Insiders and Outsiders:
Local Ethnic Politics and Public Goods Provision

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The under-supply of public goods is a hallmark of underdevelopment.

Growing macro and micro literatures suggests ethnic politics is a major factor.

Ethnic affiliation - affiliations along tribal, linguistic, or caste lines - determines the election of leaders in many developing countries.

Two mechanisms identified for the negative consequences of ethnic politics:
A. When information is limited, citizens vote mechanically on ethnic lines. This allows incompetent and corrupt leaders to win elections (Banerjee and Pande, 2010; Casey, 2015).

Because public resources are siphoned off to politicians, insiders - member’s of the leader’s own group - and outsiders are hurt.

B. Ethnic politics distorts the allocation of public resources.

The allocation depends on ethnicity and not efficiency when such goods can be targeted (Besley et al., 2007; Bardhan and Mookherjee, 2010; Anderson et al., 2015; Burgess et al., 2015).

Insiders benefit at the expense of outsiders.
We re-examine ethnic politics at the local level, in India.

The standard problem of limited information is absent.

We simultaneously consider both the level of actual public goods and their distribution - not just corruption or individually-targetable transfers focused on in the literature.

The distinction between targetable and non-excludable public goods, we show, is important.

Indeed, the existence targetable goods in the portfolio of politicians affects the supply of public goods.
The central question is:

At the local level, does the existence of ethnic (caste) politics increase or decrease the supply of public goods?

Need to define:

A. The characteristics of ethnic groups - who are the insiders and what defines them.

B. The set of publicly-funded resources allocated by politicians.
The voluntary provision of public goods is a classic problem in political economy.

*Collective action problem*: individuals do not internalize benefits to others.

Most acute in local governments, which rely on low or unpaid volunteers.

Local government decisions more important now than ever - decentralization is worldwide trend, along with local democratization (India, China).

In India, 65% of population live in villages, where decisions about local infrastructure and welfare transfers are made.
Two fundamental characteristic of ethnic communities:

A. High levels of internal co-operation.

    Large literature showing group solidarity helps support private activities when markets function imperfectly; e.g., risk-sharing in rural areas.

    Central question here: does this within-group social connectedness ameliorate the collective action problem in politics?

    If so, ethnic politics could result in the selection of more competent leaders and more public goods.

    For non-excludable goods, insiders and outsiders gain.
B. The dark side: ethnic communities’ disregard for others.

Leaders do not take into account the benefits to outsiders.

This problem is particularly serious for targetable goods (e.g. BPL transfers in India):

Insiders benefit at the expense of outsiders.

This aspect of ethnic politics has been the focus of the prior literature, which ignores the supply of non-excludable goods.
What we do:

1. Build a theory incorporating the role of communities in the selection of leaders in a democratic setting.
   
   A. Two public resources - non-excludable (public goods) and targetable.
   
   B. Ethnic groups are heterogeneous in size.
   
   C. Individuals are heterogeneous in ability.
   
   D. Providing public goods requires costly effort.
   
   E. The groups can internally co-operate but have complete disregard of other group members.
2. Test the model using data from rural India describing public goods outcomes and welfare transfers across three elections at the ward level.

The model delivers two fundamental predictions:

1. There will be a discrete increase in the supply of local public goods and representative ability when the largest group in the constituency (ward) crosses a threshold, if within the groups (castes) representatives are induced to internalize group benefits.

We test for a threshold and estimate the gain in public goods supply and leader ability there.
2. The location of the threshold is informative about whether the coupling of non-excludable goods and targetable goods contributes to or ameliorates the problem of the under-supply of public goods.

We estimate where the threshold is located.

3. Carry out auxiliary tests of targeting.

1. Are welfare transfers more likely to go to a household if it is a member of the elected representative’s caste?

2. Similarly, are the public goods we examine targeted to streets by caste affiliation?
4. Estimate the structural parameters of the model and carry out counter-factuals.

1. By how much does caste solidarity increase public goods supply relative to purely selfish politicians and relative to the first best, when there is no collective action problem?

2. By how much does the supply of public goods change when we take the distribution of welfare transfers out of the hands of politicians?
The Setting: Why India?

A. Social Structure: Castes

The insider-outsider dichotomy key to the literature on ethnic politics is especially pronounced in India.

Caste (jati) identity is salient, shown to be important in risk-sharing and job acquisition.

95% of rural Indians marry within their caste.

