Enfranchising Your Own? Experimental Evidence on Bureaucrat Diversity and Bias in Indian Elections

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Abstract

This paper estimates the effects of religious and caste diversity among local-level government officials on the provision of an important public service, fair and well-functioning elections. I exploit a natural experiment in the 2014 parliamentary elections in India, where the government mandated the random assignment of state employees to the teams that managed polling stations on election day. I find that the presence of officers of minority religious or caste identity within teams led to an average shift in vote share margin of 2.3 percentage points toward the political coalition associated with these groups. Significant spillover effects also occurred across polling stations in close geographic proximity, and the magnitude of the combined direct and indirect effects is large enough to be relevant to election outcomes. Using survey experiments conducted with more than 5,000 potential voters and election officials, I provide evidence of own-group favoritism in local election personnel and identify reduced discrimination in the process of voter identity verification as an important channel through which team diversity impacts polling station management and voting outcomes.

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1 Introduction

While both theoretical and empirical work have emphasized the importance of state capacity for economic development (Besley and Persson 2010, Acemoglu et al. 2015, Muralidharan et al. 2015), a nascent experimental literature has identified more specifically the importance of the behavior of state personnel (overviewed in Finan et al. 2015), who can in their actions influence the realization of government policies. One such channel of influence is that it is often necessary in the course of their duties for local-level bureaucrats to use discretion in decisions that can impact which members of the public receive access to government services. As discrimination along dimensions such as ethnicity and religion are documented in a wide variety of contexts (Bertrand and Duflo 2015), own-group bias in decision making by local government personnel is an underexplored potential mechanism through which the quality of public service provision may be undermined. Better understanding the circumstances under which this discrimination occurs, and how it can be mitigated, is therefore valuable.

In this paper, I provide novel experimental evidence in the context of India that diversity in terms of the religious and caste composition of bureaucratic teams positively impacts the provision of elections, a critical public service in democracies. I first demonstrate the existence among election officials of own-group bias in discretionary decision making. I then show that voting patterns at polling stations change in response to the composition of the officer teams who manage them on election day, in a pattern consistent with such bias. I provide additional evidence that the differential treatment of minorities at polling stations is reduced through two different means: the presence of minority officers on teams, or a reduction in the scope for officer discretion in the election administration process. Finally, I determine that the magnitudes of the observed effects of team diversity are large enough to be relevant to the outcomes of elections.

The ability of citizens to cast votes in a free and fair setting plays a critical role in holding elected officials accountable to the public, which evidence generally suggests has beneficial impacts on policy choices and citizen welfare (Besley and Case 1993, Besley and Burgess 2002, Maskin and Tirole 2004, Ferraz and Finan 2008, among others). Concerns of electoral malpractice, however, are common across the world. As shown in Figure 1, more than one quarter of respondents in nearly seventy five percent of sample countries in the most recent round of the World Values Survey indicate that election officials are often

unfair.[1,2] In addition, the conduct of elections is often a massive administrative task and economically significant in scale, so it is worthwhile to better understand how to improve their management. The 2014 national parliamentary elections in India considered in this study involved as a whole more than more than 8 million election officers and security personnel interacting with roughly 800 million voters. The total cost to the government of administering these elections has been estimated at more than $1.2 billion USD (Press Trust of India 2014).

I study two districts in the large Indian state of Bihar, covering more than 5.6 million registered voters across 5,561 polling stations for the 2014 national elections. Religious and caste identity were highly relevant to political affiliation in this setting: largely in opposition to upper-caste Hindu influence, two minority groups, Muslims and Yadavs (a low-caste Hindu group), formed an alliance in the mid-1990s that has constituted the core of one of the two major political coalitions in the state for the last two decades.[3]

I take advantage of a natural policy experiment during these elections in which state personnel were randomly assigned by the government to the teams managing polling stations, generating random variation in the religious and caste composition of these groups. The teams of officers I study contained at least one Muslim or Yadav approximately one third of the time, allowing me to identify the causal impacts of shifting from a "homogeneous" to "mixed" team of officers at a polling station.[4] I supplement the policy experiment with survey-based experiments conducted with more than 5,000 individuals randomly selected from the same populations of election officers and potential voters that were involved in the elections.[5]

The random assignment circumvents issues of selection in election officer placement at polling stations that would otherwise confound identification of the impacts of team diversity. A government may assign election personnel with greater experience to manage more

[1]This round was the first to include election-related questions, which were asked of representative samples of individuals in forty-two of the sixty countries included in Round 6 between 2010 and 2014.

[2]Election administration issues are not restricted to developing countries–a 2014 U.S. government study states that "one of the signal weaknesses of the system of election administration in the United States is the absence of a dependable, well-trained corps of poll workers" (PCEA 2014).

[3]Wittsoe (2013) provides a detailed account of the state of the alliance over time.

[4]Due to the low proportions of Muslims and Yadavs among officers, teams that are fully Muslim/Yadav are not observed in my sample.

