The Efficacy of Parochial Politics:
Caste, Commitment, and Competence in Indian Local Governments *

Kaivan Munshi[†]   Mark Rosenzweig[‡]

November 2009

Abstract

This paper explores the possibility that community involvement in politics need not necessarily worsen governance and, indeed, can be efficiency-enhancing when the context is appropriate. Complementing the new literature on the role of community networks in solving market problems, we test the hypothesis that strong traditional social institutions, exemplified by the sub-caste in the Indian context, can discipline the leaders they put forward, successfully substituting for political parties when they are ineffective. Using new data on local governments at the ward level over multiple terms, and exploiting the randomized election reservation system, we provide support for the theoretical prediction that the level of public goods received should increase discontinuously, with an accompanying change in leader characteristics, when the population share of the most numerous sub-caste eligible to contest the election in a ward crosses a threshold level. This improvement in leadership competence occurs without apparently diminishing leaders' responsiveness to their constituency.

1 Introduction

It is increasingly recognized that ethnic, linguistic, tribal, and caste affiliations can play an important role in the selection of political leaders and the performance of governments. In India, the setting for this paper, caste politics appears to have grown stronger over time (Banerjee and Pande 2007) and a similar persistence in ethno-linguistic politics has been documented in countries at various stages of economic development (e.g., Posner 2005). The standard explanation for the emergence and the persistence of parochial politics is that social loyalty gives leaders leverage when political institutions are weak, allowing them to appropriate substantial rents for themselves in return for the patronage they provide to their supporters (Padro i Miquel 2007). Parochial politics is thus associated with corrupt rulers (kleptocracies), wasteful patronage transfer, and low levels of public good provision.

Economists historically associated networks and other community-based economic institutions with nepotism, rent-seeking, and inefficiency. In recent years, however, this view has been replaced by a more moderated position, which recognizes that these institutions can under the right circumstances facilitate economic activity when markets function imperfectly. Complementing the new literature on non-market economic institutions, this paper documents, using new data on local public good provision and electorate and elected leader characteristics, the role played by the community in solving leadership commitment problems when the democratic system functions imperfectly and the context is appropriate, providing a more complete assessment of parochial politics and its consequences.

The classical Downsian (1957) model of political competition is not concerned with leaders' (or candidates') characteristics, focussing instead on the identity and the preferences of the pivotal voter. Recently, however, citizen-candidate models in which leaders cannot commit to implementing policies that diverge from their own preferences have generated much attention in the political economy literature. Osborne and Slivinski (1996) and Besley and Coate (1997) are the early contributions to this literature, which has now received empirical support both in the United States (Levitt 1996, List and Sturm 2006) and in developing countries (Pande 2003, Chattopadhyay and Duflo 2004). To understand the consequences of such an absence of leadership commitment, consider a political system in which elected representatives allocate a fixed level of resources to two public goods, sanitation and street lights, in their constituencies. Individuals are heterogeneous in their preferences for public goods. With suitable restrictions on entry costs, the citizen-candidate model predicts that the winning candidate will be endowed with the median level of ability in the constituency (in expectation) and

policy choices will coincide with the predictions of the Downsian model.[1]

The predictions of the two models start to diverge, however, once we endogenize the total level of resources and allow individuals to differ on two dimensions – in their preference for public goods and their leadership competence. Assume that these two characteristics are correlated such that more competent individuals (e.g., professionals), who provide a higher level of resources for their constituency when elected, prefer larger expenditures on, say, street lights. The tension that arises when commitment is absent is that the pivotal median voter would like to endorse the most competent individual in the constituency as the leader but at the same time is aware that the share of resources subsequently allocated to street lights will exceed his own preferred allocation. Although the leader may now be endowed with greater competence than the median voter, the most competent individual will not necessarily be chosen. The distribution of resources will also fail to match the median voter's preferred distribution.

In a well-functioning polity, a party apparatus could solve this commitment problem. The political party has been seen to provide voters with information (Caillaud and Tirole 2002), to screen candidates (Snyder and Ting 2002), and, most importantly, to ensure that candidates commit to the party platform once they are elected to office (Alesina and Spear 1988, Harrington 1992). In countries with weak parties, as in much of the developing world, existing social ties could be exploited instead to ensure that elected leaders do not renege on their commitments. In India, networks organized around the endogamous sub-caste or *jati* have been seen to solve information and commitment problems in the credit market (Banerjee and Munshi 2004), the labor market (Munshi and Rosenzweig 2006), and to provide mutual insurance (Munshi and Rosenzweig 2009). If the sub-caste were able to extend the domain of its influence beyond the market to the political system, local leaders elected with the support of their sub-caste would make decisions that reflect the preferences of the group, even if they did not expect to be elected in the future, to avoid the social and economic punishment they would face if they chose their individually optimal policies instead. Under conditions that we describe below, this would allow the most numerous sub-caste in a constituency to put forward its most competent member as a candidate, while at the same time ensuring that his choices reflected the preferences of the median individual in the group (although not the entire constituency) once elected.

---

[1]Besley and Coate (1997) derive this result for single-candidate and two-candidate political equilibria. Their model rules out equilibria with three or more candidates.

A number of recent papers have focused on the vertical (competence) dimension of leadership quality, studying how outside options and compensation in office shape the pool of candidates and the subsequent effort that elected leaders exert (Caselli and Morelli 2004, Messner and Polborn 2004, Ferraz and Finan 2008). Other studies, using data from India, have attempted to identify the misallocation of resources due to corruption or targeting, which can be interpreted as another dimension of competence (Duflo, Fischer, and Chattopadhyay 2005, Besley, Pande, and Rao 2007) Our analysis is concerned with the characteristics of elected leaders and the resources that they provide to their constituency, net of any seepage through corruption or targeting. By concentrating on the commitment problem, and its effect on leader selection, we link the vertical dimension emphasized in the studies cited above to the literature on political competition and political parties, which has otherwise restricted itself to the horizontal (valence) dimension of leadership quality. In our framework, a social institution – the caste – decouples these two dimensions of leadership quality, allowing more competent leaders to be selected.

We exploit a unique local governance experiment that is currently under way in rural India to test the hypothesis that parochial politics - organized around the sub-caste - can be efficiency-enhancing when the context is appropriate. As described in Section 2, the 73rd Amendment of the Constitution, passed in 1991, gave village governments or *panchayats* the power and the resources to make relatively substantial expenditures on public goods. The *panchayats* were divided into wards and regular elections for the position of *panchayat* president and for each ward representative have been held every five years in most states. Reservation of seats for historically disadvantaged groups – Scheduled Castes, Scheduled Tribes, Other Backward Castes, and women – was also introduced in the 73rd Amendment. Seats for each reserved category are assigned randomly across wards and, for the position of the president, randomly across *panchayats*, from one election to the next. This affords a unique opportunity to study the effect of exogenous leadership changes on the performance of the *panchayat*. Note that the changing requirements for leader eligibility across elections means that the discipline of re-election is almost entirely absent, making the commitment problem especially severe.[2]

Starting with Chattopadhyay and Duflo (2004), a number of studies have exploited the transformation of the *panchayat* system with the 73rd Amendment to test the citizen-candidate model by examining the *distribution* of public and private goods across and within villages. Consistent with the absence of commitment, public good provision is higher in the *panchayat* president's village, and

---

[2]Our data indicate that only 13.9 percent of elected members of *panchayats* had run for office previously.

scheduled castes and tribes receive more resources when the president's position is reserved for a member of their group (Besley, Pande, Rahman, and Rao 2004, Duflo, Fischer, and Chattopadhyay 2005). Our analysis differs from this research in three important ways: First, we focus on political outcomes at the ward level because sub-castes are too small to play a dominant role in state- or even *panchyat*-level elections in India (Chhibber 1999). Second, in addition to testing for leadership commitment, we directly measure leadership competence based on the *level* of resources channeled to the ward representative's constituency. Third, our analysis explicitly recognizes that reservation, by restricting the set of potential leaders, changes not only the caste and gender of the leader but also the probability that a *caste equilibrium* that overcomes the leadership commitment problem and serves the interest of a different pivotal voter will emerge in the ward.

The data that we use in this paper are drawn from the sixth round of a nationally-representative panel survey of rural Indian households carried out by the National Council of Applied Economic Research (NCAER). The current round has three components that are relevant for this study: (i) a census of all households in the approximately 250 villages covered by the survey, which enables the identification of the pivotal voter at the ward level by sub-caste; (ii) a village module that includes information on public good provision at the street level for each of three *panchayat* terms; and (iii) the characteristics of the elected representatives to and electoral candidates for *panchayat* seats in each ward in those terms. These survey data are indicative of the importance of local caste politics in India. Key informants were asked to list the various sources of support that the elected ward representatives received in each of the last three *panchayat* elections. As described in Table 1, caste is clearly the dominant source of support: 82 percent of the elected ward representatives received support from their caste inside the village and 29 percent received support from caste members outside the village. Religious groups and wealthy individuals are evidently much less prevalent sources of support and, more importantly, just 41 percent of local representatives are reported to have received support from a political party.

Section 3 of the paper develops a citizen-candidate model of leadership selection with citizens who are heterogeneous in their preferences for public goods and in leadership competence, and who belong to groups (sub-castes) that can discipline their leaders. The principal implication of the model in this research setting is that the level of public goods received should increase discontinuously, with an accompanying change in leader characteristics, when the share of the most numerous sub-caste that is eligible to contest the election in the ward crosses a threshold, allowing a caste equilibrium

with commitment to emerge. We test these predictions in Section 4 of the paper using the new survey data, exploiting the random change in the set of sub-castes that the leader can be drawn from across election terms to estimate the effect of a shift to a caste equilibrium on the *level* of public goods provided within each ward. We simultaneously estimate the effect of a shift to the caste equilibrium, with its consequences for the identity of the pivotal voter, on the *composition* of local public goods. The empirical analysis concludes by assessing whether the commitment problem is overcome in a caste equilibrium, exploiting the fact that gender reservation is overlayed on caste reservation in India. The gender of the leader should have no effect on the composition of public goods in a caste equilibrium, although it could in the alternative equilibrium without commitment, regardless of the extent to which the preferences of male and female leaders differ.

Our results suggest that in the context of Indian local governments, parochial (caste) politics appears to simultaneously increase both the competence and commitment of elected leaders, as indicated by the characteristics of the elected representatives and their enhanced delivery of local public goods in response to constituents' preferences. These effects, however, may not scale up. At the state and national level, multiple sub-castes must form coalitions to compete successfully, appealing to a broader caste identity to win elections. As discussed below, the collective punishments that discipline leaders within sub-castes do not cross caste lines. Without a mechanism to discipline leaders, caste politics at higher levels of government could thus be associated with substantial inefficiencies as documented by Banerjee and Pande (2007). Even at the local level, there are distributional consequences that are not necessarily benign. Because the elected ward representative in a caste equilibrium is answerable to the social group she belongs to, her choices will be aligned with the preferences of the median voter in her caste rather than the median voter in the constituency. The welfare consequences of a caste equilibrium are thus ambiguous. Caste politics is a second-best solution and, ultimately, there is no perfect substitute for well-functioning political institutions (parties) in a competitive democratic system.

2 Institutional Setting

For many decades after independence in 1947 there was little effort to encourage local government in India. Local government expenditures accounted for only 8.6 percent of total government expenditure in 1976-77 and 6.4 percent in 1986-87 (Datta 1993). Local government councils or *panchayats* were

almost completely dependent on state governments for their revenues, which were typically earmarked for specific activities (Chhibber 1999). A serious attempt was made, starting in the early 1990s, to make *panchayats* more influential and autonomous. The 73rd Amendment of the Constitution, passed in 1991, established a three-tier system of *panchayats* – at the village, block, and district level – with all seats to be filled by direct election. The village *panchayats*, which often cover multiple villages, were divided into 10-15 wards. *Panchayats* were given the power and the resources to make relatively substantial expenditures on public goods, and regular elections for the position of *panchayat* president and for each ward representative have been held every five years in most states (Chaudhuri 2003).

The major responsibilities of the *panchayat* are to construct and maintain local infrastructure (public buildings, water supply and sanitation, roads) and to identify targeted welfare recipients. Although *panchayats* can now raise their own revenues, in large part through land and water usage taxes, these revenues accounted for just 12.6 percent of total annual expenditures in 2006-2007, the last complete years for the *panchayats* in our sample. The major source of funding is still the state government, although *panchayats* also benefit from specific central government programs. Chattopadhyay and Duflo (2004) note that most of these external funds are allocated through the Sampoorna Grameen Rozgar Yojana (SGRY), an infrastructure scheme covering irrigation, drinking water, roads, etc., and a Block Grant to the *panchayat*.[3] The *panchayat* has complete control over the Block Grant, and assuming that it has similar autonomy over the revenue that it raises, our data indicate that 50.2 percent of its budget is discretionary. Combining the discretionary and non-discretionary components of the budget, we will later see that the major expenditure items include the construction and maintenance of drinking water and sanitation facilities, roads, electricity, street lights, public telephones, irrigation infrastructure, and public buildings. The delivery of education and health services, however, remains under the control of the state government.

How are *panchayat* expenditures allocated? The council makes decisions collectively (the president does not have veto power) and so the ability of an elected ward representative to channel public goods to his constituency will depend on his influence within the *panchayat* as well as his ability to ensure that the earmarked resources reach their destination. As described in the Introduction, the mix of goods that the representative lobbies for will depend on the level of leadership commitment, with the

---

[3]Based on the balance sheets collected from 40 *panchayats* in the state of West Bengal, Chattopadhyay and Duflo report that the Block Grant accounts for 33 percent, the SGRY (formerly known as the Jawhar Rozgar Yojana) 30 percent, and welfare programs 15 percent of the external funds. Our all-India data are broadly consistent with these statistics. These data indicate that in the years 2006 and 2007 Block Grants accounted for 43 percent of external funds and the SGRY another 15 percent of these funds.

leader choosing his preferred mix when commitment is absent. What makes the *panchayats* especially interesting for an analysis of leadership commitment is the system of randomized reservation, by caste and by gender, that was also introduced in the 73rd Amendment in 1991. The rule followed by almost all Indian states is that seats are reserved in each election for three historically disadvantaged groups – Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Castes (OBC) – in proportion to their share of the population in each district. Within each of these categories, and in constituencies open to all castes in that election, one-third of the seats are reserved for women (Chattopadhyay and Duflo 2004). Seats are reserved randomly across wards and, for the position of the president, randomly across *panchayats*, from one election to the next in each district. The only restriction is that no seat can be reserved for the same group across consecutive elections (Besley, Pande, and Rao 2007), which exacerbates the leadership commitment problem since representatives in many reserved seats will be aware that they will hold office for a single term. This system of randomized reservation exogenously changes the pool of eligible candidates within a ward, while leaving the electorate unchanged. We will see in Section 3 that the likelihood of a caste equilibrium, in which the most numerous eligible sub-caste in the ward puts forward its most competent member and subsequently disciplines him is increasing in its population-share. Exogenous changes in the set of eligible sub-castes from one election to the next thus generate exogenous changes in the likelihood that a caste equilibrium with commitment will emerge, which we exploit in the empirical analysis that follows in Section 4.

The main idea underlying the analysis in this paper is that sub-castes have been able to extend the domain of their influence from private economic activity to the public political arena. The basic rule in Hindu society is that individuals cannot marry outside their sub-caste or *jati*. Marriage ties built over many generations give rise to frequent interactions within a *jati* and so exclusion from these interactions serves as a natural and extremely effective mechanism to sustain cooperative behavior. Recent evidence from urban India indicates that networks organized around the *jati* provide credit (Banerjee and Munshi 2004) and jobs (Munshi and Rosenzweig 2006) for their members. More importantly for the current analysis, these networks continue to serve as the main source of mutual insurance for their members in rural India, particularly for major contingencies such as illness and marriage (Munshi and Rosenzweig 2009). Exclusion from future social interactions and network services can be a powerful disciplining device, and the key assumption in the model that follows in Section 3 is that the sub-caste is able to discipline its representative even if he only expects to

hold political office for a single term. Moreover, the size of the sub-caste *within* the ward will have no bearing on the level of commitment that can be sustained since the collective punishments are organized at the level of the sub-caste, which extends beyond the ward and beyond the village.