World Values Surveys (2005-2009, large, low- or medium-income countries) - India is an outlier.
Figure 1A: Percentage of Respondents Who Trust People in their Neighborhood, by Country (World Values Survey, 2005-2009)
Figure 1B: Percentage of Respondents Who Do Not Have a Problem with Their Neighbors Speaking a Different Language, by Country (World Values Survey, 2005-2009)
Figure 1C: Percentage of Respondents Who are Fine with their Neighbors Following a Different Religion, by Country (World Values Survey, 2005-2009)
4,000 castes in India, so 250,000 on average in each.

Key to co-operation with groups: social sanctions.

Sanctions are effective when activities are concentrated within a group (and other groups exclude).

Castes are clustered spatially, across and within villages (Rural Economic Development Survey (REDS) 2006):

1. 64 castes per state, so 12 castes per village = 30 households in a caste in a village.

2. Each caste makes up 6% of the village population, but 14% of a ward’s population.
Evidence on the within-caste concentration of activities:

2006 REDS Census:

Every household was asked to list in order three individuals in the village they would rely on for food or a temporary loan if there was an emergency.

Benchmark: if picked randomly from villagers, 6% would be from the same caste.

Finding: 50% of individuals named first belonged to the same caste as the respondent for both questions.

Note: A severe underestimate of reliance on caste loans.
Figure 2: The Importance of Caste within the Village

- Average caste's share of village population
- Average caste's share of ward population
- Share of food transferred from a caste member
- Share of loans from a caste member
B. Indian Local Politics

System established by an amendment to the constitution in 1991.

Established village councils (*Panchayats*) covering one or two villages who receive funding from the state.

Villages divided into 10-15 wards.

Representatives chosen by direct election in each ward every 5 years.

Major responsibilities of the council are to construct and maintain village infrastructure (public goods) and identify welfare recipients and provide transfers.
Caste politics is built into the system:

Randomization is imposed by caste *group* (aggregates) across wards and across elections on who is eligible to run for office.

The council makes decisions on how to spend its budget.

How much spending goes to a ward depends on the influence of the representatives from each ward (decisions are made by council vote).

So a representative’s effort and ability matter.
### Table 1: Sources of Support for Ward Representatives

<table>
<thead>
<tr>
<th>Source of support (%)</th>
<th>Within village (1)</th>
<th>Outside village (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From caste</td>
<td>82</td>
<td>29</td>
</tr>
<tr>
<td>From religion</td>
<td>28</td>
<td>13</td>
</tr>
<tr>
<td>From wealthy individuals</td>
<td>38</td>
<td>--</td>
</tr>
<tr>
<td>From a political party</td>
<td>--</td>
<td>41</td>
</tr>
</tbody>
</table>

Source: Rural Economic Development Survey, 2006. The statistics are computed over the last three election terms in each ward. Each statistic reflects the percent of representatives who received support from a given source.
The collective action problem is acute in this system, in the absence of the hypothesized caste-based co-ordination capability:

A. Monetary compensation is trivial, and unrelated to performance. No monetary gain from winning office.

B. Long-term incumbency is all but eliminated by the set-asides - no seat can be reserved for the same caste group across consecutive elections (only 14.8% of council members incumbents).

Cooperation with outsiders cannot be sustained.
The Theory

Incorporates, in the context of democratic elections:

A. Ethnic groups that are inward-oriented:

Interact only with themselves → sanctioning power.

:: High degree of internal cooperation.

B. Heterogeneity in individual abilities.

C. Two types of public resources:

Non-excludable public goods and targetable goods.
There are $K$ ethnic groups in a political constituency.

Each ethnic group $k$ has $N_k$ members, with $\sum_k N_k = N$.

$k$ subscripts sort groups by size, so $N_K$ is the largest group.

The constituency must select, by voting, a representative.

The representative is compensated so that he internalizes the benefits of the public resources to his group - only.

This is key: solves collective action problem.

The representative does not place any weight on the benefits to outsiders - the dark side of ethnic politics.
I. Public good provision is the sole task of the representative.

The level of the public good depends on the representative’s effort.

A representative with ability $\omega$ belonging to group $k$ will choose effort $e$ to maximize

$$N_k e^\beta - \frac{e}{\omega},$$

where $e^\beta = \text{level of the public good (production function)}$.

$\beta < 1$ (we will see, $\beta < 1/4$ is necessary (tested)).
The level of the public good, for simplicity, maps linearly one-to-one into the utility of each constituent

Optimal effort by the representative:

\[ e(\omega, N_k) = (\beta \omega N_k)^{1-\beta} \]

See: effort depends positively on group size and the representative’s own ability.

If ethnicity not salient, then selfishness and \( N_k = 1 \)!
Group of size $N_k$ selects a candidate of ability $\omega$ to maximize its net benefit (including the candidate)

$$N_k\left[e(\omega, N_k)\right]^\beta - \frac{e(\omega, N_k)}{\omega} - \alpha \omega,$$

where $\alpha \omega$ is the candidate's opportunity cost.

