Conditions (3.6)-(3.8) are statements of the first order conditions of *U* and *B*, *M* and *S*, respectively. Together, (3.6) and (3.9) imply that the marginal utility from expenditure on material consumption must be greater than that on conflict of any kind for *U* in equilibrium if that community is significantly poorer than *B* in terms of its resource endowment. Consequently, it will allocate its entire resource to material consumption, free riding on *B* for access to the two normative goods. *B* must equate the marginal utility of expenditure on material consumption with those of contributions to both religious and caste conflicts. The opposite will hold when *U* is sufficiently better endowed than *B*. When the two communities have broadly similar resource endowments, marginal utilities will be equated across all three items for both *B* and *U*. *U* and *B* will have identical material consumption in this case. It can be shown that (3.6)-(3.9) imply uniqueness of the equilibrium when either $\theta \in (0, \underline{\theta}]$ or $\theta \in [\overline{\theta}, 1)$. The equilibrium values of normative good shares g_{ST} and g_{MR} must always be uniquely defined, as well as those of material consumption for all four communities, given the parameters of the model ρ_S, ρ_M, ρ_H and θ. However,

when we have $\theta \in (\underline{\theta}, \overline{\theta})$, x_{UT}, x_{UR}, x_{BT} and x_{BR} must all be individually indeterminate, leading to multiple Nash equilibria, though $(x_{UT} + x_{UR}), (x_{BT} + x_{BR})$ and $(x_{UT} + x_{BT})$ will all be determinate.

How do changes in communal resource endowments, by impacting the simultaneous group contestations over caste and religion, affect equilibrium acceptability of untouchability, modelled as the equilibrium share of the normative caste good accruing to the SC community (g_{ST})?

Proposition 2. Let Assumption 1 hold, and let ${g_{ST}}^*, {g_{MR}}^*$ be the values of g_{ST} and g_{MR}, respectively, in a Nash equilibrium corresponding to some initial configuration of ρ_H, ρ_S, ρ_M and θ. Suppose further that ${g_{ST}}^*, {g_{MR}}^* < \frac{1}{2}$. Then, ceteris paribus:

(i) any fall in either ρ_M or ρ_S must reduce the equilibrium value of g_{ST};

(ii) any rise in ρ_H must reduce the equilibrium value of g_{ST};

and

(iii) there exist $\overline{\theta}, \underline{\theta} \in (0,1), \underline{\theta} < \frac{1}{2} < \overline{\theta}$, such that any rise in θ over $\left(0, \underline{\theta}\right)$ must increase the equilibrium value of g_{ST}, any rise in θ over $\left[\underline{\theta}, \overline{\theta}\right]$ must keep it invariant, while any rise in θ over $\left(\overline{\theta}, 1\right)$ must reduce it.

Proof. See Appendix 1.

Proposition 2 refers to an initial equilibrium situation where upper and backward caste Hindus collectively dominate both SCs and religious minorities, in the minimal sense of receiving the larger share of both normative goods. Thus, in the initial situation, the collective social norms governing social interaction within the overall Hindu community in the village embody more caste Hindu beliefs regarding ritual pollution than their negation. Analogously, the collective life of the village is organised more according to the symbols, rituals and practices of non-SC Hindus than those identified with religious minorities. It is easy to see that this must necessarily be the case if the total resource endowment of upper and backward castes is sufficiently greater than those of both SCs and non-Hindus in the village (i.e., if ρ_H is sufficiently greater than $\max\{\rho_S, \rho_M\}$). Then, by Proposition 2(i), any fall in the resource endowment of either non-Hindus or SCs themselves must reduce g_{ST}, i.e., increase the extent to which the practice of untouchability is considered normatively legitimate or acceptable within the village. Any rise in the resource endowment of non-SC Hindus (ρ_H) will have the same effect (Proposition 2(ii)). Perhaps most interestingly, an increase in the share of upper castes in the total resource endowment of non-SC Hindus has a non-monotone impact on village norms legitimizing the practice of untouchability (Proposition 2(iii)). When backward castes are significantly better endowed

than upper castes, marginal increases in the resource share of the latter vis-à-vis those of the former makes untouchability less legitimate. Thus, given the total resource endowment of the non-SC Hindu community, a reduction of the dominance of backward castes vis-à-vis upper castes has the effect of making villages norms less tolerant of untouchability. However, when upper castes dominate backward castes in terms of resource endowment, further improvements in their relative resource position causes greater dominance of upper caste ideas of ritual purity, which legitimize the practice of untouchability.

The mechanisms generating the relationships highlighted by Proposition 2 are the following. Any decrease in the resource endowment of non-Hindus permits non-SC Hindus to reallocate some resource from religious conflict to caste conflict. This shifts the outcome of the caste conflict further against SCs. Any decrease in the endowment of the SC community reduces its allocation to the caste contest, thereby reducing the opposition to notions of ritual purity and increasing the legitimacy of untouchability. Any increase in the endowment of the non-SC Hindu community increases its allocation to the caste contest and thereby increases the legitimacy of untouchability. As already noted in Lemma 1 and Proposition 1, when backward castes dominate upper castes sufficiently in terms of resource endowment, the latter withdraw from all conflict, choosing instead to free-ride on the backward castes for access to the normative goods. In such a situation, a marginal redistribution of resources from *B* to *U* reduces the ability of OBCs to defend norms of ritual purity against SCs, but does not induce upper castes to enter the caste conflict. Thus, OBCs reduce their allocation to the caste conflict, but upper castes continue to contribute nothing to it. The outcome therefore shifts in favour of SCs - the legitimacy of untouchability declines in consequence. The opposite effect obtains when upper castes dominate backward castes enough to make the latter free-ride on the former. In the intermediate zone, both *B* and *U* contribute to conflict. A marginal resource redistribution from, say, *B* to *U*, then has no impact on equilibrium consumption bundles: the loser community B reduces its total conflict contribution by the amount lost, while the gainer community *U* increases its total conflict contribution by the exact same amount, so that the equilibrium shares and material consumption levels in any post-redistribution equilibrium remain exactly the same as those in any pre-redistribution equilibrium.[12]

Remark 1. An interesting outcome obtains when $g_{MR}{}^{*} > \frac{1}{2}$ in the initial equilibrium, i.e., non-Hindus dominate non-SC Hindus. Then, as can be easily checked, an increase in the resource endowment of the non-Hindu bloc (ρ_M) induces non-SC Hindus to transfer resources from the religious conflict to the caste conflict. The equilibrium value of g_{ST} falls in consequence – the outcome of the caste conflict shifts against the SCs. This suggests that, in villages dominated by Muslims or Christians, greater resource acquisition by them may increase the extent to which the practice of untouchability is

[12] This follows immediately from the well-known neutrality property of Cournot games of voluntary contributions to pure public goods, first highlighted in a seminal paper by Bergstrom et al. (1986). See Dasgupta and Kanbur (2007) for a detailed discussion of this property.

considered normatively acceptable among the Hindu population of the village. Since very few villages in our sample can be said to be dominated by non-Hindu communities, either numerically or in terms of land shares, we shall ignore this possibility in our empirical analysis presented in Section 4 below.[13]

Remark 2. Given Assumption 1, the equilibrium value of g_{ST} is increasing in ρ_S and decreasing in ρ_H. Analogously, the equilibrium value of g_{MR} is increasing in ρ_M but decreasing in ρ_H. This clarifies the exact sense in which a community's resource endowment can be identified with its political power in our model – other parameters remaining constant, a community fares better in every conflict it engages in whenever its resource endowment increases.