3   The Model

The model developed in this section extends the citizen-candidate models of Osborne and Slivinski (1996) and Besley and Coate (1997) by introducing a vertical dimension to leader quality and by allowing for leadership commitment (within a restricted social group). Two individuals can potentially be elected from a constituency in our framework: (i) The median individual in the constituency who stands independently and selects policies aligned with his own preferences. (ii) The most able member of the single social group in the constituency that can compete with the median individual. We begin by deriving conditions under which the equilibrium with leadership commitment in which the group representative is elected as the leader can emerge. Subsequently, we derive the relationship between the population share of the group, the probability that such an equilibrium will be obtained, and the level of public goods received by the constituency. We make a number of simplifying assumptions for analytical convenience when deriving these results. Theoretical and empirical support for some of the important assumptions is provided at the end of this section.

3.1   Individual Preferences and Leadership Quality

N individuals reside in a political constituency. Each individual i is endowed with a unique level of ability or competence $\omega_i \in [0, 1]$. Two public goods are provided in this economy. To highlight the trade-off between leadership competence and public good preferences in equilibrium and to keep the model simple we assume that preferences and ability are isomorphic: individual i's most preferred share of resources to be allocated to the second good is ω_i. Moreover, his utility is an additively separable function of the *level* of resources received in the constituency and the *share* of these resources allocated to the second good.[4]

The overall level of resources and the share of these resources allocated to the two goods is

---

[4]These assumptions can be shown to be consistent with utility maximizing behavior. Let individual i receive the following utility from spending g_1, g_2 on the two goods: $U = (1 - \omega_i)ln(g_1) + \omega_i ln(g_2)$.

For a fixed amount of total resources, $G \equiv g_1 + g_2$, the preceding expression can be rewritten in terms of the corresponding shares, S_1, S_2: $U = (1 - \omega_i)ln(S_1) + \omega_i ln(S_2) + ln(G)$.

Utility is separable in the level of resources and the mix of goods, and for a given G it is straightforward to verify that utility is maximized at $S_2 = \omega_i$.

determined by the political leader selected by the residents of the constituency. The level of resources that this leader is able to provide is increasing in his ability. Without commitment, the leader will choose his most preferred mix of goods. Individual i's utility when individual j is selected as the leader is then specified as $\beta\omega_j - \gamma|\omega_j - \omega_i|$.

The first term in the expression above represents the amount of resources (in utility units) that the leader can generate for his constituency, which we assume is increasing linearly in his ability. The second term represents the cost to individual i when a leader with different characteristics is chosen. This disutility is specified to be a linear function of the distance in ability-space, or the difference in the preferred allocation of total resources, between the two individuals. Individual i would like the most able resident of the constituency to be the leader but is aware that this individual will also choose a mix of projects ω_j that differs from his own preferred mix ω_i. If the horizontal dimension dominates, $\gamma > \beta$, the linearity in our chosen specification implies that any individual i will prefer himself to any other individual in the constituency as the leader when commitment is absent.[5] We assume that this condition holds in the discussion that follows to emphasize the importance of commitment in leadership selection.

With commitment, the leader will choose the mix of goods that is preferred by a pivotal individual in his social group. The threat of *ex post* sanctions as described in Section 2 ensures such commitment, and allows the most able individual in the group to be put forward as a candidate, and subsequently elected, under conditions that we derive below.

3.2   The Political Equilibrium

Elections are contestable and each resident in the constituency chooses whether or not to stand for election. The decision to stand is accompanied by an entry cost that is close to zero. After all residents have simultaneously made their entry decision, the election takes place and the candidate with the most votes is declared the leader. Voters choose their preferred candidate, regardless of whether or not he belongs to their social group, without coercion. For simplicity we restrict our attention to single-candidate equilibria.[6]

---

[5]Individual i will certainly prefer himself to any individual with lower ability, since that individual will be dominated on both the horizontal and the vertical dimension. He will prefer himself to any individual j with higher ability if $\beta\omega_i > \beta\omega_j - \gamma(\omega_j - \omega_i)$, which is satisfied for $\gamma > \beta$.

[6]In fact, a single candidate stood for election in over 50 percent of our ward elections. This does not imply that those elections were not contestable. With complete information, the identity of the winning candidate is known *ex ante*, which is why everyone else stays out, as we show below.

To begin with, consider the equilibrium without leadership commitment. When the cost of standing for election close to zero, the only strategy profile that can be supported as a Nash equilibrium has the individual with median ability in the constituency, m, standing for election, while all the other individuals stay out. To see why this is the case, normalize so that the utility obtained in a constituency without a leader is zero. The median individual will not wish to deviate from the equilibrium since $\beta m > 0$. No other individual wants to deviate and stand for election (with its associated cost) since he would receive fewer votes than the median individual. To see why even an individual with ability greater than m would not stand, consider an alternative candidate with ability $\omega_j > m$. For any individual with ability $\omega \leq m$, $\beta m - \gamma(m - \omega) > \beta \omega_j - \gamma(\omega_j - \omega)$ for $\gamma > \beta$. A majority of the electorate will thus continue to vote for the median individual.[7] By the same argument, no strategy profile in which someone other than the median voter stands for election can be supported as an equilibrium. When the cost of standing is close to zero, the median voter will always deviate from such an equilibrium, stand for election and subsequently get elected.

Once we allow for leadership commitment, within a restricted social group, an alternative political equilibrium can also emerge. We assume that only one social group in the constituency is capable of competing with the median individual. All the members of this group are concentrated in a single segment of the ability distribution, ranging from $\underline{\omega}_c$ to $\overline{\omega}_c$. They are evenly spaced and located symmetrically on both sides of the median member of their group, who is endowed with ability m_c. The social planner who organizes the mobilization of the group assigns equal welfare weights to all its members, which implies from the preceding distributional assumption that the group representative will choose a mix of goods that is aligned with the preferences of the individual with ability m_c. The individual with the highest ability in the group, $\overline{\omega}_c$, is put forward and will be elected in the equilibrium with commitment under conditions that we describe below.

Proposition 1. *An equilibrium with commitment is obtained if and only if the median individual in the constituency prefers the group representative to himself as the leader.*

We prove this result for two cases: (i) $m_c < m$, and (ii) $m_c > m$. For each case we derive the condition under which the median individual in the constituency prefers the group representative to himself as the leader. When this condition is satisfied, we show that the equilibrium with commitment

---

[7] Any individual with ability lower than m would certainly lose to the median individual since all individuals with ability greater than m would vote for the median individual. He has greater ability (competence) than his rival and is closer in ability-space (on the valence dimension) to them.

in which the group representative stands unopposed is the unique equilibrium. If the derived condition is not satisfied, we show that the equilibrium without commitment in which the median individual in the constituency stands unopposed is the unique equilibrium.

Case 1: $m_c < m$.

The group representative, who is endowed with ability $\overline{\omega}_c$, chooses a mix of projects that is aligned with the preferences of the median member of his group. The median individual in the constituency will prefer the representative to himself as the leader if

$$\beta\overline{\omega}_c - \gamma(m - m_c) > \beta m.$$

Rearranging terms, the required condition is

$$\frac{\overline{\omega}_c - m}{m - m_c} > \frac{\gamma}{\beta}, \tag{1}$$

which simplifies to

$$\frac{S_c}{m - m_c} > 2\left(\frac{\gamma}{\beta} + 1\right), \tag{2}$$

with $S_c \equiv 2(\overline{\omega}_c - m_c)$ measuring the population share of the group.

To show that the equilibrium with commitment is the unique equilibrium when inequality (2) is satisfied, we first need to show that no one wants to deviate from this equilibrium:

(i) Any individual with ability less than m_c would lose a straight contest with the group representative because he has higher ability ($\overline{\omega}_c > m$ from inequality (1)) and because m_c is closer in ability-space to all individuals with ability greater than or equal to m.

(ii) Any individual with ability between m_c and m prefers the group representative to himself as the leader. The median individual with ability m prefers the group representative to himself from condition (2). Now consider an individual with ability $\omega \in [m_c, m)$. This individual will also prefer the group representative to himself if $\beta\overline{\omega}_c - \gamma(\omega - m_c) > \beta\omega$. Rearranging the inequality, it is straightforward to show that $(\overline{\omega}_c - \omega) - \frac{\gamma}{\beta}(\omega - m_c) > \frac{(\overline{\omega}_c - m_c)(m - \omega)}{m - m_c} > 0$, using inequality (1) above.

(iii) Any individual with $\omega_j > m$ would lose a straight contest with the group representative because all individuals with ability less than or equal to m would vote against him. Consider an individual with ability $\omega \in [0, m]$. To verify this last claim, we need to show that $\beta\overline{\omega}_c - \gamma(m_c - \omega) > \beta\omega_j - \gamma(\omega_j - \omega)$. Rearranging the inequality, the required condition is $(\omega_j - m_c) - \frac{\beta}{\gamma}(\omega_j - \overline{\omega}_c) > 0$, which is satisfied since $m_c < \overline{\omega}_c$ and $\beta < \gamma$.

11

Verifying that no other equilibrium can be supported when condition (2) is satisfied is also straightforward. A strategy profile in which an individual, other than the median individual in the constituency, stands unopposed is not an equilibrium since the median individual would deviate and stand against him. A strategy profile in which the median individual stands unopposed is also not an equilibrium. The group would put its representative forward and everyone with ability less than or equal to m would vote for him. Individuals with ability less than m_c would prefer the group representative because he dominates the median individual on both the horizontal and vertical dimension. The median individual prefers the group representative to himself. It follows that individuals with ability between m_c and m will also prefer the group representative since his chosen mix of goods is even closer to their preferred mix.

Having established that the equilibrium with commitment is the unique equilibrium when condition (2) is satisfied, all that remains is to show that the equilibrium without commitment, where the median individual in the constituency standing unopposed, is the unique equilibrium when that condition is not satisfied. No other individual outside the group wants to deviate from this equilibrium since he will certainly lose to the median individual in a straight contest. The group will also not put forward a candidate since its representative will now lose to the median individual in a straight contest, with all individuals with ability greater than or equal to m voting for the median individual. Consider an individual with ability $\omega \in [m, 1]$. For this claim to be true, $\beta m - \gamma(\omega - m) > \beta \overline{\omega}_c - \gamma(\omega - m_c)$. Rearranging the inequality, the required condition is $\beta(\overline{\omega}_c - m) - \gamma(m - m_c) < 0$, which is evidently satisfied when the sign of inequality (1) is reversed. By the same argument, no other strategy profile could be supported as an equilibrium since the median individual would always deviate and stand for election.

Case 2: $m_c > m$.

The median individual in the constituency will now prefer the group representative to himself as the leader if

$$\beta \overline{\omega}_c - \gamma(m_c - m) > \beta m.$$

Rearranging terms, the required condition is

$$\frac{\overline{\omega}_c - m}{m_c - m} > \frac{\gamma}{\beta}, \tag{3}$$

which gives us a condition analogous to inequality (2),

$$\frac{S_c}{m_c - m} > 2\left(\frac{\gamma}{\beta} - 1\right). \tag{4}$$

To show that the equilibrium without commitment is the unique equilibrium when condition (4) is satisfied, we must first establish that no one wants to deviate from this equilibrium. Following the same steps as in case 1, it is straightforward to verify that (i) individuals with ability $\omega \in [0, m)$ would lose a straight contest with the group representative, (ii) individuals with ability $\omega \in [m, m_c]$ prefer the group representative to themselves as the leader, and (iii) individuals with ability $\omega \in (m_c, 1]$ would lose a straight contest with the group representative.[8] Following the same argument as in case 1, it is also straightforward to verify that no other equilibrium can be sustained when condition (4) is satisfied, and that the equilibrium without commitment is the unique equilibrium when that condition is not satisfied, to complete the proof.

3.3 Group Share and the Provision of Public Goods

Inequalities (2) and (4) specify conditions under which an equilibrium with commitment will be obtained. These conditions are derived in terms of the group share, S_c, and the ability of the median individual in the group, m_c. To derive the unconditional relationship between group share, the probability that an equilibrium with commitment will emerge, and the level of public goods received by the constituency we consequently need to place restrictions on the relationship between S_c and m_c. The analysis that follows considers three cases: (i) m_c is independent of S_c, (ii) m_c is increasing in S_c, and (iii) m_c is decreasing in S_c.

Proposition 2. *(a) If m_c is independent of S_c, the probability that an equilibrium with commitment will emerge is increasing in S_c, at an increasing rate, until it reaches one at a share S_c^*. The average ability of the elected leader is also increasing in S_c, at an increasing rate, until the share reaches S_c^*, after which average ability will increase linearly in the share. (b) If m_c is increasing or decreasing in S_c, the probability that an equilibrium with commitment will emerge is zero up to a threshold $\underline{S}_c$*

---

[8]The only minor difference between case 1 and case 2 is that for (i) $\omega \in [0, m)$ we cannot simply claim that the alternative candidate is dominated by the group representative on both the horizontal and vertical dimensions. For individuals with ability between m and m_c we must take advantage of the fact that these individuals prefer the group representative to themselves as the leader. It follows that they will prefer the group representative to the alternative candidate, with lower ability than themselves. For individuals with ability greater than m_c, the group representative dominates the alternative candidate on the horizontal and vertical dimension as in case 1.

and one thereafter till a share $\overline{S}_c > \underline{S}_c$. The ability of the elected leader is constant till $\underline{S}_c$ and then increases discontinuously at the threshold, continuing to increase with S_c thereafter till $\overline{S}_c$.

We begin by proving part (a) of the proposition. From inequalities (2) and (4), an equilibrium with commitment will be obtained if the ability of the median individual in the group, m_c, lies in the range $\left[m - \frac{S_c}{2} \frac{1}{\gamma/\beta+1}, m + \frac{S_c}{2} \frac{1}{\gamma/\beta-1} \right]$. Because m_c is independent of S_c, it will be distributed uniformly over the feasible range $\left[\frac{S_c}{2}, 1 - \frac{S_c}{2} \right]$. The probability $\pi(S_c)$ that an equilibrium with commitment will be obtained is thus described by the expression

$$\pi(S_c) = \frac{\frac{S_c}{2} \left[\frac{1}{\gamma/\beta+1} + \frac{1}{\gamma/\beta-1} \right]}{1 - S_c} = \frac{S_c}{1 - S_c} \frac{\gamma/\beta}{[(\gamma/\beta)^2 - 1]}.$$

It follows immediately that $\pi'(S_c) > 0$, $\pi''(S_c) > 0$. Setting $\pi(S_c^*) = 1$, $S_c^* = \left[\frac{1}{(\gamma/\beta-\beta/\gamma)+1} \right] < 1$. The probability that an equilibrium with commitment will be obtained $\pi(S_c)$ is increasing in S_c, at an increasing rate, until it reaches one at a share $S_c^* < 1$.

To derive the relationship between group share and the level of public goods, we derive an expression for the leader's expected ability $E\omega(S_c)$, which maps one-for-one into the supply of public goods in our framework,

$$E\omega(S_c) = \pi(S_c)E\overline{\omega}_c(S_c) + (1 - \pi(S_c))m. \tag{5}$$

The leader's ability in the equilibrium with commitment, $\overline{\omega}_c \equiv m_c + S_c/2$, is distributed uniformly over the range $\left[m - \frac{S_c}{2} \frac{\gamma/\beta}{\gamma/\beta+1}, m + \frac{S_c}{2} \frac{\gamma/\beta}{\gamma/\beta-1} \right]$, corresponding to the range for m_c derived above. Average ability in this equilibrium, $E\overline{\omega}_c(S_c) = m + \frac{S_c}{2} \left[\frac{(\gamma/\beta)^2}{(\gamma/\beta)^2-1} \right]$, is thus increasing linearly in S_c.

Since $\pi'(S_c) > 0$, $\pi''(S_c) > 0$, it follows from equation (5) that $E\omega'(S_c) > 0$, $E\omega''(S_c) > 0$ until $S_c = S_c^*$. Thereafter, $\pi(S_c) = 1$ and so $E\omega(S_c) = E\overline{\omega}_c(S_c)$ will be increasing linearly in S_c, from the expression for $E\overline{\omega}_c(S_c)$ above, to complete the proof of part (a).

To prove part (b) of the proposition, begin with the case where m_c is increasing with S_c. For S_c close to zero, it is evident that the left hand side of inequality (2) is close to zero and an equilibrium with commitment will not be obtained. As S_c and m_c increase, the left hand side will increase monotonically until it just equals the right hand side at a threshold share $\underline{S}_c$. Notice that $m_c < m$ at $\underline{S}_c$, since the left hand side will certainly exceed the right hand side when m_c is very close to m.