Solving for the ability of the optimal candidate from the group:

$$\omega(N_k) = \left[\frac{\beta N_k}{\alpha^{1-\beta}}\right]^{\frac{1}{1-2\beta}}$$

Larger groups put forth higher-ability candidates.
Similarly, candidates from larger groups expend more effort:

$$e(N_k) = \left[ \frac{(\beta N_k)^2}{\alpha} \right]^{\frac{1}{1-2\beta}}$$

The net benefit from public goods provision is strictly positive, so every group will prefer to have its candidate rather than have no public goods, even if they bear the cost:

$$\left( \frac{\beta^2}{\alpha} \right)^{\frac{\beta}{1-2\beta}} N_k^{\frac{1}{1-2\beta}} (1 - 2\beta)$$

But who will actually run (from which group) and who will win the election?
Set-up: Citizen-candidate model, but with group representatives contesting for election.

Small entry cost, so only candidates who can win run.

Candidate with the most votes win.

Largest-group candidate (LGC) should always win, right? No. Might not run.

Largest group could free ride on the next largest group and forego the costs of the representative if big enough.
Two conditions must be met for the LGC to run and win:

A. *Feasibility condition* (FC): the LGC must be preferred to any other candidate by a voter in a third group.

   Obviously satisfied in this case.

B. *Incentive condition* (IC): the largest group must prefer its own candidate to the next largest caste candidate (not want to free ride).

   When will the IC be satisfied, and what happens if not?
The IC will be satisfied if

\[ N_K e(N_K) \beta - \frac{e(N_K)}{\omega(N_K)} - \alpha \omega(N_K) \geq N_K e(N_{K-1}) \beta \]

or

\[ N_K \left( \frac{\beta^2}{\alpha} \right)^{\frac{1}{1-2\beta}} \left[ N_K^{\frac{2\beta}{1-2\beta}} (1 - 2\beta) - N_{K-1}^{\frac{2\beta}{1-2\beta}} \right] \geq 0 \]

If the condition is satisfied, there will be a unique equilibrium in which only the LGC runs.

When will it hold? Depends on the ethnic composition of the constituency (square brackets).
The expression implies there will be a unique threshold \textit{share} of the largest group in the constituency above which the IC is satisfied.

A. If all groups are the same size \((N/K)\), the expression is negative.

B. As \(N_K\) increases, for given \(N\), the size of the other groups declines; by continuity there is some threshold share \(N^{*}_K/N\) at which the IC is just satisfied.
What happens if the largest group size is below the threshold?

Multiple equilibria, with the winning group of a size below that of the largest (and next largest) caste.

Therefore,

**Proposition 1.** *There is a discontinuous increase (jump up) in the ability of the winning representative and the supply of the public good when the population share of the largest group crosses a threshold share $N^*/N$.*

Note: More inequality in group sizes $\rightarrow$ higher level of public goods, in particular way.
II. Adding targetable public resources: welfare transfers

Local government officials often entrusted to distribute transfers.

Unlike public goods, transfers can be targeted. Gives rise to the possibility of politician corruption - targets resources to himself.

With strong inward-looking groups “corruption” is at the group level - transfers targeted to the representative’s group.

If politicians can also target some public resources, what happens to the supply of public goods?
Assume for simplicity there is a fixed number of transfer units $T \in (N/K, N)$ available to the constituency.

Each beneficiary receives one transfer unit from which she gets $\theta$ in utility.

A representative from a group of size $N_k$ allocates the first $N_k$ units to his own group and then the rest, if any, $(T - N_k)$ randomly to outsiders in the constituency.

The existence of private transfer does not affect the ability or level of effort of the preferred candidate from each group.

What changes is who runs and gets elected, and that affects the equilibrium level of public goods.
To see what happens, we need to again consider the IC and FC.

The new IC (when the largest group chooses to contest the election) is:

$$N_K \left( \frac{\beta^2}{\alpha} \right)^{\frac{\beta}{1-2\beta}} \left[ N_K^{1-2\beta} (1 - 2\beta) - N_j^{1-2\beta} \right] + \theta N_K \left[ \max \left( 1, \frac{T}{N_K} \right) - \left( \frac{T - N_j}{N - N_j} \right) \right] \geq 0$$

Relative to the IC when there are only public goods there is a second bracketed term reflecting the gain (more transfers) from having a winning candidate from the group.

This term is obviously always positive. The largest group has a greater incentive to have its representative elected.
Thus, the threshold share at which the IC holds with equality $\frac{N^{**_K}}{N}$ is below the threshold in which there are no welfare transfers $\frac{N^{*_K}}{N}$.