[5]"Potential voter" refers to registered voters who went to the polling station on election day with the intention of voting.

troubled locations in an effort to maintain neutrality. Alternatively, the ruling party may station supporters as officers in strategically important areas to influence outcomes in their favor. In either case, the assignment of officers would be endogenous to voting behavior. The setting considered in this paper eliminates concerns of this type. An additional benefit of the study context is that the polling officer assignment policy had already been in place statewide for a decade at the time of the election under consideration, eliminating concerns that the estimated impacts reflect only partial equilibrium effects that may disappear once the policy is brought to full scale or as the government and political parties adjust to the change over time (Acemoglu 2010, Svensson and Yanagizawa-Drott 2012).

This paper has four main results. First, I generate a measure of bureaucrat own-group bias in discretionary decison making using a vignette experiment, in which polling station officials assess the likelihood that a hypothetical individual would be allowed to vote, based on a description where all information is held constant across respondents with the exception of a randomly assigned name. Officers are 10 percentage points, or 25 percent, more likely to favorably assess qualification to vote when they are of the same religious/caste-group type as the potential voter.

Second, using detailed polling station location information and unique officer assignment data, I identify both the direct effects within stations and the spillover effects across stations of changes in team religious and caste composition on voting outcomes. The average vote share margin between the two major political coalitions shifts toward the minority-oriented coalition by an average of 2.3 percentage points, or 12.7 percent, when the team at a given polling station includes a minority officer. This shift is driven by a significant 4.6 percent increase in votes for the minority-oriented coalition and a 4 percent decrease in votes for the opposing coalition. Further, I identify that being in close proximity to a station with a minority officer present shifts the vote share margin in the same direction as within-station mixed team composition by an average of 2.6 percentage points, demonstrating that the omission of the cross-station spillovers would lead to an underestimate of the total impact of team diversity. I also show that the effects of team composition on voting outcomes are concentrated in areas with low voter identity card coverage, which ostensibly increases the scope for office bias in discretionary decisions regarding voter eligibility.

Third, I turn to the election day experiences of potential voters. Based on list randomiza-

tion experiments conducted with potential voters, approximately 23 percent of respondents indicate that officers on election day treated the public differently based on religion or caste, and 13 percent that officers attempted to influence voting behavior. I additionally show that Muslim/Yadav individuals at polling stations with no minority officers express significantly lower satisfaction with their election day experience and are less likely to be allowed to vote than are non-minorities. These differences by voter religion and caste disappear, however, when either polling station team composition is mixed or individuals possess a voter identity card. Taken together my results demonstrate that own-group bias influences bureaucratic decision making in a manner which undermines the provision of an important public service, but also that this disciminatory behavior can be mitigated through two different means – religious/caste diversity within officer teams or reduction of the scope for discretion in officer duties.

Finally, I ask whether the combined within- and cross-station effects of religious and caste diversity are large enough to influence the outcomes of elections. Estimates from counterfactual calculations suggest that alternative officer assignment mechanisms would have within Bihar changed the identity of the winning coalition in approximately 3 and 18 percent of races in recent national and state elections, respectively. These changes in election outcomes would have led to roughly a 25 percent increase in Muslim officeholders. Recent work finds that the election of Muslim legislators in India significantly improves child health and education outcomes for both Muslim and non-Muslim households (Bhalotra et al. 2014), suggesting how the religious and caste diversity of bureaucrat teams can have downstream effects on citizen welfare in this setting.

This paper contributes to and bridges two nascent economic literatures. A small body of field experimental work investigates the impacts of ethnic diversity on the performance of organizations and society more generally (overviewed in Bertrand and Duflo 2015), where the studies in this area have focused on the productivity of teams in private sector settings (Hoogendoorn et al. 2013, Hjort 2013, Marx et al. 2015).[6] There additionally exists a relatively young literature using field experiments in developing country settings to improve our understanding of the personnel economics of the state (overviewed in Finan et al. 2015).

[6]In the context of bureaucracies within the Nigerian Civil Service, Rasul and Rogger (2015) document a positive correlation between ethnic diversity and the delivery of public services, in terms of higher project completion rates.

To the best of my knowledge, my work is the first to provide experimental evidence in a developing country setting of the existence of own-group bias in the decision making of public sector employees toward the public and its negative impacts on the quality of service delivery. Further, my results demonstrate a positive channel, the reduction of discriminatory behavior, through which team diversity can influence the performance of groups of public sector personnel.

This paper is also relevant to an established body of economic research studying the negative impacts of societal ethnic fractionalization on the quality of government decision making and the provision of public goods (Easterly and Levine 1997, Alesina et al. 1999, Alesina and Ferrara 2005, Miguel and Gugerty 2005). I provide micro-econometric evidence on an additional area, the administration of elections, in which heterogeneity in the ethnic composition of a population can lead to adverse effects on the quality of public service provision.