Once an equilibrium with commitment is obtained, it will continue to be sustained as S_c increases as long as $m_c \leq m$. It will also be sustained for $m_c > m$, from inequality (4), as long as $m_c - m$ is sufficiently small. Thus, there exists a share $\overline{S}_c > \underline{S}_c$ up to which the equilibrium with commitment

14

will continue to be sustained. If m_c is not increasing too rapidly in S_c, then the equilibrium with commitment will be obtained over the entire range, $S_c \in [\underline{S}_c, 1]$. These changes in the political equilibrium map directly into leader ability. Up to $\underline{S}_c$, the leader's ability will be m, at $\underline{S}_c$ it will increase discontinuously to $\overline{\omega}_c > m$ (from inequality (1)), and from $\underline{S}_c$ to $\overline{S}_c$ it will be increasing in S_c since $\overline{\omega}_c(S_c) = m_c(S_c) + S_c/2$.

To prove part (b) of the proposition for the case where m_c is decreasing in S_c, go through the same steps as above. As S_c increases and m_c declines, the left hand side of inequality (4) will increase until it just equals the right hand side at a threshold share $\underline{S}_c$. This equilibrium will be sustained up to a share $\overline{S}_c > \underline{S}_c$. The elected leader's ability and, hence, public good provision will match these changes in equilibria, staying constant at m over the range $S_c \in [0, \underline{S}_c]$, increasing discontinuously to $\overline{\omega}_c > m$ at $\underline{S}_c$, and then increasing thereafter till $\overline{S}_c$, to complete the proof.

3.4   Applicability of the Model to Indian Local Elections

We close this section by providing theoretical and empirical support in the context of Indian local elections for some of the important assumptions of the model.

1. Only one social group can compete with the median individual: Many sub-castes in rural India will be able to support leadership commitment, using *ex post* social sanctions as a disciplining device. Restricting attention to a single group in the model is still reasonable, however, if only one group in the relevant constituency has a credible chance of putting forward a representative and winning an election. In our data, there is usually one sub-caste that is dominant in a ward for any given election type, with a large drop from the largest sub-caste to next largest. In particular, the average share of the most numerous sub-caste in the ward across all elections is 0.71, while the average for the next most numerous sub-caste is 0.22.

The model implies that numerical dominance is not necessary or sufficient for a sub-group to win an election and overcome the commitment problem. A sub-caste that is smaller than the most numerous sub-caste but more centrally located in ability-space could, in principle, put its most able member forward and win an election, from inequalities (2) and (4). The data indicate, however, that the most numerous eligible sub-caste in the ward is in almost all elections the only sub-caste that can challenge the median voter. We use three variables to characterize ω in the empirical analysis: the value of land owned by the household, whether the household head is engaged in a managerial

occupation, and the education of the household head. Based on these measures, $\left(\frac{S_c}{|m_c - m|}\right)$, which determines whether an equilibrium with commitment will be obtained, is larger for the most numerous sub-caste relative to the next most numerous sub-caste in the ward 92 percent of the time across all elections. It thus seems reasonable to assume, both in the model and the empirical analysis that follows that a single group – the most numerous sub-caste in the ward in a given election – is the only feasible candidate to support an equilibrium with commitment.

Note that the assumption that the social group is restricted to a single segment in the ability distribution is not critical. Members of other groups could be located in the $[\underline{\omega}_c, \overline{\omega}_c]$ interval without changing any of the results. All that matters for determining whether an equilibrium with commitment will be obtained is m_c and $\overline{\omega}_c$. Given the restrictions on economic and social mobility in rural India documented by Munshi and Rosenzweig (2009), heterogeneity within sub-castes will be much smaller than heterogeneity across sub-castes. For a given m_c, the population share of the group S_c will thus be a good predictor of $\overline{\omega}_c$, and that is the implicit assumption we make when deriving the results in terms of S_c.

2. Inter-group sanctions and coalitions are ruled out: Exclusion from social interactions is an effective disciplining mechanism within the sub-caste because these interactions are frequent and economically and socially important. Given the spatial segregation by caste that is characteristic of the Indian village and given the historical restrictions on inter-caste social interactions, a similar collective disciplining mechanism is unavailable to maintain cooperation *between* sub-castes. Inter-caste coalitions could form even if punishments were absent if long-term alliances could be maintained. The reservation scheme described in the previous section rules out long-term political coalitions and it follows that the caste representative cannot commit to implementing policies that diverge from the preferred choice of the median member of his sub-caste in equilibrium.

3. The social planner places equal weight on all members of the group: If exclusion from social interactions is the primary punishment mechanism through which commitment is enforced within the sub-caste, then any change that reduces the frequency and importance of these interactions has negative consequences for the integrity of the caste network. Households with different levels of consumption, for example, engage in different leisure activities. Heterogeneity in the level (and pattern) of consumption within the group would thus reduce social interactions, providing an efficiency-based explanation for the egalitarian distribution of resources that is often observed in collective arrangements (Abramitzky 2008, Munshi and Rosenzweig 2009).

16

4 Empirical Analysis

4.1 The Data

The data that we use are unique in their geographic scope and detail. They are from the 2006 Rural Economic and Development Survey, the most recent round of a nationally representative survey of rural Indian households first carried out in 1968. The survey, administered by the National Council of Applied Economic Research, covers over 250 villages in 17 major states of India. We make use of two components of the survey data - the village census and the village inventory - for 13 states in which there were ward-based elections and complete data in both components.[9] The census obtained information on all households in each of the sampled villages. The village inventory collected information on the characteristics of the elected ward representatives and public good provision at the street level in each ward in each of the last three *panchayat* elections prior to the survey.

The complete census of households in the sampled villages allows us to compute the population share of the most numerous eligible sub-caste in each ward and *panchayat* term, and to identify the pivotal household/individual depending on the political equilibrium that is in place. Households provided their sub-caste and religion. A sub-caste group is any set of households within a village reporting the same sub-caste name. Most of the Muslim households provided sub-caste (*biradari*) names. We also counted Muslim households within a village that were without a formal sub-caste name as a unique sub-caste. On average, there are seven wards per village, 67 households per ward, and six sub-castes per ward. We use the census information on the landholdings value of each household, the education (in years) of the household head, and information on the head's occupation to characterize the pivotal voter. The census data also reveal for each household whether or not the household head or any family member was a candidate for election for the two last *panchayat* elections preceding the survey.

The village inventory includes a special module that obtained information on the characteristics – education (in categories) and occupation – of all of the elected representatives from each ward in each of the three *panchayat* terms as well as information on whether new construction or maintenance of specific public goods *actually* took place on each street in the village for each term. These local public goods include drinking water, sanitation, improved roads, electricity, street lights, and public

---

[9]The states are Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajastan, Tamil Nadu, Uttar Pradesh, and West Bengal. Punjab and Jharkhand did not have any ward-based elections and the election data are not available for Gujarat and Kerala.

telephones as well as schools, health and family planning centers, and irrigation facilities. The data permit the mapping of street-level information into wards so that public goods expenditures can be allocated to each ward, and its constituents, for each *panchayat* term. The combined data set covers 1085 wards in 136 villages. Ninety-five percent of the wards have information for at least two elections.

Proposition 2, case (b), which we verify below is empirically relevant in this setting, states that a caste equilibrium characterized by commitment and the selection of more competent representatives will be obtained when the share of the most numerous sub-caste in the ward crosses a threshold level. A ward with a numerically dominant sub-caste is mechanically less likely to be fractionalized along caste lines. An increase in public good provision when the share of the most numerous sub-caste crosses a threshold could then simply reflect the well documented fact that the willingness to invest in public goods is higher in less fractionalized populations (see, for example, Miguel and Gugerty 2005). This is less of a concern in Indian local elections because most of the resources available to a *panchayat* are received from the state and central governments as described in Section 2, rather than through local taxes. Nevertheless, it is still possible that less fractionalized wards could receive greater external transfers for a variety of reasons, in which case greater public good provision would be erroneously attributed to the efforts of their elected representatives.

To allow for the possibility that the population characteristics of a ward could determine the level of resources that it receives and to emphasize the role of leadership selection, we take advantage of the randomized caste reservation in *panchayat* elections, which exogenously changes the set of castes eligible to seek election and, hence, the probability that a caste equilibrium will emerge from one term to the next within a ward. Our analysis thus always uses a ward fixed effect, which subsumes ward characteristics such as population heterogeneity. The implicit assumption here is that the population of the ward, or the electorate, remains essentially unchanged over time. This is a reasonable assumption given the unusually low spatial mobility that is characteristic of rural India. Munshi and Rosenzweig (2009), for example, report that permanent migration rates of men aged 20-30 out of their origin villages were as low as 8.7 percent in 1999. The corresponding rates for entire households would be much lower. Indeed, the census listing data indicate that since 1991 when the local electoral system was put in place, less than 3 percent of households had migrated into the sample villages.

As described in Section 2, ward elections are reserved for Scheduled Castes (SC), Scheduled

Tribes (ST), and Other Backward Castes (OBC) in proportion to the share of these groups in the population at the district level. Among the 3,300 ward-terms in our sample, 11 percent were reserved for Scheduled Castes, 6 percent were reserved for Scheduled Tribes, and 23 percent were reserved for Other Backward Castes. Panel A of Table 2 describes the share of the most numerous eligible sub-caste in the ward by type of election. These shares are generally quite large, reflecting the fact that neighborhoods in rural India are often dominated by a single sub-caste, as documented in Section 3. Half the wards have a share greater than 0.6 and a quarter have a share greater than 0.85 in the unreserved elections. Although the shares must be lower in the reserved elections on average since fewer sub-castes are eligible to stand for election, the probability that the shares exceed 0.5 in these elections remains high.

Panel B of Table 2 displays the fraction of ward-terms in which the share of the most numerous eligible sub-caste exceeds alternative pre-specified thresholds, by the type of election. Matching the descriptive statistics in Panel A, the proportion of elections in which the threshold is exceeded is largest for unreserved elections, followed by elections in which the ward candidates are restricted to ST, OBC, and SC in that order, regardless of the threshold that is specified. Just as the likelihood that any threshold is crossed varies across different reservation schemes in Table 2, there will be variation in the likelihood that the threshold will be crossed and a caste equilibrium will emerge from one term to the next *within* a ward as the type of reservation changes. For example, suppose that the threshold share above which a caste equilibrium is obtained is 0.5 and suppose that the most numerous sub-caste in a ward is a high caste with a share of 0.6, followed by another high caste with a share of 0.2, and two Scheduled Castes (SC's) with shares of 0.1 each. When the election in that ward is unreserved, the most numerous sub-caste will put its most competent representative forward and a caste equilibrium will be obtained. When the election is reserved for SC candidates, however, a caste equilibrium will not be obtained and the median individual in the ward will be elected as the ward representative.[10] Thus in our empirical analysis we can avoid biases due to

---

[10]We assume in the model and in the empirical analysis that follows that the median individual in the ward is eligible to stand for election when the caste equilibrium cannot be obtained. We use three measures of leadership competence based on occupation, wealth, and education later in the empirical analysis. Based on the occupation measure, the median individual was ineligible to stand for election in less than 3.5 percent of the relevant ward-terms (assuming that 0.5 was the threshold share above which a caste equilibrium was obtained). Based on the education measure, the education of the median individual and the closest eligible individual was statistically indistinguishable (at the 5 percent level) in those ward-terms. Finally, we could reject the hypothesis that wealth was the same for the two groups of individuals, but the correlation in the wealth of the median individual and the closest eligible individual was as high as 0.92.

cross-sectional heterogeneity in the population (inclusive of fractionalization) by exploiting variation over time within a ward to estimate the effect of a caste equilibrium on leadership selection and public good provision. Notice from Table 2 that the likelihood that the threshold is crossed varies substantially across the different thresholds ranging from 0.3 to 0.5. This variation is also useful, allowing us to later experiment with alternative thresholds to identify the share above which a caste equilibrium can be sustained.

4.2 Testing the Theory

Proposition 2 indicates that the relationship between public good provision and the share of the largest eligible sub-caste in the ward (S_c) depends on the underlying relationship between this share and the caste-median (m_c). We next proceed to estimate this relationship, exploiting variation in the share of the largest eligible sub-caste in the ward over time that is generated by randomized caste reservation as described above. We use three individual/household characteristics to measure preferences for different types of public goods: (i) the value of land owned by the household, (ii) whether the head of the household is engaged in a managerial or professional occupation, and (iii) the education of the household head. In order to present the nonparametric relationship between m_c and S_c in the same figure for all three characteristics, we replace m_c by the normalized measure $m_c - m$ in Figure 1. This measure is computed for each characteristic in each ward in each election term. The normalization thus shifts the intercept of each nonparametric plot but has no effect on the slope, because the ward-median m is constant over time and ward fixed effects are included in all the regressions.[11]

   We see in Figure 1 that $m_c - m$ is increasing in S_c with each characteristic.[12] This implies that case (b) in Proposition 2 is relevant. Public good provision will be flat up to a threshold $\underline{S}_c$, it will increase discontinuously at that threshold, and then continue to increase thereafter until the share

---

[11]The nonparametric estimates in Figure 1 are constructed in two steps for each characteristic. In the first step we regress $m_c - m$ in each ward-term on a flexible cubic function of the share of the most numerous eligible sub-caste in that ward-term, including a full set of reservation and election-term dummies as well as ward fixed effects as additional regressors. The election year is also included in this regression since *panchayat* elections are not synchronized across the country. Using the estimated coefficients from this regression, we partial out all the regressors other than the share (including the ward fixed effects), adding back the sample average of each variable to preserve the level of the intercept for the differenced dependent variable. This differenced dependent variable is nonparametrically regressed on the share in the second step using the Epanechnikov kernel function. Occupation is measured by an indicator variable that takes the value one if the household head is a farmer, businessman, or professional. Land value is measured in millions of Rupees. Education is measured by years of schooling.

[12]The linear, quadratic, and cubic share coefficients in the first step regression estimated prior to the nonparametric regression presented in Figure 1 are jointly significant with each of the three characteristics, rejecting the hypothesis that m_c is independent of S_c.

reaches $\overline{S}_c > \underline{S}_c$. According to the model the level of public goods is determined by the selected leader, while the mix of public goods is a function of the characteristics of the pivotal voter. Ignoring the increase in public good provision above $\underline{S}_c$ for a moment, if $\underline{S}_c$ were known, we could estimate the determinants of local public good provision taking into account (median) voter preferences and leadership competence with a specification of the form

$$G_{kjt} = (\alpha_k + \delta_k X_{jt})(1 + \theta M_{jt}) + h_j + \xi_{kjt} \tag{6}$$

where G_{kjt} measures the allocation of good k in ward j in term t, X_{jt} measures the characteristics and, hence, the preferences of the pivotal household or individual in the ward-term, $M_{jt} = 1$ if $S_c \geq \underline{S}_c$ and $M_{jt} = 0$ if $S_c < \underline{S}_c$, and ξ_{kjt} is a mean-zero disturbance term. The competence parameter θ thus measures the discontinuous increase in the overall level of public goods that is associated with the switch to the caste equilibrium at $\underline{S}_c$. If we allowed public good provision to increase beyond $\underline{S}_c$, the θ parameter would be interpreted as the average increase associated with the caste equilibrium.[13]

When $M_{jt} = 0$, the pivotal household in the non-caste equilibrium is the median household in the ward. When $M_{jt} = 1$ and the regime shifts to the caste equilibrium, the pivotal household becomes the median household from the most numerous eligible caste in that ward-term. Note that the first term in parentheses in equation (6) thus characterizes the (linear) demand for different types of public goods, with the δ_k parameter identified off changes in the pivotal household within the ward over time when there is a change in the equilibrium type. Thus, if the reservation system does not change the equilibrium in the ward, or there is only one dominant household that dictates the composition of public goods no matter who is elected, then the δ_k parameter would not be identified. The second term in parentheses reflects the ability of the elected representative to raise the overall level of public goods received in the ward. Differencing out the ward fixed effects, h_j, the competence parameter θ and the demand parameters α_k, δ_k can be estimated using nonlinear least squares.

