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Does affirmative action in politics hinder performance? Evidence from India ☆

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ABSTRACT

This paper examines the consequence of affirmative action for a "middle" ranked group on equity and the leader's overall performance or "efficiency." The literature on electoral quotas is invested in the equity question for disadvantaged groups, but is mostly silent on this issue. We use a randomized electoral quota for an intermediately ranked caste group (OBCs) in a large state in India to show that overall, such a quota does not affect delivery of public projects, or redistribute projects away from disadvantaged groups (SC/STs). Moreover, we show that when the group is large, the quota may in fact *improve* leader's performance. The improvement in overall performance does not come at a cost of lower allocation to the most disadvantaged group. We argue and provide suggestive evidence that when the group is large, such a quota for the group increases *within-group* electoral competition in villages. The result highlights that "efficiency" concerns regarding affirmative action may need reevaluation. It further justifies the targeting of electoral quota policy in India towards jurisdictions where the group is numerous.

1. Introduction

Affirmative action (AA) in electoral politics has proliferated in the modern world. These policies impose restrictions or quotas in elections in favor of members of certain population groups.[1] Evidently, these restrictions are imposed to achieve equity in political representation for the historically discriminated groups. However, affirmative action policies often face criticisms in public debates on the grounds that such restrictions on candidate entry may dampen electoral competition (Jensenius (2017); Auerbach and Ziegfeld (2020)), or bar more competent candidates from running, negatively affecting governance. The website http://

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[1] Currently some form of quota for women in elections exists in about 130 countries (http://www.quotaproject.org) and electoral quotas for some ethnic group in about 24 countries (Bird, 2014).

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www.quotaproject.org, for example, points out: “Quotas imply that politicians are elected because of their gender, not because of their qualifications and that more qualified candidates are pushed aside.”[2]

The literature on the impact of affirmative action in electoral politics in India focuses on caste based electoral quotas in villages of India. Caste groups form the basic organizing unit both in social interactions as well as in local political mobilizations in rural India (Munshi, 2019); voters tend to vote for candidates belonging to their own caste. Interestingly, the local elections in Indian villages are subject to quotas for Scheduled Castes (SCs) and Scheduled Tribes (STs) – historically the most disadvantaged caste groups and indigenous tribes, as well as Other Backward Classes (OBCs) – an intermediately ranked caste group positioned in the “middle” of the caste hierarchy. The extant literature (described more below) has primarily focused on the effect of electoral quotas for SCs and STs on the distribution of public resource and finds overall mixed results. Some work, such as Gulzar et al. (2020) examine both the equity and efficiency effects of a quota for the STs, and point out that targeting towards the group has improved due to the quota, at the cost of those ranked above them; thus equity is enhanced with no efficiency loss.

We examine the equity and efficiency implications of affirmative action for OBCs – the “middle” ranked group, through the lens of the implementation of a large rural public works program. We do so for three important reasons. First, SCs and STs have higher a preference for public projects, because they benefit more from their provision. Hence affirmative action for them may not lead to a fall in the overall provision of public projects. However, an electoral quota for OBCs, a group with a relatively lower demand for public employment, may create forces that operate in the opposite direction and, hence, may result in a decline in the efficiency of such programs, hurting the disadvantaged groups living in those villages. Second, the effects on redistribution have very different implications in this context; redistribution from the disadvantaged group towards the group getting affirmative action would not be considered a socially desirable outcome. Third, given the mixed results in the literature, the effect of affirmative action for OBCs remains an empirical question.[3]

We examine this question by studying the randomized quota for OBCs in the elections of the head of village governments or Gram Panchayats (GPs from now on) in Rajasthan, India. For this empirical analysis, we compile a dataset comprising a near universe of village councils of Rajasthan. We use data on public spending under the National Rural Employment Guarantee Scheme (NREGS) to test the effects of AA on village head’s performance. The NREGS is the largest public program that GPs implement and it constitutes an overwhelming majority of their annual budget.[4] The OBC quota policy randomly selects village councils using lotteries and imposes the restriction that all candidates running for the village head elections in the selected villages must be members of the OBC group.

In each GP, we consider the population to be composed of two groups - SC/STs and non-SC/STs. The OBCs belong to the non-SC/ST group. The partition is dictated by data considerations because the Census of India does not record population figures separately for OBCs. However, OBCs constitute 85% of the non-SC/ST group in Rajasthan, the rest being the General Category (GC) caste group which is ordered higher in the caste hierarchy. Moreover, using the universe of villages in Rajasthan, we show that the village level OBC population share is a linear and highly predictable function of the non-SC/ST population share. The variation in the population shares of the non-SC/ST group across GPs is wide; this is helpful for identifying the effect of the OBC quota across the entire range of values of the non-SC/ST population shares. As a robustness exercise, we impute the GP-level OBC population share from another data source and show that our results remain unchanged to such imputation.

We find that, on average, affirmative action does not lead to a fall in efficiency – as measured by the implementation of the NREGS, or the share of the total work that goes to the disadvantaged groups. This suggests the absence of the feared diversion of work away from the disadvantaged groups. Thus, in aggregate, reserving for the “middle” has no negative consequences for the overall provision of the NREGS as well as the provision of public work for the most disadvantaged groups. There could also be a reallocation between the OBCs and the caste group ranked above them – the GC group, but we are unable to comment on such reallocations because disaggregated data on the share of the NREGS work allocated to GC and OBC groups are not available.

Heterogeneity analysis, however, reveals interesting patterns. We find that the impact of affirmative action for OBCs depends on the population composition of the caste groups in the GP. When the population share of non-SC/ST group is large, the OBC quota *improves* the provision of public employment. When its population share is small, AA leads to a fall in public works employment. GPs with 75% share of the non-SC/ST group witness 5.1% higher work generated per capita in OBC reserved GPs (compared to open election GPs). The effect is even higher for GPs with higher non-SC/ST population share. As 44% of GPs in our sample have non-SC/ST population share larger than 0.75, the estimated gains are economically significant. Reserved GPs have 20% less work when the non-SC/ST population share is less than 0.35.[5] However, only 3% GPs have non-SC/ST share below 0.35.

Our results are robust to using night light luminosity as an outcome measure. Moreover, using night light as an outcome allows us to compare a GP across election cycles and test whether the outcome changes similarly when the same GP’s reservation status changes from open election to OBC reservation or vice versa. We find consistent results using this empirical strategy as well.

[2] Such concerns regarding affirmative action policies are more general. There is a large literature that discusses these issues in the context of education (see, for example, Backes (2012), Antonovics and Backes (2014), Fang and Moro (2010) among others), employment (Loury (1992), Coate and Loury (1993), Moro and Norman (2003)), and tournaments (Schotter and Weigelt (1992), Calsamiglia et al. (2013)). For a general discussion on the equity vs efficiency debate in labor market and education see also Holzer and Neumark (2000). Similar discussions in electoral politics are rare.

[3] We do not take any normative stand on the issue of whether there should be quotas for OBCs, because the consequences of quotas go beyond the provision of public goods.

[4] We also show the robustness of our results using data on night light luminosity.

[5] All the estimates mentioned so far are statistically significant.

We also find that the OBC quota does not differentially affect the share of work allocated to SC/STs across GPs with different non-SC/ST shares. The coefficients are small in magnitude and statistically insignificant. This does not rule out the possibility of distributional changes within the non-SC/ST group, across OBCs and GCs. Nonetheless, the result suggests that the adverse distributional effects of an OBC quota are minimal.

Several potential mechanisms can explain our result. We focus on the salient mechanism of electoral competition and show suggestive evidence in its favor. We also consider a range of alternate explanations; for some we do not find supporting evidence. We elaborate on our proposed mechanism with the help of a formal model. We argue that in contexts where group identities are salient, such as in rural India, the population composition of groups often impinges on electoral competition. This may happen because of the caste based voting observed in India, or "co-ethnic" preferences, i.e., voters prefer a leader from their own group. In such contexts, affirmative action can alter the level of electoral competition by changing the group composition of candidates.

To understand the logic, consider a village with two caste groups where one caste group, say the OBCs, has a large population share. In an open election in the village, the (best) candidate from the OBC group suffers a moral hazard problem. Since a large fraction of the voters is expected to vote for her, she gets an undue advantage against the (best) candidate from the smaller group. Therefore, even though the OBC candidate will likely be elected, her performance may not be as high due to a lack of electoral competition.[6] Affirmative action eliminates the OBC candidate's co-ethnic advantage, which *increases* electoral competition and consequently, *improves* the performance of those GPs. In contrast, when the OBC group is small, the candidate from the other (larger) group, who is likely to win an open election, now suffers from the moral hazard problem. However, the incentive for the OBC candidate to perform better would be high in an open election. This gets dampened in an election with an OBC quota because the opposing candidate now also belongs to the OBC group and hence, is not as strong a rival. Therefore, we contend that in the context of rural India, the effect of AA on performance would depend on the size of the group in question and that effect would be mediated through electoral competition. The basic story of our paper is similar to Banerjee and Pande (2007) who explore the consequence of ethnic polarization of voters. They argue that a lower ability candidate may have a higher probability of winning the elections if she is member of a larger group. We, on the other hand, examine the moral hazard story to understand why group size would matter in elections.

Consistent with the predictions of our model, we find that for GPs with non-SC/ST population share higher (lower) than 0.5, the win margin was significantly lower (higher) in OBC reserved villages (relative to open election villages). This result, therefore, is consistent with the pattern we observe for the implementation of the NREGS and provides a validation of our story.

To examine alternate explanations, we present suggestive evidence that the result is indeed an effect of affirmative action, and not of electing an OBC leader. To show this, we remove all the GPs headed by non-OBCs and limit the analysis to only those GPs with OBC heads, due either to OBC reservation or OBC candidates winning an open election, i.e., we compare OBC reserved GPs to GPs without OBC reservation but with OBC heads. Our results remain unchanged for this sample. This suggests that the change in provision of NREGS work is not driven by the differential preferences of village heads (OBC vs other caste groups), or by OBC leaders' favoritism towards members of their own group. The result is also inconsistent with the explanation that OBC voters may be able to discipline an OBC head to implement greater public spending, especially when the OBC group is large, as argued by Munshi and Rosenzweig (2018). Therefore, it is due to AA *per se* that the effect is realized. We use the candidates' education level as a proxy for their ability to show also that OBC reservation did not improve ability of village heads, and therefore, cannot be the mechanism driving the result.

We do not consider the reelection motives of politicians in our analysis. This is motivated by our context. Banerjee et al. (2017) find that re-election rates in village elections in Rajasthan are extremely low: conditional on a GP President being able to run again, the reelection rate is 5%.[7] This is true for many other states of India as well. The Rural Economic and Demographic Survey (REDS), 2006, a pan-Indian survey conducted in 17 major states of India, reports that 90% of village heads either did not run the previous time or have never held office. Hence, we use a static model of electoral competition to explain our result in the context of Rajasthan. The static model has been used in several previous papers discussing electoral politics in rural India (Chattopadhyay and Duflo (2004), Munshi and Rosenzweig (2018), Foster and Rosenzweig (2022), Bardhan and Mookherjee (2000) and Bardhan and Mookherjee (2006)). We also show that the reservation status of GPs in the 2005 election cycle did not have any average or differential effects on outcomes in the post 2010 period, suggesting that the dynamic effects of affirmative action are not strong in our context.

The existing literature on caste based electoral quotas has examined the policy for SCs and STs, and is almost exclusively focused on its effects on distribution (Dunning and Nilekani (2013), Jensenius (2015), Besley et al. (2004), Besley et al. (2012), Chattopadhyay and Duflo (2004), Bardhan et al. (2010), Chin and Prakash (2011) etc). Overall, its verdict is mixed, pointing to the importance of the group and context being studied. Our paper is closest to Gulzar et al. (2020), who find that a quota for STs improved the distribution of public resources (particularly the NREGS) towards STs, but it had no average effect on overall provision.

Our paper differs from Gulzar et al. (2020) in four ways. First, our *context* does not focus on any historically disadvantaged geography like a Scheduled Area (and GPs in the non Scheduled Areas adjoining them). Reservation for OBCs, by construction, focuses on the complementary area. Second, we differ on the *group* receiving affirmative action. Gulzar et al. (2020) look at Scheduled Tribes, a distinct community, outside the caste hierarchy. A large proportion of them live together, segregated from others.

[6] Several candidates from the same group may contest an election. But, a group would have a strong incentive to limit the number of candidates, because vote-splitting would reduce the group's chance of winning. Alternatively, knowing this, the voters would also coordinate their votes around the best candidate from their group. Later, using data on the vote shares of candidates, we show that even though more than two candidates run in any GP election, most votes are captured by the first two candidates (who often represent different caste groups).

[7] In our sample, only 85 out of 7933 elected heads (i.e., about 1%) were reelected in 2015.

Given that both the group and context are different and given the results in the literature, it is not obvious that the same results would apply. The remaining points echo what we have mentioned above but bear in particular on a comparison of the two papers. As STs have a higher preference for public projects, affirmative action for them may not lead to fall in the overall provision of public projects. However, AA for OBCs – a group with a relatively lower demand for projects like public employment, may result in a fall in efficiency of such programs. This can adversely affect the SCs and STs living in such villages. Consequently, the results on redistribution have very different implications in our context. If there was a redistribution from the disadvantaged group towards the group getting affirmative action (analogous to Gulzar et al. (2020)), this would not be considered a socially desirable outcome.

Besides this, we are the first to examine the effect of an electoral quota for OBCs, the largest caste group in India, comprising about 44% of the Indian population (NSSO, 2011-12). The implications of a quota for a middle group in an electoral context are relatively unknown. Hence our paper contributes to this nascent literature. Our analysis suggests that affirmative action for the middle group makes the electoral competition between OBCs and SC/STs salient. Moreover, we highlight that affirmative action policies can have *heterogenous* effects on a leader's overall performance, and for some demographic compositions, can increase overall allocation without affecting distribution. Hence, equity promotion through affirmative action can be aligned with enhancing "efficiency" or performance.[8] Pande (2003) also examines a non-randomized ST quota in state level assembly elections and finds that it increased overall public spending in the constituency.[9] Unlike us, the paper, however, does not differentiate between constituencies with high and low ST population shares. Anderson and Francois (2020) examine how quotas in the presence of reelection motives can have heterogenous effects on governance outcomes.

Further, our work has implications for how the ethnic heterogeneity of candidates in elections affects the provision of public goods. AA increases the homogeneity of the candidate pool and it may increase the overall delivery of public goods. The paper, therefore, also speaks to the literature that shows that the ethnic diversity of a population negatively affects the provision of public goods in developed and developing countries (Alesina et al., 2019; Miguel and Gugerty, 2005; Alesina and La Ferrara, 2000; Alesina et al., 1999 etc). In the case of India, where caste identities are salient, Banerjee and Somanathan (2007), Chadha and Nandwani (2018) and Balasubramaniam et al. (2013) find similar negative effects. Usually, the arguments for the negative effect of ethnic diversity allude to the lack of collective action observed in diverse societies. Our work highlights that ethnically diverse societies tend to have ethnically diverse candidate pool in elections, which can negatively impact electoral competition. Therefore, the electoral process can be an important mechanism driving the negative relationship between ethnic fractionalization and public good provision.

2. Background and data

2.1. Brief background

Our empirical analysis uses data from 5,002 village councils, also called Gram Panchayats (GPs), in the northern Indian state of Rajasthan. Gram Panchayats, the lowest tier of governance in India (Appendix Section B.1)), comprise of councilors elected from single-member wards within GPs. Each GP has a Sarpanch, analogous to a mayor in a municipality. We focus on the election of sarpanches for our study and, therefore, choose as our context the state of Rajasthan, which holds direct elections for that position.

The position of Sarpanch is subject to affirmative action policies, in the form of quotas, for groups, such as women, SCs, STs, and OBCs. We focus on caste-based electoral quotas. These policies select certain fraction of such positions where only the members of the relevant caste group can run as candidates. The government rules that determine the positions to reserve for each group vary by state. We study the context of Rajasthan because it provides us an exogenous determination of these positions for the case of the OBC group. We detail the algorithm for OBC reservations in Rajasthan in the Identification section (Section 3.2).

2.2. Data sources and compilation

The sample is constructed by triangulating different administrative datasets: that for the public policy outcome, data on demographic characteristics and the infrastructure development of the GPs, and the GP election records. While descriptions of each dataset follow below, it is important to note that barring cases of missing administrative records, this is a census of all GPs eligible for having the position of sarpanch reserved for a member of the "Other Backward Classes" (OBC). We will return to the eligibility criterion for being in the pool for potential reservation in the section on empirical methodology (Section 3.1).

For each GP, we use data on the total days of work generated recorded in the administrative data as person-days of work under the public workfare program called NREGS for the financial year 2013-14 (April, 2013 to March, 2014). The NREGS is one of the largest public works programs in the world and it is managed by the GP, in particular the Sarpanch (Appendix Section B.2).[10] The NREGS also constitutes roughly 80% of the annual budget under the direct control of the Sarpanch, and, hence, covers most of

[8] We use the term efficiency and performance interchangeably in the paper, though one can think about efficiency in the context of electoral democracy in a much broader sense. We use the delivery of public goods as a measure of performance of a leader, which we take to be a proxy for efficiency.

[9] Chin and Prakash (2011) also find that a ST quota in state assembly elections in India reduce poverty.