While a sizeable literature examines the potential for discrimination against minorities in the judicial system (Glaeser and Sacerdote 2003, Shayo and Zusman 2011, Abrams, Bertrand, and Mullainthan 2012, Alesina and La Ferrara 2014, McConnell and Rasul 2016), this paper extends consideration to the electoral process of the potential negative effects of own-group bias on the decision making of government officials interacting directly with the public. In doing so, it also relates to a body of work that studies possible discrimination against blacks and hispanics in the American electoral system and finds that minorities receive lower quality information about voting requirements from local election officials prior to elections and have different procedural experiences at polling stations on election day (Ansolabehere 2009, Atkeson et al. 2010, Cobb et al. 2012, White et al. 2015).

Finally, this paper complements an economic literature examining technology-centered approaches to strengthening the electoral process. While technological innovations in the election setting have been shown to significantly impact electoral fraud , voter turnout , and even subsequent public service delivery and health (Marx et al. 2014, Callen et al. 2015), Fujiwara 2015), less progress has been made in understanding, holding the electoral setting otherwise constant, how the identities of election personnel matter.

The paper proceeds as follows. The next section provides background on the historical and institutional context of the study, while Section 3 presents a conceptual framework.

Section 4 describes the data and performs randomization checks. Section 5 presents the results and Section 6 concludes.

2 Background

2.1 Religion, caste, and politics

Over the last two decades, the dominant political parties in state-level politics in Bihar have been the RJD, BJP, and JDU. The RJD has traditionally enjoyed the support of an alliance between Muslims and Yadavs, a lower-caste Hindu group, which arose in large part in the mid-1990s in an attempt to counter upper-caste Hindu influence in the state (Wittsoe 2013). Muslims and Yadavs are sizeable constituencies in Bihar, making up approximately 17 percent and 14 percent of the population of registered voters, respectively (CSDS 2010). Between 2005 and 2013, the BJP and JDU parties were joined in a political alliance. The BJP was primarily supported by upper-caste Hindus, while the JDU relied more on the support of non-Yadav lower castes. The BJP-JDU alliance dissolved in the run up to the 2014 parliamentary election and, as a result, religion and caste were widely considered of high electoral relevance (Anuja 2013, Bhaskar 2013, Rukmini 2014).

The RJD and BJP subsequently each formed coalitions with other political parties and the JDU contested alone. Members within each coalition agreed prior to the elections not to field candidates in the same races. As upper-castes are less than 15 percent of the population in Bihar, the BJP increased its efforts to court low-caste Hindu voters. Post-polls for the 2014 elections indicate that only 19 percent of Muslims and 2 percent of Yadavs voted for the BJP coalition, while approximately 78 percent of upper-caste Hindus and more than 50 percent of other low-caste groups did so. Correspondingly, only 5 percent of upper castes and 10 percent of other low-caste groups, but 64 percent of both Muslims and Yadavs, voted for the RJD coalition (Kumar 2014a).

Given the strong connections between religious and caste identity and party affiliation, non-Muslim/Yadav officials are expected on average to be relatively politically inclined toward the BJP coalition over the RJD coalition, and vice versa for Muslim/Yadav officers. Section 3 discusses the channels through which shifting from a homogeneous to mixed polling officer team in terms of religious/caste composition may influence voting outcomes. I here-

after refer to the coalitions as simply the RJD and the BJP.

2.2 Administrative structure and randomized officer assignment

Bihar, with a population of roughly 100 million, is the third largest state in India and divided into 40 parliamentary constituencies (PCs), single member jurisdictions electing representatives to the national parliament via plurality rule. The PCs are further subdivided into 243 assembly constituencies (sub-constituencies), each of which contains roughly 250 polling stations on average (see Figure 2 for an example). Registered voters receive a specific polling station assignment for each election and are only able to cast a vote at that station. Parallel to the electoral structure, the state's bureaucratic structure is divided into 38 districts. PCs and districts often, but not always, fully overlap.[7]

A polling station is managed on election day by a presiding officer and typically three or four polling officers with distinct administrative responsibilities, detailed below.[8] Prior to elections, each district uses a proprietary government software program to randomly draw 120 percent of the total number of required officers. Each polling team position has a distinct district-level pool of state government employees from which the officers are selected. After the completion of polling duty training, individuals from each position-specific pool are randomly assigned to polling officer teams in designated sub-constituencies. Officers are not assigned to sub-constituencies where they are registered to vote or are employed full time. The randomization is conducted in the presence of official observers assigned by the national office of the Election Commission of India (ECI), no more than seven days prior to election day.

A second randomization is conducted in which polling officer teams are assigned to specific polling stations. This assignment occurs the day prior to deployment of the teams to polling stations, timed so that they arrive the night before the election and no one has advance knowledge of who the officers at a given polling station will be. The software program also

[7]District administrators are responsible for managing election personnel assignment in those sub-constituencies falling within their districts.