3.2. Village norms, individual behaviour and the incidence of untouchability

Lastly, how do the village norms arrived at through the process of group contestation affect individual practice of untouchability on part of upper castes and OBCs? We assume that all H (i.e., upper caste and OBC) individuals j take the village norms governing the extent of tolerance of untouchability, modelled parsimoniously as the equilibrium value of $(1 - g_{ST})$, as given and act so as to maximize their utility, given by:

$$V_j = v_j - K(g_{ST}); \tag{3.10}$$

where v_j is the idiosyncratic benefit from practising untouchability. The idiosyncratic benefit v_j is distributed according to some distribution function $\breve{H}(v_j)$ defined over support $[0, \overline{v}]$. $\breve{H}(v_j)$ is continuous and differentiable over $(0, \overline{v})$, so that $0 \leq \breve{H}(0) < 1, \breve{H}(\overline{v}) = 1$ and $\breve{H}'(v_j) > 0$. Notice that we permit part of the non-SC Hindu population to derive no benefit from practising untouchability. $K(g_{ST})$ specifies the cost of practising untouchability. The greater the value of g_{ST}, the lower the collective tolerance of untouchability, hence the greater the cost to upper caste and OBC individuals from its practice. We therefore assume $K(0) = 0, K' > 0$ and $K(1) \leq \overline{v}$. It is then clear from (3.10) that the proportion of the upper caste and OBC population within the village that will practise untouchability (i.e., its incidence within the H community) is given by:

$$\mu = 1 - \breve{H}(K(g_{ST})) \equiv \mu(g_{ST}); \tag{3.11}$$

with $[1 \geq \mu(0) = 1 - \breve{H}(0) > 0]$ and $\mu'(g_{ST}) < 0$. The variable μ can be alternatively interpreted as the probability that a randomly chosen non-SC Hindu member of the village will engage in the practice.

[13] It may however have an application to the debate among historians over the impact of Islamic rule on untouchability. There is a view that Islamic rule led to a reinforcement of upper caste Hindu norms of ritual purity, and, therefore, of untouchability. Our finding may be interpreted as broadly consistent with this view. Such a reinforcement may in turn have been one of the key drivers of mass conversion of Hindu 'untouchable' castes to Islam in medieval India. For a flavour of the highly divisive and politically charged debate in India over the connections between untouchability, Islamic rule and mass conversion, see Ilaiah and Ansari (2015).

Note that a positive proportion of the H population may *not* practise untouchability even if it is costless to do so. The proportion of the H population not practising untouchability increases as the SC bloc attains greater success in the caste conflict. Proposition 2 then yields the following corollary.

Corollary 1. Let Assumption 1 hold, and let $g_{ST}{}^*, g_{MR}{}^*$ be the values of g_{ST} and g_{MR}, respectively, in a Nash equilibrium corresponding to some initial configuration of ρ_H, ρ_S, ρ_M and θ. Suppose further that $g_{ST}{}^*, g_{MR}{}^* < \frac{1}{2}$. Then, ceteris paribus:

(i) any fall in either ρ_M or ρ_S must increase μ;

(ii) any rise in ρ_H must increase μ;

and

(iii) there exist $\overline{\theta}, \underline{\theta} \in (0,1), \underline{\theta} < \frac{1}{2} < \overline{\theta}$, such that any rise in θ over $\left(0, \underline{\theta}\right)$ must reduce μ, any rise in θ over $\left[\underline{\theta}, \overline{\theta}\right]$ must keep it invariant, while any rise in θ over $\left(\overline{\theta}, 1\right)$ must increase it.

Any fall in either the land or population share (or both) of the H bloc must reduce its power, ρ_H. When such declines are associated with corresponding increases in the land or population share (or both) of the SCs or of the non-Hindu bloc, either ρ_S or ρ_M (or both) must rise. The combined effect of such a redistribution of land and/or population share from upper castes and OBC Hindus to SCs and/or non-Hindus must, by Corollary 1, reduce the proportion of the former that practises untouchability (μ). A marginal redistribution of population or land within the H bloc, from OBCs to upper castes, will have the same effect when OBCs dominate upper castes in terms of caste power.

Remark 3. Note that, as can be easily seen from Proposition 1, the model becomes *scale neutral* under the additional assumption $F(n_i) \equiv \ln n_i$. This means that, given θ, any equi-proportionate change in the community resource endowments ρ_M, ρ_S and ρ_H will leave the equilibrium shares unchanged under this additional assumption. Thus, only the land and population *shares* of the different communities would matter, not the total land or population endowment of the village as a whole. Our data-set only provides information regarding the population proportions and land shares of the various communities within a village, not the aggregate population size or total land holding. Hence, in confronting the predictions of our theoretical model with the empirical evidence, we will deploy the scale-neutral version of the model.

4. Empirical strategy and findings

We now proceed to test the predictions of our model, as summarized by Corollary 1. To this end, we convert IHDS 2012 rural household-level data into village-level, focusing on Hindu non-SC/ST households, to conform to our theoretical model. This gives rise to a sample of about 13000 households drawn from about 1100 villages.

4.1. Empirical Strategy

The key driver of untouchability in our model is a community's relative power. Section 3 defined the measure of a community's power (i.e., its normalized resource endowment) simply as the population share weighted land share of the community (recall Remarks 2 and 3). Thus, for each village in our sample, the resource base or power of the OBC community, ρ_B, is empirically measured by the population share of OBC households in that village multiplied by the proportion of the total village land owned by OBC households therein. For example, if 50% of the population in the village belong to the OBC category, and OBC households collectively own 70% of the village land, then the variable ρ_B will be ascribed a value of 0.35 for that village. This measure will in general vary across villages. Resource endowments of upper castes, SCs and non-Hindus, as captured respectively by the variables ρ_U, ρ_S, and ρ_M in our theoretical model, are all measured analogously, as their respective population shares in the village multiplied by their respective shares of total village land.[14] As specified in Section 3, $\rho_H \equiv \rho_U + \rho_B$ and $\theta \equiv \frac{\rho_U}{\rho_H}$. We include only Muslims and Christians in the non-Hindu category, dropping the other religious minorities due to their numerical insignificance and localized presence.[15] As the land market is generally inactive in Indian villages, the land shares held by different communities can be considered relatively stable over time. Population shares of different communities are relatively stable as well. We therefore treat the composite population share weighted land shares as exogenously given and proceed to assess their effects on the practice of untouchability in our sample.