[10] We do not use expenditures on materials as it may reflect corruption. While labor expenditure can also be subject to corruption, we test using a separate household survey whether households indeed receive more work when there is more expenditure on labor as reported in the administrative records. We discuss this in detail at the end of the results section (Section 6).

the GP's expenditure on public projects. Later we show the robustness of our results for the year 2014-15.[11] The information on the NREGS is sourced from the official portal (www.nrega.nic.in) and it is available for the entire GP as well as for each of its major social groups: Scheduled Castes (SC), Scheduled Tribes (ST) and other groups ("Others"). For most of our analysis, we use the aggregate while turning to group outcomes when we discuss distributional concerns. We deflate the total days of work by the population of the GP to arrive at the main outcome variable of interest, the per capita number of days of work ($Days\,pc$). Many types of public goods are created under the NREGS program, such as local roads, toilets, wells, irrigation facilities, etc. Using person-days of work generated under the NREGS gives us a common currency to measure the overall delivery of all the different types of public goods. Another variable of interest obtained from the NREGS portal is demand for NREGS work. The official procedure to get work under the NREGS requires a household to request the work verbally or in writing; the GP NREGS officials note the request and it is available in the administrative records.

Data on the population of the GPs as well as its other demographic characteristics are obtained from the 2011 Census records.[12] Each GP consists of multiple villages. This mapping from village to GP is available in the local government directory maintained by the Ministry of Panchayati Raj, Government of India.[13] Using this mapping, we aggregate information on villages belonging to a GP to calculate the total GP population. The census also provides information on the number of individuals that are a member of the SC, ST, and "Other" social groups. It is important for our empirical analysis to note that the population in the OBC social group is part of "Other"; it is not recorded separately. While we show in a later section that our results are robust to imputation of the OBC population using other data sources, we use the Census population recorded for "Other" for our main results. For the sake of clarity and for reasons described below, we will refer to "Other" as "non-SC/ST." Along with the aggregate population and its distribution among different social groups, the other variables of interest obtained from the Census are the total number of literates and the total number of females in the GP, after suitable aggregation of the village data. We also construct GP development quartiles by using census village amenities data (Appendix Section B.3).

The third source of data is the election records. We use the results of elections held in 2010 for the position of the GP head. The Rajasthan State Election Commission was the source for all information related to this election – the caste category of the Sarpanch, whether the position was reserved for any caste category, vote share of the candidates, the total number of contesting candidates, and their caste categories. While data on the former two variables were available from the online records of the election commission (http://www.rajsec.rajasthan.gov.in), the information on the latter variables were based on a manual input of the detailed official records of election results, as reported by district administrations to the election commission. Some of these sheets had been misplaced, causing a loss of 631 observations.[14] Hence, in our empirical work, while the main specification has 5,002 observations, our sample size drops a little in the subsequent subsection that looks at data from these manual records (the actual drop depends on what variable we look at).[15]

2.3. Descriptive statistics

In our sample, the per capita number of days of NREGS work is 3.2. The average population per GP is 5,510. We report these statistics for a range of variables in Table D1. The GP demographic characteristic that matters most for our study is the share of population that belongs to the non-SC/STs in the population (S^O). This share is 0.7 for our sample, with a standard deviation of 0.2. As Fig. D1 shows, our sample covers the full range of non-SC/ST shares, but there are fewer GPs with non-SC/ST population shares less than 40%.[16] Data from a large representative sample (National Sample Survey, round on employment, 2011, referred hereafter as NSS (2011)) shows that 85% of the non-SC/STs in Rajasthan are in fact OBCs. The survey also allows us to calculate the district level proportion of OBCs and non-SC/STs. If we use the mapping derived from the NSS to impute the OBC shares from the non-SC/ST shares we observe in the census, we find that the OBC shares range approximately from 5% to 70% (Fig. D2).[17] In addition, the demand for NREGS work from OBCs – and the residual "General" category that make up the non-SC/STs – is lower than from SCs and STs. According to the NSS (2011), while 80% of SC/ST households demanded NREGS work,[18,19] the proportion of OBC households that demanded work was 66%, while the corresponding proportion for the GC category was 54%. Hence, the non-SC/ST group clubs the groups that have a relatively low demand for NREGS work.[20] This difference in preference for NREGS work across

[11] The MIS data that is available on the public portal begins in 2012-2013: thus it is not possible to study outcomes over the whole tenure of the elected leaders.

[12] We use primary census abstracts from the census.

[13] The website is http://lgdirectory.gov.in/.

[14] In the case of manually recorded data, election records for 2 districts had gone missing by 2016 when we input the data. Some of the information was missing in some sheets. For example, while in all cases, the total number of candidates were recorded, the votes were not recorded for all candidates for some GPs, causing a further loss of observations. But this additional drop is small (56 observations).

[15] We describe in the Identification section how we arrive at the figure of 5,002 GPs.

[16] This implies that our results in this range of population shares could be underpowered.

[17] An alternate, albeit imperfect, estimate can be calculated from school enrollment data across all schools in Rajasthan (District Information for School Education, 2016). Given 90% enrollment rate at the primary level, one can calculate the total number of children enrolled in primary schools of a village that belong to OBCs and non-SC/STs. We calculate the share of total enrolled children belonging to OBC and to non-SC/ST and find that the correlation between the two is 0.87.

[18] Based on the questions asked in the household survey, a household is said to have demanded NREGS work if it either worked in a NREGS project, or applied for work but did not get any.

[19] The proportion of households who demanded work among ST and SC households is 86% and 75%, respectively.

[20] This is presumably because SC/STs are poorer, on average, than non-SC/STs and therefore, derive higher benefit from any level of NREGS work provision. Also, OBCs may themselves be a heterogenous group. The proportions of different sub-groups in the OBC population are not publicly available. However, the OBC candidate pool is highly concentrated; only two sub-groups - Jats and Gujjars - account for 53% of the top two candidates within OBCs.

the non-SC/STs and SC/STs will be incorporated in the model developed later and it will be important in explaining our empirical results.

3. OBC quota and leader's performance: evidence

3.1. Empirical methodology

To begin with, we wish to test if the OBC reservation status of a GP affects the level of work implemented under the NREGS. As argued above, work under the NREGS is an important performance indicator of the Sarpanch. Let $Dayspc_{vb}$ indicate the days of NREGS work per capita in a village council. Further, let D_{vb}^{RES} be equal to 1 if the election for the village head in a GP v situated in an administrative block b is reserved for OBC candidates. Let us denote the population share of non-SC/ST group in a GP as S_{vb}^{O}. We then estimate the following equation:

$$Days\,pc_{vb} = \alpha_b + \beta_1 S_{vb}^{O} + \beta_2 D_{vb}^{RES} + \varepsilon_{vb} \tag{1}$$

where α_b are block specific intercept terms (block fixed effects). We discuss the exogeneity of reservation and the need to control for the non-SC/ST population in the next subsection. We argue that β_2 captures the causal effect of OBC reservation on the provision of NREGS work. Further, following Munshi and Rosenzweig (2018) and Banerjee and Pande (2007), we explore whether the effect depends on the population share of the non-SC/ST group. The specification we estimate is

$$Days\,pc_{vb} = \alpha_b + \beta_1 S_{vb}^{O} + \beta_2 D_{vb}^{RES} + \beta_3 S_{vb}^{O} * D_{vb}^{RES} + Z'_{vb}\gamma + \varepsilon_{vb} \tag{2}$$

where Z represents a vector of characteristics: total population, literacy rate, the proportion of the population who are female, three village development quartiles (with the first quartile as the reference category). Using this specification, we calculate the following marginal effect:

$$\mathbb{E}\left[Days\,pc_{vb}|D^{RES}=1, S^{O}, Z\right] - \mathbb{E}\left[Days\,pc_{vb}|D^{RES}=0, S^{O}, Z\right] = \beta_2 + \beta_3 S^{O} \tag{3}$$

at various values of S^{O} ranging from 0 to 1. While a significant β_3 would imply that the marginal effects differ depending on the S^{O}, the marginal effect calculated in equation (3) would help us ascertain if the OBC reservation has a positive or a negative effect on the work provided at various non-SC/ST population shares. In particular, we are interested to know if this marginal effect is positive for large values of S^{O}.

While existing studies motivate why the effects may differ depending on the relative size of groups, we provide further evidence in a later section on the mechanism driving our results. At this stage, it is important to note that incorporating the relative size of groups while evaluating the impact of village leaders is natural in this setting.

3.2. Identification

To identify the causal effect of OBC reservation, we exploit the random assignment of the OBC quota within a certain pool of GPs. We describe the assignment algorithm here. The position for the head of a GP is subject to three kinds of reservation. First, the total number of positions to be reserved for the SC and ST groups is fixed based on their population in each block. Then, the list of GPs subject to each of these reservations is drawn up after arranging the villages in the descending order of the group's population share. So, in the case of SC reservation, the GPs that have the largest SC population share are reserved first, unless they had been reserved in the previous election. Once the GPs have been chosen for SC and ST reservation, the remaining GPs form the potential pool for the OBC reservation exercise. Moreover, and crucially for this empirical work, the GPs to be reserved for an OBC head are chosen at random, by lottery, from this residual pool. Hence, for our empirical work, we focus on the sample of all the GPs that remain in the pool after the GPs have been reserved for SCs and STs in each block. For ease of presentation, we refer to GPs where the position of sarpanch has been reserved for the OBC community as OBC reserved GPs.

There are about 9,000 GPs in Rajasthan. Randomization for OBC reservation is carried out on the sample of GPs not reserved for SCs and STs, that is on 5,410 GPs.[21] However, for our analysis we use data on 5,002 GPs for which administrative records are available on the NREGS portal.[22,23]

[21] The GPs for SC and ST reservations are selected from the top of an ordered list. It is not the case that every second or third GP on the list is picked. However, it is important to note that the algorithm is implemented at the block level, i.e., the ordering and selection happens for each block separately. Therefore, for each block, the GPs with the highest share of SC (and STs) will get the reservation. But there is significant variation in the average share of these groups across blocks of Rajasthan. Therefore, among the GPs that are not reserved for SC/ST, we still find a wide variation in the group share.

[22] The process of mapping all villages into GPs is an ongoing initiative of the Ministry of Rural Development. Remarkably, the election commission and the Ministry of Panchayati Raj has been able to do a full listing for elections, but such a list has not been "officially" shared with the Ministry of Rural Development. One of the authors of this paper is part of the committee for synchronizing GPs across different datasets for the Ministry.

[23] In Appendix Table D2 we compare the characteristics of the GPs that are missing in our dataset with the ones in our sample (in-sample). While the non-SC/ST population, OBC reservation status, the share of females and literacy are comparable, the GPs that are in our sample are more populous but less developed than those excluded.

Table 1
Balance Table.

	non-SC/ST Share (1)	Job Cards (2)	Population (3)	Fem. Share (4)	Lit. Share (5)	Dev Q1 (6)	Dev Q2 (7)	Dev Q3 (8)
Panel A: Balance with no Interaction								
OBC Res	-0.01**	-0.00	-0.00	-0.00	0.00	-0.02	-0.01	0.02
	(0.00)	(0.00)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Constant	0.71***	0.20***	5.51***	0.48***	0.62***	0.24***	0.23***	0.26***
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Panel B: Balance with Interaction								
OBC Res * non-SC/ST Share		0.02	-0.05	0.00	-0.02	0.14	0.01	0.06
		(0.01)	(0.40)	(0.00)	(0.02)	(0.10)	(0.11)	(0.10)
Panel C: Balance with Non-linear Interaction								
OBC Res * non-SC/ST Share		0.04	707.96	-0.00	-0.14	-0.21	0.42	0.04
		(0.06)	(1,957.02)	(0.01)	(0.11)	(0.50)	(0.50)	(0.47)
OBC Res * non-SC/ST Share squared		-0.02	-590.70	0.00	0.10	0.26	-0.32	0.02
		(0.05)	(1,591.19)	(0.01)	(0.09)	(0.39)	(0.39)	(0.36)
Observations	5,002	5,002	5,002	5,002	5,002	5,002	5,002	5,002
Block FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: The dependent variables (column-wise) are (i) population share of non-SC/ST, (ii) per capita NREGS job cards issued, (iii) population, (iv) female population share, (v) share of population that's literate, (vi - viii) Village Asset Index first quartile to third quartile. All regressions include block fixed effects and cluster the standard errors at the block level. *** p<0.01, ** p<0.05, * p<0.1.

Table 2
Balance by non-SC/ST Share.

	Job Cards (1)	Population (2)	Fem. Share (3)	Lit. Share (4)	Dev Q1 (5)	Dev Q2 (6)	Dev Q3 (7)
non-SC/ST Share							
0-20%	-0.02	-0.16	0.00	0.04	0.16	0.00	-0.23
	(0.05)	(0.60)	(0.01)	(0.07)	(0.20)	(0.00)	(0.34)
20-40%	0.002	0.38	0.00	-0.00	-0.18	0.01	0.17
	(0.01)	(0.33)	(0.00)	(0.01)	(0.13)	(0.20)	(0.12)
40-60%	0.0008	-0.07	-0.002**	0.01	0.10**	0.04	0.04
	(0.007)	(0.15)	(0.001)	(0.01)	(0.05)	(0.06)	(0.06)
60-80%	0.002	0.00	-0.00	-0.00	-0.00	-0.10	0.00
	(0.09)	(0.09)	(0.00)	(0.00)	(0.02)	(0.02)	(0.02)
80-100%	-0.0003	0.04	-0.00	0.00	-0.00	-0.02	-0.05
	(0.004)	(0.15)	(0.00)	(0.00)	(0.02)	(0.03)	(0.03)

Notes: Each cell in the table is the coefficient on OBC reservation dummy estimated from a separate regression. The columns represent the dependent variables of the regression and the row specifies the sample on which the regression is done. For example, column (1) - row (1) reports the result of regressing NREGS demand on OBC reservation for GPs with non-SC/ST population share between 0 and 20%. All regressions include block fixed effects and cluster the standard errors at the block level. *** p<0.01, ** p<0.05, * p<0.1.

Randomization should ensure that, ex ante, OBC reserved GPs do not differ in characteristics from those that are not reserved, within each block.[24] But ex-post characteristics may differ. We conduct balance tests where each baseline characteristic is regressed on D^{RES} (Table 1: Panel A). Apart from non-SC/ST shares, none of the variables are different between the OBC reserved and unreserved GPs. In the case of non-SC/ST shares, though the difference is statistically significant, the point estimate indicates that the non-SC/ST share in unreserved GPs is 70%, while it is 71% in OBC reserved GPs, making them virtually identical. Nonetheless, to purge the impact of this small ex-post difference in the non-SC/ST group size, we run a regression specification with the non-SC/ST group share as a control.

The estimation of equation (2) however requires more balance checks. A causal interpretation of our estimation results requires that there should be no difference in characteristics between OBC reserved and unreserved GPs, at each level of non-SC/ST group share. Positions for OBC Sarpanch are randomized over the full sample and not for each population share. Hence this is not guaranteed and must be checked. Table 1: Panel B shows that there is almost no discernible difference: when we regress each characteristic on D^{RES}, S^O and $D^{RES} * S^O$, the coefficients for the interaction term, as reported, is always small in magnitude and is statistically insignificant. Additionally, Panel C shows that including interaction with a quadratic term for S^O does not change our conclusion.

An alternate way to explore this non-parametrically is to test balance for the intervals of the non-SC/ST share. Table 2 shows the balance in GP characteristics when we divide the non-SC/ST share into smaller intervals. Each coefficient in the Table comes from a separate regression where the reservation dummy is regressed on a dependent variable for a subsample of GPs. The columns specify

[24] In our sample, on average, there are about 20 GPs within each block.

Table 3
Differential Effect of OBC Reservation on NREGS Work.

	Person-days generated per capita (Days pc)			
	(1)	(2)	(3)	(4)
OBC Res	0.13	0.12	0.14	-0.98**
	(0.10)	(0.10)	(0.10)	(0.49)
non-SC/ST Share		-1.26***	-0.58	-0.90**
		(0.40)	(0.36)	(0.41)
OBC Res * non-SC/ST Share				1.56**
				(0.69)
GP Controls	NO	NO	YES	YES
Observations	5,002	5,002	5,002	5,002
R-squared	0.577	0.578	0.599	0.599
Block FE	YES	YES	YES	YES

Notes: The dependent variable is the total person-days generated per capita under the NGREGS program in 2013-14 in the state of Rajasthan. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST groups. "OBC Res" is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. The first two columns do not have any village level controls. In columns (3) and (4), village level characteristics such as population, population share of women, literacy rate, village asset index etc have been included as controls. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table 4
Effect of OBC Quota on Distribution across SC/STs and non-SC/STs.