[8]Four polling officers are assigned to polling stations with greater than 1200 registered voters in rural areas and 1400 registered voters in urban areas (21.1 percent of polling stations), and only two polling officers are assigned to polling station with fewer than 500 registered voters (0.7 percent of polling stations). In the case of four polling officers, the fourth polling officer shares the duties of the second polling officer. In the case of two polling officers, the presiding officer additionally assumes the duties of the third polling officer.

automatically generates team rosters with photographs in .pdf format.

2.3 Polling station procedures

Polling station officials are transported together in teams from the district headquarters to their polling stations, making officer absence relatively conspicuous and easy to track. This centralized transport, as well as the automated generation of officer rosters with photographs, also makes it more difficult for officers to report to a polling station different than that to which they were officially assigned or to have someone else impersonate them. If officers are absent from assigned duty without a documented excuse, they are subject to punishment by the ECI. Despite the attempts of the ECI to impose high costs on officers for non-compliance, it may still be that some proportion of officers do not report to their assigned polling stations on election day.[9] To the extent that this occurs, given that I use the initial randomized assignments, the estimates in this paper can be interpreted as intent-to-treat effects.

On election day, potential voters wait in line at their polling station and sequentially interact with the first through third polling officers. The first polling officer verifies individuals' identities against the official list of registered voters, which has each individual's name, age, and, when available, a relative's name, voter identity card number, and photograph. Once a voter successfully confirms her identity with the first officer, her name is read out to the rest of the team. The second polling officer then stamps her finger with ink so that she may not vote more than once, obtains her signature or thumb impression in the official register, and gives her a paper slip with a serial number designating the order in which the voting compartment may be entered. The third officer then checks the voter's finger for ink, allows her into the voting compartment, and activates the electronic voting machine so that a single vote may be cast. Potential voters at the polling station do not necessarily interact with the presiding officer, who is tasked with the overall management and supervision of station activities.

[9] Official attendance data is not available, but the election officer survey results indicate that officers are absent from duty very infrequently.

2.4 Election fraud and policy responses

The problem of "booth capturing", as it is commonly known in India, in which a polling station comes under the control of a political party on election day, was a widespread occurrence as recently as the 2004 national elections (Rohde 2004).[10] The ECI implemented a number of policies in an effort to stem this type of election fraud. Elections may be staggered over multiple weeks across different regions within a state to maximize the available coverage of central police and paramilitary forces, observers, and camera recording equipment at sensitive locations. Additionally, electronic voting machines (EVMs), which were first used in Bihar during a 2004 nationwide rollout to all state and national assembly elections, were adopted under the general assumption that they are more secure than the traditional paper ballot.[11] For instance, EVMs have a maximum rate allowed of five votes per minute, meant to increase the difficulty of casting large numbers of false votes, and are more difficult to transport and counterfeit than ballot boxes.

The multi-stage randomized assignment of polling station teams was employed state wide in Bihar beginning in 2004, and has since been adopted nation-wide, covering more than 814 million registered voters across 543 parliamentary constituencies. Among the assumed benefits of the adoption of randomization was a weakened ability of political parties to coordinate ahead of time with polling station officials or identify which locations would be the easiest targets for capture. These policies are generally viewed as having been successful in reducing the frequency of outright booth capturing. However, issues potentially remain of biased election officer behavior on election day or types of electoral fraud that occur in the longer term prior to elections, such as vote buying or intimidation. I focus in this paper on the former.

[10] Capturing may take place in a relatively peaceful manner, with local leaders standing near the voting machine to instruct voters on their choice of candidate and making their decisions public to a nearby crowd of supporters. Votes may also be cast for absent citizens and certain groups may be prevented from voting. Alternatively, more violent methods may be employed, with armed individuals hired by parties taking control of a polling station to cast false votes or steal the ballot box, or using explosives and gunfire to reduce turnout (Wittsoe 2013).

[11] For a criticism of this assumption in the Indian context, see Wolchok et al. 2010.

3 Team composition: channels of impact

3.1 Within-station effects

In a setting where officers may engage in biased behavior at the polling station, a change from homogeneous to mixed team composition could influence voting outcomes through a "checks and balances" channel. Polling station officials have two sets of duties on election day: administration of the identity verification and voting process; and maintenance of a neutral environment in the area immediately surrounding the station. In addition, the connection of religion and caste with political affiliation is well known in this setting and potential voter type is observable to election officers.[12]

Relative to a benchmark homogeneous team of officials, whose biases and preferences are more likely to be aligned, a mixed team may increase the probability of detection and punishment of team members that act in a discriminatory manner in their administrative duties, reducing the likelihood of such behavior. Officers within a team are stationed in close proximity, typically sitting adjacent to one another (see Appendix Figure A1). Observability of actions across team members is therefore high and officers can lodge complaints to the ECI directly, with potentially severe career consequences for individuals found to have behaved improperly in the conduct of their duties. In addition to strengthening the deterrence effect stemming from the potential for future punishment (i.e. higher expected costs), the presence of an officer of different religion/caste on an otherwise homogeneous team may also lower the probability that attempts at influencing voting on election day are successful (i.e. lower expected gains), further weakening the incentives of officers to engage in biased behavior.