Our key outcome variable is a measure of the likelihood of practising untouchability by the upper caste (i.e., Brahmin and Forward caste) and OBC Hindu households within a village. This is nothing but the proportion of H (i.e., upper caste and OBC Hindu) households within a village who

[14] We also have information on income and expenditure of the households. But we prefer land ownership as a measure of resource base since its historically given character minimises the likelihood of reverse causality. As noted earlier (footnote 5), our measure of a community's resource endowment is closely linked to the notion of a 'dominant' caste, as introduced by Srinivas (1955).

[15] According the latest (2011) Indian Population Census, Sikhs, Jains, Parsees and Buddhists collectively constitute only about 3.5% of the Indian population. At 1.7% of the population, Sikhs make up about half of this group, but they are a negligible proportion of the population in every state except Punjab, where about 80% of them live, accounting for about 60% of that state's population.

practise untouchability (μ in our theoretical model). It is derived by dividing the number of H households who admit to practising untouchability within a village by the total number of H households in that village. Accordingly, we determine the proportion of H households who practise untouchability, in the *j*-th village, as follows:

$$P_j = \alpha_0 + \alpha_1\rho_{Hj} + \alpha_2\rho_{Sj} + \alpha_3\rho_{Mj} + \alpha_4\Sigma_k\theta_{jk} + aX_j + D_d + u_j.$$

Our sample provides us approximately 1100 villages with at least one non-SC/ST Hindu household, and therefore approximately 1100 observations of P_j. About a third of the upper caste and OBC households in a village practise untouchability on average (see Table 3).

Our key explanatory variables are the group power of upper castes, OBCs, SCs and non-Hindus as captured respectively by ρ_U, ρ_B, ρ_S, and ρ_M (see Table 3). We also include θ_k's, k=1,2,3 to capture the non-monotone relationship between θ and the proportion of H households practising untouchability. In order to minimise the extent of the omitted variable bias of our estimates we also include a vector of village characteristics X to minimise the omitted variable bias of our estimates. The set of variables X includes the village's distance from the nearest town, the presence of outside workers, all-weather roads as well as government and private primary schools. Closeness to a town or the presence of outside workers in a village may enhance villagers' exposure to urban values or other cultures, which in turn may influence the practice of untouchability. Education may, potentially, act as an influence against caste-based discrimination. We also include a number of household characteristics of the H population aggregated at the village level. These include the proportion of H household heads with at least grade 5 schooling, the proportions of H households falling in the Brahmin, Forward caste and OBC categories, and the proportions of H households in various primary occupations including cultivation, labour, business and artisans. Finally, note that the districts are the lowest levels of administration in India and district authorities are responsible for local spending on education, culture and poverty and family welfare, especially within India's decentralised governance since 1993. Accordingly, we include a vector of district dummies D_d, to account for the unobserved district-level variation in local governance that may also influence the outcome of interest.

Insert Table 3

All regression variables are defined in Table 3 below, which also summarises their descriptive statistics. We also show the community level means and standard deviations of population and land shares in Table 3. This highlights the fact that a community's land share is not exactly proportional to its population share, thus justifying the use of population weighted land share as the relevant measure of community power in our analysis.

4.2. Empirical findings

In light of Corollary 1, we test the following hypotheses: (a) $\alpha_1 > 0, \alpha_2 < 0, \alpha_3 < 0$, and (b) the proportion of H households practising untouchability falls at low values of θ, but rises at high values of θ. We include dummies to represent different deciles of θ, meant to approximate its non-monotone impact on untouchability, as highlighted in Corollary 1(iii), and test whether the marginal effect is negative when θ is close to 0 and positive when θ is close to 1.

Our key regression results are presented in Table 4. Controlling for all other factors, the predictions of our theoretical model all appear to be borne out by the data. Thus, the proportion of Hindu upper caste or OBC households practising untouchability within a village appears to be influenced not only by the internal characteristics of that caste bloc or by aggregate characteristics of the village, but, crucially, by the distribution of resources among the main communities within that village (and therefore by its communal power structure) as well, in ways predicted by our model.

Ceteris paribus, greater power of non-Hindus (largely Muslims) or SCs within the village (i.e., higher ρ_M or ρ_S) is associated with a smaller proportion of upper caste and OBC households practising untouchability therein (Corollary 1(i)) – the estimated coefficients are both negative and significant. The estimated coefficient for ρ_H is positive (Corollary 1(ii)), though not significant. Thus, reduced power of non-SC/ST Hindus within the village (i.e., lower ρ_H), when associated with a corresponding increase in the collective power of either SCs or non-Hindus (or both), implies significantly lower propensity of Hindu upper caste and OBC households living in the village to practise untouchability (Corollary 1(i)-(ii)). In other words, loss of either population share or land share by the upper caste and OBC bloc to the SCs or non-Hindus would reduce the incidence of untouchability among the former.

Our theoretical model also predicts the following: given ρ_H, ρ_M and ρ_S, increases in the collective power of upper castes vis-à-vis OBCs (i.e., changes in the variable θ) will have non-monotone effects on untouchability (Corollary 1(iii)). We use the decile distribution of θ to check for such an empirical relationship in our sample, and use the 3rd to 6th deciles as our reference category. As predicted by our model, we find a u-shaped relationship between θ and the propensity of H households to practise untouchability. At low values of θ (i.e., over the two lowest deciles) an increase in θ lowers this propensity. The underlying rationale is that, since OBCs greatly resource-dominate upper castes in this interval, the latter free-ride on the former by not participating in conflicts at all. A marginal redistribution of either population share or land share from OBCs to upper castes within the village would consequently reduce the allocation by OBCs to caste conflict without inducing upper castes to enter that conflict. This would cause a decline in the incidence of untouchability. Changes in θ do not affect untouchability in any significant manner at intermediate values (7th to 9th deciles). Our theoretical argument explains this by positing that, in this interval, both OBCs and upper castes contribute to conflict, and marginal redistributions from OBCs to upper castes are exactly neutralized by a combination of compensating reductions in conflict allocation by the former and compensating

increases by the latter. The outcome of the caste conflict remains unaffected in consequence. The propensity to practise untouchability subsequently increases with θ over the topmost decile in its distribution. We rationalize this by an argument symmetric to that deployed for the lowest deciles. Thus, the estimates seem broadly consistent with our hypotheses.