	Share of persondays: non-SC/ST			
	(1)	(2)	(3)	(4)
OBC Res	-0.01	0.00	0.00	0.02
	(0.01)	(0.01)	(0.01)	(0.04)
non-SC/ST Share		0.87***	0.89***	0.90***
		(0.03)	(0.03)	(0.03)
OBC Res * non-SC/ST Share				-0.02
				(0.05)
Observations	4,848	4,848	4,848	4,848
R-squared	0.363	0.539	0.545	0.545
Block FE	YES	YES	YES	YES

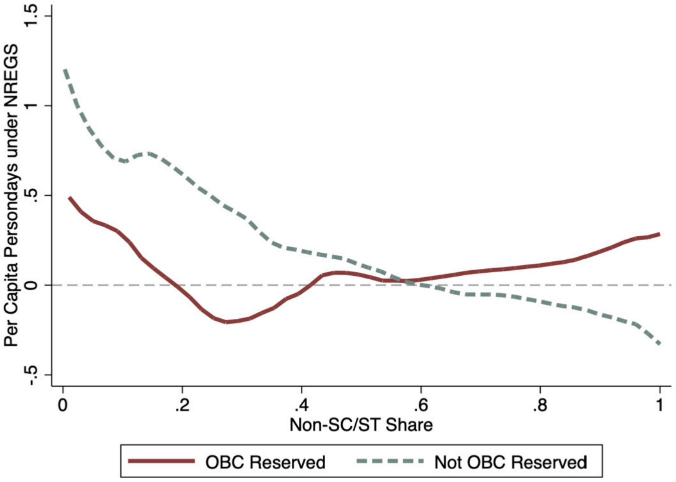
Notes: The dependent variables for all the columns are the share person-days going to the non-SC/ST group. The last two columns include all the standard village level controls. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

the dependent variables and the rows specify the subsamples of GPs with different non-SC/ST population share intervals. For most variables we find no discernible difference between the OBC reserved and unreserved GPs across the various bins. An exception is the bin 40% to 60% which shows slightly lower proportion of females in OBC reserved GPs. For this bin, OBC reserved GPs are also slightly poorer. We address this later in our regressions where we explicitly control for these variables and test the sensitivity of our coefficients of interest.

3.3. Main results

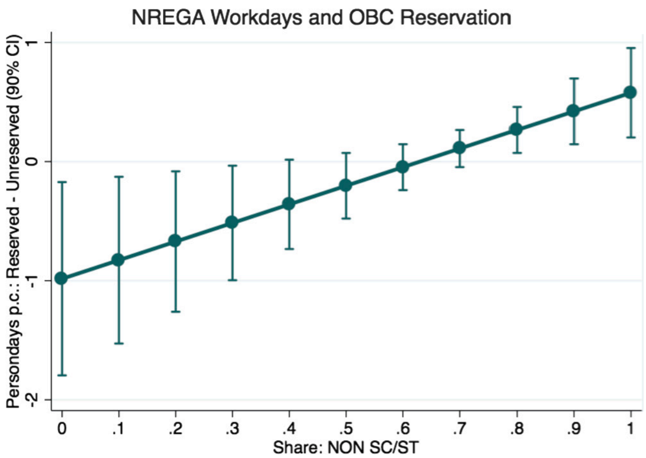
Average effect of OBC reservation: First, we estimate equation (1) and report the result in Column (3) of Table 3. The full table with all the coefficients is in Appendix Table D3. Column (1) reports the result with only the reservation dummy, while column (2) controls for the non-SC/ST share. All the estimating exercises yield insignificant results. The coefficients of D^{RES} in different columns are very similar to each other (and statistically the same). When we include all the controls (column (3)), the coefficient remains statistically the same, implying that the insignificant result is unlikely to be driven by differences between reserved and unreserved GPs. This leads to the verdict that restricting elections to OBC candidates has no average effect on the provision of public work. Hence there is no evidence to suggest that reserved GPs do worse than unreserved GPs in terms of NREGS work provision: if anything the insignificant coefficients are all positive.

While the total amount of work may not change due to OBC reservation, it is possible that the distribution of work across social groups might change. Hence, we check if more work is redistributed towards the non-SC/ST group, away from disadvantaged groups: indicating that an OBC leader favors their own group members by allocating more NREGS work to them. To check this, we replace the days of NREGS work per capita by the proportion of NREGS days that goes to the non-SC/ST group in our main specification. However, our results show that this is not true (columns (1) and (2) in Table 4). In other words, OBC reservation does



Notes: The Figure plots local polynomial relationships between non-SC/ST share of GPs and per capita person-days generated under NREGS for 2013-14 for two subsets of GPs – those with and without OBC reservation.

Fig. 1. Non-parametric relationship between per capita person-days and non-SC/ST share by OBC reservation status.



Notes: The figure plots the marginal effect of OBC quota on per capita person-days generated under NREGS for 2013-14 at different values of non-SC/ST share.

Fig. 2. Heterogenous Effects of OBC Reservation on NREGS.

not redistribute work away from the SC/STs, the most disadvantaged groups. There may still be distributional effects between OBC and General Castes, but we are not able to examine these due to data constraints.

Heterogenous effect of OBC reservation: The null result for the average effect hides significant heterogeneity across GPs that depends on the non-SC/ST group shares. A graphical representation of the non-parametric relationship between non-SC/ST shares and per capita person-days is depicted in Fig. 1. The graph plots in the y-axis the residuals of per capita person-days after controlling for block fixed effects. Hence, all comparisons of reserved and non-reserved GPs are effectively within the blocks. The graph shows that for higher non-SC/ST shares, the provision of NREGS work is greater in OBC reserved GPs than in non-reserved GPs. In GPs with lower shares of the non-SC/ST group, on the other hand, non-reserved GPs perform better than OBC reserved GPs.

We formally test for the presence of heterogeneity by estimating the specification which includes an interaction term (column (4)). The coefficient of D^{RES} (β_2) becomes negative and is significant at 5%. Moreover, the coefficient of the interaction term β_3 is positive (and significant). Also the sum of β_2 and β_3 is positive and statistically significant. The results in Table 3 imply that OBC reservations have heterogenous effects depending on the population share of non-SC/STs. Further, using the coefficients estimated in column (4), we calculate the marginal effects of OBC reservation at various values of non-SC/ST population shares, using equation (3). Fig. 2 plots the marginal effects (these are also reported in column (1) of Appendix Table D4). The impact of restricting elections to OBC candidates improves per capita days of NREGS work when the group share S^O is high. On the other hand, when the group share of non-SC/STs is low, reservations lead to lower per capita days of NREGS work. Based on our estimated coefficients, for non-SC/ST population shares lower than 62% (the difference is 0 at $\frac{0.98}{1.56}$), the impact of OBC reservation is negative. Taking into account the precision of the estimates, this negative effect is significantly different from zero when S^O is less than 35% (we use a 10% significant level as the default).[25] On the other hand, the per capita days of NREGS is statistically larger in OBC reserved GPs at 75% group population share.[26]

It is important to point out that almost 44.4% of all GPs are characterized by a non-SC/ST share higher than 75%, while the proportion over which we get a negative result is only 3%. Hence the demographics of population shares over which our positive result holds is much more common in our sample than where we get a negative result. While we have shown balance tests in Table 1, it is still possible that the large positive result for non-SC/ST population shares above 75% are driven by a particular geographical area. However, we find that the GPs with non-SC/ST shares larger than 75% are spread over all the districts and come from 94% of the blocks of the state. Moreover, Appendix Fig. D2 tells us that even at 75% population share of the non-SC/ST group, the OBC population share is about 50%, and hence, those villages are still quite fragmented. In fact, even when the non-SC/ST population share is around 90%, the OBC population share is below 70%, and hence it is never the case that the entire GP is populated with the OBCs alone. Therefore, the subset of GPs where we get a positive result is not only uncommon, but is not overwhelmingly populated with a single caste group. These GPs are also geographically dispersed across all the districts of the state.

Since we consider the population divided into two broad caste groups, controlling for the non-SC/ST share also automatically controls for caste group fractionalization. Hence, our result highlights that conditional on the ethnic fractionalization of population, the fractionalization of contesting candidates has an additional negative effect on the provision of public goods.

The size effect of the impact of reservation is not small. When S^O is at 0.75, the reserved GPs have 5.1% more work (a difference of 0.18 days given a base of around 3.5). The impact rises with higher non-SC/ST group share, with OBC reserved GPs having 11% more work when S^O is around 90%. The negative impact of OBC reservation is also large with reserved GPs having almost 20% less work when S^O is less than 35%.

One can argue that the overall increase (decrease) in NREGS work due to OBC reservation in high (low) non-SC/ST share villages simply reflects greater (smaller) allocation going to OBCs. Since we do not observe NREGS provision for OBCs separately, we can not directly answer this question. However, we test the effect on share of allocation to SC/STs – the disadvantaged groups. Columns (2) - (4) in Table 4 report the results. We find that a larger share of NREGS work goes to the non-SC/ST group when the group is larger (Columns (2)-(4)). The coefficient on non-SC/ST share is 0.90 in column (4). We cannot reject the null hypothesis that the coefficient is statistically smaller than 1. Hence the share of NREGS to non-SC/STs rises less rapidly than the group's population share. But, more significantly, there is no evidence that it goes up differentially in the GPs with OBC reservation. The coefficient for the interaction term in column (4) is small and statistically insignificant. The Appendix Fig. D6 shows this more clearly by plotting the marginal effects of OBC reservation at various levels of population shares of the non-SC/ST group. The marginal effects are always very small and nowhere statistically significant. This implies that in GPs with high non-SC/ST share, the OBC quota did not reduce the provision of the public works program towards SC/STs.[27] As before, we cannot comment on the distribution of work between OBCs and the members of the General Caste.

Imputation of OBC shares: A potential concern with our results is that we have used SC/STs and non-SC/STs as the relevant groups instead of using OBCs and the rest, which would have been ideal. To address this, we impute OBC shares at the GP level using an alternate dataset. The method is as follows: since the census data does not provide OBC demographics (the primary reason for our choice of groups), we compute district level OBC shares and non-SC/ST shares from the NSS (2011) data. We then use the district level ratios of these two shares and impute GP level OBC shares by multiplying the GP level non-SC/ST shares with this ratio (which is identical for all villages with a district). Appendix Fig. D3 shows the distribution of the district level imputed OBC proportion. We use the GP level imputed OBC shares to run equation (2). The results are in column (1) of Appendix Table D6. As evident from the coefficients, the results remain unchanged.

4. Robustness of main result

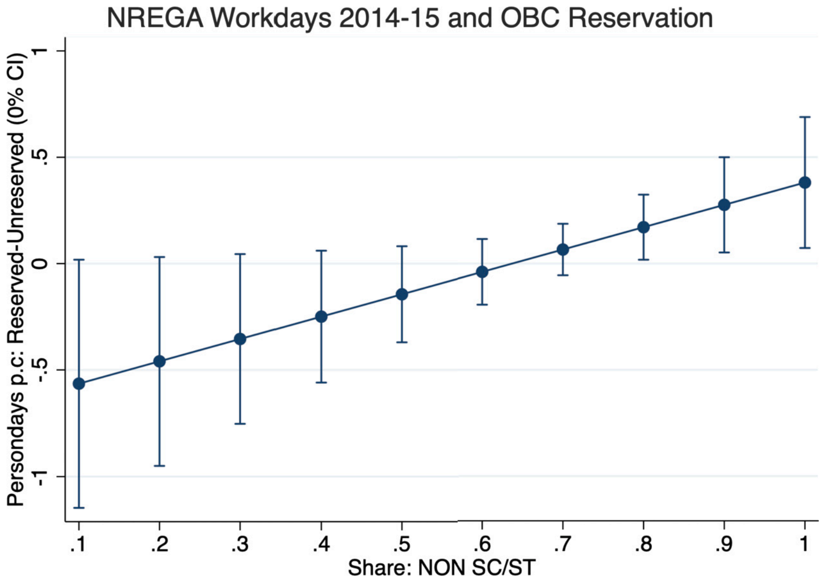
Outcome in other years: We use the NREGS outcomes of 2013-14 to show our results. We show the robustness of our result by reproducing it for the next financial year, 2014-15. Fig. 3 shows the marginal effects of OBC reservation on per capita person-days generated in 2014-15 at various levels of population share of non-SC/ST group. The figure looks the same as Fig. 2 though the estimates at low values of non-SC/ST population shares are imprecise. The estimated effect at the very top of the non-SC/ST share is virtually identical to the one we get from the main result. Matching the outcome data for 2014-15 to our main dataset resulted in a loss of about 1,000 GPs, partially explaining the imprecision of some of our estimates.

Alternate outcome variables: While we have used work provision under the NREGS as the primary lens to judge the performance of leaders chosen under AA, we examine two additional outcome variables: night lights and school construction. One advantage of using night-light data is that we can check whether similar patterns existed before the 2010 GP election, i.e., whether the result we

[25] This threshold drops to 20% if we choose a 5% significance level.

[26] The analogous threshold for a positive effect of reservation is 80% for a 5% significance level.

[27] We rerun columns (1) and (2) of Table 3 with GP population as weights and find no significant impact of OBC reservation on the aggregate person-days generated. Results available on request.



Notes: Figure plots the marginal effect of OBC quota on per capita person-days generated under NREGS for 2014-15 at different values of non-SC/ST share.

Fig. 3. Heterogenous Effect of OBC Reservation on NREGS Work Generation in 2014-'15.

obtained capture some pre-existing patterns across the GPs. We source GP level yearly night light data from SHRUG (Asher et al., 2019). We calculate per capita night light luminosity in an average year for two periods - 2006-2008, i.e., pre-2010 election, and 2011-2013, i.e., post-2010 election. Each period is of equal length (3 years) and the years correspond to the same term years in the two GP tenures.[28] We estimate our main specification using the pre and post period night-light data as outcome variables. Results are shown in Table 5 columns (1) and (2). The number of GPs in this analysis is smaller since night-light data was not available for all the GPs. Column (1) shows that there are no pre-existing differences in per capita night-lights between reserved and unreserved GPs in 2010. In column (2), we find that, in the period 2011-2013, OBC reservation had an analogous positive differential effect when non-SC/ST share was high.

Panel Analysis: Using night-light data lets us conduct a tighter test using GP fixed effects. For this analysis, we pool the periods before and after the 2010 election. We drop the GPs that were reserved for SCs/STs in 2005 to have the same interpretation as our cross sectional regression. In the cross-sectional analysis, we have estimated the impact of OBC reservation *relative* to open elections. Excluding the SC and ST reserved seats in 2005 gives us a similar inter-temporal comparison.[29] Column (3) of Table 5 reports the results. The result shows that, similar to our cross sectional results, OBC reservations have a differential positive impact when non-SC/ST shares are high.

School construction data: We also look at whether school construction is affected by AA. We source data on new schools from the District Information for School Education (DISE 2013). Using new school construction as the dependent variable, and controlling for existing stock in 2010, we do not obtain any significant results (Appendix Table D5). Unlike the NREGS work provision, school construction is a one time provision of a public good whose benefits accrue over a long time. Therefore, the politician's incentive to focus on schools is likely to be different from the public projects under the NREGS that can be provided annually.[30]

Our results highlight that AA may not show better performance in all public goods. However, with the data available, we do not find any evidence that it has an opposite effect for any public good. The night light data also confirms that the observed effect is significant enough to affect the overall well-being of the GP population.

Additional controls: There can be two further threats to our results. The first threat comes from the fact that there may still be differences across the reserved and unreserved GPs. We have been parsimonious with our list of covariates that determine demand. A better proxy would be to include the labor market characterization of the GPs that determine the demand for NREGS work. While data for the number of cultivators, the number of agricultural laborers and industrial workers are available from the census for 2011, the occupation profile is itself determined by the work offered under the NREGS. Hence we have excluded the potentially endogenous characterization of the occupation profile from our baseline specification. However, a natural question arises about whether our results remain similar when we control for these covariates. We present results after including all these occupation variables, along

[28] Data for 2014 is not reported in SHRUG. Moreover, we do not consider 2005 and 2010 since those are the election years.

[29] Women reservation status could change over time and may have an independent effect. Hence we include that as control in our panel regression.

[30] Moreover, given the expansion of public schooling in India in the decades of 90s and 2000s, the scope for politicians to benefit from additional school construction is also limited.

Table 5
Effect of OBC Reservation on Per Capita Night Lights.

	Per Capita Night Lights		
	2006-2008	2011-2013	Pooled Sample
	(1)	(2)	(3)
non-SC/ST Share	-0.016**	-0.023***	
	(0.01)	(0.01)	
OBC Res	-0.008	-0.014*	-0.006*
	(0.01)	(0.01)	(0.003)
OBC Res * non-SC/ST Share	0.011	0.018*	0.009*
	(0.01)	(0.01)	(0.005)
Observations	4,933	4,933	6602
Block FE	YES	YES	NO
GP FE	NO	NO	YES

Notes: The dependent variables in columns (1) and (2) are average per capita night light over the years 2006-2008 and 2011-2013, respectively. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST groups. "OBC Res" is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. The sample in the first two columns is the GPs with OBC reservation or unreserved GPs in 2010 election and have night lights data. The data in column (3) is the pooled sample from columns (1) and (2) for a subset of GPs that were not reserved for SC/STs in 2005. This justifies that lower number of GPs in that column. Columns (1)-(2) include the standard GP level controls used in the other tables and standard errors are clustered at block level. Column (3) includes district level time trend and standard errors are clustered at the GP level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

with the share of area irrigated in Appendix Table D6 (column (3)). We also control for (potentially endogenous) electoral outcomes such as the total number of candidates (in column (4)), years of schooling of the Sarpanch to proxy for his ability (in column (5)) and whether the village head is a woman or not (in column (6)).[31] These controls make the coefficient on the OBC reservation more noisy, though the magnitude does not change a lot. The other two coefficients of interest remain statistically significant and their magnitudes remain almost identical.

Female reservations and past reservations According to the procedure laid out by the state election commission, half of the GPs in Rajasthan are reserved for women and in theory, women's reservation status should have been randomized for each caste category. However, election records[32] show that there was a 5%age point difference in reservation between GPs that were reserved for OBC (44.5%) and those that were open (49.7%). These differences also show up when we look at non-SC/ST shares between 40 and 80% (but not above or below). To check whether this affects our result, we run our regression controlling for whether the GP was reserved for women. In addition we interact this reservation status with the non-SC/ST share to allow women's reservation to have a differential effect at different population shares. Appendix Table D7 shows that our results are also robust to controlling for these variables. Thus, it is unlikely that our results reflect the differential impacts of women's reservation.