The verification of voter identity prior to the casting of votes necessarily involves discretion in decision making by election officials. The judgement calls involved in this process may give officers the ability to successfully influence voting outomes with a lower probability of punishment as compared to actions that can be identified as improper with greater certainty.[13] As such, this step may be particularly susceptible to biased officer behavior, resulting in the disenfranchisement of qualified potential voters or enfranchisement of unqualified individuals.

[12] Each potential voter's name is read aloud during the identity verification process.

[13] Guidelines from the ECI on election day management of polling stations even state that "minor errors in the EPIC [voter identity card] and electoral roll may be ignored and overlooked."

The scope for officer discretion in the identity verification process, however, is heavily influenced by the identification documents that potential voters possess. The government-issued voter identity card is the officially preferred and least controvertible form of identification (Appendix Figure A2 provides an example of the card). While eleven other sets of documents are allowed on election day, their use by potential voters may provide greater discretionary cover to biased officer behavior during voter identity assessment. Potential voters may be less certain about what constitutes a valid alternative means of verifying identity, making them less likely to dispute officer judgement regarding their qualification to vote or increasing their susceptibility to influence in choice of candidate (e.g. if they are reciprocal individuals and feel as if they are receiving a favor in being allowed to vote). The potential monitoring benefit provided by a shift from homogeneous to mixed officer team composition may then be particularly important in situations where voter identity cards are less common.

The officer team is also responsible for maintaining a neutral environment in the area immediately surrounding the polling station. More specifically, any activities which may influence potential voters, such as canvassing of votes or disorderly behavior, are officially prohibited within one hundred meters of the polling station. If all officers on a team are of the same type, they may selectively allow agents of the political coalition with which they are aligned to engage in such behavior within that range of the station. As mixed team composition may weaken the incentives of officers to behave with bias, the likelihood that agents from both coalitions are prevented from violating neutrality could increase. In sum, if a homogeneous officer team behaves with bias relatively favoring one coalition, shifting to a mixed team would be expected to decrease votes for the previously favored coalition (here the BJP) and/or increase votes for the other coalition (here the RJD), with ambiguous predictions on total votes cast.

3.2 Cross-station externalities

In addition to impacting team behavior and voting within a given polling station, the presence of minorities on an officer team may affect other stations, especially in settings where stations can be located within a short distance of one another (see Figure 3 and Appendix Figure A3). Accounting for the possibility of these cross-station effects is important when calculating the total impact of changes in team composition, as their exclusion could bias

the overall estimates downward or upward.

If a polling station is more strictly managed in terms of maintaining a neutral environment under mixed officer composition, the ability of local political agents to influence proceedings there may be reduced. These individuals could then intensify their focus on other stations which are more amenable to their activity, leading to "displacement effects" (Ichino and Schündlen 2012) that reduce the magnitude of the total impact on voting outcomes. Alternatively, the effects of more impartial management could spill over positively to nearby stations. Informational spillovers about what constitutes sufficient documentation for identity verification may take place across potential voters in neighboring polling stations, or the presence of officers of different types on teams in close proximity may serve a monitoring role as within teams. In these cases, mixed team composition could yield additional "chilling effects" (Callen and Long 2015) in the same direction as the within-station impacts, increasing the magnitude of the total effect. It is also possible that both displacement and chilling effects occur, but over different distances from a given polling station. Chilling effects would be expected to occur across polling stations in closer proximity, while displacement effects could take place over longer distances.

4 Data

4.1 Administrative data

Administrative data on polling officers was acquired for two districts in Bihar for the 2014 elections, covering 23,384 officials posted across 5,561 polling stations. The data include officer name, team and position assignment, and, for a subset of officials, age and monthly salary. This information allows me to infer the religious and caste composition of each polling station team, described in greater detail in Section 4.3. Polling stations with at least one Muslim or Yadav officer are defined as "mixed", as opposed to "homogeneous", team polling stations.

Polling station level electoral returns were obtained from the website of the Office of the Chief Electoral Officer (CEO), Bihar. The main outcomes of interest generated from this data are the log numbers of votes received by each of the two main coalitions and cast in total, and the vote share margin between the coalitions. Sub-constituency-level

measures of voter identity card possession were also acquired from the CEO website. Due to political sensitivity, religious composition statistics are not released by the government below the sub-district level. In order to generate new measures of electorate religious and caste composition at the polling station level, publicly available online lists were scraped covering the approximately 5.6 million registered voters in the two districts for which officer assignment data was available.

For the analysis of cross-station externalities, I use polling station GPS coordinates from the dataset of Susewind (2014). As polling station identifier numbers change across elections and those in the dataset reflect the 2010 election cycle, stations were then hand matched by name, achieving a 94.5 percent match rate. The non-matches come almost entirely from new polling stations created due to increases in the number of registered voters between elections. I also use 2011 census village shapefiles acquired from MLInfoMap to match polling stations to villages.