Insert Table 4

The coefficients associated with the village-level household characteristics of the upper caste and OBC bloc are of independent interest. As expected in light of our preliminary analysis (Table 2), we find a larger population share of Brahmin households within the H bloc to be associated with a higher incidence of untouchability within that bloc. However, consistent with Table 2, a larger within-H population share of Forward castes relative to OBCs appears not to matter, implying similar behaviour by these two groups with regard to untouchability. Thus, the broad patterns revealed earlier by Table 2 are confirmed by our regression analysis. A greater proportion of H households having heads engaged in cultivation appears to increase the incidence of untouchability. However, the education level of the head of the household appears not to matter at all – the proportion of H households where the head has studied at least till class 5 has no significant effect on the proportion of H households practising untouchability.

Village-level characteristics such as closeness to the nearest town and the presence of all-weather roads both imply greater interaction with the external world and therefore greater exposure to urban value systems and modes of behaviour. Such exposure can be expected to weaken the hold of traditional norms in the minds of villagers. Unsurprisingly, therefore, we find the presence of these characteristics to be associated with a lower propensity to practise untouchability on part of H households. However, the presence of primary schools within the village, whether public or private, does not appear to make a significant difference. Recall now the finding that having a larger proportion of households where the head has studied at least till class 5 does not reduce H households' propensity to practise untouchability. Taken together, these three findings suggest that the class-room organisation and pedagogic content of the rural school system, whether public or private, do not challenge the traditional value-system legitimising untouchability in any effective fashion.

Lastly, would the conclusions change if, instead of population share weighted land shares, we took the land share alone or the population share alone or their ratio, i.e., the normalized per capita land

share[16], as the measure of community power? Table A1 in Appendix 2 shows the corresponding estimates using the caste-specific population shares alone (column 2), caste-specific land shares alone (column 3), and the normalized per capita land shares (column 4). The collective power of non-Hindus (ρ_M) continues to exert a negative and significant impact on the propensity of a Hindu upper caste or OBC household to practise untouchability under the first two alternative empirical interpretations, but loses significance under the third (normalized per capita land share) interpretation. The community power of non-SC/ST Hindus (ρ_H) has a positive and significant impact under the population share specification alone (column 2). The community power of SCs (ρ_S) loses significance under all three specifications, and has the wrong sign in the first and third cases. Considering the role of θ, i.e., the extent of resource dominance of upper castes vis-à-vis OBCs, we can identify a u-shaped relationship only under the population share specification (column 2). Thus, none of the three alternative empirical proxies for community power generates estimates that conform to our theoretical predictions.

5. Policy considerations and concluding remarks

Instead of cataloguing the central findings of this paper all over again, we close with a brief discussion of some policy questions brought to light by our analysis.

Recall that, as per our multiplicative specification, a given increase in the land share of SCs has a larger (positive) impact on their community power when their population share is greater. Any increase in the community power of SCs reduces the propensity of upper caste and OBC Hindus to practise untouchability (Table 4). Our findings therefore highlight the joint importance, of greater numerical strength and greater land (or, more generally, wealth/asset) share on part of SCs at the village level, in reducing untouchability. Measures which encourage cross-village migration by SCs, to foster greater locational consolidation of that community, may reduce untouchability directly, by increasing the population share of SCs, in the villages of SC consolidation. Table 4 suggests that such locational consolidation may also make any subsequent redistribution of land or other assets from upper castes and OBCs to SCs more effective in reducing untouchability. Caste-targeted and location-specific employment generation programs may conceivably facilitate the former. Land redistribution and micro-credit programs specifically targeted towards SCs may improve their relative asset position. However, the caste-specific, and therefore exclusionary, nature of such programs is likely to jeopardise their political viability. On the other hand, community-neutral pro-poor wealth generation programs, while politically more viable because of their broader constituency, also entail large leakages to poor upper caste and OBC households. Consequently, such programs may be of limited use in improving

[16] The normalized per capita land share measure of community power falls as a community becomes numerically larger relative to its opponents. This is a crude but simple way of capturing the idea, originally due to Olson (1965), that larger groups are less effective in conflicts with other groups, because of greater internal free-riding and collective action problems.

the asset *share* of SCs. This appears to be particularly likely for land redistribution, given the high population density in India and consequent land poverty among upper castes and OBCs.

A second sphere of policy interventions is suggested by our finding that all-weather roads and proximity to towns both imply a significant fall in the prevalence of untouchability. These features indicate greater market integration, and consequently greater exposure to outside influences and modern value systems. Such exposure may weaken the appeal of traditional notions of ritual purity. Since greater market integration typically implies greater competitive pressures, it is also likely to increase individuals' costs of satisfying their 'taste' for discrimination and thereby reduce discrimination, as suggested by Becker (1957). Such costs would include, in particular, the costs to upper caste and OBC employers arising from labour shortages due to out-migration by SC workers to more anonymous urban labour markets, as a way of evading the more egregious forms of caste discrimination. Hence, public investment in rural transport and communications infrastructure, especially roads, rail, broadband and telephone networks, may have a significant role to play in reducing the practice of untouchability. Increasing employment opportunities for unskilled workers and providing social housing for migrant workers on an extensive scale in urban areas, by facilitating rural to urban migration by SC workers, would exert downward pressure on the incidence of untouchability as well.

Empirical examination of the relations between rural connectivity and urban economic growth on the one hand, and the incidence of untouchability on the other, would constitute an important line of future research. We have not addressed possible regional differences in the determinants of untouchability. Nor have we addressed untouchability in urban settings. Future work may usefully focus on these aspects as well. Lastly, our analysis highlights the importance of a third party, viz. Muslims and Christians, in the determination of conflict outcomes within the Hindu community. Analogous investigations, of how the presence of one ethnic group affects relations among *other* ethnic groups, may yield important insights in many different country contexts.

References

Akerlof, G. (1976). "The economics of caste and of the rat race and other woeful tales", *Quarterly Journal of Economics*, 90(4): 599-617.

Ambedkar, B.R. (1946). *Who were the Shudras*?; Bombay: Thacker.

Anderson, S. (2011). "Caste as an impediment to trade", *American Economic Journal: Applied Economics*, 3(1): 239-263.

Bakshi, D. and Dasgupta, I. (2018). "A model of dynamic conflict in ethnocracies", *Defence and Peace Economics*, 29(2): 147-170.

Becker (1957). *The Economics of Discrimination*; Chicago: The University of Chicago Press.

Bergstrom, T.C., Blume, L. and Varian, H. (1986). "On the private provision of public goods", *Journal of Public Economics*, 29: 25–49.

Béteille, A. (1971). "Race, caste and ethnic identity", *International Social Science Journal*, 23(4): 519-535.