But, what happens to the FC?

First, if $\frac{N^{**_K}}{N} \geq 0.5$, then the largest group will always get elected even if outsiders would not prefer them.

If $\frac{N^{**_K}}{N} < 0.5$, what determines when outsiders would prefer the largest group to any other than itself?
The new FC is

\[
\left\{ \left( \frac{\beta^2}{\alpha} \right)^{\frac{\beta}{1-2\beta}} \left[ \frac{2\beta}{N_K^{1-2\beta}} - \frac{2\beta}{N_j^{1-2\beta}} \right] \right\} - \left\{ \theta \left[ \frac{T - N_j}{N - N_j} - \max \left( \frac{T - N_K}{N - N_K}, 0 \right) \right] \right\} \geq 0
\]

The first term is the gain to all groups in terms of the supply of public goods when the LGC is elected. It is always positive (which is why only the IC mattered when there were no welfare transfers).

The second term is the loss to outsiders, which is larger the greater is $N_j$, the size of the winning group. Because $N_j < N_K$, the second term is also always positive.
The FC is satisfied when the first term exceeds the second.

We can show there is one unique threshold value such that above that value FC is not satisfied (no support from outsiders).

Let $N_{K}^{***}(N_{j})$ be the FC threshold, then we get

**Proposition 2.** (a) If $N_{K}^{**}(N_{j}) < N_{K}^{***}(N_{j})$ the threshold at which the supply of public goods increases discontinuously is $N_{K}^{**}(N_{j})$. (b) If $N_{K}^{**}(N_{j}) > N_{K}^{***}(N_{j})$ the threshold at which the supply of public goods increases discontinuously is .5, only when the largest group has an absolute majority.
The empirical content of Propositions 1 and 2:

A. If we find evidence that there is a discontinuous increase in representative’s ability and the level of public goods when the share of the largest group crosses a threshold, that is evidence that within-group cooperation helps solve the collective action problem.

Ethnic politics, at the local level, leads to a higher level of public goods compared with elections in which all candidates seek to maximize their own welfare.

That is the positive side of ethnic politics, mostly ignored in the literature. We have a test.
B. The location of the threshold is informative about whether the inclusion of targetable transfers in the portfolio of politicians increases or decreases the supply of public goods because of the dark side of ethnic politics - exclusion.

If the threshold is found to be below .5, targeting of some public goods encourages larger groups to put up candidates to run for office - so better candidates are elected and public goods levels are higher.

If the threshold is instead at .5 then coupling public goods and targetable goods evidently contributes to the problem of the under-supply of public goods - fewer candidates from large groups, who are better representatives, are electable.
The Data

Not so big, not too small, but relevant to the theory.

Source: 2006 Rural Economic Development Survey

A. Covers three elections of representatives to village councils (at the ward level) for 242 villages in 13 major states in India.

B. Census of all households in the villages (119,000), including information on sub-caste and ward and street location.

Can measure the size (share) of each caste in each ward.
C. Village inventory provides information on elected representatives (e.g., schooling) in each ward and an inventory of *actual* public goods expenditures (new, maintenance), by type of public good, at the street level for each of three elections.

We look at six local public goods: drinking water, sanitation, improved road (pavement), electrification, street lights, and public telephones (15.2% of total local expenditures).

We exclude goods such as schools and health centers because their benefits are not confined to wards and thus their location in a ward is not necessarily a ward-specific benefit.
## Appendix Table A1: Fraction of Households Receiving Public Goods Each Term

<table>
<thead>
<tr>
<th>Type of election:</th>
<th>Open (1)</th>
<th>SC (2)</th>
<th>ST (3)</th>
<th>OBC (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>0.69</td>
<td>0.73</td>
<td>0.78</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(0.39)</td>
<td>(0.71)</td>
<td>(0.39)</td>
</tr>
<tr>
<td>Sanitation</td>
<td>0.42</td>
<td>0.42</td>
<td>0.55</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.46)</td>
<td>(0.47)</td>
<td>(0.46)</td>
</tr>
<tr>
<td>Roads</td>
<td>0.69</td>
<td>0.72</td>
<td>0.74</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>(0.41)</td>
<td>(0.40)</td>
<td>(0.41)</td>
<td>(0.39)</td>
</tr>
<tr>
<td>Telephones</td>
<td>0.07</td>
<td>0.12</td>
<td>0.08</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.30)</td>
<td>(0.25)</td>
<td>(0.28)</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.14</td>
<td>0.20</td>
<td>0.17</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.38)</td>
<td>(0.36)</td>
<td>(0.38)</td>
</tr>
<tr>
<td>Street lighting</td>
<td>0.16</td>
<td>0.19</td>
<td>0.19</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>(0.36)</td>
<td>(0.38)</td>
<td>(0.39)</td>
<td>(0.40)</td>
</tr>
</tbody>
</table>
We have public goods outcomes for 2,891 ward terms.