4.2 Survey data

Between May and September 2015, I conducted surveys of potential voters and election officers from the 2014 elections to gather information on socio-demographic characteristics and election-related experiences. Experimental modules, discussed in more detail in Section 5, were additionally included to generate experimental measures of officer bias. The surveys were conducted in one of the two districts for which officer assignment data was available.

For the survey of potential voters, a total of 4,320 individuals across 360 polling stations were sampled. In each of the 5 sub-constituencies in the district, 36 mixed and 36 homogeneous team polling stations were randomly selected, stratifying by whether the Muslim-Yadav proportion of the population was above or below the district-level median. For each of these polling stations, three Muslim and two Yadav registered voters were randomly chosen from the list of registered voters, if possible, along with seven randomly selected registered voters inferred as neither Muslim nor Yadav.

A total of 915 officers across 610 polling stations were sampled for the survey of election officers. Sixty one mixed and sixty one homogeneous team polling stations in each of the 5 ACs were chosen randomly. One Muslim or Yadav officer and one non-Muslim, non-Yadav officer were then randomly selected from each mixed team, while a single non-Muslim, non-

Yadav officer was randomly chosen from each homogeneous team.

Willingness to participate was high for both surveys: greater than 98 percent of contacted individuals in each agreed to be surveyed. Consent is not significantly correlated with voter or officer religion/caste, nor the overall composition of the team at the polling station to which they were assigned. The appendix provides additional details on the survey sampling methodology.

4.3 Inference of religious and caste identity

The categorization of election officers and registered voters as Muslim, Yadav, or neither is inferred from name. The Anthropological Survey of India's *People of India* (POI) series lists common surnames as well as religion and caste for 261 distinct communities identified as inhabiting Bihar. As surnames may be associated with multiple communities, potentially of different religious or caste affiliations, individuals are categorized as Muslim if their surnames match one listed in the POI that is associated only with Muslim communities. Individuals are also identified as Muslim if their name had components of clear Islamic origin, e.g., "Raiyaz" or "Mohammed". I categorize as Yadav those individuals with the surname "Yadav", as the majority of the members of the caste are so named and the surname is not associated with other communities. The lists of registered voters also provide the name of a relative for each individual (typically a father in the case of males or unmarried females, and husband in the case of married females). Given strong norms of marrying within religion and caste group in the region, I also categorize registered voters as Muslim or Yadav if their listed relative was inferred as falling into one of these categories. To the extent that individuals are misclassified, estimates of the impact of Muslim/Yadav presence on officer teams will be biased toward zero.

4.4 Identification and randomization check

In the two sample districts, between 8.3 and 9.3 percent of officers in each team position are Muslim/Yadav, yielding 32.3 percent of polling stations with at least one Muslim/Yadav officer (i.e. mixed team). As officers within a district are not assigned to sub-constituencies in which they are registered to vote or work full time, a sub-constituency with a larger

population proportion of Muslim/Yadav officers relative to other constituencies within the same district, for example, could then receive a lower proportion of Muslim/Yadav officers assigned to its polling stations, potentially mechanically leading to correlations between team composition and voting outcomes. However, it is still the case that each polling station *within* a sub-constituency is equally likely to have Muslim/Yadav officials posted to the officer team. I therefore exploit only within-sub-constituency variation in team composition by including sub-constituency-level fixed effects in my subsequent analysis. In addition, because the likelihood of Muslim/Yadav presence on a team is increasing in the number of officers, which is itself determined by the number of registered voters assigned to the polling station, I include fixed effects for team size.

A remaining concern is the validity of the government's implementation of the random assignment. As a randomization check, I examine whether polling stations with mixed composition teams differ significantly in pre-election dimensions potentially correlated with voting outcomes, using the specification:

$$Y_{pc} = \mu_c + \theta_o + \beta Mixed_{pc} + \epsilon_{pc,} \tag{1}$$

where p is a polling station in sub-constituency c, μ_c are sub-constituency-level fixed effects, and θ_o are fixed effects for the number of polling team members. Y_{pc} is an outcome of interest, and $Mixed_{pc}$ is an indicator variable taking value 1 if at least one polling team member is Muslim/Yadav and 0 otherwise. I also use this approach to test, across mixed and homogeneous polling stations, for balance in the random samples of surveyed election officers and potential voters.