Bidner, C. and Eswaran, M. (2015). "A gender-based theory of the origin of the caste system of India", *Journal of Development Economics*, 114: 142-158.

Caselli, F. and Coleman, W. (2013): "On the theory of ethnic conflict", *Journal of the European Economic Association*, 11(S1): 161–192.

Choi, J.P., Chowdhury, S.M., and Kim, J. (2016). "Group contests with internal conflict and power asymmetry", *Scandinavian Journal of Economics*, 118: 816–840.

Coffey, C., Gupta, A., Hathi, P., Spears, D., Srivastav, N. and Vyas, S. (2017). "Understanding open defecation in rural India: untouchability, pollution, and latrine pits", *Economic and Political Weekly*, LII(1): 59-66.

Coffey, D. and Spears, D. (2017). *Where India Goes: Abandoned Toilets, Stunted Development and the Costs of Caste*; Delhi: Harper Collins India.

Dasgupta, I. and Guha Neogi, R. (2018). "Between-group contests over group-specific public goods with within-group fragmentation", *Public Choice*, 174(3-4): 315-334.

Dasgupta, I. (2017). "Linguistic assimilation and ethno-religious conflict", in W. Buchholtz and D. Ruebbelke (eds.) *The Theory of Externalities and Public Goods: Essays in Memory of Richard C. Cornes*; Berlin, Springer: 219-242.

Dasgupta, I. (2009). **"**'Living' wage, class conflict and ethnic strife", *Journal of Economic Behavior and Organization*, 72(2): 750-765.

Dasgupta, I. and Kanbur, R. (2007). "Community and class antagonism", *Journal of Public Economics*, 91(9): 1816-1842.

Dasgupta, I. and Kanbur, R. (2005). "Bridging communal divides: separation, patronage, integration", in C. Barrett (ed.) *The Social Economics of Poverty: On Identities, Groups, Communities and Networks*; London, Routledge: 146-170.

Deshpande, A. (2011). *The Grammar of Caste: Economic Discrimination in Contemporary India*; Delhi: Oxford University Press

Dumont, L. (1970). *Homo Hierarchicus: The Caste System and its Implications*; Chicago: University of Chicago Press.

Esteban, J. and Ray, D. (2011): "A model of ethnic conflict", *Journal of the European Economic Association*, 9(3): 496–521.

Esteban, J. and Ray, D. (2008): "On the salience of ethnic conflict", *American Economic Review*, 98: 2185–2202.

Gandhi, R.S. (1982). 'The practice of untouchability: persistence and change', Humboldt Journal of Social Relations, 10(1): 254-275.

Geruso, M., and Spears, D. (2018). "Neighborhood sanitation and infant mortality", *American Economic Journal: Applied Economics*, 10(2): 125-62.

Gettleman, J. and Raj, S. (2018). "'Tell everyone we scalped you!' How caste still rules in India", *New York Times*, Nov. 17.

Hausken, K. (2005). "Production and conflict models versus rent-seeking models", *Public Choice*, 123: 59-93.

Ilaiah, K. and Ansari, M.A. (2015). "Is untouchability in India created by Islam?", *Mainstream*, LIII(43), October 17; http://www.mainstreamweekly.net/article6008.html

Iverson, V., Kalwij, A., Verschoor, A. and Dubey, A. (2014). "Caste dominance and economic performance in rural India", *Economic Development and Cultural Change*, 62(3): 423-457.

Kovenock, D. and Roberson, B. (2012). "Conflicts with multiple battlefields", in M. Garfinkel and S. Skaperdas (eds.) *The Oxford Handbook of the Economics of Peace and* Conflict; Oxford, Oxford University Press: 503-531.

Mitra, A. and Ray, D. (2014). 'Implications of an economic theory of conflict: Hindu-Muslim violence in India', *Journal of Political Economy*, 122(4): 719-765.

Mosse, D. (2018). "Caste and development: contemporary perspectives on a structure of discrimination and advantage", *World Development*, 110: 422–436.

Munshi, K. (2017). "Caste and the Indian economy", downloaded from http://www.histecon.magd.cam.ac.uk/km/Munshi_JEL2.pdf

Münster, J. 2007. "Simultaneous inter- and intra-group conflicts", *Economic Theory*, 32: 333–352.

Olson, M. (1965). *The Logic of Collective Action: Public Goods and the Theory of Groups*; Cambridge, MA: Harvard University Press.

Scoville, J.G. (1996). "Labor market underpinnings of a caste economy", *American Journal of Economics and Sociology*, 55(4): 385-94.

Shah, G., Mander, H., Thorat, S., Deshpande, S. and Baviskar, A. (2006). *Untouchability in Rural India*; Delhi: Sage.

Sharma, R.S. (1990). *Sudras in Ancient India: A Social History of the Lower Order Down to Circa AD 600*; Third Revised Edition, Delhi: Motilal Banarsidass.

Sharma, S. (2015). 'Caste-based crimes and economic status: evidence from India', *Journal of Comparative Economics*, 43: 204–226.

Spears, D., and Lamba, S. (2016). "Effects of early-life exposure to sanitation on childhood cognitive skills: evidence from India's total sanitation campaign", *Journal of Human Resources*, 51: 298-327.

Spears, D., and Thorat, A. (2018). "Caste, purity, and pollution and the puzzle of open defecation in India: evidence from a novel measure in a nationally-representative survey", *Economic Development and Cultural Change* (forthcoming): https://doi.org/10.1086/698852

Srinivas, M.N. (1952). *Religion and Society among the Coorgs of South India*; Bombay: Asia Publishing House.

Srinivas, M.N. (1955). "The social system of a Mysore village", in M. Marriott (ed.) *Village India*; Chicago: University of Chicago Press.

Teltumbde, A. (2018). *Republic of Caste: Thinking Equality in the Time of Neoliberal Hindutva*; Delhi: Navayana Publishing.

Thorat, A. and Joshi, O. (2015). "The continuing practice of untouchability in India: patterns and mitigating influences", India Human Development Survey Working Paper No. 2015-2; Delhi: National Council of Applied Economic Research.

Tullock, G. (1980). "Efficient rent seeking", in J.M. Buchanan, R.D. Tollison and G. Tullock (eds.) *Toward a Theory of the Rent-seeking Society*; College Station, Texas A and M University Press: 97-112.

Vyas, S. and Spears, D. (2018). "Sanitation and religion in south Asia: what accounts for differences across countries?", *Journal of Development Studies* (forthcoming): https://doi.org/10.1080/00220388.2018.1469742

Varshney, A. 2002. *Ethnic Conflict and Civic Life: Hindus and Muslims in India*. New Haven: Yale University Press.

Wilkinson, S. I. 2005. *Votes and Violence: Electoral Competition and Ethnic Riots in India*. Cambridge: Cambridge University Press.