The implementation of public projects in a GP can be affected by the affirmative action not only in the current term, but in previous terms as well. To address this, in our specification we control for the SC, ST, OBC and Female reservation status of the Sarpanch position in 2005. As we show in Appendix Table D8 Column (1), our results remain robust to the inclusion of these past reservation status variables. In another exercise, we interact the past reservation status with the shares of the non-SC/ST population to allow the past reservation status to have different effects at different shares of the OBC population. Results in Column (3) show that our results remain unchanged.

5. Mechanisms

Several mechanisms could potentially explain our result. The heterogeneous effect of OBC reservation could arise from differential corruption by elected leaders, or their different preferences or abilities and from a caste group's differential ability to discipline its leader. We focus, here, on a salient mechanism that we consider to be an important force in this context, namely the differences in electoral competition induced by reservation, and the consequent change in the incentive of the elected leader to perform better.

We divide the discussion on mechanisms into three sub-sections. We begin by laying out our candidate explanation in the form of a formal model. Then, we show suggestive empirical evidence consistent with the model. Finally, we consider the alternate explanations mentioned above and examine their empirical validity.

[31] Results go through even if we control for the number of candidates in each caste category: SC, ST and General candidates.
[32] https://sec.rajasthan.gov.in/cm/Upload/Publication_sarpanch_2010.pdf.

5.1. Model

We build a standard probabilistic voting model *a la* Persson and Tabellini (2002) with utility functions of voters that incorporate the idea that voters have group identities and they prefer the elected leader to be from their own group.

5.1.1. Set up

Voter preferences Suppose a continuum of voters of mass 1 divided into two groups or ethnicities, A and B. The population shares of the groups are α_A and α_B, with $\alpha_A + \alpha_B = 1$. Each voter is denoted by i and $g(i)$ denotes her group membership, i.e., $g(i) \in \{A, B\}$. The voters care about the amount of public resources spent by the elected leader, denoted by r_L, and the leader's group identity. Specifically, a voter's expected utility from public spending is given by,

$$\hat{u}_i(r_L) = \gamma_{g(i)} r_L + \mathbb{I}\{g(i) = g(L)\}.$$

The first part of the utility function captures the preference for spending on public goods and the second part captures the benefits of having a co-ethnic leader in power. γ_A and γ_B are the relative preference parameters with $\gamma_A \leq \gamma_B$. They capture how much voters from a group prefer public goods spending relative to having a co-ethnic leader. Higher γ_g implies a higher preference for public spending, or a lower preference for having a co-ethnic leader. We allow preferences for public spending to be different across groups since, in our context, SC/STs are reported to have higher preference for NREGS spending than non-SC/STs (Section 2.3).

Selection of candidates The leader is elected in a two candidate election. We fix the number of candidates in the model to focus on the changes in their composition and its consequent impact on electoral competition when the election is changed from open to one with AA. Also, this modeling assumption is consistent with the literature on the behavior of rent-seeking politicians in a probabilistic voting set-up (Polo (1998); Persson et al. (1997); Besley et al. (2010)).[33]

For each group, there is a potential candidate pool from which the group (collectively) chooses its candidate. Candidates can be either high ability (θ_H) or low ability (θ_L), with $\theta_H > \theta_L > 0$. A politician's ability captures her managerial talent or capacity for implementing public projects. The candidate pool for each group consists of two candidates, one of each ability type. We, therefore, assume that both groups have a similarly talented pool of politicians.[34]

Elections are of two types: open and "restricted" (i.e., with AA). In open elections each group puts up one candidate. A group considers the other group's choice of candidate in choosing its own to maximize payoff. In a restricted election, both candidates come from the group subject to AA; therefore, the eligible group must put up two candidates, one of each ability type. In an open election, it may seem natural to assume that each candidate comes from a different group; however, this is supposed to capture the idea that, often, the candidate profile is highly heterogenous even when we focus on the top two candidates and when one group is numerous in population. We provide evidence in favor of this heterogeneity (Section 5.2.1). Making the assumption stark in this respect helps us in making the conceptual point clearly.

Electoral competition Once chosen by a group, each candidate announces to their platform the amount they will spend on public goods if elected. We assume that their announcements are credible. Higher the public goods spending announced, greater the probability of the win, because voters' utility increases. However, it also reduces the net rent available to the elected leader, because the gross rent from being in office is fixed.; hence, promising higher public spending will leave fewer resources. Conditional on winning, therefore, and in equilibrium, each candidate trades off the probability of winning against the net rent from office. We formally describe the voting decisions and derive the win probabilities (Appendix Section A).

5.1.2. Main result I

In open elections, groups A and B choose their candidates and then announce their platforms. One can show that in an open election, both groups in equilibrium would choose high-ability candidates.[35] We assume through out the paper that affirmative action is applied to group A. In election with AA, therefore, the group A puts up both its candidates. Let's denote by r^o and r^* the equilibrium levels of public spending in open elections and elections with AA, respectively. First, we look at what happens to expected public spending when the group A is either very large or very small:

Hypothesis 1. If $\gamma_A < \frac{0.25}{\theta_H - \theta_L} < \gamma_B$ then,

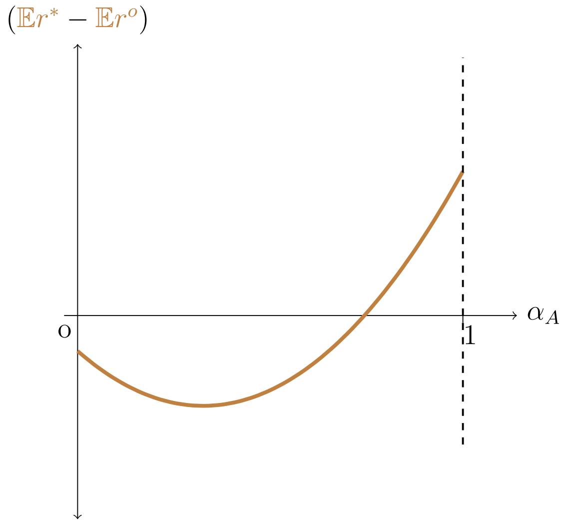
$$(i)\ \lim_{\alpha_A \to 0} (\mathbb{E}r^* - \mathbb{E}r^o) < 0 \quad \text{and} \quad (ii)\ \lim_{\alpha_A \to 1} (\mathbb{E}r^* - \mathbb{E}r^o) > 0.$$

The result states that provided the relative preferences of the groups are different enough, affirmative action would reduce public good spending when the eligible group is sufficiently small in size, and it would improve outcome when the group is sufficiently large. Note that the result is consistent with what we find in our empirical exercise. Table 3 (column (4)) shows that the effect of

[33] Our main results do not change when we endogenize the number of candidates in our model. We explore this possibility in an extension of the model (Appendix Section A.7).

[34] This is not necessary for our results; these will obtain as long as affirmative action is applied to a group that does not have a pool of more talented politicians.

[35] We provide formal proofs of this observation and all other claims in Appendix Section A.



Notes: The Figure plots the difference between equilibrium provision of public work under affirmative action and open election for different values of the population share of group A.

Fig. 4. Expected Policy and Population Share when $\gamma_A < \frac{0.25}{\theta_H - \theta_L} < \gamma_B$.

AA is negative (i.e., $\beta_2 < 0$) when non-SC/ST population share is close to zero, while it is positive (i.e., $\beta_2 + \beta_3 > 0$) when the share is close to one.

We first discuss the intuition for the second part of the result. Suppose group A is large. The group A candidate has a large co-ethnic advantage to begin with, which reduces competition, and the candidate can get away with announcing relatively low public good spending, i.e., $r^o_{AH} < r^o_{BH}$. Now, in the case of an election with AA, both candidates are from group A, and the co-ethnic advantage of (A, H) is removed. This intensifies the competition between the candidates, but at a cost–now, a low-ability candidate can run. Therefore, the outcome improves when the co-ethnic preference is sufficiently important relative to the ability gap between the candidates, or γ_A is small enough relative to $(\theta_H - \theta_L)$.

The first part of the result follows from the fact that group B voters have a stronger preference for public spending. Therefore, when group B is large (i.e., when α_A is close to zero), the overall demand for public spending is high among voters. Therefore in open elections, the group B candidate in spite of suffering from moral hazard, would not be able to win by promising low level of public spending. Hence, in elections with AA, the ability gap effect would dominate the moral hazard effect as long as γ_B is sufficiently large relative to $(\theta_H - \theta_L)$.

5.1.3. Main result II

We now generalize this result across all values α_A to show that our argument explained above holds more generally for intermediate ranges of population shares as well.

Hypothesis 2. If $\gamma_A < \frac{0.25}{\theta_H - \theta_L} < \gamma_B$ then there exists $\bar{\alpha}_A \in (0, 1)$ such that for all $\alpha_A < \bar{\alpha}_A$ we have $\mathbb{E}r^*(\alpha_A) < \mathbb{E}r^o(\alpha_A)$, for all $\alpha_A > \bar{\alpha}_A$ we have $\mathbb{E}r^*(\alpha_A) > \mathbb{E}r^o(\alpha_A)$, and at $\alpha_A = \bar{\alpha}_A$, $\mathbb{E}r^*(\alpha_A) = \mathbb{E}r^o(\alpha_A)$.

We explain the result using the Fig. 4. The graph plots the difference between expected public spending under the restricted and open election regimes as a function of the population share of group A.[36] As the figure shows, for a range of values of α_A lower than some threshold, the curve is below the horizontal axis, implying that AA will lead to a fall in public spending for those values of α_A. However, for values of α_A larger than the threshold, AA improves expected public spending. Moreover, as α_A becomes larger and comes close to one, the effect of AA becomes greater. Importantly, this is exactly what we get in our data (Fig. 2): a threshold value of the non-SC/ST population share (estimated to be 62%) below which AA leads to a fall in the provision of NREGS work. In the presence of AA, the provision of NREGS work, and the improvement in NREGS provision, is larger in GPs that have a higher non-SC/ST share than the threshold. Therefore, our model of moral hazard – along with the observed difference in preferences between SC/STs and non-SC/STs – is able to explain the opposite effects of AA at the two ends of the non-SC/ST population share distribution.

[36] The parameter values are taken to be: $\theta_H - \theta_L = 0.25$, $\gamma_A = 0.9$ and $\gamma_B = 1.1$.

5.1.4. Margin of victory

The model is able to generate results consistent with our empirical findings, but it is still not obvious if it is indeed the right model for our purpose. The primary mechanism in our model is the change in political competition due to AA. Hence we now look at the behavior of margin of victory as we change α_A. First, we define the win margins under the two election regimes as

$$m^o \equiv |V^o_{AH} - V^o_{BH}| \quad \text{and} \quad m^* \equiv |V^*_{AH} - V^*_{AL}|,$$

where V^o_c and V^*_c are the vote shares of candidate c in open election and election with AA, respectively. We now formalize our main hypothesis regarding how margin of victory would behave with α_A across the two types of elections.

Hypothesis 3. If $\gamma_A < \frac{0.5}{\theta_H - \theta_L} < \gamma_B$ then there exists $\mathring{\alpha}_A \in (0.5, 1)$ such that for all $\alpha_A < \mathring{\alpha}_A$, $m^* > m^o$, for all $\alpha_A > \mathring{\alpha}_A$, $m^* < m^o$ and at $\alpha_A = \mathring{\alpha}_A$, we have $m^* = m^o$.

The result implies that we should expect the patterns on the win margin to be exactly the opposite to the result on public spending, because higher public spending in this model comes from the tightening of electoral competition, i.e., narrower win margins. Therefore, the test of Hypothesis 3 would provide a test for the mechanism. The result is different from that in Banerjee and Pande (2007) – which sets up the model as an adverse selection problem – because we give politicians agency and, hence, explore the consequences of moral hazard shaping the behavior of politicians.

5.2. Validation of the model

5.2.1. Co-ethnic preferences and top 2 candidates

One of the main assumptions of our model is that there are co-ethnic preferences. Though we do not have direct evidence for their existence, we provide some suggestive evidence from our data: if preferences are co-ethnic, we would expect that the vote shares of OBC candidates as a group would be positively correlated to the non-SC/ST population share. We find evidence of a strong positive correlation that survives even when we compare GPs within a block and when we control for other demographic and economic covariates at the GP level. The results are reported in Appendix Table D9. The columns (1) and (2) report the correlations without and with GP level controls, respectively. Both coefficients are positive, highly statistically significant and are close to each other. This is in line with the findings of Banerjee and Pande (2007) and agrees with similar claims made regularly in the public discourse on Indian politics.

In the model, we fix the number of candidates to two. However, in the data we find that the average number of candidates in our sample is about six (Table D1). Village elections in India, like in many developing countries, see a large number of candidates, though many get a very small number of votes (Table D1 reports the average vote shares of the top four candidates); the top two candidates get about 70% of the votes on average. Also, the vote share of the candidate in the third position is about the same as the difference between the vote shares of the top two candidates (the win margin). Therefore, the third position candidate in an average election is barely pivotal – if all their votes went to the runner-up it would barely make them the winner – and the candidate in the fourth position is not pivotal at all. This motivates the assumptions of our model.

Moreover, for our model to work, we need all candidates not to belong to the OBC group in open elections even when their population share is high. In GPs that have a 60% or higher share of the non-SC/ST group, one of the top two candidates in open elections is not a member of the OBC group 59% of the time (and one of the top three is not a member of the OBC group 72% of the time); and 54% of the time when the non-SC/ST share is 75% or higher (72% of the time if we consider the top three candidates). This is in contrast to reserved elections, where all candidates are OBC.[37] Additionally, while we model the group competition as SC/ST vs OBCs, the forces would work similarly with any two group settings in our model and give us similar results. We can, for example, stratify the political competition into two groups of GPs – one where OBCs compete at the top with SC/STs and in the other, where they compete with the General Category. The top three candidates are from the three different groups in only 5.5% of the GPs. Our model would predict that, in both cases, OBC reservation would result in higher allocation when the group share is large.

5.2.2. Empirical evidence for mechanism

To explore further why we obtain the results that we do, we test the mechanics of our model that drives the theoretical results. The main force at play, we claim, is political competition in the face of co-ethnic preferences. The model predicts that for values of S^O above a threshold, the difference between win margins in the restricted elections and open elections is negative, while for values of S^O below the threshold it is positive. In other words, restricted elections are more competitive relative to open elections for high S^O. To test this, we estimate the following equation:

$$WinMargin_{vb} = \delta_b + \delta_1 * S^O_{vb} + \delta_2 * D^{RES}_{vb} + \delta_3 * S^0_{vb} * D^{RES}_{vb} + \eta' Z_{vb} + \epsilon_{vb} \tag{4}$$

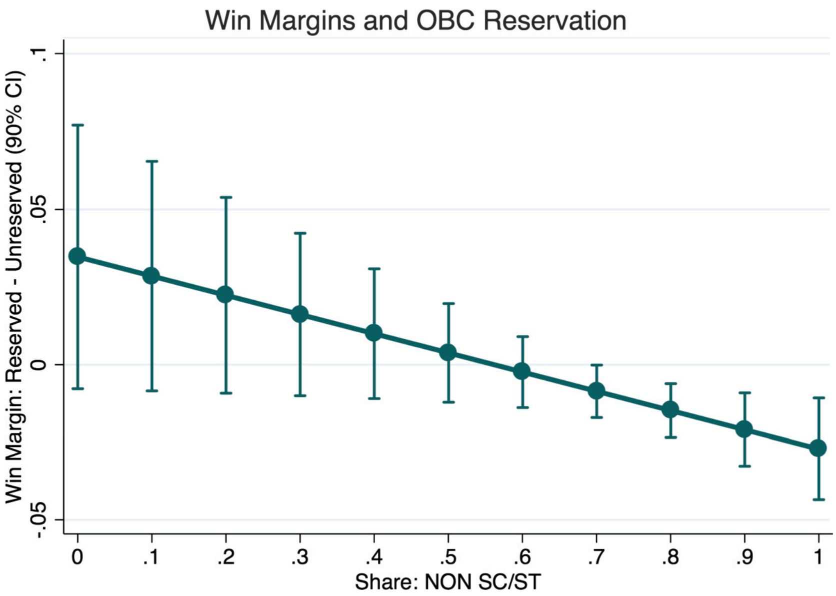
Hypothesis 3 implies the following tests for specification (4): $(i)\, \delta_2 > 0, \quad (ii)\, \delta_3 < 0, \quad (iii)\, \delta_2 + \delta_3 < 0.$

[37] To test the importance of the assumption more directly, we re-run our main specification, now including the total number of candidates that are OBC. Results (available on request) show that the inclusion of the total number of OBC candidates does not change our results. The coefficient of the interaction remains significant and is statistically similar to when we don't include the variable.

Table 6
Differential Effect of OBC Reservation on Win margin, Number of Candidates and Candidates' Education.