To estimate equation (6), we need to know $\underline{S}_c$, but the theory gives us no guidance on where the threshold is located. One strategy to identify the location of the threshold would be to allow for a flexible non-linear relationship between public good provision and the share of the largest caste,

---

[13]In general the level of public goods received by a ward in a given term will depend not just on who is elected in that ward but also on the political equilibria in other wards, as well as the characteristics of the *panchayat* president. However, random reservation in elections across wards and for the president's position allows us to ignore the identity of other elected representatives in the empirical analysis. Previous studies that focus on the role of the *panchayat* president have implicitly exploited the same randomness to ignore the role played by ward representatives in their analyses.

replacing M_{jt} with $\phi(S_{jt})$ in equation (6). The estimated relationship would then allow us to identify *ex post* the threshold share at which public good provision increased discontinuously. The problem with implementing this empirical strategy is that the competence effect and the demand parameters α_k, δ_k must be estimated jointly. To estimate the demand parameters, the pivotal individual in equation (6) must be identified for each share S_{jt}. This requires us to take a stand *ex ante* on whether or not a caste equilibrium is in place for each share S_{jt}. To avoid this inconsistency, we will continue to estimate equation (6) with a dummy M_{jt}, but will experiment with a wide range of thresholds, starting from 0.25 and extending till 0.75, above which a caste equilibrium is assumed to be obtained. We will see below that the pattern of θ estimates over this range allows us to identify $\underline{S}_c$ and, hence, to estimate the effect of a caste equilibrium on the level of public goods.

To investigate the pattern of θ coefficients that would be obtained with this exercise, we simulated the threshold model to generate a data set consisting of the actual share of the most numerous caste in each ward and election term in our villages and a hypothetical public goods level corresponding to each share. Recall that the basic prediction of the model is that public good provision should remain constant over all shares below a threshold value $\underline{S}_c$, which we set at 0.5. There should subsequently be a discrete increase in public good provision at $\underline{S}_c$, followed by a further increase until $\overline{S}_c$. We chose parameter values that would generate this discontinuous relationship between the hypothetical public goods variable that we constructed and the share, as described in Figure 2.[14]

To help us later compare our estimates with those that would be obtained if the underlying model did not have this threshold property, we also generated data sets in which public good provision was assumed to be a smoothly increasing concave or convex function of the most numerous eligible caste's share in each ward and election term. The parameters for these alternative models were chosen so that the level of public goods generated by all three models coincided when the share was zero or one, although Figure 2 presents the public goods-share relationship from 0.25 to 0.75, matching the range over which we will later estimate the model.[15]

Having generated the data corresponding to alternative underlying models, we next proceeded to estimate the competence parameter θ over a range of assumed thresholds. Restricting attention to a

---

[14]We assumed the following relationship between public good provision in ward j in period t, G_{jt} and the corresponding share of the most numerous caste S_{jt}: $G_{jt} = 0.05 + 0.2M_{jt} + 0.1M_{jt}(S_{jt} - 0.5) + 0.6M_{jt}(S_{jt} - 0.5)^2$, where $M_{jt} = 1$ if $S_{jt} \geq 0.5$, $M_{jt} = 0$ otherwise.

[15]We assumed the following relationship between public goods in ward j in period t, G_{jt} and the corresponding share of the most numerous caste S_{jt} for the convex and concave models, respectively:
$y_{jt} = 0.05 + 0.0025S_{jt} + 0.4S_{jt}^2$, and $y_{jt} = 0.05 + 0.8S_{jt} - 0.4S_{jt}^2$.

single public good, the public goods equation corresponding to equation (6) has the following form:

$$G_{jt} = \alpha + \theta M_{jt} + \epsilon_{jt}, \tag{7}$$

where G_{jt} measures the level of the single public good in ward j in term t, M_{jt} takes the value one if the share of the most numerous caste in that term S_{jt} exceeds an assumed threshold $\underline{S}$ and the value zero otherwise, and ϵ_{jt} is a mean-zero disturbance term. We estimated equation (7) with $\underline{S}$ ranging from 0.25 to 0.75, in increments of 0.05. To estimate the regression with the data we had generated, a normally distributed mean-zero noise term with standard deviation 0.01 was added to each public good value. The estimated θ coefficient for each underlying model and for each assumed threshold $\underline{S}$ is plotted in Figure 3.

When the underlying data are generated by the threshold model, the estimated θ coefficient increases steeply at low thresholds, reaching its maximum when the assumed threshold $\underline{S}$ coincides with the true threshold $\underline{S}_c$, which was specified to be 0.5. The θ coefficient at this point can be interpreted as the average effect of a caste equilibrium on public good provision. There is an initial decline for assumed thresholds above 0.5, followed by a flattening out at higher thresholds. To understand why this pattern is obtained, return to the step function in Figure 2. Based on the specification in equation (7), the θ estimate for any assumed threshold is simply the difference in average public good provision for shares to the right and left of that threshold. It is evident from Figure 2 that the average for shares to the left of the assumed threshold is unchanged, while the average to the right of the threshold increases, as we gradually shift this threshold from 0.25 till 0.5. This is why the θ estimate increases steadily over the 0.25-0.5 range in Figure 3. Once the assumed threshold crosses the true threshold at 0.5, the pattern is reversed. Although we assume that public good provision is a convex function of the share above 0.5 to emphasize the robustness of the result, suppose instead that public good provision is constant after the discontinuous increase at 0.5. Average public good provision for shares to the right of the assumed threshold will now be unchanged, while the average for shares to the left of the threshold will increase, as we gradually increase this threshold above 0.5. This implies that the estimated θ will decline in this range, matching the pattern in Figure 3.

In contrast to the pattern of estimated regression coefficients that are obtained when the underlying model has a threshold property, the estimated θ coefficients are smoothly and monotonically

increasing (decreasing) in the assumed threshold in Figure 3 when the data are generated by the convex (concave) model. Although the theory simply states that there is a positive relationship between G_{jt} and S_{jt} above $\underline{S}_c$, public good provision was assumed to be a convex function of the share of the most numerous caste above $\underline{S}_c$ when generating the data for the threshold model. If we had assumed a linear relationship instead, the estimated θ coefficient would have continued to decline monotonically to the right of 0.5 in Figure 3 instead of flattening out (not reported). The simulation results thus highlight a robust implication of the threshold model, which is that a trend break in the estimated pattern of θ coefficients should be observed at the true threshold value $\underline{S}_c$. An additional implication of the theory is that leadership characteristics plausibly associated with competence, which drive the increase in public good provision, should also change discontinuously at the same threshold. These observations will allow us to rule out alternative explanations, based on other data generating processes, for the results that are obtained.

4.3 Public Good Provision

G_{kjt} in equation (6) is measured as the fraction of households in the ward who received a particular good k in a given *panchayat* term, where public good provision is defined to include both new construction and maintenance. This variable was constructed by matching the locations of households and goods, based on the street location of each public goods investment and the street addresses of the households. Our analysis focuses on six goods for which the benefits have a significant local and spatial component; that is, goods for which attachment or proximity to the household is desirable. The goods are: drinking water, sanitation, improved roads, electricity, street lights, and public telephones.[16] These six goods account for 15.2 percent of all local public spending, which is four times the amount spent on schools and health facilities.[17] Table 3 reports the fraction of households in the ward that received each public good, averaged across wards and *panchayat* terms, by type of election. Evidently, a large fraction of households benefited directly from expenditures on water, roads, and

---

[16]Public irrigation investments or school buildings, for example, are valued local public goods whose placement close to a ward resident, or even within the ward (defined by place of residence) may not be desirable. Some public goods, in contrast, have a private dimension. For example, water could be piped to some households but not to others within a ward. We do not have information on the distribution of public goods at the household level, only at the street level. Thus, it is not possible to carry out an analysis of within-ward discrimination in public goods provision.

[17]Key informants in the village were asked to rank 12 issues, by importance, that came under the purview of the elected *panchayat*. Inadequate roads and drinking water were ranked 1 and 2, followed by health, schooling, sanitation, street lights and electrification. Note that the low spending on health and education and the relatively low level of importance assigned to these goods by the key informants reflects the fact that they are largely allocated at the state level and so fall outside the purview of the village *panchayat*, as discussed in Section 2.

24

sanitation, while a much smaller fraction benefited in any term from expenditures on electricity, street lights, and public telephones. The public goods we are examining are quite heterogeneous, including the degree to which they confer benefits to other wards and villages. For example, improved street paving may facilitate transportation of goods across wards, while piped water to a house is less likely to have externalities. We have thus allowed the public goods demand parameters α_k and δ_k in equation (6) to differ for each public good indexed by k.

The model simulation predicts that θ should be positive and increasing up till an assumed threshold share that coincides with the true threshold share, at which point there will be a trend break followed by a subsequent decline in θ. Figure 4 reports the pattern of estimated θ's and the accompanying 95 percent confidence bands, for thresholds over the 0.25-0.75 range in 0.05 increments, using land value as the pivotal characteristic that determines demand in equation (6).[18] As in Figure 3, the estimated θ coefficient is increasing steeply at thresholds below 0.5 and then subsequently increases at a slower rate, although a trend-break around a critical threshold is not visually discernable. Figures 5 and 6 repeat this exercise with occupation and education, respectively, as the pivotal characteristics. Once again we see a steep increase in the estimated θ coefficient at thresholds below 0.5. However, there is now a sharp trend-break at 0.5 in both figures, followed by a short decline and then a flattening out, precisely matching the predictions of the threshold model.

Table 4 reports the estimates of the public goods delivery equation, with the public goods demand parameters reported in Table 4(a) and the competence parameters in Table 4(b). Given the patterns in Figures 4-6, these estimates are based on the assumption that 0.5 is the threshold above which a caste equilibrium can be sustained. The first three columns of each table report estimates from the basic specification, equation (6), measuring the pivotal voter's characteristics sequentially by owned land value, occupation, and education. The next three columns of each table report estimates from an augmented specification that allows competence to vary by the gender and caste of the elected ward representative with the same sequence of median voter characteristics:

$$G_{kjt} = \sum_{r=1}^{R} \left[w_{1r}(\alpha_k + \delta_k X_{jt}) + w_{2r}\theta M_{jt}(\alpha_k + \delta_k X_{jt}) \right] + h_j + \xi_{kjt},$$

where w_{1r}, w_{2r} estimate the effect of reservation, separately in the non-caste and caste equilibrium, on overall resources. The reservation categories include SC, ST, OBC, and women, with unreserved men occupying the reference category. Because variation in the share of the most numerous eligible

---

[18]The public goods regressions also include a full set of term dummies as well as the election year.

sub-caste and, hence, M_{jt} within a ward is generated by changes in caste reservation across terms, an alternative explanation for changes in the θ estimate is that caste reservation changes the distribution of competence in the pool of potential leaders, instead of changing the selection of leaders from a fixed pool as assumed in the model. Recall that the share of the most numerous eligible caste was less likely to cross any of the pre-specified thresholds, ranging from 0.3 to 0.5, in Table 2 when the election was reserved. One explanation for the positive θ estimates that we obtain is that lower caste leaders are less competent. The augmented specification of the public goods equation allows for this possibility.

The public good demand estimates in Table 4(a) are precisely estimated, with the intercepts α_k matching the pattern of public good provision in Table 3. Recall that a relatively large fraction of households benefited from expenditures on water, sanitation, and roads in each ward-term. Public telephones are the reference category in Table 4(a), and we see that the drinking water, sanitation, and roads intercepts are relatively large in magnitude and very precisely estimated.

The estimates also indicate, consistent with our model, that the characteristics of the pivotal household have a significant effect on the allocation of public goods in the ward. Clearly, the reservation system is changing the identity of the pivotal voter and thus shifting the mix of public goods that are delivered to the wards. We can reject the joint hypothesis that the pivotal characteristic has no effect on the distribution of public goods with 95 percent confidence for land value, occupation, and education. The individual coefficients imply, for example, that relative to public telephone investment (the reference category), when the pivotal household has greater land wealth the allocation of resources to roads is increased and the allocation to electricity is reduced. When the pivotal individual (household head) is employed in a managerial or professional occupation, we see a relative increase in the resources allocated to electricity and street lights. The education of the pivotal individual, in contrast, does not appear to significantly affect the allocation to any single good.

The results in Table 4(a) indicate that elected ward representatives are responsive to the preferences of the pivotal individuals in their constituencies, which evidently change within a ward due to changes in the political equilibrium brought about by the reservation system. The estimates, reported in table 4(b), Columns 1-3, correspond to the θ coefficients in Figures 4-6 when the threshold is set at 0.5 and indicate that there is not only a change in the pivotal voter when there is a change in the political equilibrium but also a change in leadership competence. The competence parameter θ in Table 4(b) is positive and significant across both specifications and for all measures of the pivotal

voter's characteristics, ranging in magnitude from 0.13 to 0.20. The presence of a caste equilibrium in an election term thus appears to increase the overall level of local public resources the ward receives, with respect to this set of local public goods, by about 16 percent. Although some of the caste coefficients are individually significant in the augmented specification reported in Columns 4-6, we cannot reject the hypothesis that all the caste coefficients, uninteracted and interacted with θ, are jointly zero. While a woman leader in the non-caste equilibrium is statistically indistinguishable from the reference category (unreserved men), it is interesting to note that elected women are more competent than elected male representatives when there is a caste equilibrium (when competence is more likely to matter for election outcomes). Female representatives raise the overall level of resources by 10 percent compared to men who are elected in the same equilibrium.[19]

Ward fixed effects control for cross-sectional heterogeneity in population characteristics that could independently determine public good delivery, net of leadership selection. The caste reservation interactions control, in addition, for the possibility that the pool of potential candidates is weaker in reserved (lower caste) elections where a caste equilibrium is mechanically less likely to be obtained. Suppose, however, that the most competent individuals within each caste tend to cluster together in a relatively small number of wards, while less competent individuals are spatially dispersed. A positive relationship between the share of the most numerous caste and public good provision could then simply reflect the fact that the most competent members within each caste tend to be located in wards where they account for a disproportionate share of the population.

To rule out this unlikely possibility, we take advantage of the particular pattern of θ coefficients implied by the threshold model of leadership selection in Figure 3. As noted, this pattern matches well with the empirical results reported in Figures 4-6. The leadership selection results that we report below also reveal a discontinuous change in the elected representatives's characteristics just below 0.5, consistent with the hypothesized link between leadership competence and the level of public goods received by the ward. Even if there was a positive relationship between the share of the most numerous caste in the ward and the competence of the pool of potential candidates, there is no reason why this relationship would display a discontinuity just above a particular threshold. If the relationship were smooth and monotonically increasing instead, the pattern of estimated θ coefficients would match with the predictions of the concave or convex models in Figure 3, which are

---

[19]These findings are broadly consistent with recent evidence in Chattopadhyay and Duflo (2004) and Beaman et al. (2008). These results, however, are obtained for *panchayat*-level elections in which the caste equilibrium is less likely to emerge.

qualitatively quite different from the patterns in Figures 4-6.[20]

4.4   Leadership Competence

Within the context of the model, the finding that public good provision increases discontinuously when the share of the most numerous eligible sub-caste crosses a threshold around 0.5 is interpreted as a change in the political equilibrium, with the most competent individual in the most numerous eligible sub-caste replacing the median individual in the ward. We now proceed to test whether variables that are plausibly correlated with the competence of elected ward representatives also exhibit a discontinuous increase at the same threshold.

The theory provides us with no guidance about which individual characteristics might be associated with leadership competence in the rural Indian context. However, our model highlights a fundamental problem for leadership selection that arises from the fact that characteristics that determine preferences for different types of public goods also determine leadership competence. This is the source of the tension between the horizontal and vertical dimensions of leadership quality that generates a need for leadership commitment. We are thus particularly interested in assessing whether the three characteristics that were shown to determine the demand for public goods, (i) household wealth, (ii) the household head's occupation, and (iii) the household head's education, are also associated with leadership competence.