In Panel A of Table 1, I consider whether the size or composition of the electorate differs across homogeneous and mixed team polling stations. The average polling station has roughly 1,000 registered voters of which 46 percent are female and 13 percent are Muslim or Yadav, with no significant differences by team composition. In Panel B, I examine station-level electoral results from the previous 2010 elections to the state assembly. As the number of polling stations increases over time due to growing numbers of registered voters, it is not possible to fully match polling stations across elections. For each 2010 election-related variable, I therefore take the average value across all polling stations within the same immediate

location in 2010 and assign it to each polling station in that location in 2014.[14] Additionally, a small proportion of polling stations were established in new locations for the 2014 election and so cannot be matched to previous elections.[15] I observe no significant differences in the log votes previously received by either coalition or in total, or in the vote share margin between the coalitions.[16]

Panel C tests for differences by team composition in the spatial distribution and team diversity of surrounding polling stations. Polling stations have an average of 1.2 immediate neighbors (ranging between 0 and 8), 0.39 being mixed team (ranging between 0 and 4). Neither of these characteristics differ significantly across team types, nor do the average numbers of total or mixed team polling stations within 0.25 kilometers, between 0.25 and 0.75 kilometers, or within the same or neighboring villages. Finally, Appendix Table A1 shows that the assignment of a Muslim/Yadav officer to a given position is not significantly correlated with officer type in the other positions within that team.

In Panels D and E, I test for balance across polling station types of the random samples of surveyed election officers and potential voters. Election officers are on average 43 years old, and the majority are college educated (68%) and have prior polling station experience (66%).[17] None of the officer characteristics differ significantly with team composition.[18] The sample of potential voters is approximately 43 percent Muslim/Yadav, 39 percent literate, and 44 percent female. While respondents from mixed team polling stations are more likely to be female (45 versus 41 percent), the other characterstics considered do not differ significantly by team type, and I control directly for gender when applicable in the analysis that follows.

[14]Section 5.2.2 provides greater detail on the identification of locations.

[15]The total number of polling stations across Bihar increased by 5.9 percent between the 2010 and 2014 elections.

[16]Observation numbers change across the previous election outcomes because the coalitions (as defined in 2014) fielded candidates in different numbers of constituencies in 2010.

[17]Election officers are officially required to be male, with the rare exception of certain heavily Muslim areas where female officers may be used to interact with the female population. The sample area contains no stations of this type.

[18]By definition, homogeneous officer teams do not contain Muslim/Yadav officers. Therefore balance tests across team types of officer characteristics are necessarily restricted to the sample of non-Muslim/Yadav officers. Potential differences in characteristics across officer types are considered in Section 5.5.

5 Local bureaucrat bias in election management

In Section 5.1, I provide experimental evidence examining own-group bias as a potential mechanism through which religious/caste identity influences bureaucratic decision making on election day. Section 5.2 exploits a natural policy experiment to identify the impacts of diversity in election officer teams on voting outcomes at the polling station level. I use a combination of experimental and non-experimental evidence in Section 5.3 to consider effects on the election day experiences of potential voters. Section 5.4 conducts a counterfactual analysis of the impacts of bureaucrat team diversity on election outcomes, while Section 5.5 concludes with a consideration of alternative explanations for the observed pattern of results.

5.1 Vignette experiment: election officer own-group bias

I test for own-type bias in bureaucratic decision making using a vignette experiment embedded within my survey of election officers. I examine whether, holding all other information constant, potential voters are more likely to be assessed by an election officer as qualified to vote if they are of the same type as that official. Vignette experiments have been used previously to address research questions in the electoral setting (Carlson 2010, Banerjee et al. 2014) and are methodologically similar to the randomized correspondence studies in the labor market discrimination literature (Bertrand and Mullainathan 2004, Banerjee et al. 2009).

Each respondent was read a vignette describing a hypothetical individual attempting to vote, with the wording identical across respondents with the exception of the individual's name, which was randomly assigned. Respondents were then asked to indicate the likelihood on a 4-point scale, with 1 corresponding to "Very Unlikely" and 4 to "Very Likely", that the individual in the vignette would be able to cast a vote. Each officer respondent was randomly assigned one of nine possible voter names. Three names each were chosen to signal Muslim, Yadav, or Brahmin (the highest of Hindu castes) identity in the hypothetical voter.[19]

To examine whether an officer's evaluation of the likelihood of a potential voter's ability to cast a vote is influenced by whether that individual is of the same type as the officer, I use regression specifications of the form:

[19]The appendix provides the full text of the vignette, as well as the names in each potential voter category.

$$Y_{qpc} = \mu_c + \varphi_n + \pi_v + \theta Match_{qpc} + \mathbf{X}'_{\mathbf{qpc}}\lambda + \epsilon_{qpc}, \tag{2}$$

where Y_{qpc} is an outcome of officer q in polling station p in sub-constituency c, and μ_c signifies sub-constituency fixed effects. Additionally included are fixed effects for the randomly assigned potential voter name, φ_n, and election officer type, π_v. $Match_{qpc}$ is an indicator variable taking value 1 if the election officer's group type and that of the potential voter are the same (e.g. Yadav and Yadav) and 0 otherwise.