D. Household survey, providing information on targeted governmental transfers received by households in each of three elections.

We look at whether a household in a ward received financial assistance from the BPL (below the poverty line) program.

BPL transfer allocations are determined by local elected representatives.

The political economy features of the data were in part designed by the authors.
One key challenge: the composition of castes in a ward can affect the demand for public goods; the theory is about public goods supply

Having a panel of elections enables us to eliminate the effect of caste composition on the demand for public goods:

A. There is little mobility, so that caste composition in any ward remains stable over the three elections (Munshi and Rosenzweig, forthcoming).

B. The Indian electoral reservation system randomly reserves local council seats to particular caste groups - Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Castes (OBC).
There is thus random variation over time in the caste composition of eligible castes within a ward - the largest *eligible* caste changes within a ward across elections.

Ward fixed effects absorb the ward-level differences in preferences for or costs of public goods.

Candidate quality or public good preferences might differ across the caste categories, so we also include election-specific reservation dummy variables in all specifications.
Table 2: Population Share of the Largest Eligible Caste, by Election Type

<table>
<thead>
<tr>
<th>Type of election:</th>
<th>Open</th>
<th>SC</th>
<th>ST</th>
<th>OBC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Distribution of shares</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 percentile</td>
<td>0.42</td>
<td>0.14</td>
<td>0.16</td>
<td>0.20</td>
</tr>
<tr>
<td>50 percentile</td>
<td>0.60</td>
<td>0.33</td>
<td>0.57</td>
<td>0.41</td>
</tr>
<tr>
<td>75 percentile</td>
<td>0.85</td>
<td>0.65</td>
<td>0.95</td>
<td>0.69</td>
</tr>
<tr>
<td><strong>Panel B: Fraction of ward-terms where largest share exceeds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25</td>
<td>0.97</td>
<td>0.48</td>
<td>0.64</td>
<td>0.69</td>
</tr>
<tr>
<td>0.5</td>
<td>0.66</td>
<td>0.29</td>
<td>0.50</td>
<td>0.44</td>
</tr>
<tr>
<td>0.75</td>
<td>0.36</td>
<td>0.18</td>
<td>0.41</td>
<td>0.21</td>
</tr>
<tr>
<td>Fraction of ward-terms</td>
<td>0.60</td>
<td>0.11</td>
<td>0.06</td>
<td>0.23</td>
</tr>
</tbody>
</table>

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

A. Do elected representatives have on average higher schooling levels than do typical heads of households?

Theory predicts candidates will be positively selected on ability in each caste.

B. Is there evidence that the representative’s ability (schooling) and the level of public goods increases discontinuously when the largest eligible caste in the ward crosses a threshold?
### Table 3: Years of Schooling of Elected Representatives and Median Household Heads in the Wards

<table>
<thead>
<tr>
<th>Election type:</th>
<th>Open (1)</th>
<th>SC (2)</th>
<th>ST (3)</th>
<th>OBC (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median household head</td>
<td>4.46 (3.76)</td>
<td>3.53 (3.59)</td>
<td>3.30 (3.65)</td>
<td>4.03 (3.36)</td>
</tr>
<tr>
<td>Male representatives</td>
<td>7.42 (4.43)</td>
<td>6.01 (4.49)</td>
<td>5.30 (3.99)</td>
<td>7.05 (4.30)</td>
</tr>
<tr>
<td>Female representatives</td>
<td>3.23 (3.83)</td>
<td>5.78 (4.39)</td>
<td>2.22 (2.05)</td>
<td>4.72 (4.17)</td>
</tr>
</tbody>
</table>

Median household education, by reservation category in each ward, is computed from the household census. The mean (standard deviation) across all wards is reported in the table. Representative's education is obtained for the last three terms in each ward.
We semi-parametrically estimate the relationship between the population share of the highest eligible caste in ward $j$ in election $t$ ($S_{jt}$) and two electoral outcomes:

$$y_{jt} = \phi(S_{jt}) + X_{jt}\gamma + \zeta_{jt}$$

where $y_{jt} = $ either the schooling of the elected representative or the fraction of the six public goods receiving any expenditures in ward $j$ in election $t$.

To partial out the control variables $X_{jt}$ (reservation, year and ward effects) we use a two-step estimation procedure.
1. We first estimate the relationship between $y_{jt}$ and $S_{jt}$ using a specification replacing the $\varphi$ function by a set of 5 dummy variables (6 intervals) representing share intervals from 0 to 1.