Recall from Section 2 that a major task of the ward representative, and the one we focus on here, is to channel resources to his constituency and to subsequently ensure that the planned construction and maintenance of public goods actually takes place. The representative's persuasive skills and his influence within the *panchayat* council more generally will thus be important determinants of his competence. More competent leaders will also have managerial skills that ensure that targeted transfers reach their destination. We thus would expect self-employed individuals in managerial occupations, such as businessmen and farmers, to make especially competent local leaders. These individuals need to make independent connections with buyers and suppliers, establish a reputation that allows them to gain access to formal and informal credit, and manage an enterprize that often employs large numbers of workers. Consistent with this hypothesis, Ferraz and Finan (2008) find that business experience among elected representatives in Brazil is positively correlated with political

---

[20]Although not reported in Figure 3, if public good provision were a linear positive function of the share of the most numerous caste, the estimated θ coefficients would be approximately constant across the entire range of assumed thresholds. This is once again qualitatively quite different from the patterns reported in Figures 4-6.

competence, measured by legislative effectiveness. The village inventory elicited information on the elected representative's occupation for each of the three election terms in each ward. Based on the notion that managerial experience is relevant to political effectiveness our first measure of leadership competence is thus a binary variable that takes the value one if the elected ward representative is in business or farming (self-employed), and zero if the leader is employed in a professional occupation, skilled labor, unskilled labor, agricultural labor, or housework.

Individuals running large-scale operations may be particulary well-suited to manage public goods delivery, and we might also expect that larger landowners are more effective representatives on the *panchayat* council. Although there is no information on the land ownership or wealth of the elected ward representatives, the census data identifies the candidates for council seats for the last two *panchayat* elections. We use information on the (log) value of land owned by these candidates to construct a second measure of leadership competence.[21] Our third measure of leadership competence is the elected representative's education, which is measured in four categories – illiterate, primary graduate, secondary graduate, and post-secondary graduate – in the village inventory. Education provides many of the skills that are associated with leadership competence in this context and will also be positively correlated with innate ability to the extent that there is positive selection into schooling. Ferraz and Finan (2008) also found that the schooling of elected representatives in Brazil was positively associated with legislative effectiveness, but in that population schooling and business experience were positively correlated. In our sample of villages, more than half of the men elected and more than three quarters of the women elected never went beyond primary school and education and occupation are only weakly correlated.

Replacing public good provision with each of these proxies for leadership competence as the dependent variable, the leadership equation is specified as

$$y_{jt} = \phi(S_{jt}) + f_j + \xi_{jt}, \tag{8}$$

where y_{jt} measures the occupation, wealth, or education of the leader selected (or candidate) from ward j in term t, S_{jt} is the share of the most numerous caste in the ward in that term with $\phi(S_{jt})$ a flexible function of S_{jt}, f_j is a ward fixed effect and ξ_{jt} is a mean-zero disturbance term. We expect that at least one of the leadership characteristics will change discontinuously at the same threshold share at which θ reached its maximum level. This will provide support for the underlying mechanism

---

[21]Over half the elections had only one candidate.

that generated the discontinuous increase in public goods, based on a change in leadership, and indicate that there is indeed a tension between the horizontal and vertical dimensions of leadership quality in this context.

Panel A of Table 5 compares the characteristics of potential leaders for unreserved, SC, ST, and OBC elections as measured by the median characteristic of eligible households in each ward in each of these reservation categories. The mean (with standard deviation in parentheses) of each median characteristic is then computed across all wards. We see that there are substantial differences in median household characteristics across reservation categories. For example, eligible households in unreserved elections have more land wealth, and heads of these households more education, compared with eligible households in restricted elections (particularly when they are reserved for SC and ST candidates). This is because in unreserved elections, unlike in the caste-restricted elections, historically advantaged upper-caste households may also put up candidates.

Variation in S_{jt} across terms within a ward is generated by random caste reservation. The statistics in panel A suggest that the pool of potential leaders could vary substantially with the type of caste reservation that is in place and this could account for variation in elected leader characteristics with S_{jt} even if leaders were randomly selected from eligible households. Note, however, that an elected male representative in Panel B is much more likely to have managerial experience and have substantially higher education than a typical (invariably male) household head in Panel A, within each caste reservation category.[22] This suggests that there is systematic (non-random) leader selection and rejects the hypothesis that the elected representative is always the median voter, although variation in the pool of potential leaders across types of elections may still play a role in determining leadership competence across terms within a ward. We will consequently include in equation (8) a full set of election reservation dummies – SC, ST, and OBC – as well as measures of the distribution of characteristics among the potential leaders in the ward in each term: the median and the 25th and 75th percentiles for each leadership variable.[23]

Panel C in Table 5 also shows that elected female representatives are substantially disadvantaged with respect to schooling and our measure of managerial experience. Our finding that elected women are in fact more capable than men in delivering public goods to their wards thus suggests that

---

[22]Education levels are provided in four categories for the leaders in the village listing. Years of schooling are imputed by assigning 4 years of schooling to primary graduates, 10 years of schooling to secondary graduates, and 14 years of schooling to post-secondary graduates.

[23]As with the public goods regressions, all the leadership regressions include term dummies as well as the election year.

neither the occupational measure nor schooling fully capture leadership competence. Few women run businesses; most women, and no men, specialize instead in managing households. The occupational measure we use thus may not be appropriate for female representatives. Moreover, household land wealth does not reflect management experience for women, who typically do not participate in farm management decisions. Indeed, if both wealthier women and men are more likely to be elected in caste equilibria this would call into question the hypothesis that wealth reflects managerial skill. We thus estimate equation (8) separately for men and women.[24]

Figures 7-8 report nonparametric estimates of the three leadership characteristics regressed on the share of the most numerous eligible sub-caste, for male and female leaders respectively. These estimates are constructed in two steps. In the first step we estimate equation (8), using five binary variables, $D_1 - D_5$, which take the value one if S_{jt} lies in the intervals $0.20 - 0.35$, $0.35 - 0.50$, $0.50 - 0.65$, $0.65 - 0.80$, and $0.80 - 1.00$, respectively, to approximate the $\phi(S_{jt})$ function. Using the estimated coefficients from this regression, we partial out all the regressors other than the share (including the ward fixed effects), adding back the sample average of each variable to preserve the level of the intercept for the differenced leadership characteristic. This differenced characteristic is nonparametrically regressed on the share in the second step. We see in Figure 7 that the probability that the male leader holds a managerial job and (log) land wealth increase discontinuously at precisely the share, just below 0.5, where we observed a trend-break in the θ estimates in Figures 5-6. In contrast to the results for managerial experience and land wealth, we find no change in the education of the elected representative (measured either by years of schooling or literacy) across the entire range of the share distribution.

Do the patterns exhibited in Figure 7 for the landholdings and occupation of the elected male representatives conform to the shape of the theoretical figure relating public good provision, and competence, to the share of the most numerous sub-caste in Figure 2? The first three columns of Table 6 report the estimated coefficients from the flexible nonlinear specification that we estimated in the first stage to construct Figure 7 as well as tests of the shape of the competence-share relationship for each of the three leader characteristics. The test statistics indicate that for the occupation and landholdings of the male leaders we can reject the absence of a threshold and cannot reject that the non-liner relationship is broadly consistent with Figure 2. In particular, the test statistics indicate

---

[24]Note that nearly all women are elected because of the random set-aside of *panchayat* seats for women, so that stratification by gender does not result in this case in choice-based samples.

that for these measures of leadership competence: (i) We cannot reject the hypothesis that there is no increase in leadership competence for shares below 0.5 relative to the reference category, $S_{jt} \in [0, 0.20]$. (ii) We cannot reject the hypothesis that the relationship between leadership competence and the share is flat below 0.5. (iii) We *can* reject the hypothesis that leadership competence is equal above and below 0.5, and (iv) We cannot reject the hypothesis that the relationship between leadership competence and the share is flat above 0.5. In contrast, we do not observe a statistically significant relationship between the leader's education and the share of the most numerous eligible sub-caste in any interval.[25]

Figure 8 reports the relationship between characteristics associated with competence and the share of the most numerous eligible sub-caste for female leaders. Data limitations prevent us from nonparametrically estimating the relationship between land value and the share for female leaders.[26] As noted, women in rural India will rarely participate in farm management decisions, and so we would not expect the value of land owned by the household to be strongly associated with the competence of female leaders in any case. Because few women run businesses or farms, we consider any work outside the home as an additional measure of leadership competence instead.

As in Figure 7, there is a discontinuous change in the characteristics of the female leaders at the same share threshold just below 0.5. Interestingly, above that threshold, where we expect more competent leaders to be selected based on both the theory and the results in Table 4(b), the women selected are less likely to have participated in the labor market or run their own farms or businesses. This implies that work outside the home in rural India may not be positively selective for women. Figure 8 does suggest that literate women are more likely to be selected as leaders in the caste equilibrium. However, the test statistics in Table 6, Columns 4-6 indicate that none of the discontinuous changes that we observe in Figure 8 are statistically significant. The especially competent female leaders in the caste equilibrium are evidently being selected on attributes that are unobserved by the econometrician.

We complete the empirical analysis of leadership selection by verifying an additional prediction of the model, which is that the probability that the selected leader is drawn from the most numerous caste will increase discontinuously when its share crosses the threshold above which a caste equilib-

---

[25]Table 7 reports the education-share relationship using literacy as the measure of education. The results would be qualitatively unchanged, for both male and female leaders, if we used years of schooling instead.

[26]Conditional on the other regressors, there is insufficient variation in land value across the five share categories, $D_1 - D_5$, to estimate the first-stage regression.

rium is obtained. The village inventory did not collect information on the elected representatives' sub-castes. However, this information is available from the village census for all candidates in the last two *panchayat* elections. We can thus test this prediction by replacing leader (or candidate) competence as the dependent variable in equation (8) with a binary variable indicating whether any candidate belonged to the most numerous eligible sub-caste in each ward and election term. Using the same two-step procedure as in Figures 7-8, and the same specification in the first step, it is quite striking that the predicted probability increases discontinuously in Figure 9 at the same threshold share, just below 0.5, where we observed a trend-break in the estimated θ and where leadership characteristics changed discontinuously.

4.5 Leadership Commitment

The model predicts that the leader in the caste equilibrium will choose projects that are aligned with the preferences of the median individual in the most numerous caste, regardless of his or her own preferences. In contrast, the median individual in the ward, who is selected as the leader, will choose his or her preferred mix of projects in the non-caste equilibrium.

To test these predictions, we take advantage of an additional feature of the randomized reservation in Indian local governments, which is that a reservation for female ward representatives is overlayed on caste reservation. In particular, one third of all seats are randomly restricted to female leaders and this reservation is applied equally across caste and open seats in each *panchayat* election. It is generally believed that male and female preferences for public and private goods differ, with a voluminous literature on intra-household resource allocations providing empirical support for this claim. Within a ward, for a given type of caste reservation (or open election), the share of the most numerous caste and, hence, the political equilibrium, will be the same across *panchayat* terms whether or not the seat is reserved for a woman. If the ward representative's position is reserved for a woman in one of those terms, the allocation of public goods can be compared across male and female leaders to test the commitment hypothesis: that in a caste equilibrium variation in the elected ward representative's characteristics should not affect the distribution of public goods in the ward.

Given the problem of commitment, in the non-caste equilibrium we would also expect *elected* male and female representatives to have relatively similar preferences (close to the median preference in the ward). However, if the male and female preference distributions have little overlap, the allocation of resources could vary with the gender of the leader, as found by Chattopadhyay and Duflo (2004).

33

The strong prediction of our model is that even in such cases differences in public goods allocations by gender should never be observed in the caste equilibrium.

To test these predictions, we estimate a modified version of the public goods allocation equation. In particular, we now include ward-reservation fixed effects. We are thus identifying the role of the gender of the elected representative in delivering public goods for each equilibrium type controlling for all (observable and unobservable) characteristics of voters in the ward:

$$G_{kjtr} = \eta_k + \pi_k W_{jtr} + \tilde{h}_{jr} + \zeta_{kjtr} \tag{9}$$

where G_{kjtr} measures the share of households in ward j that received good k in term t when reservation r was in place. W_{jtr} is a binary variable that takes the value one if the position was reserved for a female leader in that ward-term, $\tilde{h}_{jr}$ is a ward-reservation fixed effect, η_k is a full set of public good dummies, and ζ_{kjtr} is a mean-zero disturbance term. The reservation categories are SC, ST, OBC, and Open. The regression is estimated separately for $M_{jt} = 0$ and $M_{jt} = 1$, and the prediction is that π_k should be zero for all public goods k when $M_{jt} = 1$. The female coefficient could be significant when $M_{jt} = 0$ if the male and female preference distributions are sufficiently far apart, as discussed above.

Table 8 reports the estimates of equation (9) with ward-reservation fixed effects, separately for $M_{jt} = 0$ and $M_{jt} = 1$. We consider three thresholds above which a caste equilibrium is assumed to be present: 0.3, 0.4, 0.5. In the non-caste equilibrium ($M_{jt} = 0$), the woman representative coefficient is always positive and significant for street lights, increasing the share of households that receive that good by 0.07-0.09 relative to the reference good (public telephone). The woman-leader coefficient is also positive and significant for electricity and the coefficients are jointly significant for all public goods with the threshold set at 0.3, although the precision of the estimates declines at higher thresholds. In contrast to the estimates for the non-caste equilibrium, the elected woman-representative coefficient is *never* significant in the caste equilibrium ($M_{jt} = 1$) for any public good or jointly for all public goods.[27] Thus, while the election of a female ward representative does appear to change the mix of goods (the allocations are relative to the reference good) observed in the ward

---

[27]We cannot reject the hypothesis that all the female coefficients are zero with thresholds set at 0.4 and 0.5 in the non-caste equilibrium as well. Notice, however, that the p-values for the test range from 0.5 to 0.8 for $M_{jt} = 1$ but are much lower, ranging from 0.02 to 0.15 for $M_{jt} = 0$. Our inability to reject the null hypothesis in the non-caste equilibrium for all thresholds might simply be a consequence of the low power of the statistical test. Note again that we are only identified off variation in the gender of the leader within wards *and* reservation categories.

in the non-caste equilibrium, we cannot reject the hypothesis of leadership commitment in the caste equilibrium.

5 Conclusion

In this paper we explore whether community involvement in the political sphere always worsens governance. In particular, complementary to the new literature on the role of community networks in solving market problems, we test the hypothesis that strong traditional social institutions can discipline the leaders they put forward, successfully substituting for secular political institutions when they are ineffective. We do this by examining the interaction between an Indian institution that is hundreds of years old – the caste system – with a new set of political institutions – local democracy. Using detailed data on local public goods at the street level and Indian local politicians at the ward level over multiple terms, we find that the presence of a caste equilibrium (in which the population share of the most numerous sub-caste crosses a fixed threshold) is associated with the selection of leaders with superior observed characteristics and greater public goods provision. This improvement in leadership competence occurs without apparently diminishing leaders' responsiveness to their constituency.

Although these results suggest that parochial politics does not necessarily imply bad governance, they need to be placed in the appropriate perspective. Although the sub-caste may be able to control the leaders it nominates at the ward level, it will have less influence at higher levels of government where a single sub-caste is rarely dominant. The negative effect of caste-identity politics on leadership selection and outcomes has been documented at the state level in India and similar negative outcomes have been associated with parochial politics in other parts of the world. Moreover, the elected representative in a caste equilibrium is answerable to the social group she belongs to and so her choices will be aligned with the preferences of the median voter in her caste rather than the median voter in the constituency. The welfare consequences of a caste equilibrium are thus ambiguous. Caste politics is a second-best solution and, ultimately, there is no perfect substitute for well functioning political institutions (parties) in a competitive democratic system.

Finally, our results shed new light on the efficiency consequences of political reservation in India. Randomly-assigned caste reservation mechanically increases the commitment problem by inducing exogenous turnover in the leadership. Reservation also reduces the likelihood that a caste equilib-

rium will emerge in any constituency, exacerbating the commitment problem. The obvious equity advantage of any reservation system is that it favors historically-disadvantaged groups. The multiple sources of inefficiency that we identify in this paper, however, suggest that a more systematic appraisal of the costs and the benefits of political reservation in India may be warranted. One notable exception to this qualified assessment of the reservation system is quotas for women. This particular reservation scheme does not adversely affect the probability that a caste equilibrium will emerge and we find that women leaders are significantly more competent than men in that equilibrium. To the extent that the historical lack of participation by women in local politics was based on underestimates of their competence, the reservation system has uncovered a new set of especially competent, and now experienced, leaders.

References

[1] Abramitzky, Ran. 2008. "The Limits of Equality: Insights from the Isreali Kibbutz," *Quarterly Journal of Economics* 123(3): 1111-1159.

[2] Alesina, Alberto and Stephen E. Spear. 1988. "An Overlapping Generations Model of Electoral Competition," *Journal of Public Economics* 37: 359-379.