TABLES

Table 1. Incidence of untouchability in rural areas of Indian states

State	Untouchability (%)
Madhya Pradesh	45.5
Himachal Pradesh	43.8
Bihar	41.3
Rajasthan	35.7
Uttar Pradesh	35.5
Gujarat	34.9
Chhatisgarh	33.3
Uttaranchal	31.6
India (except Maharashtra, West Bengal and Kerala)	**28.4**
Odisha	25.5
India (all states)	**24.3**
Karnataka	19.6
Haryana	17.2
Assam	16.5
Tamil Nadu	15.2
Jharkhand	14.7
Jammu and Kashmir	12.4
Punjab	12.1
Andhra Pradesh	10.2
Maharashtra	**3.2**
WB	**0.9**
Kerala	**0.2**

Note: Total number of observations is 26,329

Table 2. Community-specific incidence of practising untouchability (rural all-India)

	Community	(1) Population share (%)	(2) Land share (%)	(3) Population share practising untouchability (%)	(4) Probability of practising untouchability ($\frac{column\ 3\ value}{column\ 1\ value}$)
1	Brahmin	4	7	2.2	0.56
2	Forward Caste	14	25	4.7	0.34
	Upper/General Caste (Brahmin + Forward Caste)	**18**	**31**	**6.9**	**0.38**
3	**OBC**	**35**	**39**	**11**	**0.32**
	(Brahmin + Forward Caste + OBC)	53	70	17.9	0.34
4	ST	9	7	2.2	0.25
5	**SC**	**21**	**11**	**2.2**	**0.11**
6	Muslim	10	11	1.1	0.11
7	Other	7	8	0.6	0.09
8	**Non-Hindus (Muslim + Other)**	**17**	**19**	**1.7**	**0.10**
9	Total (1-7)	100	100	24	0.24

Note: The numbers involve rounding approximations. Total number of observations is 26,329.

Table 3. Variable definitions and summary statistics in the sample villages

Variable	Definition	Obs	Mean	Std. Dev.
	Outcome variable			
untouchability	Practice of untouchability by Hindu upper castes (non-SC/ST households)	1,215	0.32342	0.316624
	Village population shares			
U	Brahmin and Forward population share	1,184	0.255177	0.267787
B	OBC population share	1,183	0.435567	0.283303
H	(U + B)	1,183	0.690935	0.225737
S	SC population share	1,183	0.212466	0.169005
M	Muslim plus Christian population share	1,203	0.084289	0.164987
U_H	U/ H	1,178	0.280941	0.317399
	Village land shares			
U_landsh	Land share held by Brahmins and Forwards	1,115	0.309327	0.317604
B_landsh	Land share held by OBCs	1,115	0.409031	0.31455
H_landsh	(U_landsh + B_landsh)	1,115	0.718359	0.248308
S_landsh	Land share held by SCs	1,115	0.107955	0.14163
M_landsh	Land share held by Muslims and Christians	1,215	0.169951	0.318693
U_H_landsh	U_landsh/H_landsh	1,095	0.419251	0.382122
	Key explanatory variables: Measures of community power			
ρ_U	U *U_landsh	1,105	0.149671	0.222729
ρ_B	B *B_landsh	1,104	0.247064	0.260724
ρ_H	$\rho_U + \rho_B$	1,104	0.396869	0.235755
ρ_S	S * S_landsh	1,104	0.039095	0.097658
ρ_M	M * M_landsh	1,203	0.03376	0.109802
θ	$\rho_U/(\rho_U + \rho_B)$	1,085	0.389605	0.419239
	Other control variables X			
	Share of Brahmin households	1,215	0.083428	0.184351
	Share of Forward caste households	1,215	0.257187	0.327708
	Share of OBC households	1,215	0.643714	0.360497
	Share of households where head has ≥5 years of school	1,215	0.249352	0.234052
	Share of cultivator households	1,215	0.439327	0.294087
	Share of labour households	1,215	0.272429	0.233192
	Share of business households	1,215	0.09102	0.152573
	Share of artisan households	1,215	0.013115	0.063566
	Distance from the nearest town (km)	1,206	13.52322	10.53336
	Has outside workers	1,215	0.548148	0.497881
	Has all-weather road	1,215	0.878189	0.327202
	Has government primary school	1,215	0.981893	0.133393
	Has private primary school	1,215	0.412346	0.49246

Table 4. OLS estimates of untouchability practised by Hindu non-SC/ST Hindu household

	untouchability	untouchability	untouchability
ρ_H	0.0166	0.0042	0.0002
	(0.36)	(0.09)	(0.00)
ρ_M	-0.3653***	-0.3195***	-0.2830***
	(3.89)	(3.39)	(2.97)
ρ_S	-0.2252**	-0.2277**	-0.1993*
	(2.04)	(2.10)	(1.80)
θ: decile 1 & 2	-0.0895***	-0.0847***	-0.0743***
	(3.88)	(3.66)	(3.09)
θ: decile 7-9	-0.0278	-0.0297	-0.0283
	(1.01)	(1.09)	(1.02)
θ: decile 10	0.0843*	0.0948**	0.0835*
	(1.96)	(2.20)	(1.93)
Distance from the nearest town (km)	0.0020*	0.0018*	0.0018*
	(1.96)	(1.78)	(1.85)
Has outside workers	-0.0056	-0.0036	-0.0001
	(0.27)	(0.17)	(0.01)
Has all-weather road	-0.0840***	-0.0726**	-0.0675**
	(2.59)	(2.24)	(2.07)
Has government primary school	-0.0309	-0.0446	-0.0617
	(0.44)	(0.63)	(0.84)
Has private primary school	-0.0108	-0.0038	-0.0041
	(0.56)	(0.19)	(0.20)
Share of households where head has ≥ 5 years of school		-0.0214	-0.0366
		(0.47)	(0.78)
Share of cultivator households		0.0847*	0.1118**
		(1.66)	(2.14)
Share of labourer households		-0.0687	-0.0418
		(1.17)	(0.69)
Share of business households		-0.0092	0.0020
		(0.12)	(0.03)
Share of artisan households		-0.1032	-0.0683
		(0.56)	(0.37)
Share of Brahmin households			0.4466***
			(2.97)
Share of Forward Caste households			0.2525*
			(1.81)
Share of OBC			0.2667*

households			
			(1.93)
Intercept	0.4575***	0.4632***	0.1839
	(4.74)	(4.45)	(1.03)
District dummies	Yes	Yes	Yes
R^2	0.16	0.17	0.18
N	1,096	1,096	1,096

We use robust standard errors. T-statistics are shown in the parentheses: * p<0.1; ** p<0.05; *** p<0.01

Appendix 1

Define $X_R \equiv x_{MR} + x_{HR}, X_T \equiv x_{ST} + x_{HT}$. We shall prove Proposition 2 via the following lemma.