	Win margin				HHI of vote shares	No. of Candidates	Candidate education		
							Winner	Top 2	Top 3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OBC Res	-0.01*	-0.01*	-0.01**	0.03	0.03	-1.00	-1.98**	-1.30	-1.08
	(0.00)	(0.00)	(0.00)	(0.03)	(0.02)	(0.65)	(0.96)	(0.84)	(0.77)
non-SC/ST Share		-0.03	-0.04*	-0.03	0.02	-0.73	-0.89	-0.28	-0.31
		(0.02)	(0.02)	(0.02)	(0.02)	(0.48)	(0.72)	(0.58)	(0.55)
OBC Res * non-SC/ST Share				-0.06*	-0.05*	1.27	2.08	1.39	1.19
				(0.03)	(0.03)	(0.87)	(1.30)	(1.14)	(1.04)
Observations	4,352	4,352	4,352	4,352	4,352	4,352	4,273	4,199	3,666
R-squared	0.100	0.100	0.104	0.104	0.286	0.385	0.099	0.121	0.126
Block FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: The dependent variable for columns (1)-(4) is win margin, for column (5) is the HHI of vote shares of the top 5 candidates, for column (6) is the number of candidates running in the 2010 Sarpanch elections, and for columns (7) - (9) are the (average) years of schooling of the winning candidate, top 2 candidates and top 3 candidates, respectively. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST groups. "OBC Res" is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. In columns (3)-(8) village level characteristics such as population, population share of women, literacy rate, village asset index etc have been included as controls. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.



Notes: The Figure plots the marginal effect of OBC quota on win margin in the 2010 GP elections at different values of non-SC/ST share.

Fig. 5. Differential Effects of OBC Reservation on Margin of Victory.

Table 6 columns (1)-(4) report the results on win margins. We first note that, while the average win margin is 10%, the win margin in reserved elections, is on average one percentage point lower than in open elections (Table D1; Columns (1)-(3) in Table 6). This is consistent with the positive, though imprecise, estimate of the average effect of reservation on NREGS work (Columns (1)-(3) in Table 3). The results of the specification in equation (4) are reported in column (4). All the coefficients have the signs as predicted by the model, but δ_2 is imprecisely estimated. Part (ii) of the hypothesis proposed above, however, is verified by the data. For part (iii) we estimate the effect of reservation at various values of S^O. We compute

$$\mathbb{E}\left[WinMargin_{vb}|D^{RES}=1,S^O,Z\right]-\mathbb{E}\left[WinMargin_{vb}|D^{RES}=,S^O,Z\right]=\delta_2+\delta_3 S^O. \quad (5)$$

The marginal effects are reported in Column (2) of Appendix Table D4, and depicted in the Fig. 5. Using the estimated coefficients, we find that this difference is negative and significant at 5% for all S^0 greater than 0.7. Since the marginal effect at $S^O = 1$ is negative and statistically significant, part (iii) of the hypothesis is also verified. The difference is positive below a non-SC/ST group share of 0.5; however it is estimated with large standard errors and we cannot reject the null of no differential win margin.

While we have discussed our results with the win margin as the main dependent variable, our results go through when we use the Herfindahl-Hirschman Index or HHI (defined as the sum of the squares of vote shares among the top 5 candidates) as our measure of electoral competition (column (5)). In the mechanism suggested in the model, we underplay the possibility that the number of candidates responds to the election format. The number of electoral candidates can also increase political competition; if more candidates compete in reserved elections, at high values of S^O, the effect on win margins would be similar. However, this is unlikely to be the case as can be seen in column (6) of Table 6. We find that the number of candidates are no different across the two election formats, nor do they differ across the two types of elections for any value of S^O.

OBC vs SC/ST and general candidates: We group both OBC and GC together as the "non-SC/STs". While we report that, on average, non-OBC politicians make up a significant share of the top two candidates in open elections, one can argue that SC/ST candidates are likely to absent when non-SC/ST shares are high. In such a case, the primary competition could be between OBC and GC candidates, making the connection between our empirical result and the theoretical justification less obvious. However, we find that both General and SC/ST candidates have a significant presence among top two candidates even when non-SC/ST share is high. For example, in GPs with non-SC/ST share higher than 60%, 25% of cases have at least one SC/ST candidate among the top two. The number for General candidates is 38%. The corresponding numbers in GPs with at least 75% non-SC/ST share are 22% and 34%.

We reestimate our main specification, equation (2), separately for two samples of GPs – (i) reserved for OBCs or unreserved with an OBC and a GC in the top 2, and (ii) reserved for OBCs or unreserved with an OBC and a SC/ST candidate in the top two. Appendix Table D10 reports the results. We find consistent results in both columns, but the results are stronger and statistically significant for the sample with OBC vs SC/ST competition, suggesting that the OBC vs SC/ST comparison is indeed a salient dimension of competition. This provides a justification for our group categorization. Moreover, the result sheds some light on the consequence of affirmative action for a group located in the middle of caste hierarchy. It appears that the competition between OBCs and GCs is less salient than that between OBC and SC/ST. It could be because preferences over public projects are more aligned between OBCs and GCs than between OBCs and ST/STs, or because the affirmative action policy for OBCs and SC/STs makes them electorally salient in open elections. The sample of GPs with OBC vs SC/ST (GC) competition is endogenous. This is why we considered the full sample for our empirical analysis. Hence, we should treat the result as suggestive.

OBC dominated open elections: Our empirical exercise contrasts open election contests between candidates of different castes to reserved elections that restrict candidates to only one caste. We have taken advantage of the randomized nature of the caste reservation to draw out the difference in the two cases. However, in many open elections, there are only OBC candidates among the top two to three candidates. In such elections as well, there should be no co-ethnicity advantage, akin to reserved elections. While this occurrence is not exogenous in open elections, our argument should go through if we compare GPs with such OBC dominated open elections to other GPs where there are candidates of different castes. As Appendix Table D11 shows, this is indeed the case when all top three candidates are OBC (column (2)). The coefficients are similar in sign to those for reserved elections. If only the top two candidates are OBC, the signs are similar but estimated less precisely (column (1)). This suggests that within group (i.e., within OBC) electoral competition is indeed an important force generating our results.

6. Alternate explanations

Corruption: It could be that changes in the NREGS work provision, as reported in the official figures, reflect changes in corruption or misreporting. When non-SC/ST share is high, OBC reservation leads to more corruption, leading to higher reported work provision. On the other hand, when the non-SC/ST share is low, OBC reservation leads to greater policing by the dominant SC/ST group, leading to a fall in misreporting. While showing direct evidence against corruption is hard, we address this issue in two ways. We argue that if the reported work under the NREGS correlates positively with natural covariates of demand, then part of it reflects real transfer to households. To begin with, we know that the demand from SC and ST households for NREGS work is larger than from others. In line with that, the $Days\ pc$ is negatively correlated with S^O. Large GPs have lesser per capita NREGS work, in line with the idea that they have more private economic activities to engage people. $Days\ pc$ is positively correlated with the proportion of female population, reflecting the well known preference of women in the state to work on local NREGS projects; and NREGS work is negatively correlated with literacy rates, which is expected as this is work done by the poorly educated. GPs that are well developed in terms of infrastructure ($DEV\,Q4$) show lower NREGS work per capita, re-affirming the idea that the need for NREGS is lower in developed GPs. Thus our results show that the GP level provision of NREGS work is consistent with some obvious correlates of the demand.

Further, we address this point more directly using survey conducted in 2013 in Rajasthan. The survey data covers 69 GPs (262 villages) and 3430 households in 2013. The details of this survey are described in Himanshu et al. (2015). We run a household level regression where we regress two outcomes: whether a household got work under NREGS and the number of days of work under NREGS, on GP level expenditure per capita, as reported in the official statistics. We control for a household's ownership of Below Poverty Line (BPL) ration card, land ownership, caste group, the population of the GP and a village development index. Further, we control for block fixed effects and cluster standard errors at the GP level.[38] The results (columns (1) and (2) in Appendix Table D12) show that the per capita expenditure correlates positively with both the outcome variables, thus showing that when more money is reported to be spent on the NREGS, households receive more work under the NREG; hence larger per capita expenditures do reflect some improvement in household welfare.

[38] The clustering is at the GP level is because the sampling was done using GP as strata.

Table 7
Comparing OBC Sarpanches with the Same in Reserved GPs.

	Person-days generated p.c. (Days pc)		
	(1)	(2)	(3)
OBC Res	-0.98**	-1.33**	-1.50**
	(0.49)	(0.65)	(0.68)
non-SC/ST Share	-0.90**	-0.86*	-1.57**
	(0.41)	(0.44)	(0.75)
OBC Res * non-SC/ST Share	1.56**	1.95**	2.11**
	(0.69)	(0.89)	(0.92)
OBC Sarpanch		0.45	
		(0.46)	
OBC Sarpanch * non-SC/ST Share		-0.44	
		(0.64)	
Observations	5,002	5,002	3,186
R-squared	0.599	0.600	0.620
Block FE	YES	YES	YES

Notes: The dependent variable is the total person-days generated per capita under the NREGS program in 2013-14 in the state of Rajasthan. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST group. "OBC Res" is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. "OBC Sarpanch" is a dummy indicating whether the sarpanch is from the OBC group. Column (3) runs the column (1) specification on the sample of GPs with OBC sarpanches only. In all the columns village level characteristics such as population, population share of women, literacy rate, village asset index have been included as controls. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Next, we test whether OBC reservation has an effect analogous to our main result, for household level data. To run this regression, we keep the sample of households that belong to GPs that are not subject to SC and ST reservation (recall that this is the sample on which OBC reservation is randomized in the population). While this is a small sample, it has some advantages: for one, the OBC population share is now available to us. And we can directly test if households report higher work when there is OBC reservation. We therefore add to the above specification OBC reservation, the share of population that is OBC and its interaction (we omit GP level expenditure per capita). We find results similar to our main result. OBC reservation has positive effects, when the share of OBC is high: and while the estimated coefficient of the interaction is positive and significant for whether the household got work, it is not significant for the log of the number of workdays. However, as Appendix Figs. D4 and D5 show, it is indeed significant for both outcomes when evaluated at high OBC shares.

In an alternate analysis, we add a dummy variable to our main specification to control for an OBC leader (whether reserved or open election) and its interaction with S^O. If all the results are driven by caste favoritism of OBC leaders, then the coefficient of D^{RES}_{vb} and $S^0_{vb} * D^{RES}_{vb}$ should become insignificant after the inclusion of these variables. However, as Column (2) in Table 7 shows, this is not the case. The variables stay significant and retain their sign. Another way to interpret this result is to contrast the effect of OBC reservation at various non-SC/ST shares in Column (1) and (2). If the effect of OBC reservation is primarily through electing OBC Sarpanches (as a mediating channel) then controlling for whether a GP has an OBC Sarpanch should attenuate the marginal effect of reservation. Appendix Fig. D7 shows that the marginal effects remain statistically the same at all values of non-SC/ST share. Hence, merely electing an OBC Sarpanch is unlikely to be the primarily explanation for our result.

This can also be seen in a non-parametric representation depicted in Appendix Fig. D8. It plots per capita person-days against non-SC/ST share for three types of GPs – those with OBC reservation, without OBC reservation but with an OBC Sarpanch, and those with a non-OBC Sarpanch. We find that at higher non-SC/ST shares, work provision in OBC reserved GPs exceeds that of GPs with OBC Sarpanches selected in open elections. This directly shows that the reservation policy has an independent effect on outcome.

Another exercise that brings this out clearly is if we keep only the subset of GPs where an OBC politician came to power, irrespective of whether this was through open elections or reservations. We run our main regression on this sample. In this exercise, we compare OBC reserved GPs with GPs where OBC leaders have been elected in open elections. As evident from column (3) of the same table, we find a similar result as our main specification, thus pointing out that the results have nothing to do with OBC leaders coming into power, and hence cannot be explained by their differential preferences (to favor OBCs or in any other way). It has to do with the reservation per se.

Group alignment and leader disciplining: Munshi and Rosenzweig (2018) examine an alternate mechanism, in the context of ward level elections in rural India. They predict that, when a group is large and the leader is aligned to the group, the provision of public goods improves. They argue that a large group can credibly discipline a leader from own group more and consequently, extract more work out of her. In our context, the result that OBC reservation improves the provision of public goods when S^O is high enough could be driven by similar alignment issues. However, if the main result is driven by this mechanism, then if we compare OBC leaders in reserved vs open election GPs, we would not observe any effect. The results in Table 7, on the other hand, show that our results are robust to this test. Therefore, it rules out this mechanism as well.

Behavioral effects of reservations: Reservation could result in changes in outcomes by engendering behavioral changes within the disadvantaged group, such as by raising their aspiration, or increasing their social recognition and political salience (Iyer et al., 2012). For this to explain our results, affirmative action must interact with the non-SC/ST population shares to produce different results at different population shares. Since we lack data on measures of the relevant behavioral parameters, we cannot rule out this possibility. However, such aspirational effects of reservations are more likely to happen in GPs where the group is smaller and therefore, more likely to be discriminated; therefore, we consider the possibility less likely.

7. Policy and other lessons

As mentioned in the Introduction, electoral quotas as an affirmative action policy is popular in many countries. However, the design of the quota policy varies from one country to the other, and in case of India, is different even across states. Our paper provides one way to evaluate the design of the quota policy, namely how to optimally *target* the quotas across jurisdictions once the total number of quota positions is decided. While it may be reasonable from an equity point of view to target the areas where the groups are small, in practice many Indian states target jurisdictions (GPs or constituencies) where the groups are numerous. The quotas for SCs and STs in Rajasthan, for example, is based on the population shares of the groups in the GPs and the quota is assigned to GPs with the highest shares of the groups within each block, as explained above. Many other states also follow similar methods of assignment. Our results suggest that when groups are unevenly spread across jurisdictions (GPs in our context), targeting the jurisdictions where one group is numerous may result in an improvement in the leader's overall performance without worsening the distribution of public spending. We therefore provide a justification for such a policy design choice.

It is pertinent to add also that our research delves into the implications of AA for a group that, unlike the SCs and the STs, lies in the "middle" of the economic strata of society. This is an interesting topic to study in its own right, though we do not take any normative position on the desirability of AA for such groups.

Finally, our work shows that in ethnically diverse societies, the electoral process may create an additional mechanism to reduce the provision of public goods; therefore, elections can potentially exacerbate an ethnically diverse population's ability for collective action, especially in societies with asymmetric group sizes.

8. Conclusion

One persistent concern with affirmative action policies, in general, is that it intends to promote equity at the cost of efficiency or performance. We shed some light on this debate, albeit indirectly, by focusing on the consequences of affirmative action policies in elections. We exploit the randomized quota policy of village president positions for an intermediately ranked caste group (OBCs) in Rajasthan, India to show that affirmative action for the group did not have any average effect on the provision of public work, and that it improved the public provision of work in GPs dominated by the group. We find that the improvement did not adversely affect allocations to the most disadvantaged group, namely SC/STs.

We consider several potential mechanisms that can explain the result. We first propose a salient mechanism of electoral competition by building a model. The model predicts that affirmative action for a group can increase within-group electoral competition and consequently the performance of the elected leader, especially if the group is large. This happens because voters have "co-ethnic" preferences, i.e., they prefer a candidate from their own group, conditional on promises made by the candidates. This presents a moral hazard problem for the candidate from a group that is relatively large in size. In such a situation imposing a restriction on candidate entry in the form of an AA policy removes this friction from the election leading to positive outcome. We find suggestive evidence in favor of this mechanism effects; win margin, a measure of electoral competitiveness, goes down in GPs with an OBC quota when the group is large. We do not find supportive evidence in the favor of corruption or differential preference or ability of elected leaders driving our results. It is possible, however, that quotas engender aspirational changes and salience of caste cleavages among group members and such effects are more pronounced when the group is large. We cannot rule out that such behavioral effects of the quota, that can potentially also explain our result.

Our analysis highlights that restricting candidates through affirmative action will not necessarily lead to poorly performing elected officials in all contexts. Therefore, we may need to reexamine the performance related efficiency concerns of affirmative action policies.

Declaration of competing interest

This statement affirms that we have no financial interests that may be potentially impacted by the findings in this paper. We have not received any significant financial support from interested parties who may have a financial, ideological, or political stake related to the article. We maintain no positions in any organization whose policy positions, goals, or financial interests relate to the article.

Data availability

Data will be made available on request.

Appendix A. Theoretical analysis

In this section we first formalize the nature of electoral competition (Section A.1) described informally in the main paper. Then, we compute equilibrium policies announced by candidates in open elections and elections with AA (Sections A.2 and A.3). We then derive formal proofs of the various claims and hypotheses we made in the main text of the paper (Section A.4-A.6). Finally, we discuss an extension of our model where we endogenize the number of candidates to allow for the possibility that multiple candidates from the same group may run for election (Section A.7).

A.1. Electoral competition

A candidate c chooses her platform r_c to maximize:

$$v_c(r_c) = \pi_c \left[1 - \frac{r_c}{2\theta_c}\right]$$

where π_c is the probability that candidate c wins, which may depend on both her and her opponent's platforms. The gross rent from office is 1 and $\frac{r_c}{2\theta_c}$ is the effort cost of the candidate to deliver on her promise if elected. Therefore, the expression $(1 - \frac{r_c}{2\theta_c})$ captures the net rent candidate c would enjoy if elected to office. Announcing higher public spending may increase a candidate's probability of win, but it leaves her with lower net rent. This is the trade-off that each candidate faces. Before voting takes place, each voter gets two preference shocks for each candidate in the following manner. Let the candidates be c and c'. Then voter i votes for candidate c if

$$\hat{u}_i(r_c) > \hat{u}_i(r_{c'}) + \mu_i + \sigma$$

where μ_i is the relative idiosyncratic preference shock of i for candidate c'. μ_i could either be voter i's personal (relative) preference for c''s ideology, or it could be i's preference for the candidate's personal characteristics. σ is the overall level of (relative) popularity of candidate c'. We assume that

$$\mu_i \sim U\left[-\frac{1}{2}, \frac{1}{2}\right] \quad \text{and} \quad \sigma \sim U\left[-\frac{1}{2}, \frac{1}{2}\right].$$

We introduce these shocks to make the probability of win non-degenerate and smooth functions of the candidates' platforms. This is a standard technique applied in probabilistic voting models, first proposed by Polo (1998), and later canonized by Persson and Tabellini (2002).