[3] Banerjee, Abhijit and Kaivan Munshi. 2004. How Efficiently is Capital Allocated? Evidence from the Knitted Garment Industry in Tirupur, *Review of Economic Studies* 71(1):19-42.

[4] Banerjee, Abhijit and Rohini Pande. 2007. "Parochial Politics: Ethnic Preferences and Politician Corruption," Harvard University, Kennedy School of Government, typescript.

[5] Beaman, Lori, Raghabendra Chattopadhyay, Esther Duflo, Rohini Pande, and Petia Topalova. 2008. "Powerful Women: Does Exposure Reduce Prejudice?" MIT department of economics, typescript.

[6] Besley, Timothy and Stephen Coate. 1997. "An Economic Model of Representative Democracy," *Quarterly Journal of Economics* 112(1): 85-114.

[7] Besley, Timothy, Rohini Pande, Lupin Rahman, and Vijayendra Rao. 2004. "The Politics of Public Good Provision: Evidence from Indian Local Governments," *Journal of the European Economic Association* 2(2-3): 416-426.

[8] Besley, Timothy, Rohini Pande, and Vijayendra Rao. 2007. "Just Rewards? Local Politics and Public Resource Allocation in South India," Harvard University, Kennedy School of Government, typescript.

[9] Caillaud, Bernard and Jean Tirole. 2002. "Parties as Political Intermediaries," *Quarterly Journal of Economics* 117(4): 1453-1489.

[10] Caselli, Francesco and Massimo Morelli. 2004. "Bad politicians," *Journal of Public Economics* 88: 759-782.

[11] Chattopadhyay, Raghabendra and Esther Duflo. 2004. "Women as Policy Makers: Evidence from a Randomized Policy Experiment in India," *Econometrica* 72(5): 1409-1443.

[12] Chaudhuri, Shubham. 2003. "What difference does a constitutional ammendment make? The 1994 Panchayati Raj Act and the attempt to revitalize rural local government in India," Columbia University department of economics, typescript.

[13] Chhibber, Pradeep K. 1999. *Democracy without Associations: Transformation of the Party System and Social Cleavages in India.* Ann Arbor: University of Michigan Press.

[14] Downs, Anthony. 1957. *An Economic Theory of Democracy.* New York, NY: Harper and Row.

[15] Duflo, Esther, Greg Fischer, and Raghabendra Chattopadhyay. 2005. "Efficiency and rent seeking in local government: Evidence from randomized policy experiments in India," MIT department of economics, typescript.

[16] Ferraz, Claudio and Frederico Finan. 2008. "Motivating Politicians: The Impacts of Monetary Incentives on Quality and Performance," UCLA department of economics, typescript.

[17] Harrington, Jr., Joseph E. 1992. "The role of party reputation in the formation of policy," *Journal of Public Economics* 49: 107-121.

[18] Levitt, Steven D. 1996. "How do Senators Vote? Disentangling the Role of Voter Preferences, Party Affiliation and Senate Ideology," *American Economic Review* 86(3): 425-441.

[19] List, John and Daniel Sturm. 2006. "How Elections Matter: Theory and Evidence from Environmental Policy," *Quarterly Journal of Economics* 121(4): 1249-1281.

[20] Messner, Matthias and Mattias Polborn. 2004. "Paying Politicians," *Journal of Public Economics* 88 : 2423-2445.

[21] Miguel, Edward and Mary Kay Gugerty. 2005. "Ethnic Diversity, Social Sanctions, and Public Goods in Kenya," *Journal of Public Economics* 89: 2325-2368.

[22] Munshi, Kaivan and Mark Rosenzweig. 2006. Traditional Institutions Meet the Modern World: Caste, Gender and Schooling Choice in a Globalizing Economy, *American Economic Review*, 96(4):1225-1252.

[23] Munshi, Kaivan and Mark Rosenzweig. 2008. The Efficacy of Parochial Politics: Caste, Commitment, and Competence in Indian Local Governments. 2008. *NBER Working Paper* No. 14335.

[24] Munshi, Kaivan and Mark Rosenzweig. 2009. Why is Mobility in India so Low? Social Insurance, Inequality and Growth, *NBER Working Paper* No. 14850.

[25] Osborne, Martin and Al Slivinski. 1996. "A Model of Political Competition with Citizen-Candidates," *Quarterly Journal of Economics* 111(1): 65-96.

[26] Padro i Miquel, Gerard. 2007. "The Control of Politicians in Divided Societies: The Politics of Fear," *Review of Economic Studies* 74: 1259-1274.

[27] Pande, Rohini. 2003. "Can Mandated Political Representation Increase Policy Influence for Disadvantaged Minorities? Theory and Evidence from India," *American Economic Review* 93(4): 1132-1151.

[28] Posner, Daniel N. 2005. *Institutions and Ethnic Politics in Africa.* Cambridge, MA: Cambridge University Press.

[29] Snyder, Jr., James M. and Michael M. Ting. 2002. "An Informational Rationale for Political Parties," *American Journal of Political Science* 46(1): 90-110.

Table 1: Sources of Support for Ward Leaders

Source of support:	within village (1)	outside village (2)
From caste	82	29
From religion	28	13
From wealthy individuals	38	--
From a political party	--	41

The statistics are computed over the last three local governments in each ward.

Each statistic reflects the percent of leaders who received support from a given source.

Table 2: Share of the Most Numerous Eligible Caste in the Ward

Type of election:	Open	SC	ST	OBC
	(1)	(2)	(3)	(4)
Panel A: Distribution of shares				
25 percentile	0.42	0.14	0.16	0.20
50 percentile	0.60	0.33	0.57	0.41
75 percentile	0.85	0.65	0.95	0.69
Panel B: Fraction of wards where share exceeds				
0.3	0.92	0.52	0.67	0.63
0.4	0.79	0.46	0.61	0.53
0.5	0.67	0.37	0.52	0.44
Total number of observations	1,973	373	187	769

SC=scheduled caste, ST=scheduled tribe, OBC=other backward caste.

Information on reservation and election outcomes is obtained for three terms in each ward.

Table 3: Fraction of Households in the Ward Receiving Public Goods in each Term

Type of election:	Open	SC	ST	OBC
	(1)	(2)	(3)	(4)
Water	0.69	0.73	0.78	0.72
	(0.40)	(0.39)	(0.71)	(0.39)
Sanitation	0.42	0.42	0.55	0.42
	(0.46)	(0.46)	(0.47)	(0.46)
Roads	0.69	0.72	0.74	0.73
	(0.41)	(0.40)	(0.41)	(0.39)
Telephones	0.07	0.12	0.08	0.10
	(0.24)	(0.30)	(0.25)	(0.28)
Electricity	0.14	0.20	0.17	0.20
	(0.34)	(0.38)	(0.36)	(0.38)
Street lighting	0.16	0.19	0.19	0.22
	(0.36)	(0.38)	(0.39)	(0.40)
Number of observations	1,704	373	176	619

Means and standard deviations (in parentheses).

SC=scheduled caste, ST=scheduled tribe, OBC=other backward caste.

Statistics are based on the last three terms in each ward.

Table 4(a): Public Goods Demand Parameters

Dependent variable:	public good provision					
Specification:	no reservation interactions			reservation interactions		
Pivotal characteristic:	land value	managerial/ professional occupation	education	land value	managerial/ professional occupation	education
	(1)	(2)	(3)	(4)	(5)	(6)
Water intercept	0.57	0.58	0.55	0.54	0.54	0.51
	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)	(0.03)
Sanitation intercept	0.31	0.34	0.31	0.29	0.32	0.28
	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)	(0.02)
Roads intercept	0.54	0.57	0.56	0.51	0.53	0.53
	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)	(0.03)
Electricity intercept	0.09	-0.03	0.08	0.08	-0.03	0.07
	(0.01)	(0.03)	(0.01)	(0.01)	(0.03)	(0.01)
Street lights intercept	0.09	-0.03	0.09	0.08	-0.03	0.08
	(0.01)	(0.03)	(0.01)	(0.01)	(0.03)	(0.01)
Pivotal char. - water	5.76	-0.02	2.82	5.57	-0.02	3.67
	(4.43)	(0.04)	(3.31)	(4.26)	(0.04)	(3.20)
Pivotal char. - sanitation	2.20	-0.04	-1.05	2.07	-0.04	-0.24
	(4.85)	(0.04)	(3.49)	(4.58)	(0.04)	(3.33)
Pivotal char. - roads	24.50	-0.005	-1.22	23.60	-0.004	-0.01
	(5.47)	(0.04)	(3.55)	(5.22)	(0.04)	(3.40)
Pivotal char. - electricity	-17.70	0.10	-4.44	-16.50	0.09	-3.64
	(3.21)	(0.03)	(2.62)	(3.04)	(0.03)	(2.49)
Pivotal char. - street lights	-6.44	0.12	-3.19	-5.87	0.11	-2.37
	(3.50)	(0.03)	(2.65)	(3.28)	(0.03)	(2.51)
all pivotal char.-goods=0						
(F-statistic)	17.00	10.68	2.32	14.62	12.99	2.49
(p value)	0.00	0.00	0.04	0.00	0.00	0.03

Standard errors in parentheses are robust to heteroscedasticity and clustered residuals within each ward-term.

The dependent variable is computed as the fraction of households in the ward who received a given public good in a given term.
   Public telephone is the excluded local public good.

The pivotal characteristic is the median in the ward (most numerous caste) when a caste equilibrium is assumed to be absent (present).

Land value is measured in thousands of Rupees. Coefficients on land value-goods in Columns 1 and 4 must be divided by 10^5.

Managerial/ professional occupation takes the value one for business, farming, and professional occupations
   zero for agricultural labor, skilled labor, unskilled labor, technician, and housewife.

Education is measured as years of schooling. Coefficient on education-goods in Columns 3 and 6 must be divided by 10^3.

All regressions include ward fixed effects, term dummies and the election year.

Competence parameters are reported in Table 4(b).

Table 4(b): Leadership Competence Parameters

Dependent variable:	public good provision					
Specification:	no reservation interactions			reservation interactions		
Pivotal characteristic:	land value	managerial/ professional occupation	education	land value	managerial/ professional occupation	education
	(1)	(2)	(3)	(4)	(5)	(6)
Theta	0.13	0.16	0.17	0.15	0.20	0.19
	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
SC	--	--	--	0.08	0.12	0.12
				(0.05)	(0.05)	(0.05)
ST	--	--	--	0.09	0.11	0.13
				(0.07)	(0.08)	(0.08)
OBC	--	--	--	0.09	0.09	0.08
				(0.05)	(0.05)	(0.05)
Woman	--	--	--	-0.02	-0.001	-0.02
				(0.04)	(0.04)	(0.04)
SC x Theta	--	--	--	-0.02	-0.09	-0.04
				(0.08)	(0.08)	(0.08)
ST x Theta	--	--	--	0.09	0.04	0.02
				(0.10)	(0.10)	(0.10)
OBC x Theta	--	--	--	-0.05	-0.05	-0.04
				(0.06)	(0.06)	(0.06)
Woman x Theta	--	--	--	0.10	0.08	0.10
				(0.05)	(0.05)	(0.05)
all caste dummies=0						
(F-statistic)	--	--	--	0.79	1.57	1.93
(p value)				0.50	0.19	0.12
all caste dummies-caste equilibrium=0						
(F-statistic)	--	--	--	0.53	0.23	0.38
(p value)				0.66	0.88	0.77
R^2	0.37	0.36	0.36	0.37	0.36	0.36
Number of observations	14,270	14,215	14,255	14,270	14,215	14,255

Standard errors in parentheses are robust to heteroscedasticity and clustered residuals within each ward-term.

The dependent variable is computed as the share of the households in the ward who received a given good in a given term: clean water(1), sanitation(2), improved roads(3), electricity(4), street lights(5). Public telephone is the excluded category.

The pivotal characteristic is the median in the ward (most numerous caste) when a caste equilibrium is absent (present).

Land value is measured in thousands of Rupees.

Managerial/ professional occupation takes the value one for business, farming, and professional occupations zero for agricultural labor, unskilled labor, skilled labor, technician, and housewife.

Education is measured as years of schooling.

Reservation categories are SC, ST, OBC, and woman.

All regressions include ward fixed effects, term dummies and the election year.

Table 5: Pivotal Voter and Leader Characteristics

Election type:	Open	SC	ST	OBC
	(1)	(2)	(3)	(4)
Panel A: Median individuals				
Land value	94.80	47.35	63.35	94.76
	(173.19)	(105.85)	(182.02)	(157.49)
Managerial occupation	0.34	0.33	0.40	0.42
	(0.47)	(0.47)	(0.46)	(0.49)
Education	4.46	3.53	3.30	4.03
	(3.76)	(3.59)	(3.65)	(3.36)
Panel B: Male leaders				
Land value	99.55	81.50	58.36	83.21
	(23.69)	(20.16)	(19.91)	(15.23)
Managerial occupation	0.75	0.38	0.82	0.72
	(0.43)	(0.49)	(0.38)	(0.45)
Education	7.42	6.01	5.30	7.05
	(4.43)	(4.49)	(3.99)	(4.30)
Panel C: Female leaders				
Land value	95.61	43.01	31.50	62.44
	(30.23)	(10.10)	(40.86)	(91.83)
Managerial occupation	0.10	0.32	0.05	0.54
	(0.30)	(0.47)	(0.22)	(0.50)
Education	3.23	5.78	2.22	4.72
	(3.83)	(4.39)	(2.05)	(4.17)

All characteristics in Panel A are measured as the median value in the ward for the relevant caste category.

The means (standard deviations) of these characteristics across all wards are reported in the table.

Leaders' occupation and education is obtained for last three terms in each ward.

Information on land value is based on all candidates in the ward over the last two terms.

Information on the landholdings of elected representatives was not collected

Land value is measured in thousands of Rupees.

Managerial occupation takes the value one for business and farming and zero for

professional occupations, agricultural labor, skilled labor, unskilled labor, technicians, and housewife.

Education is measured as years of schooling.

SC=scheduled caste, ST=scheduled tribe, OBC=other backward caste.

Table 6: Leader Characteristic - Share Relationship

Leader's gender:	male			female		
Leader characteristic:	log(land value)	manager	literate	worker	manager	literate
	(1)	(2)	(3)	(4)	(5)	(6)
λ_1	-0.42	0.59	0.04	1.44	-1.43	2.20
	(1.68)	(0.81)	(0.46)	(2.01)	(1.63)	(2.04)
λ_2	1.44	-0.81	-0.65	-0.60	-0.65	1.56
	(1.77)	(0.82)	(0.50)	(2.36)	(2.18)	(2.38)
λ_3	4.65	1.68	-0.33	-2.87	-2.84	3.59
	(1.69)	(0.94)	(0.80)	(2.79)	(2.65)	(2.72)
λ_4	3.01	2.20	0.18	-2.62	-3.64	-1.43
	(2.27)	(1.23)	(0.92)	(3.60)	(2.24)	(3.35)
λ_5	0.06	1.86	-0.38	0.90	1.56	0.27
	(2.26)	(1.34)	(0.81)	(1.57)	(1.29)	(1.88)
R^2	0.26	0.29	0.28	0.49	0.49	0.31
Number of observations	1708	2170	2156	1109	1109	1101
$H_0: \lambda_1=\lambda_2=0$	0.66	0.32	0.32	0.73	0.68	0.52
$H_0: \lambda_1=\lambda_2$	0.39	0.13	0.17	0.48	0.71	0.81
$H_0: \lambda_1=\lambda_2=\lambda_3=0$	0.04	0.06	0.39	0.35	0.63	0.77
$H_0: \lambda_3=\lambda_4=\lambda_5$	0.21	0.94	0.87	0.32	0.16	0.29

Standard errors in parentheses.

$D_1=1$ if S_{jt} lies in the 0.20-0.35 interval.

$D_2=1$ if S_{jt} lies in the 0.35-0.50 interval.

$D_3=1$ if S_{jt} lies in the 0.50-0.65 interval.

$D_4=1$ if S_{jt} lies in the 0.65-0.80 interval.

$D_5=1$ if S_{jt} lies in the 0.80-1.00 interval.

λ_1-λ_5 are the corresponding coefficients on the share-dummies.

Hypothesis tests report p-values.