2. We then construct the conditional outcome

$$\tilde{y}_{jt} = y_{jt} - (X_{jt} - \overline{X}_{jt}) \hat{\gamma}$$

based on the first stage estimates, where $\overline{X}_{jt}$ is the sample average of each regressor, and estimate

$$\tilde{y}_{jt} = \phi(S_{jt}) + \zeta_{jt}.$$
Figure 3: Public Goods and the Elected Representative’s Schooling (Years), by the Population Share of the Largest Eligible Caste

- **Representative's years of schooling**
- **Public goods (fraction of total)**
Locating the Threshold

We now test formally for a threshold, and attempt to pin down where it is located (place statistical bounds on its location).

We use the Hansen (1999) procedure, estimating a step function using our transformed variables:

$$\tilde{y}_{jt} = \pi_1 + \pi_2 D_{jt} + \varepsilon_{jt}$$

where $D_{jt}$ is an indicator variable, =1 if the population share of the largest eligible caste exceeds $S$. 
If the true threshold is $\tilde{S}$, then the Residual Sum of Squares (RSS) is minimized when $S = \tilde{S}$.

But even if we identify a threshold, how do we know we have step function? and how precise is our estimate of where the threshold is located?

Intuitively, how fast the RSS increases as we deviate from $\tilde{S}$ is a metric for the steepness of the threshold.

Hansen (1999) constructs a likelihood ratio statistic based on this idea:

$$LR(S) = \frac{RSS(S) - RSS(\tilde{S})}{RSS(\tilde{S})} \cdot N$$
The asymptotic distribution of the Hansen LR statistic can be derived. Bounds can thus be placed on the location of the true threshold for any pre-specified level of confidence (95%, 99%).

To illustrate, we generated two variables based on $S$, one using a threshold function ($V_S$), with the threshold set at .5 (the theoretical threshold of interest), and one from a linear function ($V_L$), adding zero-mean noise with the same variance to each.

We then used the same non-parametric estimation routine we used to estimate the relationship between $y$ and $S$ the actual data to estimate the relationships between $V_S$ and $V_L$ and $S$ in the simulated data.
Figure 4: Simulated Variables $V_S$ and $V_L$, by the Population Share of the Largest Castes
Figure 5: Threshold Tests on Simulated Data: Step versus Linear Function
Likelihood Ratio by Hypothesized Threshold
Figure 6: Threshold Tests: Public Goods and the Elected Representative’s Schooling
Likelihood Ratio by Hypothesized Threshold
What is the gain at the threshold in public goods supply?

Having identified where the threshold share is located (0.5), we estimate the increase in the fraction of public goods supplied to a ward, and the educational level of the elected representative at that threshold.

\[ y_{jt} = \lambda_1 + \lambda_2 D_{jt} + X_{jt} \gamma + \xi_{jt}, \]

where \( D_{jt} = 1 \) if the population share of the largest eligible caste exceeds .5.

The vector \( X_{jt} \) includes ward, year, reservation fixed effects.

The \( \lambda_2 \) estimates: 13% rise in public goods, 54% increase in ed.
Table 4: Change in Public Goods and the Representative's Schooling at the Population Share Threshold of 0.5

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Public goods (1)</th>
<th>Representative's schooling (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean-shift at threshold</td>
<td>0.042** (0.021)</td>
<td>2.264*** (0.802)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1666</td>
<td>1591</td>
</tr>
<tr>
<td>Threshold location</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Mean of dependent variable below the threshold</td>
<td>0.335 [0.081]</td>
<td>4.16 [3.034]</td>
</tr>
</tbody>
</table>

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors clustered at the ward/term level.
All regressions include ward fixed effects, reservation dummies, term dummies, and election year.
Public goods are measured as the fraction of the six major goods that were received in each ward-term.
Concerns:

1. The ability of a ward representative to get resources for his ward depends on the competence of representatives in the other wards to the extent that total resources are fixed for the village council.

   Randomization over time and across wards in eligibility - so, who gets elected in another ward is orthogonal to $D_{jt}$.

2. Members of larger castes in a ward might have higher levels of schooling on average.

   Figure 10: no relationship of schooling to caste size, and no threshold, in the caste populations.
Figure 10: Caste Population Schooling (Years) Distribution, by Caste Population Share
Figure 11: Threshold Tests: Education Distribution in the Caste Likelihood Ratio by Hypothesized Threshold
Is there targeting of public resources?
BPL transfers vs. public goods

The evidence suggests that

A. Larger caste representatives deliver more public goods.

B. Larger castes do not attract votes from other castes despite the fact that outsiders benefit ($\tilde{S} = 0.5$).

The theory indicates that this must be because larger caste representatives are unattractive on another dimension - they siphon some public resources to their own group.