The sequence of events in the model is as follows: (1) The election type - open or restricted - is decided. Then (2) the eligible group(s) decide their candidates. (3) The candidates announce their platforms. Thereafter (4) the preference shocks μ_i and σ are realized and voters cast their vote. Finally, (5) the winner implements her announced platform and payoffs are realized.

A.2. Equilibrium policy in open elections

Observation 1. *We first assume that both A and B put up their high ability candidates. Therefore, the candidate profiles are (A, H) and (B, H). Let r_{AH} and r_{BH} be the announced platforms of the candidates. Then their platform announcement game has a unique Nash Equilibrium and it is given by*

$$r^o_{AH} = 2\theta_H - \frac{(2\alpha_A - 1)}{3\kappa} - \frac{1}{2\kappa} \quad \textit{and} \quad r^o_{BH} = 2\theta_H + \frac{(2\alpha_A - 1)}{3\kappa} - \frac{1}{2\kappa},$$

where $\kappa = \alpha_A\gamma_A + \alpha_B\gamma_B$.

Proof. Suppose the candidates (A, H) and (B, H) announce r_{AH} and r_{BH} as their platforms. Then voters from group A would vote for candidate (A, H) if

$$\gamma_A(r_{AH} - a_{BH}) + 1 - \sigma > \mu_i$$

where μ_i is voter i's idiosyncratic (relative) preference for the candidate (B, H) and σ is the overall (relative) popularity of the same candidate. Therefore, the vote share of candidate (A, H) from group A is given by,

$$V^A_{AH} = \mathbb{P}[\gamma_A(r_{AH} - r_{BH}) + 1 - \sigma > \mu_i] = \frac{1}{2} + [\gamma_A(r_{AH} - r_{BH}) + 1 - \sigma].$$

Similarly, the vote share of candidate (A, H) from group B is given by,

$$V^B_{AH} = \mathbb{P}[\gamma_B(r_{AH} - r_{BH}) - 1 - \sigma > \mu_i] = \frac{1}{2} + [\gamma_B(r_{AH} - r_{BH}) - 1 - \sigma].$$

Notice that the vote shares are random because the overall (relative) popularity of the candidates are random, which makes the preference of the median voter random. Therefore, the probability that candidate (A, H) wins is non-trivial and is given by,

$$\pi_{AH} = \mathbb{P}\left[\alpha_A V^A_{AH} + \alpha_B V^B_{AH} > \frac{1}{2}\right]$$

$$\Rightarrow \ \pi_{AH} = \frac{1}{2} + \kappa(r_{AH} - r_{BH}) + (2\alpha_A - 1),$$

where $\kappa = \alpha_A\gamma_A + \alpha_B\gamma_B$

$$\Rightarrow \ \pi_{BH} = 1 - \pi_{AH} = \frac{1}{2} + \kappa(r_{BH} - r_{AH}) - (2\alpha_A - 1)$$

Candidate (A, H) now solves the following problem:

$$\max_{r_{AH}} \pi_{AH}\left[1-\frac{r_{AH}}{2\theta_H}\right]$$

which yields the following best response function:

$$r_{AH}=\theta_H+\frac{r_{BH}}{2}-\frac{(2\alpha_A-1)\beta}{2\kappa}-\frac{1}{4\kappa}.$$

Similar optimization by candidate (B, H) results in the following best response function:

$$r_{BH}=\theta_H+\frac{r_{AH}}{2}-\frac{(2\alpha_A-1)\beta}{2\kappa}-\frac{1}{4\kappa}.$$

As evident from the two equations, they entail a unique Nash Equilibrium given by,

$$r^o_{AH}=2\theta_H-\frac{(2\alpha_A-1)}{3\kappa}-\frac{1}{2\kappa},$$
$$r^o_{BH}=2\theta_H+\frac{(2\alpha_A-1)}{3\kappa}-\frac{1}{2\kappa}. \quad \square$$

Observation 2. *The open election game has a unique Nash Equilibrium where both groups choose their high ability candidates and the candidates announce platforms as specified in Proposition 1.*

Proof. Suppose that candidate from group B is (B, H). Now, group A is considering whether to put up the high or low ability candidate. If it puts up the candidate (A, L) then the equilibrium announcements by the candidates will be,

$$\tilde{r}^o_{AL}=2(\frac{1}{3}\theta_H+\frac{2}{3}\theta_L)-\frac{(2\alpha_A-1)}{3\kappa}-\frac{1}{2\kappa},$$
$$\tilde{r}^o_{BH}=2(\frac{2}{3}\theta_H+\frac{1}{3}\theta_L)+\frac{(2\alpha_A-1)}{3\kappa}-\frac{1}{2\kappa}.$$

Clearly, the expected public spending is lower in this case compared to the case where candidate (A, H) was put up since $\tilde{r}^o_{AL} < r^o_{AH}$ and $\tilde{r}^o_{BH} < r^o_{BH}$. Candidate (A, L) announces a lower public spending because she is less competent. Candidate from group B responds to that by announcing in equilibrium a lower public spending. Also, the probability that the candidate from group A wins is now,

$$\tilde{\pi}_{AL}=\frac{1}{2}+\kappa(\tilde{r}^o_{AL}-\tilde{r}^o_{BH})+(2\alpha_A-1)=\frac{1}{2}+\frac{2\kappa}{3}(\theta_L-\theta_H)+\frac{1}{3}(2\alpha_A-1).$$

Therefore, $\tilde{\pi}_{AL} < \pi^o_{AH} = \pi_{AH}(r^o_{AH}, r^o_{BH})$. Hence, group A's payoff is unambiguously worse under candidate (A, L). Therefore, group A will choose the high ability candidate. Notice that this will be true even if group B had picked its low ability candidate for election. It is, therefore, a dominant strategy for A to pick its high ability candidate. By similar logic, it is also a dominant strategy for group B to choose its high ability candidate. Hence, both groups picking their high ability candidate is a unique Nash Equilibrium.

Equilibrium expected public spending is calculated using the formula

$$\mathbb{E}r^o=\pi^o_{AH}r^o_{AH}+(1-\pi^o_{AH})r^o_{BH}$$

which gives us the necessary result. $\square$

A.3. Equilibrium policy in elections with AA

The candidate profiles in the election are (A, H) and (A, L). Hence, for voters from both groups the candidates are symmetric from the point of view of being co-ethnic. For group A both candidates are co-ethnic while for group B none are so. Hence a voter from group g would vote for candidate (A, H) if

$$\gamma_g(r_{AH}-r_{AL})-\sigma>\mu_i.$$

Following the same logic as before we can compute the probability of win for (A, H) to be

$$\pi_{AH}=\frac{1}{2}+\kappa(r_{AH}-r_{AL}).$$

Candidates choose r_{AH} and r_{AL} to maximize their expected rents from office which results in the following equilibrium announcements:

$$r^*_{AH}=\frac{2(2\theta_H+\theta_L)}{3}-\frac{1}{2\kappa} \quad \text{and} \quad r^*_{AL}=\frac{2(\theta_H+2\theta_L)}{3}-\frac{1}{2\kappa}. \tag{6}$$

Observation 3. *In the restricted election, the announcement game has a unique Nash Equilibrium. Candidates (A, H) and (A, L) announce*

$$r^*_{AH}=\frac{2(2\theta_H+\theta_L)}{3}-\frac{1}{2\kappa} \quad \textit{and} \quad r^*_{AL}=\frac{2(\theta_H+2\theta_L)}{3}-\frac{1}{2\kappa}.$$

Proof. Proof follows similar logic as in the proof of Proposition 1. □

A.4. Main result I

Hypothesis 4. If $\gamma_A < \frac{0.25}{\theta_H - \theta_L} < \gamma_B$ then,

$$\lim_{\alpha_A \to 0} (\mathbb{E}r^* - \mathbb{E}r^o) < 0 \quad \text{and} \quad \lim_{\alpha_A \to 1} (\mathbb{E}r^* - \mathbb{E}r^o) > 0.$$

Proof. We calculate the difference between $\mathbb{E}r^o$ and $\mathbb{E}r^*$ at $\alpha_A = 0$ and 1.

$$(\mathbb{E}r^o - \mathbb{E}r^*)\,|_{\alpha_A=0} = \frac{1}{\gamma_B}\left[\gamma_B(\theta_H - \theta_L)\left\{1 - \frac{4}{9}\gamma_B(\theta_H - \theta_L)\right\} - \frac{2}{9}\right],$$

and

$$(\mathbb{E}r^o - \mathbb{E}r^*)\,|_{\alpha_A=1} = \frac{1}{\gamma_A}\left[\gamma_A(\theta_H - \theta_L)\left\{1 - \frac{4}{9}\gamma_A(\theta_H - \theta_L)\right\} - \frac{2}{9}\right].$$

Therefore, $\gamma_B(\theta_H - \theta_L) > 0.25$ implies that $(\mathbb{E}r^o - \mathbb{E}r^*)\,|_{\alpha_A=0} > 0$ and, $\gamma_A(\theta_H - \theta_L) < 0.25$ implies that $(\mathbb{E}r^o - \mathbb{E}r^*)\,|_{\alpha_A=1} < 0$. □

A.5. Main result II

Hypothesis 5. If $\gamma_A < \frac{0.25}{\theta_H - \theta_L} < \gamma_B$ then there exists $\bar{\alpha}_A \in (\tilde{\alpha}_A, 1)$ such that for all $\alpha_A < \bar{\alpha}_A$ we have $\mathbb{E}r^*(\alpha_A) < \mathbb{E}r^o(\alpha_A)$, for all $\alpha_A > \bar{\alpha}_A$ we have $\mathbb{E}r^*(\alpha_A) > \mathbb{E}r^o(\alpha_A)$, and at $\alpha_A = \bar{\alpha}_A$, $\mathbb{E}r^*(\alpha_A) = \mathbb{E}r^o(\alpha_A)$.

Proof. We first proof the following observation:

Observation 4. *Suppose $\gamma_A \le \gamma_B$ and $\gamma_A < \frac{0.25}{\theta_H - \theta_L}$. Then there exists $\tilde{\alpha}_A \in (0,1)$ such that,*

$$\frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A} > 0 \quad \text{for all } \alpha_A \in (\tilde{\alpha}_A, 1],$$
$$\frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A} < 0 \quad \text{for all } \alpha_A \in [0, \tilde{\alpha}_A), \quad \text{and}$$
$$\frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A} = 0 \quad \text{at } \alpha_A = \tilde{\alpha}_A.$$

Proof.

$$\mathbb{E}r^* - \mathbb{E}r^o = \theta_H - \theta_L + \frac{4\kappa(\theta_H - \theta_L)^2}{9} + \frac{2(2\alpha_A - 1)^2}{9\kappa}$$
$$\Rightarrow \quad \frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A} = \frac{4(\theta_H - \theta_L)^2(\gamma_A - \gamma_B)}{9} - \frac{2(2\alpha_A - 1)^2(\gamma_A - \gamma_B)}{9\kappa^2} + \frac{8(2\alpha_A - 1)}{9\kappa}$$
$$\Rightarrow \quad \frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A} = \frac{4(\theta_H - \theta_L)^2(\gamma_A - \gamma_B)}{9} + \frac{2(2\alpha_A - 1)}{9\kappa^2}[2\kappa + \gamma_A + \gamma_B]$$

It is clear that

$$\frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A}\,|_{\alpha_A=0} < 0 \quad \text{and} \quad \frac{\partial(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A}\,|_{\alpha_A=1} > 0$$

given that $\gamma_A \le \gamma_B$ and $\gamma_A < \frac{0.25}{\theta_H - \theta_L}$. Hence there exists $\tilde{\alpha}_A \in (0,1)$ such that the derivative is zero at $\tilde{\alpha}_A$. Also,

$$\frac{\partial^2(\mathbb{E}r^* - \mathbb{E}r^o)}{\partial \alpha_A^2} > 0$$

implying that $\tilde{\alpha}_A$ is unique. □

Given the assumption $\gamma_A < \frac{0.25}{\theta_H - \theta_L} < \gamma_B$, we have $\mathbb{E}r^* < \mathbb{E}r^o$ at $\alpha_A = 0$ and $\mathbb{E}r^* > \mathbb{E}r^o$ at $\alpha_A = 1$, by Hypothesis 4. Since $(\mathbb{E}r^* - \mathbb{E}r^o)$ is falling in α_A in $[0, \tilde{\alpha_A})$ (by Observation 4), we have $\mathbb{E}r^* < \mathbb{E}r^o$ at $\alpha_A = \tilde{\alpha}_A$. Therefore, there exists at least one $\bar{\alpha}_A \in (\tilde{\alpha}_A, 1)$ where $\mathbb{E}r^* = \mathbb{E}r^o$. Since $(\mathbb{E}r^* - \mathbb{E}r^o)$ is monotonically increasing in $[\tilde{\alpha}_A, 1]$, $\bar{\alpha}_A$ is unique and we have $\mathbb{E}r^* < \mathbb{E}r^o$ for all $\alpha_A < \bar{\alpha}_A$ and $\mathbb{E}r^* > \mathbb{E}r^o$ for all $\alpha_A > \bar{\alpha}_A$. □

A.6. Margin of victory

Hypothesis 6. If $\gamma_A < \frac{0.5}{\theta_H - \theta_L} < \gamma_B$ then there exists $\mathring{\alpha}_A \in (0.5, 1)$ such that for all $\alpha_A < \mathring{\alpha}_A$, $m^* > m^o$, for all $\alpha_A > \mathring{\alpha}_A$, $m^* < m^o$ and at $\alpha_A = \mathring{\alpha}_A$, we have $m^* = m^o$.

Proof. We calculate that

$$V^o_{AH} - V^o_{BH} = \frac{1}{2} + \kappa(r^o_{AH} - r^o_{BH}) + 2\alpha_A - 1 = \frac{1}{2} + \frac{1}{3}(2\alpha_A - 1)$$
$$\Rightarrow \quad m^o = \frac{1}{2} + \frac{1}{3}(1 - 2\alpha_A) \text{ for } \alpha_A \in [0, \frac{1}{2})$$
$$\text{and} \quad m^o = \frac{1}{2} + \frac{1}{3}(2\alpha_A - 1) \text{ for } \alpha_A \in [\frac{1}{2}, 1]$$
$$m^* = V^*_{AH} - V^*_{BH} = \frac{1}{2} + \kappa(r^*_{AH} - r^*_{AL}) = \frac{1}{2} + \frac{2}{3}\kappa(\theta_H - \theta_L)$$
$$\Rightarrow \quad m^* - m^o = \frac{2}{3}\kappa(\theta_H - \theta_L) - \frac{1}{3}(1 - 2\alpha_A) \text{ for } \alpha_A \in [0, \frac{1}{2})$$
$$\text{and} \quad m^* - m^o = \frac{2}{3}\kappa(\theta_H - \theta_L) - \frac{1}{3}(2\alpha_A - 1) \text{ for } \alpha_A \in [\frac{1}{2}, 1]$$

Therefore, at $\alpha_A = 0$, we have $m^* > m^o$ if $\gamma_B > \frac{0.5}{\theta_H - \theta_L}$. Similarly, at $\alpha_A = 1$, we have $m^* < m^o$ if $\gamma_A < \frac{0.5}{\theta_H - \theta_L}$. Also, $m^* > m^o$ at $\alpha_A = \frac{1}{2}$. Hence, $m^* > m^o$ for all $\alpha_A \in [0, \frac{1}{2}]$. Therefore, there exists a $\mathring{\alpha}_A \in (0.5, 1)$ such that $m^* > m^o$ for $\alpha_A \in [0, \mathring{\alpha}_A)$, $m^* < m^o$ for $\alpha_A \in (\mathring{\alpha}_A, 1]$ and $m^* = m^o$ for $\alpha_A = \mathring{\alpha}_A$. □

A.7. Extension of the model

In this section we discuss one possible extension of the model where we endogenize the number of candidates that a group can put up. We maintain the assumption that each group has a set of two potential candidates - one high and one low ability. In presence of AA the eligible group would still continue to put up both of its candidates, since putting up only one candidate would result in zero public good provision owing to no electoral competition. Therefore, we only need to worry about the open elections.

Now let us consider a case where group A is majority and both groups have initially chosen their respective best candidates. Now suppose group A is considering whether to allow its low ability politician to run as well. If there is a second candidate from the same group, the high ability candidate from group A would increase her platform due to competition. This increases group A's payoff. However, notice that if the second candidate from group A runs, then *ceteris paribus* the group B candidate wins with higher probability, since the group A votes are now split between the two candidates. Therefore, the probability that any of the group A candidates wins is lower. This reduces group A's payoff. Also, since the second candidate from group A is of low quality, it reduces the average quality of the candidate pool which reduces expected public spending. Therefore, group A will put up a second candidate only when the moral hazard problem is quite severe, i.e., when α_A is very high. It is evident from this discussion that the minority group would not put up its second politician as candidate. For extremely high values of α_A, therefore, the majority group would put forward two candidates. However, this would not disturb the main result of the model. To see this notice the following: for large values of α_A, the two candidates from group A become the effective candidates in an open election. However, the presence of the group B candidate implies that the marginal return on announcing higher public spending is lower for the group A candidates in an open election compared to a restricted election regime, where the group B voters would not have any option but to vote for one of the group A candidates.[39]

Here we note that in our context, though the groups can have high population shares, they do not usually reach the limiting case when the aforementioned theoretical possibility is entertained, as discussed in the descriptive statistics.