Lemma 2. Let Assumption 1 hold and let ${g_{ST}}^*, {g_{MR}}^*$ be the values of g_{ST} and g_{MR}, respectively, in some initial Nash equilibrium. Suppose further that ${g_{ST}}^*, {g_{MR}}^* < \frac{1}{2}$. Then:

(i) given ρ_S, if a marginal change in any of the other parameters ρ_M, ρ_H and θ generates an increase (resp. decrease) in the equilibrium value of $\left(\frac{x_{MR}}{{X_R}^2}\right)$, then x_{HT} must fall (resp. rise), and x_{ST} rise (resp. fall) in the new equilibrium;

(ii) given ρ_S, ρ_H and θ, a marginal increase in ρ_M must imply a rise in the equilibrium values of both x_{MR} and $\left(\frac{x_{MR}}{{X_R}^2}\right)$.

Proof of Lemma 2.

Let Assumption 1 hold. Then, by Proposition 1, every Nash equilibrium must satisfy conditions (3.6)-(3.9). Suppose ${g_{ST}}^*, {g_{MR}}^* < \frac{1}{2}$. Then, by (3.2)-(3.3), we must have, in the initial equilibrium:

$$x_{HT} > x_{ST}, x_{HR} > x_{MR}. \tag{N1}$$

It can be easily checked that:

$$\text{given any } a, b > 0, \frac{\partial\left[\frac{a}{(a+b)^2}\right]}{\partial a} < 0 \ \ (\text{resp.} > 0) \text{ iff } a > b \ (\text{resp.} < b). \tag{N2}$$

(i) Given ρ_S, suppose a marginal change in any of ρ_M, ρ_H and θ generates an increase (resp. decrease) in the equilibrium value of $\left(\frac{x_{MR}}{{X_R}^2}\right)$. Then, from (3.6), $\left(\frac{x_{ST}}{{X_T}^2}\right)$ must rise (resp. fall) as well. By (N1)-(N2), $\frac{\partial\left(\frac{x_{ST}}{{X_T}^2}\right)}{\partial x_{ST}} > 0$. If x_{HT} does not fall (resp. rise) but $\left(\frac{x_{ST}}{{X_T}^2}\right)$ rises (resp. falls), then x_{ST} must rise (resp. fall). By (N1)-(N2), $\frac{\partial\left(\frac{x_{HT}}{{X_T}^2}\right)}{\partial x_{HT}} < 0$, and $F'' < 0$. Therefore, given ρ_S, if x_{HT} does not fall (resp.

rise) even as x_{ST} rises (resp. falls), then (3.8) cannot hold. Hence, x_{HT} must fall (resp. rise). But, by the same argument as before, if x_{HT} falls (rises), then, from (3.8), x_{ST} must rise (resp. fall).

(ii) Given ρ_S, ρ_H and θ, suppose a marginal increase in ρ_M does not produce a rise in the equilibrium value of x_{MR}. Then, since by assumption $F'' < 0$, the RHS of (3.7) must fall. By (N1)-(N2), $\frac{\partial\left(\frac{x_{HR}}{{X_R}^2}\right)}{\partial x_{HR}} < 0$. Then, by (3.7), x_{HR} must rise. By (N1)-(N2), $\frac{\partial\left(\frac{x_{MR}}{{X_R}^2}\right)}{\partial x_{MR}} > 0$. Thus, if x_{MR} does not rise and x_{HR} does rise, then $\left(\frac{x_{MR}}{{X_R}^2}\right)$ must fall. Hence, by (3.6) and (3.9), $\left(\frac{x_{ST}}{{X_T}^2}\right)$ must fall as well. Recall that, by (N1)-(N2), $\frac{\partial\left(\frac{x_{ST}}{{X_T}^2}\right)}{\partial x_{ST}} > 0$. Hence, if x_{HT} does not rise but $\left(\frac{x_{ST}}{{X_T}^2}\right)$ falls, then x_{ST} must fall. But if x_{ST} falls, since $F'' < 0$, the RHS of (3.8) must fall, given ρ_S. This cannot satisfy (3.8) when x_{HT} does not rise but x_{ST} falls, since, by (N1)-(N2), $\frac{\partial\left(\frac{x_{HT}}{{X_T}^2}\right)}{\partial x_{HT}} < 0$. Hence, x_{HT} must rise, along with x_{HR}. Since $F'' < 0$, this implies that, the RHS of (3.6) must rise. However, we have already established that $\left(\frac{x_{ST}}{{X_T}^2}\right)$ must fall. In light of (3.6), we then have a contradiction, which establishes the claim that a marginal increase in ρ_M must generate a rise in the equilibrium value of x_{MR}.

Now suppose x_{MR} rises, but $\left(\frac{x_{MR}}{{X_R}^2}\right)$ does not rise. Then, since, by (N1)-(N2), $\frac{\partial\left(\frac{x_{MR}}{{X_R}^2}\right)}{\partial x_{MR}} > 0$, x_{HR} must rise. However, recalling (3.6) and (3.9), since $\left(\frac{x_{MR}}{{X_R}^2}\right)$ does not rise, and since $F'' < 0$, neither $(\rho_B - x_{BT} - x_{BR})$ nor $(\rho_U - x_{UT} - x_{UR})$ can fall, given ρ_H and θ. Thus, $(x_{HT} + x_{HR})$ cannot rise. Then, since x_{HR} rises, x_{HT} must fall. Now, by (3.6) and (3.9), if $\left(\frac{x_{MR}}{{X_R}^2}\right)$ does not rise then $\left(\frac{x_{ST}}{{X_T}^2}\right)$ cannot rise either. Since, by (N1)-(N2), $\frac{\partial\left(\frac{x_{ST}}{{X_T}^2}\right)}{\partial x_{ST}} > 0$, it follows that x_{ST} must also fall if x_{HT} falls. However, given ρ_S, a simultaneous decline in both x_{ST} and x_{HT} is incompatible with the satisfaction of (3.8), since $F'' < 0$ and $\frac{\partial\left(\frac{x_{HT}}{{X_T}^2}\right)}{\partial x_{HT}} < 0$ by (N1)-(N2). This contradiction establishes part (ii) of Lemma 2. ■

Proof of Proposition 2.

Let Assumption 1 hold. Then, by Proposition 1, every Nash equilibrium must satisfy conditions (3.6)-(3.9). Suppose further that ${g_{ST}}^*, {g_{MR}}^* < \frac{1}{2}$, so that (N1) holds.