Table 7: Leadership Commitment Estimates

Dependent variable:	public good provision					
Threshold for caste equilibrium:	0.3		0.4		0.5	
	(1)	(2)	(3)	(4)	(5)	(6)
Woman - water	-0.018	0.009	-0.012	0.012	0.003	0.005
	(0.039)	(0.017)	(0.028)	(0.019)	(0.024)	(0.020)
Woman - sanitation	-0.043	0.020	-0.007	0.017	-0.014	0.024
	(0.049)	(0.019)	(0.033)	(0.020)	(0.027)	(0.022)
Woman - roads	-0.105	0.034	-0.010	0.027	-0.021	0.038
	(0.050)	(0.018)	(0.033)	(0.020)	(0.028)	(0.021)
Woman - electricity	0.136	-0.006	0.053	0.003	0.037	0.004
	(0.045)	(0.014)	(0.030)	(0.015)	(0.024)	(0.016)
Woman - street lights	0.094	-0.001	0.075	-0.005	0.069	-0.008
	(0.046)	(0.015)	(0.030)	(0.016)	(0.024)	(0.017)
Caste equilibrium in the ward	No	Yes	No	Yes	No	Yes
All woman-goods=0						
(F-statistic)	2.80	0.89	1.63	0.50	1.77	0.82
(p value)	0.02	0.49	0.15	0.77	0.12	0.53
R^2	0.43	0.43	0.42	0.44	0.41	0.46
Number of observations	3,095	11,140	4,525	9,710	5,975	8,260

Standard errors in parentheses are robust to heteroscedasticity and clustered residuals within each ward-term.

The dependent variable is computed as the share of households in the ward who received a given good in a given term.

   Public telephone is the excluded good.

Woman dummy equals one if the leader is a woman, zero otherwise.

A caste equilibrium is assumed to be present if the share of the most numerous caste in the ward exceeds the threshold.

Reservation includes SC=scheduled caste, ST=scheduled tribe, OBC=other backward caste, and Open.

All regressions include ward-reservation fixed effects, term dummies, the election year, and a full set of public goods dummies.

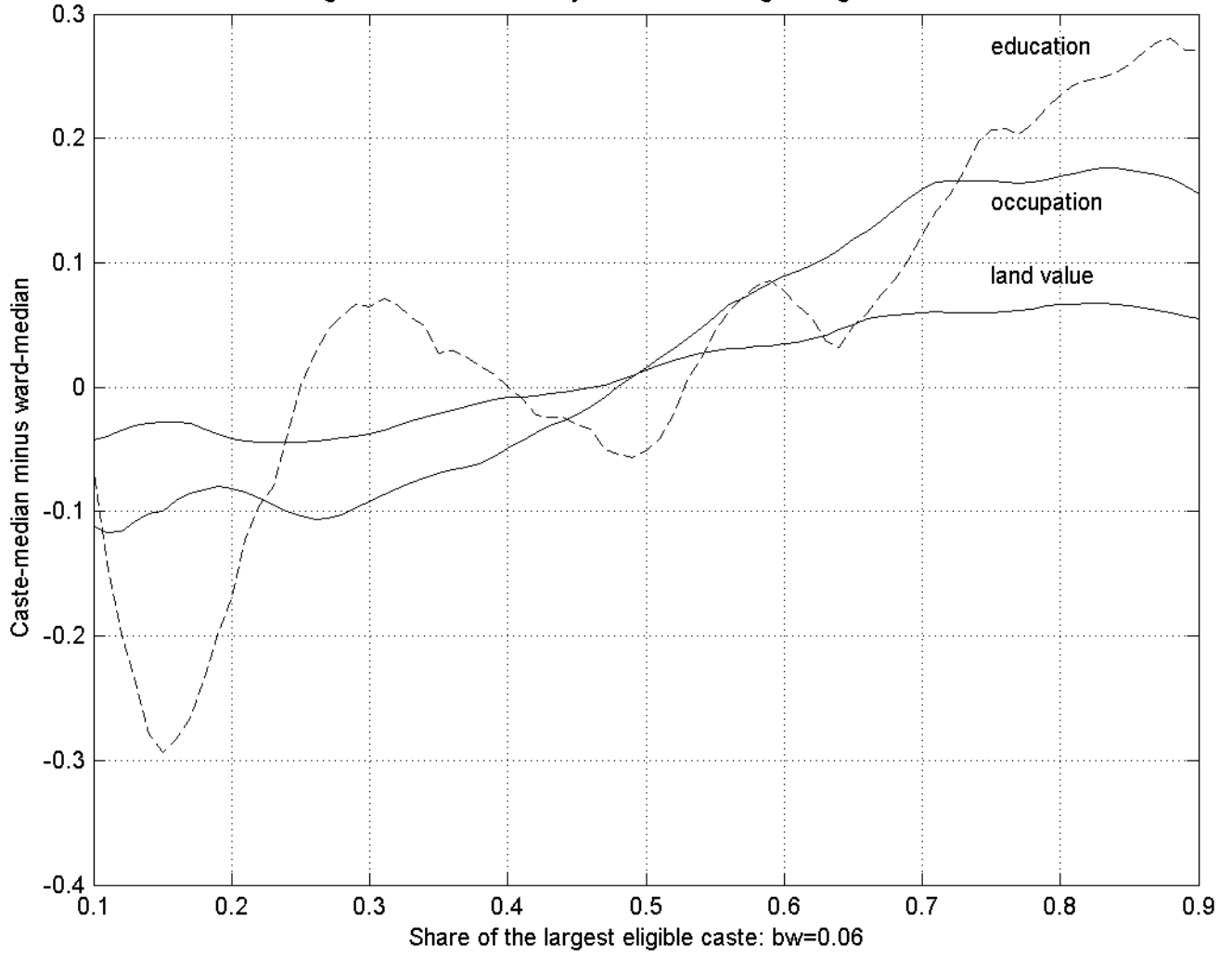Figure 1: Caste-Median by Share of the Largest Eligible Caste

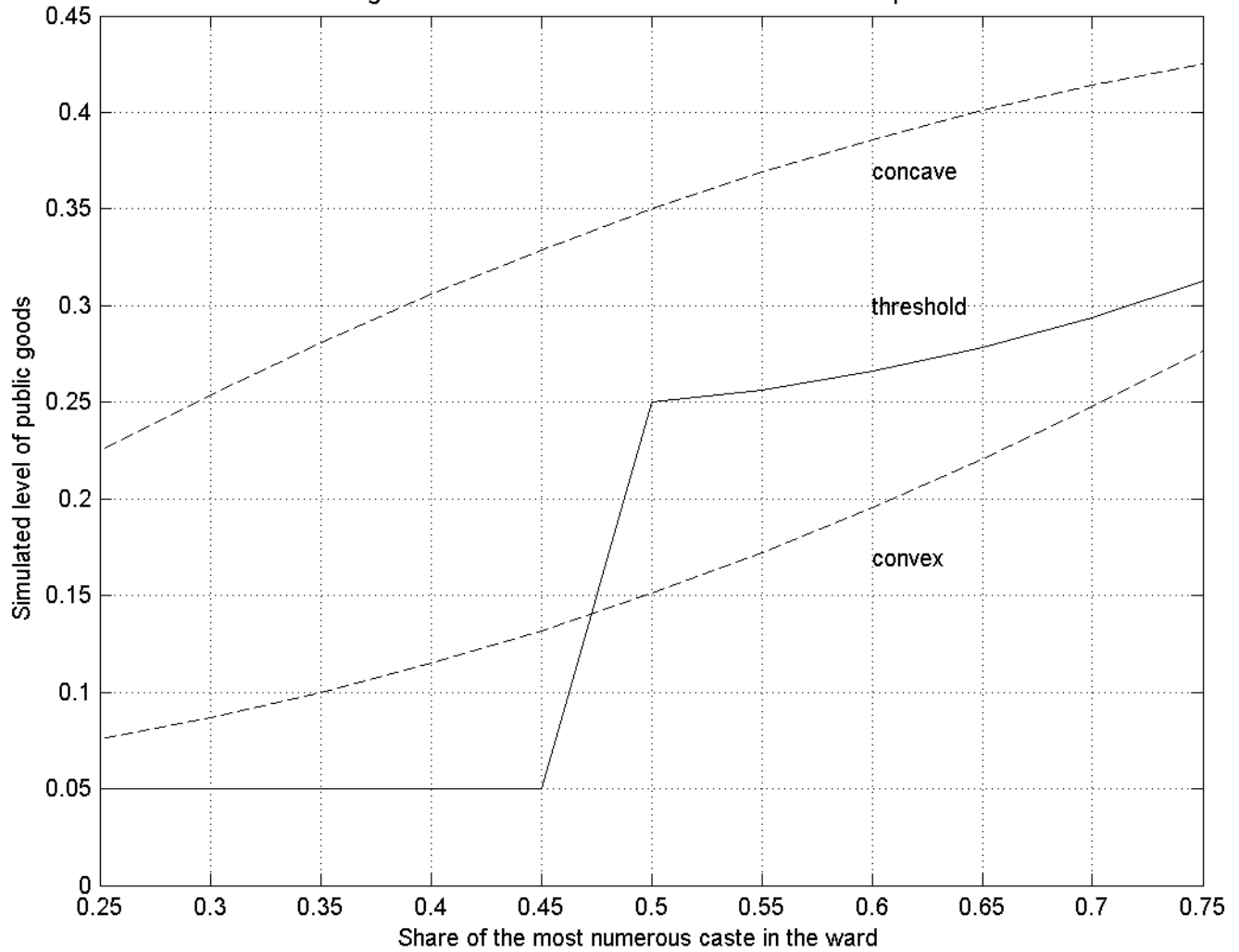Figure 2: Alternative Public Goods-Share Relationships

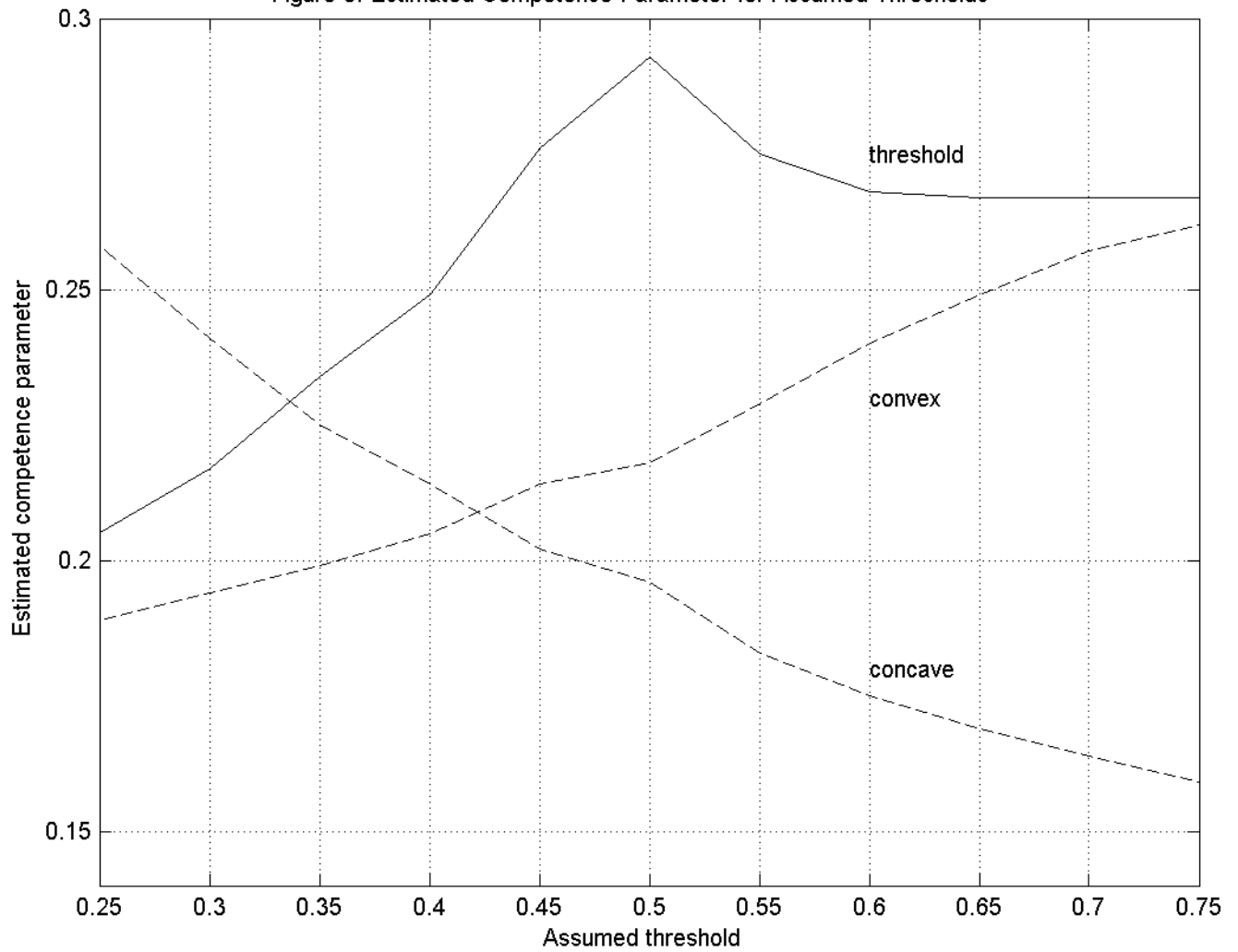Figure 3: Estimated Competence Parameter for Assumed Thresholds