Appendix B. Institutional details and data description

B.1. Village councils and quota policies in village elections in India

The village council or Gram Panchayat (GP from now on) is the lowest tier of governance in India. It is part of a three tier governance system that all Indian states adopted after the 73^{rd} Constitutional amendment in 1993. In this system each state is divided into districts which are run by district councils headed by a President. The districts are further divided into blocks which are divided, in turn, into GPs. The GPs are comprised of councilors who are elected from single member wards within GPs. Each GP has a president or Sarpanch, analogous to a mayor in a municipality. Depending on the state, the Sarpanch may or may not be directly elected. We focus on the election of Sarpanches for our study and, therefore, choose as our context the state of Rajasthan which holds direct elections for that position.[40]

The primary responsibility of a GP is to provide local public goods, such as village roads, drinking water facilities (hand pumps, wells etc), primary schools, health centers, irrigation facilities (such as public canals, water sheds). The GPs, however, have minimal taxation power. Their expenditure is met by resources received from higher tier governments. Literature has shown that the Sarpanch enjoys significant discretionary power in deciding budgetary allocations in a GP, including the number of public projects to be

[39] Technically speaking, in election with AA, group B voters switch from one group A candidate to the other at an infinitely high rate with higher announcements by a candidate. However, in open elections, this rate is finite in presence of a group B candidate.

[40] This is in contrast to the context used by Anderson and Francois (2020). Maharashtra is a state where the Sarpanch is chosen by elected members of the GP among themselves.

implemented and their composition (see, for example, Besley et al. (2004), Besley et al. (2012), Chattopadhyay and Duflo (2004)). The source of this discretion is possibly the fact that the Sarpanch heads the planning and finance subcommittee within a GP and therefore signs off on all the public good expenditures. In the recent years, owing to increasing decentralization in the delivery of public goods and services, the resources available at the GPs have increased manifold. Therefore the extent of work done by a GP depends a lot on the organizational capacity of the GP which, in turn, is heavily influenced by the Sarpanch's managerial ability and efforts. In particular, in the provision of work under the National Rural Guarantee Scheme (NREGS), the role of the Sarpanch is especially important. We turn to that in the description of NREGS.

B.2. NREGS

National Rural Employment Guarantee Scheme (NREGS) is the largest running public works program in the world that was initiated by the Indian Government in 2006. By the year 2008, it was made universal, i.e., the program was running in all districts of India. As part of the program, any adult member of a rural household is entitled to 100 days of employment in a year. The employment is generated by implementing various public projects in the villages, such as construction of roads, watershed, irrigation canal, wells, sanitation facilities etc. The GPs are the implementing agencies of this program and by the time of our study, 2013-14, NREGS had become the largest expenditure head in the annual budgets of GPs, comprising of a significant majority of their annual expenditure. Though in principle the program is demand driven, there is now growing evidence that a significant part of the expenditure under NREGS is determined by supply side factors such as bottlenecks in bureaucratic procedures during fund allocation, or capacity of local GPs to plan for new projects and execute them on time (Himanshu et al., 2015). Hence, the managerial efforts of the Sarpanch is an important determinant of the level of public goods that's provided through this program. We therefore use the extent of work implementation under NREGS as our primary measure of performance of the Sarpanch.

B.3. Construction of village development index

We also construct a GP development index using infrastructure data from the 2011 census. For each village, the census records the access to a set of amenities. Let $I_{jiv} = 1$ indicate that the village i in GP v has access to the amenity j (0 if it doesn't). We construct the GP access to the amenity j as $I_{jv} = \sum w_i I_{ijv}$ where w_i is the population weight of each village i in the GP. We construct such GP level indicators for access to a set of amenities. We divide amenities into two groups. Since some facilities do not need to be inside a village to provide services, we take into account the distance to Primary Healthcare Centre, Post Office, All Weather (Pucca) Road, State Highway, Wholesale Market (Mandi), Assembly Polling Station, Government Primary School, Private Primary School, Government Senior Secondary School. We define the village to have access to these amenities if they are within 5 kms of the village. For other amenities which need to be inside the village to benefit households, we define the village to have access if any household in the village has access to the stated amenity. We consider access to Treated Tap Water and Closed or Covered (permanent) Drainage facilities as a part of this list. Next, these indicators are combined to a GP level development index using principle component analysis. As is conventional in the literature, we use the first factor and generate development quartiles using data on all GPs ($DEVQ1 - DEVQ4$) with $DEVQ1$ being the most developed GP.

Appendix C. Alternative mechanisms

In this section we explore some additional mechanisms that can potentially explain our result.

Selection on ability: One may argue that our results are driven by a selection effect; that the rise in performance is given by selection of better candidates in reserved election, especially when the OBC population share is high. (Banerjee and Pande, 2007) While the ability of candidates is very hard to measure, we follow Munshi and Rosenzweig (2018), Anderson and Francois (2020) and Banerjee et al. (2017) in proxying quality by the education of the candidates. The results in columns (7) to (9) of Table 6 that regress the (average) years of schooling of the winner, the top 2 candidates and the top 3 candidates show that, if anything, the average quality falls in reserved elections. While the interaction term with S^O is positive, the overall marginal effect is still negative for very high population shares and is never significant.

Party politics: The results above also show that party politics are not likely to drive our main results. Though parties are formally not allowed to be part of local elections in Rajasthan, they are often informally aligned to candidates. These affiliations are often based on caste groups but are fluid over time, responding to concurrent political contingencies. However, if our results are driven by party politics, then the population shares of groups in a GP and the winner's caste identity would determine the level of delivery of public goods. We, therefore, should not expect any difference in outcomes between OBC reserved GPs and GPs where OBCs win in open elections (for the same population composition of groups). Thus party politics may have a limited role in explaining our results.

Salience of caste identity: An important mechanism that may explain our result is that the salience of caste as a way to mobilize voters may be reduced in GPs where the OBC quotas are imposed. Vaishnav (2017), for example, argues that SC reservation reduces the importance of caste based vote mobilization, since all the candidates are from the same caste, and makes the candidates run on a more developmental platform. If such a force is at play in our context then it may explain our results as well. However, if

OBC reservation causes the candidates to focus less on caste and more on delivery of public goods and services, then we should expect a positive outcome in all GPs, which we don't see. Moreover, if fractionalization captures salience of group identities, which researchers of ethnic conflict argue to be the case, GPs with large non-SC/ST population share would arguably have lower potential for caste based voter mobilization to begin with. Hence, the effect of OBC reservation would be lower in GPs with high non-SC/ST population share and highest when the groups are symmetric. However, this is not consistent with what we find. Hence it is unlikely to be the primary mechanism behind our result.

Appendix D. Additional tables and figures

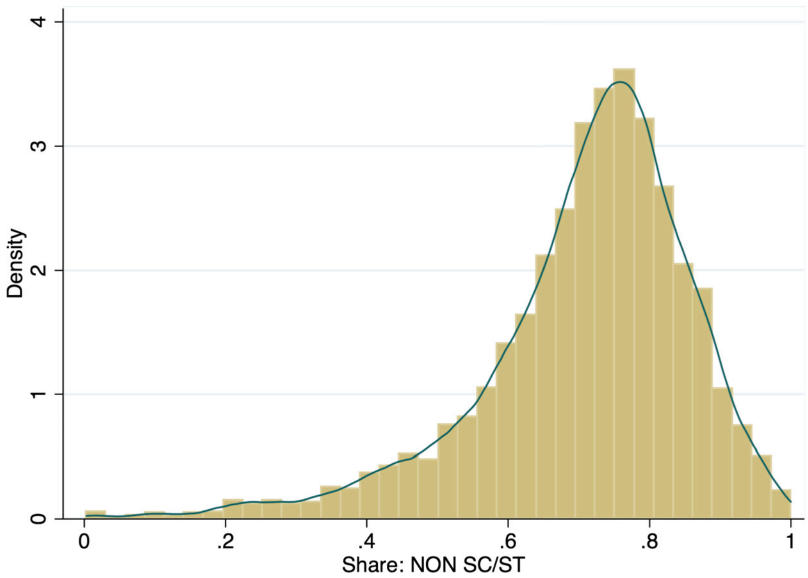


Fig. D1. Distribution of non-SC/ST population share.

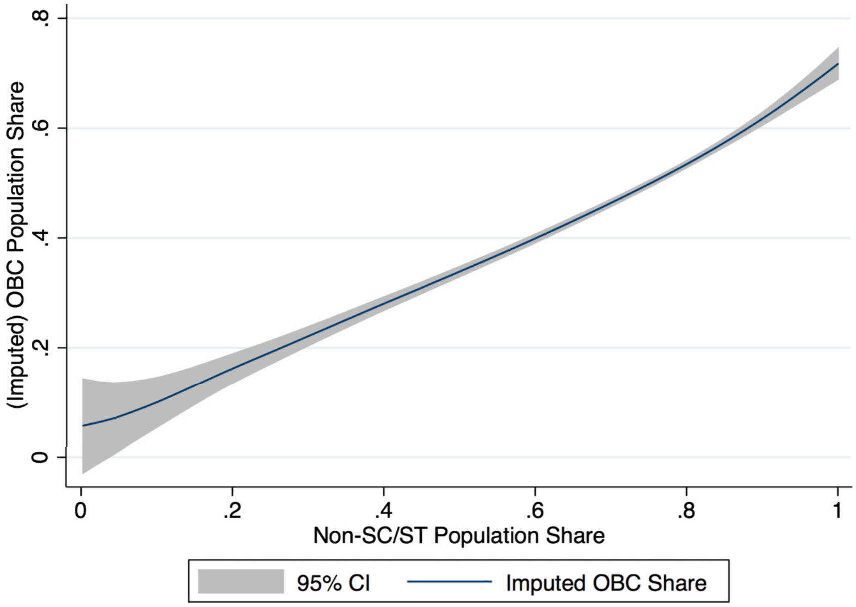


Fig. D2. Correlation between non-SC/ST Population Share and OBC Population Share.

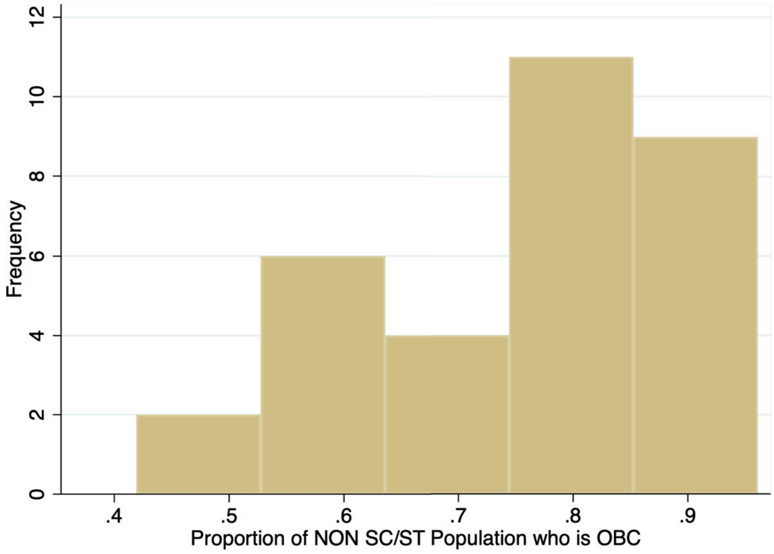


Fig. D3. Distribution of District Proportion of OBC among non-SC/ST.

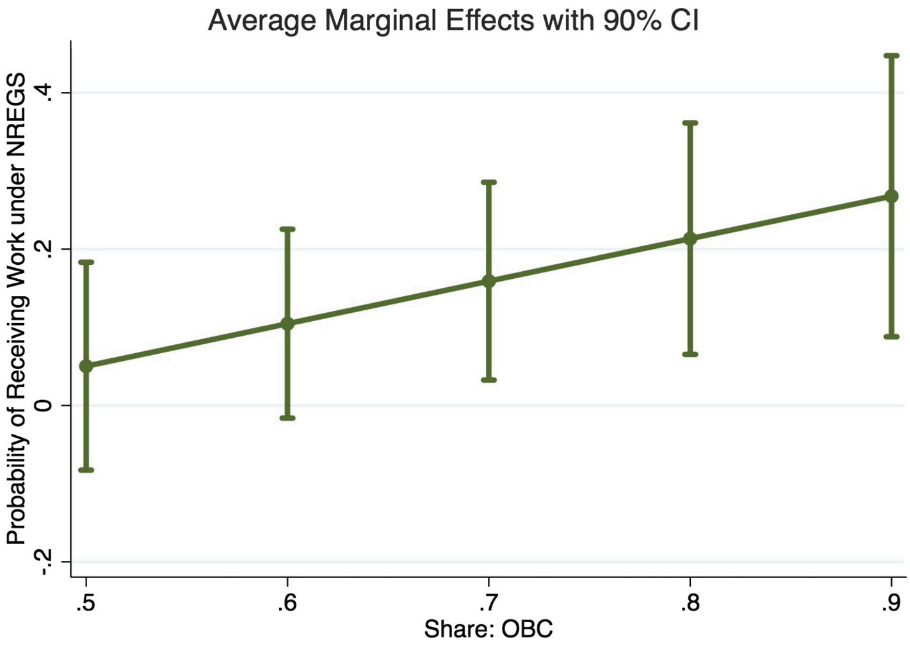


Fig. D4. Heterogenous Effect of OBC Reservation: Survey Data.

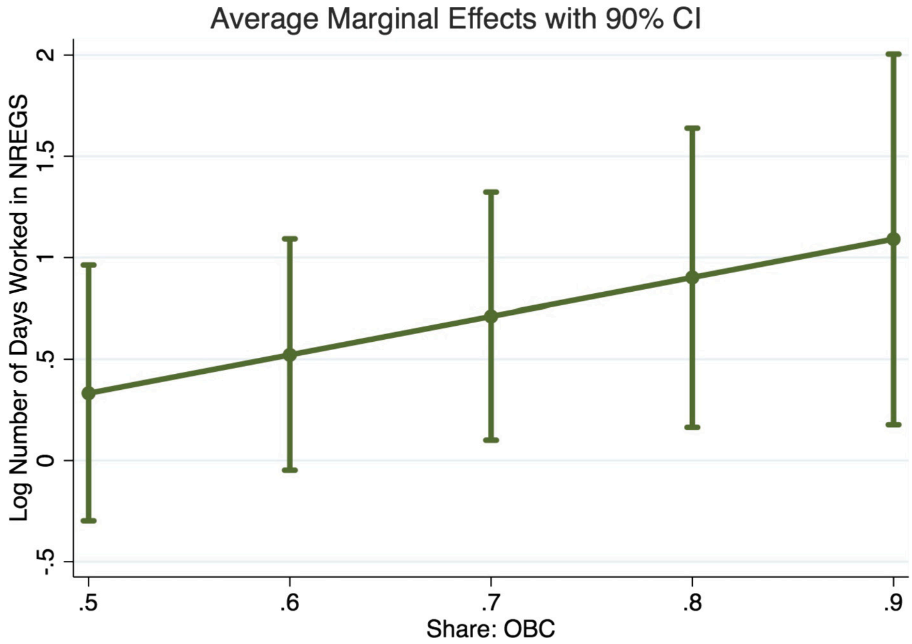


Fig. D5. Heterogenous Effect of OBC Reservation: Survey Data.

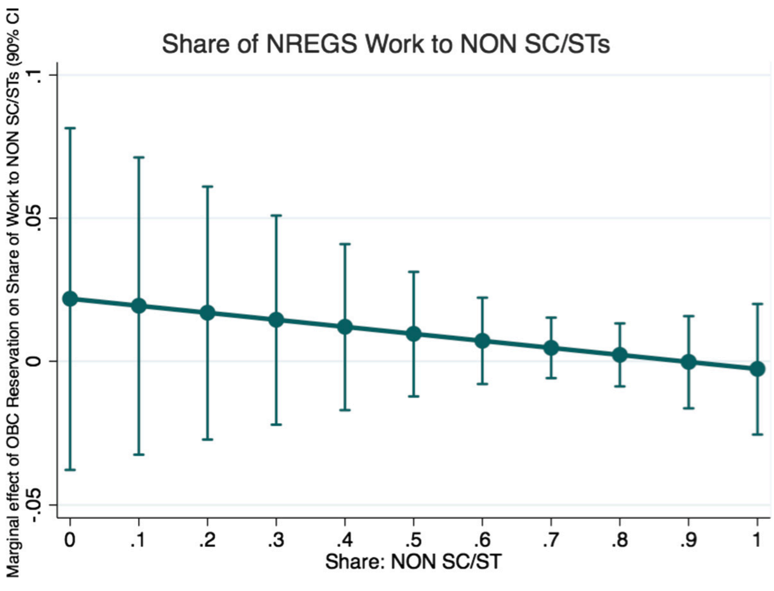


Fig. D6. No Distributional Consequences of OBC Reservation.