(i) Noting (3.2), that the equilibrium value of g_{ST} falls with any decline in ρ_M follows immediately from Lemma 2. To show that g_{ST} falls with any decline in ρ_S, we need to establish the following:

given ρ_H, ρ_S and θ, a marginal decline in ρ_M must reduce the equilibrium value of $(\rho_M - x_{MR})$. (N3)

Suppose not. Then, since $F'' < 0$, and since, by Lemma 2(ii), x_{MR} must decline with a fall in ρ_M, from (3.7), recalling that $\frac{\partial\left(\frac{x_{HR}}{X_R{}^2}\right)}{\partial x_{HR}} < 0$ by (N1)-(N2), we can conclude that x_{HR} must rise. But then $\left(\frac{x_{MR}}{X_R{}^2}\right)$ must fall, and hence, since $F'' < 0$, by (3.6) and (3.9), neither $(\rho_B - x_{BT} - x_{BR})$ nor $(\rho_U - x_{UT} - x_{UR})$ can fall and at least one must rise. Given ρ_H, this implies $(x_{HT} + x_{HR})$ must fall. Thus, since x_{HR} increases, x_{HT} must fall. Since, by (3.6), $\left(\frac{x_{ST}}{X_T{}^2}\right)$ must fall as well, recalling that $\frac{\partial\left(\frac{x_{ST}}{X_T{}^2}\right)}{\partial x_{ST}} > 0$ by (N1)-(N2), this implies x_{ST} must fall. However, since $F'' < 0$, and $\frac{\partial\left(\frac{x_{HT}}{X_T{}^2}\right)}{\partial x_{HT}} < 0$ by (N1)-(N3), (3.8) cannot hold if x_{ST} and x_{HT} both decline with ρ_S held constant. This contradiction establishes (N3). By Lemma 2(ii), given ρ_S, ρ_B and θ, a marginal decline in ρ_M must reduce $\left(\frac{x_{MR}}{X_R{}^2}\right)$ as well. Then, by (3.6) and (3.9), $min\{F'(\rho_B - x_{BT} - x_{BR}), F'(\rho_U - x_{UT} - x_{UR})\}$ must fall. By (N3), since $F'' < 0$, the decline in ρ_M must raise $F'(\rho_M - x_{MR})$. Thus, if ρ_M declines, then $\frac{min\{F'(\rho_B - x_{BT} - x_{BR}), F'(\rho_U - x_{UT} - x_{UR})\}}{F\prime(M_m - x_{mR})}$ declines as well. Using (3.6)-(3.7), we have:

$$\frac{x_{MR}}{x_{HR}} = \frac{min\{F'(\rho_B - x_{BT} - x_{BR}), F'(\rho_U - x_{UT} - x_{UR})\}}{F\prime(M_m - x_{mR})}. \qquad \text{(N4)}$$

Recalling (3.3), it follows from (N4) that the equilibrium value of g_{MR} falls in consequence of a marginal fall in ρ_M from any initial situation where $g_{MR} < \frac{1}{2}$, given ρ_S, ρ_H and θ. Hence, starting from an initial situation where $g_{MR} < \frac{1}{2}$, any fall in ρ_M must reduce the equilibrium value of g_{MR}. Then, by an analogous argument, it must be that the equilibrium value of g_{ST} falls with any decline in ρ_S.

(ii)-(iii) We first show that:

> given ρ_S, ρ_M, the equilibrium value of $\left(\frac{x_{MR}}{X_R{}^2}\right)$ must fall if there is either an increase in ρ_H (given θ) or a decrease in θ (given ρ_H) over $(0, \underline{\theta})$. (N5)

Suppose not. Then, by (3.6) and (3.9), recalling that $F'' < 0$, at least one of x_{HT}, x_{HR} must increase. Without loss of generality, suppose x_{HT} increases. If $\left(\frac{x_{MR}}{X_R{}^2}\right)$ does not fall, then, by (3.6), $\left(\frac{x_{ST}}{X_T{}^2}\right)$ cannot fall either. Hence, since, by (N1)-(N2), $\frac{\partial\left(\frac{x_{ST}}{X_T{}^2}\right)}{\partial x_{ST}} > 0$, it follows that if x_{HT} increases, x_{ST} must rise well. Thus, if (N5) does not hold, then a rise in ρ_H (given θ) or a decline in θ over $(0, \underline{\theta})$ (given ρ_H) must both imply an increase in the equilibrium values of x_{HT} and x_{ST}. However, as $\frac{\partial\left(\frac{x_{HT}}{X_T{}^2}\right)}{\partial x_{HT}} < 0$ by (N1)-(N2)) and $F'' < 0$, (3.8) cannot hold if both x_{HT} and x_{ST} rise from their initial equilibrium values, given ρ_S. This contradiction establishes (N5). Now note the following:

given ρ_S, ρ_M and ρ_H, the equilibrium value of $\left(\frac{x_{MR}}{{X_R}^2}\right)$ must fall with an increase in θ over $(\overline{\theta}, 1)$. (N6)

Recall that, by Proposition 1, if $\theta \in (\overline{\theta}, 1)$, then $x_{BT}, x_{BR} = 0$ in equilibrium. Condition (N6) then follows by an argument exactly analogous to that used to establish (N5). Lastly, it can be shown that:

given ρ_S, ρ_M and ρ_H, the equilibrium values of g_{ST} and g_{MR} must both remain invariant with respect to any change in θ over $[\underline{\theta}, \overline{\theta}]$. (N7)

Together, Lemma 2(i), (3.2) and (N5), (N6) and (N7) yield parts (ii) and (iii) of Proposition 2. ■

Appendix 2

Table A1. OLS estimates of untouchability practised by upper caste and OBC Hindu households – alternative estimates using population share, land share and normalized land share per capita

	(2) Population share	(3) Land share	(4) Land share / Population share
Variables	untouchability	untouchability	untouchability
ρ_H	0.0972*	-0.0801	-0.0010
	(1.80)	(1.51)	(0.92)
ρ_M	-0.2093***	-0.1980***	-0.0007
	(3.33)	(4.35)	(0.58)
ρ_S	0.0191	-0.1299	0.0012
	(0.27)	(1.58)	(0.09)
θ: decile 1_2	-0.0602**	-0.0772***	-0.1133***
	(2.52)	(3.22)	(3.01)
θ: decile 7_8_9	-0.0342	0.0095	-0.0175
	(1.44)	(0.32)	(0.48)
θ: decile 10	0.0862**	0.0533	-0.0480
	(2.22)	(1.31)	(0.73)
Intercept	0.1416	0.2707	-0.2198
	(0.87)	(1.48)	(0.76)
Other controls	Yes	Yes	Yes
District dummies	Yes	Yes	Yes
R^2	0.18	0.19	0.26
N	1,175	1,089	512

T-statistics are in the parentheses: * p<0.1; ** p<0.05; *** p<0.01; other controls are as in Table 4.