Figure 4: Estimated Competence Parameter for Assumed Thresholds (Land Value)
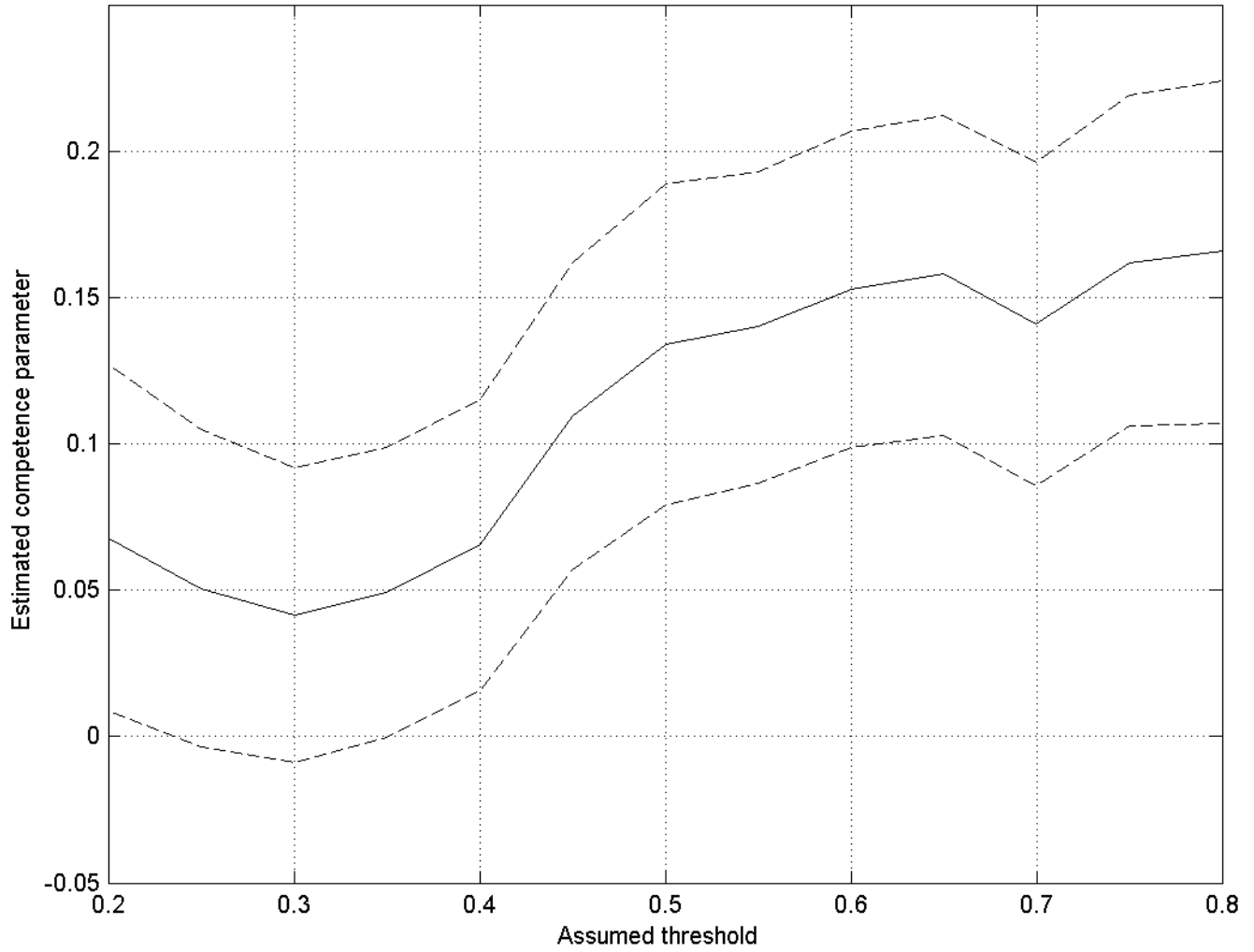
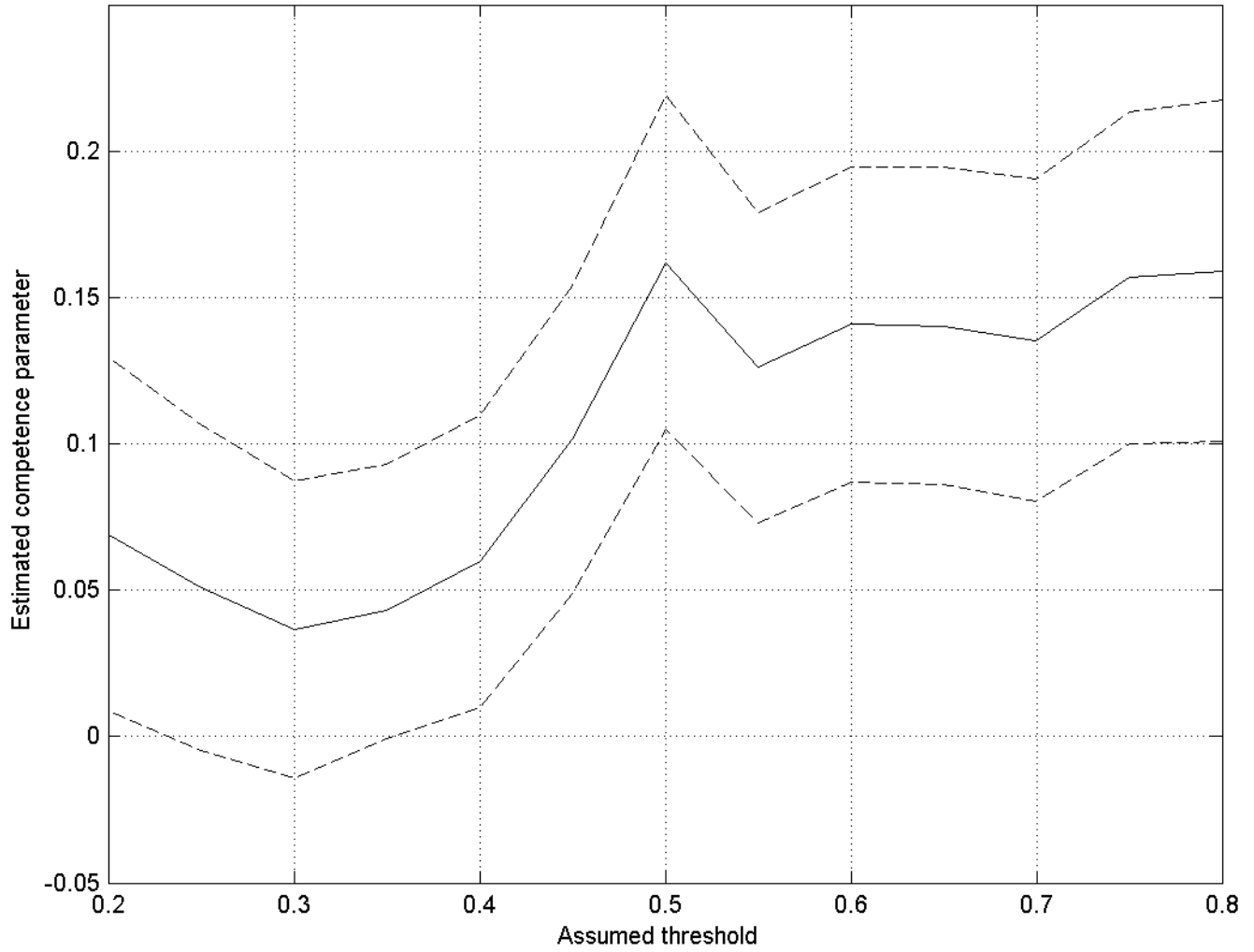Figure 5: Estimated Competence Parameter for Assumed Thresholds (Occupation)

Figure 6: Estimated Competence Parameter for Assumed Thresholds (Education)
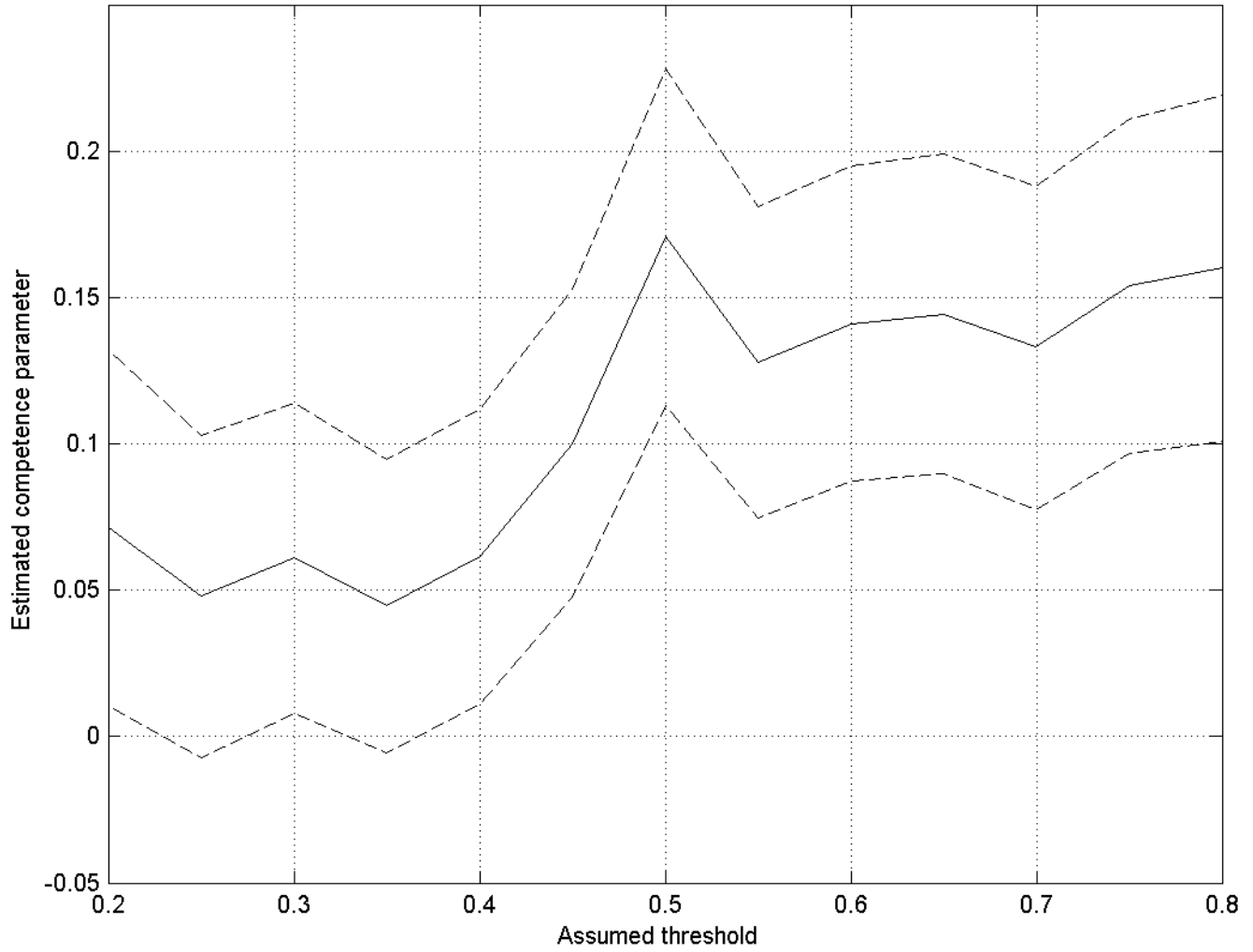
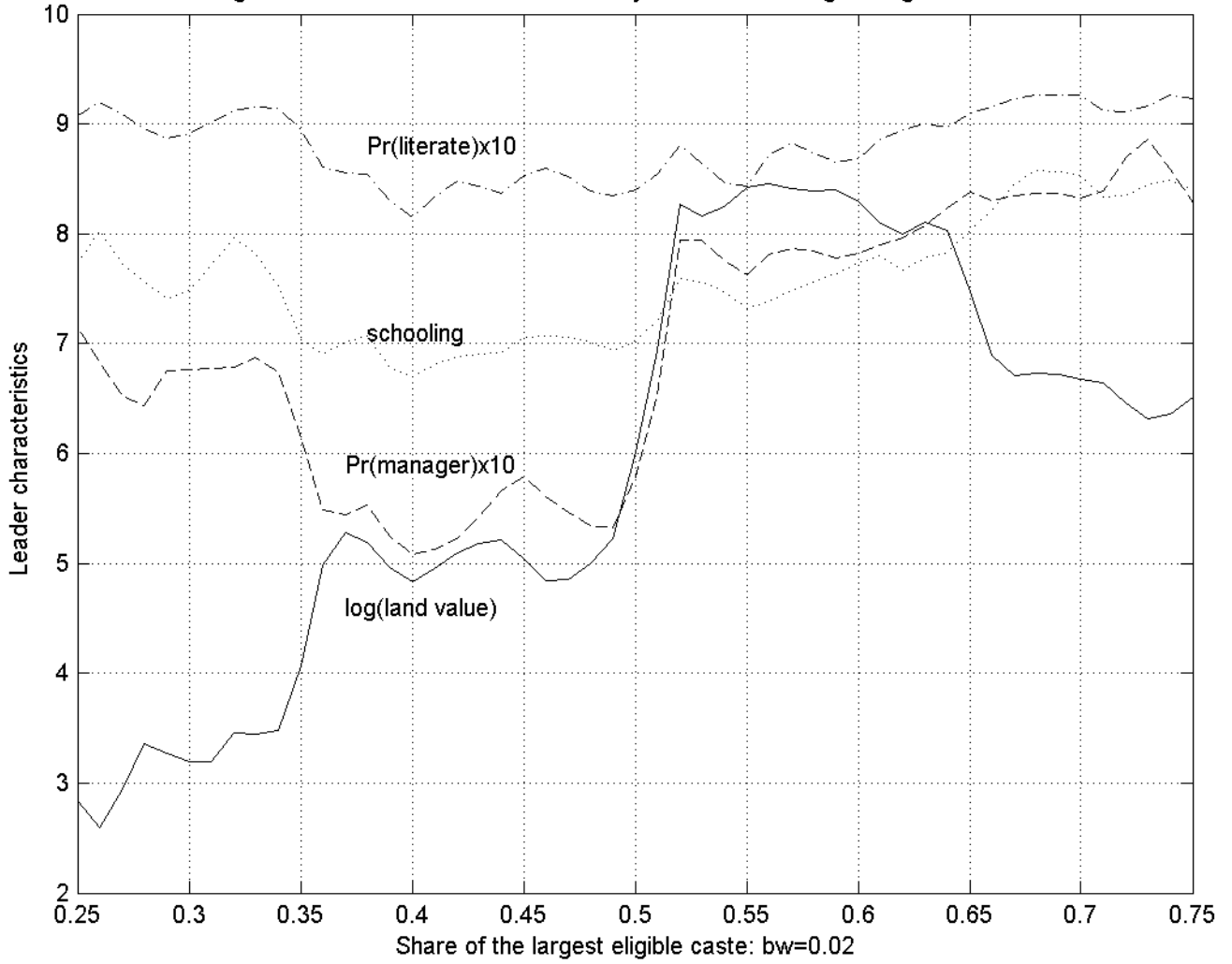Figure 7: Male Leader Characteristics by Share of the Largest Eligible Caste

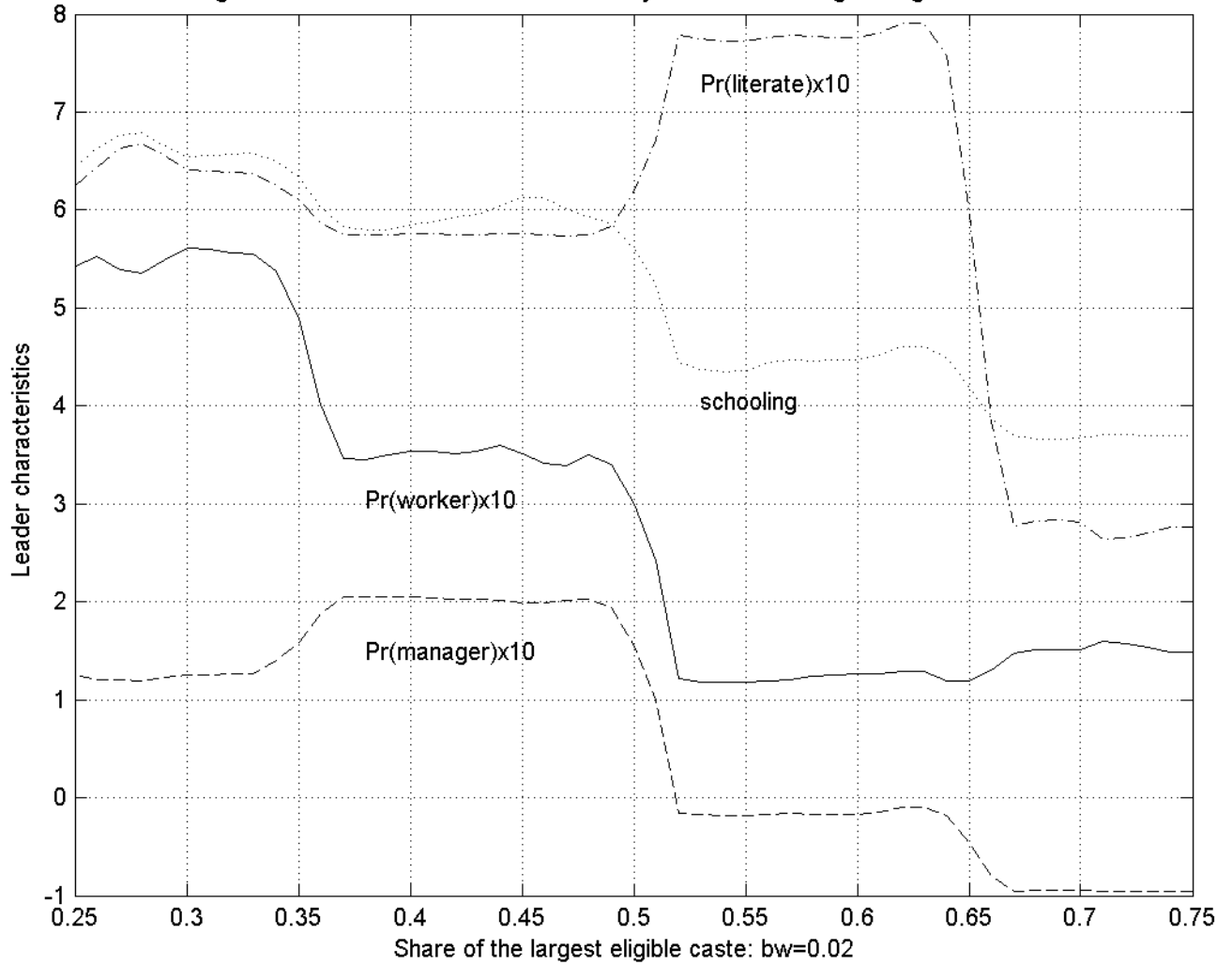Figure 8: Female Leader Characteristics by Share of the Largest Eligible Caste

Figure 9: Leader Belongs to the Largest Caste by Share of the Largest Caste