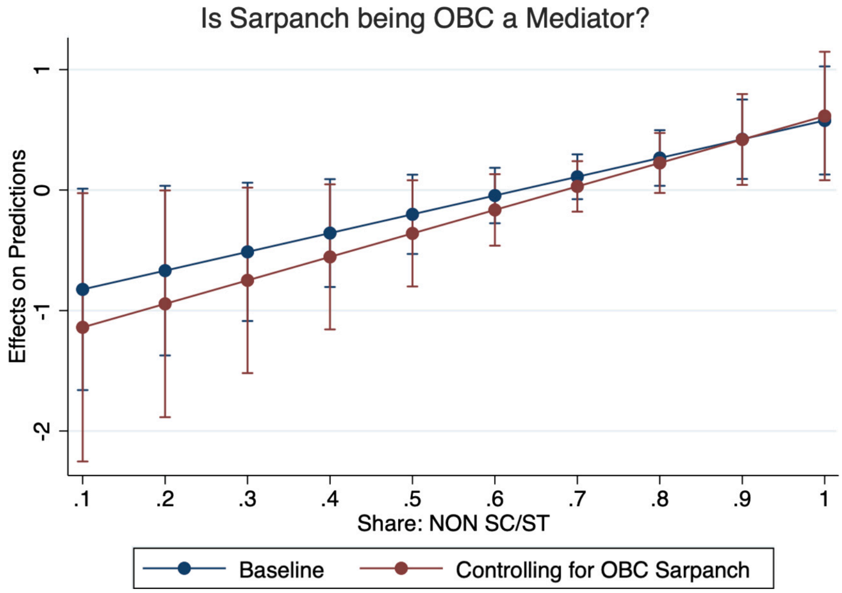


Fig. D7. Mediation Analysis: Marginal Effect of OBC Reservation. (For interpretation of the colors in the figure(s), the reader is referred to the web version of this article.)

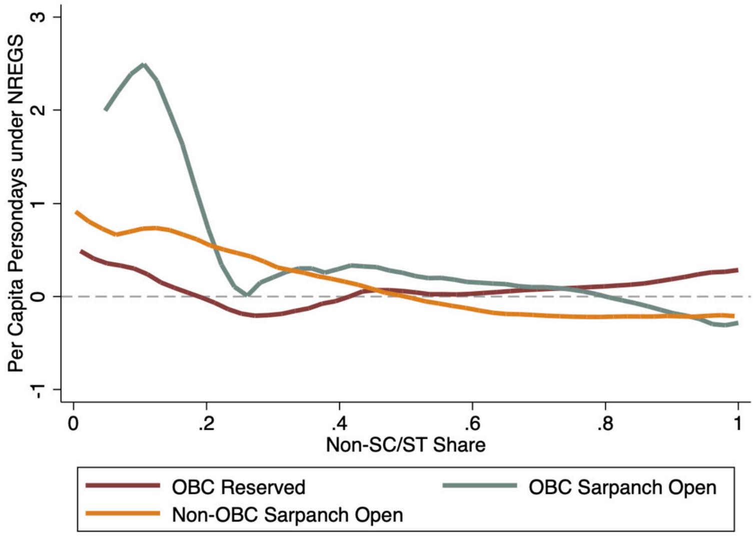


Fig. D8. Non-parametric relationship between per capita person-days and non-SC/ST share by types of Sarpanch.

Table D1
Summary statistics.

Variable	Mean	Std. Dev.	N
Number of NREGS Days Per Capita (Days p.c.)	3.6	4.2	5,002
Number of NREGS Days per Household (Days p.H.)	19.4	23	5,002
Share of population: non-SC/ST	0.71	0.15	5,002
OBC Sarpanch reservation	0.24	0.43	5,002
non-SC/ST Share * OBC Res	0.17	0.31	5,002
Total Population (in thousands)	5.51	1.93	5,002
Share of population: Females	0.48	0.01	5,002
Share of population: Literates	0.62	0.09	5,002
Dummy: Development Quartile 1 (Least Developed)	0.23	0.42	5,002
Dummy: Development Quartile 2 (DEV Q2)	0.26	0.44	5,002
Dummy: Development Quartile 3 (DEV Q3)	0.27	0.45	5,002
Total Number of Candidates	6.18	3.75	4,352
Vote share - position 1 (winner)	0.41	0.14	4,352
Vote share - position 2 (runner-up)	0.28	0.09	4,352
Vote share - position 3	0.13	0.08	4,352
Vote share - position 4	0.07	0.06	4,352
Win Margin	0.13	0.13	4,352

Table D2
In-Sample and Out of Sample Comparisons.

Variable	In-Sample	Excluded Sample	Difference
Share of population: non-SC/ST	0.71	0.72	-0.01
OBC Sarpanch reservation	0.24	0.24	-0.003
Total Population (in thousands)	5.51	3.6	2.7***
Share of population: Females	0.48	0.48	-0.0016
Share of population: Literates	0.62	0.62	0.003
Dummy: Development Quartile 1 (Least Developed)	0.20	0.38	-0.19***
Dummy: Development Quartile 2	0.22	0.0.23	0.015
Dummy: Development Quartile 3	0.26	0.22	0.05*

Notes: Column 3 reports the difference between In-sample and excluded sample. The development indices used in this table pools across all GPs including those that are not in the sample for regressions and differ from the those that are used in the regressions (the latter uses only the in-sample GPs) *** p<0.01, ** p<0.05, * p<0.1.

Table D3
Full Table Looking at Effect of OBC Reservation on NREGS Work.

	Person-days generated per capita (Days pc)			
	(1)	(2)	(3)	(4)
OBC Res	0.13	0.12	0.14	-0.98**
	(0.10)	(0.10)	(0.10)	(0.49)
non-SC/ST Share		-1.26***	-0.58	-0.90**
		(0.40)	(0.36)	(0.41)
OBC Res * non-SC/ST Share				1.56**
				(0.69)
Population			-0.24***	-0.24***
			(0.03)	(0.03)
Female Share			12.28**	12.15**
			(6.10)	(6.09)
Literate Share			-4.46***	-4.45***
			(1.01)	(1.00)
DEV Q1			0.44***	-0.43
			(0.14)	(0.15)
DEV Q2			0.30**	-0.30
			(0.12)	(0.14)
DEV Q3			0.24**	0.23
			(0.12)	(0.14)
Constant	3.55***	4.44***	1.89	2.17
	(0.024)	(0.28)	(2.75)	(2.73)
GP Controls	NO	NO	YES	YES
Observations	5,002	5,002	5,002	5,002
R-squared	0.577	0.578	0.599	0.599
Block FE	YES	YES	YES	YES

Notes: The dependent variable is the total person-days generated per capita under the NGREGS program in 2013-14 in the state of Rajasthan. The variable “non-SC/ST Share” is the proportion of GP population that belongs to the non-SC/ST group. “OBC Res” is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. “OBC Sarpanch” is a dummy indicating whether the sarpanch is from the OBC group. Female Share and Literate Share are shares of the population who are female and literate, respectively. DEV Q1-Q3 are indicators of development quartiles based on village level infrastructure. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D4
Marginal Effect Estimates of OBC Reservation.

non-SC/ST Share	*Person days generated p.c.*	*Win margin*
0	-0.98**	0.03
	(0.49)	(0.03)
0.1	-0.82*	0.03
	(0.42)	(0.02)
0.2	-0.67*	0.02
	(0.36)	(0.02)
0.3	-0.51*	0.02
	(0.29)	(0.02)
0.4	-0.36	0.009
	(0.23)	(0.01)
0.5	-0.20	0.004
	(0.17)	(0.01)
0.6	-0.05	-0.002
	(0.12)	(0.007)
0.7	0.11	-0.009*
	(0.09)	(0.005)
0.8	0.27**	-0.15***
	(0.12)	(0.005)
0.9	0.42**	-0.02***
	(0.17)	(0.007)
1	0.57**	-0.03***
	(0.23)	(0.01)
Observations	5,002	4,352

Notes: The dependent variables for the two columns are the total person-days generated per capita under the NGREGS program in 2013-14 and the win margin, i.e., the difference between vote shares of the winner and the runner-up in the 2010 village elections, respectively. The table provides estimates of marginal effect of OBC reservation across villages with different non-SC/ST population shares, ranging from zero to 1. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D5
Effect of OBC Reservation on New School Construction.

	New Schools per Capita 2011-2013		
	All Schools (1)	Public Schools (2)	Private Schools (3)
OBC Res	0.01	0.02	-0.02
	(0.03)	(0.03)	(0.02)
non-SC/ST Share	-0.02	-0.00	-0.01
	(0.03)	(0.02)	(0.02)
OBC Res * non-SC/ST Share	-0.02	-0.04	0.02
	(0.04)	(0.04)	(0.02)
Observations	4,683	4,683	4,683
R-squared	0.164	0.181	0.133
Block FE	YES	YES	YES

Notes: The dependent variables in all the columns are per capita construction of new schools during 2011 and 2013. Column (1) refers to all schools constructed during this period, while columns (2) and (3) refer to public and private schools, respectively. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST group. "OBC Res" is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. "OBC Sarpanch" is a dummy indicating whether the sarpanch is from the OBC group. In all the columns village level characteristics such as population, population share of women, literacy rate, village asset index, and existing stock of corresponding schools (per capita) have been included as controls. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D6
Robustness Checks.

	Person-days generated per capita (Days pc)					
	(1)	(2)	(3)	(4)	(5)	(6)
OBC Res	-0.64*	-0.98**	-0.98**	-0.75	-0.65	-0.74
	(0.33)	(0.49)	(0.49)	(0.48)	(0.49)	(0.49)
Imputed OBC Pop Share	-0.97**					
	(0.49)					
OBC Res * Imputed OBC Pop Share	1.39**					
	(0.59)					
non-SC/ST Share		-0.90**	-0.85**	-0.85**	-0.86**	-0.84**
		(0.41)	(0.41)	(0.40)	(0.41)	(0.41)
OBC Res * non-SC/ST Share		1.56**	1.56**	1.31*	1.18*	1.30*
		(0.69)	(0.69)	(0.69)	(0.70)	(0.70)
No. of Candidates				-0.004		
				(0.02)		
Education of Sarpanch					-0.005	
					(0.01)	
Woman Sarpanch dummy						0.06
						(0.08)
Observations	5,002	5,002	4,996	4,372	4,293	4,372
R-squared	0.599	0.600	0.625	0.619	0.616	0.619
Block FE	YES	YES	YES	YES	YES	YES

Notes: The dependent variable for all columns is the total person-days generated per capita under the NGREGS program in 2013-14 in the state of Rajasthan. The variable “non-SC/ST Share” is the proportion of GP population that belongs to the non-SC/ST group. “OBC Res” is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. Column (1) used imputed values of OBC population share of villages instead of non-SC/ST share. Column (2) is the same specification as in column (4) of Table 3. Column (3) has additional village controls of occupational patterns and area irrigated added. Results in column (4) to (6) further controlled for 3 separate election outcomes: number of candidates, years of schooling of sarpanch and a dummy indicating whether sarpanch is a woman. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D7
Results Robust to Controlling for Women Reservation.

	Person-days generated per capita (Days pc)		
	(1)	(2)	(3)
non-SC/ST Share	-0.90**	-0.90**	-0.86*
	(0.41)	(0.41)	(0.48)
OBC Res	-0.98**	-0.97*	-0.97**
	(0.49)	(0.49)	(0.49)
OBC Res * non-SC/ST Share	1.56**	1.55**	1.54**
	(0.69)	(0.69)	(0.69)
Women Res		0.03	0.08
		(0.07)	(0.34)
Women Res * non-SC/ST Share			-0.08
			(0.48)
Observations	5,002	5,002	5,002
R-squared	0.599	0.600	0.600
Block FE	YES	YES	YES

Notes: The dependent variable is the total person-days generated per capita under the NGREGS program in 2013-14 in the state of Rajasthan. The variable “non-SC/ST Share” is the proportion of GP population that belongs to the non-SC/ST group. “OBC Res” is a dummy that takes value one when the GP Sarpanch election is reserved for the OBC group. “Women Res” is a dummy that takes value one when the GP Sarpanch election is reserved for women. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D8
Impact of Past Reservations.

	Person-days generated p.c. (Days pc)		
	(1)	(2)	(3)
non-SC/ST Share	-0.90**	-0.96**	-0.80
	(0.41)	(0.41)	(0.65)
OBC Res	-0.98**	-1.03**	-0.97*
	(0.49)	(0.49)	(0.52)
OBC Res X non-SC/ST Share	1.56**	1.56**	1.46**
	(0.69)	(0.69)	(0.73)
SC Res 2005		-0.07	-0.51
		(0.09)	(0.46)
ST Res 2005		-0.14	-0.15
		(0.13)	(0.57)
OBC Res 2005		-0.26***	0.04
		(0.10)	(0.60)
Fem Res 2005		0.02	0.41
		(0.08)	(0.49)
SC Res 2005 X non-SC/ST Share			0.61
			(0.65)
ST Res 2005 X non-SC/ST Share			0.00
			(0.91)
OBC Res 2005 X non-SC/ST Share			-0.41
			(0.81)
Fem Res 2005 X non-SC/ST Share			-0.55
			(0.69)
Constant	2.61	2.75	2.56
	(2.72)	(2.73)	(2.69)
Observations	5,002	5,002	5,002
R-squared	0.599	0.600	0.600
GP Controls	YES	YES	YES
Block FE	YES	YES	YES

Notes: All columns include the standard GP level controls used in the other tables. Standard errors are clustered at block level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table D9
Co-ethnic Voting in Sarpanch Elections.

	OBC Vote Share	
Share: non-SC/ST	0.582***	0.636***
	(0.0544)	(0.0527)
Observations	3,813	3,813
R-squared	0.273	0.282
Block FE	YES	YES
GP Controls	NO	YES

Notes: The dependent variables for both columns are aggregate vote share of the OBC candidates in the top 5 positions. The sample includes only the GPs which had an open election for the Sarpanches in 2010. Column (1) doesn't control for any GP level characteristics, while column (2) controls for population, female share, literacy rate and development quartile indicators. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D10
OBC Reserved vs Unreserved with OBC and Other Caste Candidates in Top 2.

	Person-days per capita (Days pc)	
	OBC vs General (1)	OBC vs SC/ST (2)
OBC Res	-0.72	-1.52*
	(0.65)	(0.91)
non-SC/ST Share	-0.97	-2.71**
	(0.95)	(1.30)
OBC Res * non-SC/ST Share	1.19	2.38*
	(0.92)	(1.42)
Observations	1,873	1,418
R-squared	0.610	0.627
Block FE	YES	YES

Notes: The dependent variable is the total person-days generated per capita under the NGREGS program in 2013-14 in the state of Rajasthan. The sample in column (1) includes OBC reserved GPs and open election GPs with OBC and General candidates in top 2 positions. The sample in column (2) includes OBC reserved GP and unreserved GPs with OBC and SC/ST candidates in top 2 positions. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST group. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D11
Comparing GPs with Top Candidates OBC and GPs with Mixed Group Top Candidates.

	Person-days per capita (Days pc)	
	(1)	(2)
Top 2 Candidates OBC	-0.498	
	(0.504)	
non-SC/ST Share	-0.845*	-0.883*
	(0.484)	(0.472)
Top 2 Candidates OBC * non-SC/ST Share	0.814	
	(0.732)	
Top 3 Candidates OBC		-1.017*
		(0.536)
Top 3 Candidates OBC * non-SC/ST Share		1.480*
		(0.751)
Observations	3,079	3,079
R-squared	0.623	0.623
Block FE	YES	YES

Notes: The dependent variable is the total person-days generated per capita under the NGREGS program in 2013-14 in the state of Rajasthan. The sample includes only open election GPs. "Top 2 Candidates OBC" is a dummy which takes value one if the top two candidates in the Sarpanch election is from OBC. The "Top 3 Candidates OBC" dummy is defined in a similar way. The variable "non-SC/ST Share" is the proportion of GP population that belongs to the non-SC/ST group. Standard errors are clustered at block level. *** p<0.01, ** p<0.05, * p<0.1.

Table D12
Effect of OBC Reservation on Household NREGS Work: Survey Data.

	HH Got Work (1)	Log Work Days (2)	HH Got Work (3)	Log Work Days (4)
Person-days of NREGS generated per capita	1.58*	6.94*		
	(0.91)	(3.84)		
OBC Res			-0.22	-0.57
			(0.19)	(0.93)
OBC Share			-0.05	0.49
			(0.23)	(1.00)
OBC Res * OBC Share			0.54*	1.81
			(0.28)	(1.44)
OTHER CONTROLS	YES	YES	YES	YES
Observations	3,430	3,430	2,118	2,118
R-squared	0.315	0.347	0.269	0.314
Block FE	YES	YES	YES	YES

Notes: The dataset used for this result comes from a household survey in Rajasthan in 2013 (Himanshu et al., 2015). The dependent variable in columns (1) and (3) is a dummy indicating if any member of the household worked under NREGS in Rajasthan. The dependent variable in columns (2) and (4) is the number of days a household worked under NREGS. The variable "Person-days of NREGS generated per capita" is the per capita person-days generated under the NREGS in the GP, as reported in the official sources. Standard errors are clustered at GP level. The variable "OBC Share" is the proportion of GP population that belongs to the OBC group. "OBC Res" is a dummy that takes value one when the GP sarpanch election is reserved for the OBC group. OTHER CONTROLS include whether the household has a "Below Poverty LIne Card", Land ownership, Caste Category of the Household (OBC, SC, ST), Village Development Index and the GP Population. GP level standard controls are included in all the columns. Standard errors are clustered at GP level. *** p<0.01, ** p<0.05, * p<0.1.

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