Is there direct evidence of insider politics - of targeting to insiders?
We look at the receipt of BPL transfers to households using the panel survey data.

First, there is no relationship between the largest eligible caste in the ward and the total fraction of households receiving BPL transfers - total BPL resources appear to be fixed (and no threshold).

Thus, as in the theory, insiders can only gain at the expense of outsiders, and when larger castes are in power, there will be even less for outsiders when castes behave selfishly.

Prior evidence exists that politically-connected households receive more BPL transfers. But this evidence is based on cross-section data - possible these families are poorer and it is never easy to measure total household incomes well.
Figure 12: Public Goods and the Share of Households Receiving BPL Transfers, by the Population Share of the Largest Eligible Caste

- Share of households receiving BPL
- Public goods (fraction of total)
Figure 13: Threshold Tests: Public Goods and Welfare Transfers (BPL)
Likelihood Ratio by Hypothesized Threshold
In our analysis we estimate whether the same household is more likely to get BPL transfers when it is an insider - a member of its caste is elected - compared with when it is an outsider - another caste’s representative is elected.

We estimate, using conditional logit (household fixed effects):

\[ BPL_{ijt} = \eta_1 RC_{ijt} + \eta_2 RN_{jt} + Z_{ijt} \delta + \zeta_{ijt} \]

where

\[ RC_{ijt} = 1 \text{ if the ward representative in that term } t \text{ in ward } j \text{ is from household } i’\text{’s caste. So, } \eta_1 > 0. \]

\[ RN_{jt} = \text{size of the elected representative’s caste in term } t \text{ in the ward } j. \]
The size of the elected representative’s caste should affect insiders and outsiders differently.

We thus additionally estimate:

\[ BPL_{ijt} = \eta_1 RC_{ijt} + \eta_2 RN_{jt} + \eta_3 RC_{ijt} \times RN_{jt} + Z_{ijt} \delta + \zeta_{ijt}. \]

\( \eta_2 (< 0) \) is the effect of the caste size in power on BPL transfers to outsiders \((RC = 0)\) - the crowding out effect.

\( \eta_1 + \eta_3 RN_{jt} (> 0) \) is the effect of being an insider on BPL transfers for a member of a caste of size \(RN_{jt}\).
Concerns:

1. $RC_{ijt}$ is an endogenous outcome of the electoral process (unlike largest eligible caste size).

   If when households experience a temporary drop in income they put more effort into electing their representative, then $\eta_1 > 0$ is upward biased.

   But this would only be true if there is targeting; otherwise no benefit.

2. The results are spurious.

   Apply same test to the public goods, which are not targetable (fraction of public goods on hh’s street).
### Table 5: Household Fixed Effects Estimates: Targeting of Public Resources

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Household receives BPL transfers</th>
<th>Public goods placed on household’s street</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household belongs to the representative's caste</td>
<td>1.377** (0.577)</td>
<td>-- (--)</td>
</tr>
<tr>
<td>Fraction of households belonging to representative’s caste on street</td>
<td>-0.00915 (0.0573)</td>
<td>-0.0451 (0.106)</td>
</tr>
<tr>
<td>Size of representative's caste</td>
<td>-0.0192 (0.0190)</td>
<td>0.000463 (0.000957)</td>
</tr>
<tr>
<td>Relevant interaction</td>
<td>-- (--)</td>
<td>0.00151 (0.00264)</td>
</tr>
<tr>
<td>Mean of dependent variable</td>
<td>0.258 (0.438)</td>
<td>0.343 (0.228)</td>
</tr>
<tr>
<td>N</td>
<td>1387</td>
<td>1387</td>
</tr>
</tbody>
</table>

Standard errors are clustered at the ward level. Logit estimates in columns 1 and 2.
Structural Estimation and Counter-Factuals

We estimate the structural parameters of the model $\alpha$ and $\beta$.

**Purposes:**

1. To validate that $\beta < 1/4$.

2. To quantify the gain in public goods supply due to the internal cooperation within castes relative to the first best and to when politicians are individually selfish.

3. To assess the gain from decoupling public good provision from the distribution of targetable resources.

4. Assess gains from removing the reservation system.
Given the optimized effort $e$ of the caste’s representative, public goods $G (\equiv e^\beta)$ are related to caste size $RN$ by

$$G = \left[ \frac{(\beta RN)^2}{\alpha} \right]^{\frac{\beta}{1-2\beta}}$$

As noted, the data provide public goods expenditures at the street level, but the model (and elections) are at the ward level.

We use street-level panel (three elections) data, and assume a stochastic relationship between ward-level effort and street level public goods ($N=2,492$).
Public good provision on street $s$ in ward $j$ and term $t$ is:

$$G_{sjt} = F_{sjt} \cdot G_{jt},$$

where $F_{sjt}$ has a time-invariant street-specific component and a time-varying iid error.

Taking logs and substituting, we get the estimating equation

$$\log(G_{sjt}) = \frac{\beta}{1-2\beta} \log\left(\frac{\beta^2}{\alpha}\right) + \frac{2\beta}{1-2\beta} \log(RN_{jt}) + f_{sj} + v_{sjt}$$

Both $\alpha$ and $\beta$ are identified. We use NLS, weighting by the number of households on each street in a ward.
Table 6: Structural Parameter Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate/ p-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$</td>
<td>0.0148</td>
</tr>
<tr>
<td></td>
<td>(0.0128)</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.122***</td>
</tr>
<tr>
<td></td>
<td>(0.0450)</td>
</tr>
<tr>
<td>$H_0: \beta &lt; 0, p$</td>
<td>.004</td>
</tr>
<tr>
<td>$H_0: \beta &gt; 0.25, p$</td>
<td>.000</td>
</tr>
<tr>
<td>$H_0: 2\beta/(1 - 2\beta) = 0, p$</td>
<td>.041</td>
</tr>
<tr>
<td>N</td>
<td>1957</td>
</tr>
</tbody>
</table>

Standard errors clustered at the ward level.

* p < 0.1, ** p < 0.05, *** p < 0.01.
The counter-factuals, using the $\beta$ and $\alpha$ estimates:

1. Compare public good levels with caste solidarity to:

   A. The first best: Caste size $RN$ replaced by ward size $N$ - benefits to all considered by politicians.

   B. Full collective-action problem: $RN$ replaced by 1 - politicians only act in their own interest.

For wards with dominant castes, the supply of public goods is close to first best.

At the mean size of castes (25) the public good supply is 71% higher than that supplied by a purely-selfish representative.
Figure 14: Public Goods Level, by the Size of the Elected Caste
Relative to Two Benchmarks
2. Eliminate targeting by removing the distribution of welfare transfers from the representative’s portfolio.

   A. Benchmark: A caste is only in power if it exceeds .5 share; otherwise a caste 80% of the size of the largest eligible caste is in power.

   B. In the decoupled scenario, a caste’s representative is elected if the IC alone is met:

\[
\left( \frac{N_K}{N_{K-1}} \right) \geq \left( \frac{1}{1-2\beta} \right)^{\frac{1-2\beta}{2\beta}}
\]

   Benchmark: 40% of wards receive less than 1/3 of the set of public goods.

   Decoupled: The under-served proportion falls to 34%.
Figure 15: Counterfactual-Simulation Cumulative Distributions: Fraction of Public Goods Received by a Ward

Baseline: Reservations and welfare transfers
Reservations, no welfare transfers
No reservations and welfare transfers
No reservations, no welfare transfers
3. The Indian political reservation system

With regard to the supply of the non-excludable public good, reservation is clearly inefficient.

Reservation, by restricting the set of castes that are eligible, will mechanically eliminate the largest castes with positive probability.

With respect to the distribution of the welfare transfers, low castes are as exclusionary as high castes in our theory. What reservation does is to vary which castes get to be insiders, and that creates some equity.

When targeting is decoupled, then no rationale.
The structural estimates indicate that:

The proportion of wards receiving less than $1/3$ of the public goods set falls from 40% (baseline) to 24% when electoral reservations are removed.

The proportion falls to less than 20% when the distribution of welfare transfers are also taken out of the hands of politicians - a halving of the population of the under-served compared to the baseline.
Conclusion

Does caste politics in India contribute to the under-provision of local public goods?

No, and yes:

The good: At the local level, where information constraints are relatively unimportant, within-caste coordination results in better politicians getting elected and a substantially higher level of public goods compared to a benchmark of individually-selfish politicians.

Insiders and outsiders benefit from this aspect of castes.
The bad: The existence of targetable public resources, the focus of much of the literature, lowers the level of non-excludable public goods as caste representatives give priority to their own caste members.

As a result, the more able politicians that come from larger castes do not get support from outsiders, and on average elected representatives are less competent and public goods less ample.
Policy implications:

For India, we show empirically that taking welfare transfers out of the hands of politicians would increase the supply of public goods (as would eliminating the reservation system).

However, the same model suggests that it is possible in other contexts that the coupling of targetable and non-excludable goods can attract better politicians to run and increase the supply of public goods.

So what is good for India, may not be in other places where ethnic politics are important.

Research along the same lines needed to find out.