The potential-voter-name and officer-type fixed effects control for the average differences in assessed likelihood of the potential voter's ability to vote across the different hypothetical names and by officers of different types. Therefore the coefficient of interest, θ, gives the average change in officer assessment caused by the officer-voter type match. Further controls included are fixed effects for polling team composition and a set of officer-level covariates: age, log monthly salary, an indicator for first term of service at a polling station, and fixed effects for occupation type, education level, and polling team position. I additionally include polling-station-level controls for log total registered voters, shares Muslim/Yadav and female registered voters, and fixed effects for station location type and number of officer team members.

I consider as outcomes both a continuous variable taking the 1-to-4 scale value and an indicator variable taking value 1 if the officer indicates the individual would be "Likely" or "Very Likely", as opposed to "Unlikely" or "Very Unlikely", allowed to vote. Considering the 4-point-scale outcome variable, the left panel of Figure 4 shows a significant 0.24 point average increase the assessed likelihood of voting ability when the potential voter is of the same type as the election officer. Table 2 presents the underlying estimates from equation (2).

To understand whether this shift reflects only movement from "Very Unlikley" to "Unlikely" or "Likely" to "Very Likely", as opposed to shifting across the unlikely to likely margin, I use the binary likelihood measure as an outcome. The right panel of Figure 4 shows a significant increase of 10 percentage points, or more than 25 percent, in the probability that an individual is assessed as at least likely able to cast a vote when of the same type as the election officer. Overall, the vignette experiment results strongly suggest the presence of own-group bias in the decision making of local-level election officials. In the

following section, I examine whether team composition influences actual voting outcomes in a manner consistent with the presence of such bias among officers at polling stations.

5.2 Impacts on polling station voting outcomes

5.2.1 Within-station effects

Does the presence of Muslim/Yadav officers on polling station teams change voting outcomes? Using administrative vote returns data, Figure 5 plots the distribution of the polling-station-level vote share margin between the RJD and BJP, separately by team type. The figure shows that the average vote share of the RJD, the more minority-oriented coalition, relative to that of the BJP is lower for teams with no Muslim/Yadav officers, where the equality of the distributions can be rejected at the 5 percent level.

I further examine impacts on voting by estimating equation (1), including polling-station-level controls for the log number of registered voters and the shares Muslim/Yadav and female to improve statistical precision.[20] Column (1) of Table 3 shows that the presence of a minority officer on a polling station team significantly shifts the vote share margin toward the RJD by 2.3 percentage points, or 12.7 percent. Underlying the vote share impact, in columns (2) and (3) I observe that, with mixed team composition, on average the votes received by the RJD increase by 4.6 percent and decrease by 4 percent for the BJP.

Consistent with the strong connections of religion and caste to political affiliation in this setting, I also observe that a 1 percentage point increase in the Muslim/Yadav share of registered voters at a polling station is associated with a 3 percent increase in RJD votes and 3 percent decrease in BJP votes. Changing from a homogeneous to mixed team of officers therefore has roughly the same impact as increasing the Muslim/Yadav share of registered voters by 1.5 percentage points, where the overall average share of Muslim/Yadav registered voters across sample polling stations is 13 percent. Finally, while column (4) shows that the hypothesis of no average effect of mixed team composition on log total votes cast cannot be rejected, I am unable at 95 percent confidence to rule out effects of approximately 1.6 percentage points in magnitude in either direction, and, as described in Section 3.1, the expected impact of changing composition on total votes is ambiguous.[21]

[20] Results are robust to the exclusion of these covariates.

[21] Appendix Table A2 considers whether impacts vary significantly by: the position within a team in

5.2.2 Cross-station externalities

I next test for spatial externalities of team composition across polling stations in close proximity. I exploit the fact that, for each polling station, the officer assignment mechanism also generates random variation in the proportion of neighboring stations with mixed officer teams. Stations are defined as neighbors if their locations match in the administrative data,[22] or if they are within 0.1km based on the available GPS coordinates. Similar to the approaches of Miguel and Kremer (2004) and Callen and Long (2015), I estimate externalities of team diversity with the specification:

$$Y_{pc} = \mu_c + \theta_o + \beta Mixed_{pc} + \gamma T_{pc} + \phi N_{pc} + \mathbf{X'_{pc}}\lambda + \epsilon_{pc}, \tag{3}$$

where N_{pc} is the number of neighbors of polling station p in constituency c, and T_{pc} is the number of these neighbors with a mixed officer team. Impacts associated with polling station density are captured by N_{pc}, and, conditional on this density, the number of neighbors with mixed composition teams is randomly determined.

The within-station direct effects of mixed team composition on voting outcomes are given by β, while γ is the average cross-station spillover effect of a mixed team neighbor. Note also that, since the team type at each polling station with a given number of neighbors is orthogonal to the number of those neighbors that are mixed team, the estimates of the within-station impacts of changes in team composition should be unchanged from equation (1). Standard errors are clustered at the location level.

I also extend the consideration of externalities to longer distances using two different approaches. First, I supplement equation (3) with the variables $N_{pc}^{0.25km}$ and $N_{pc}^{0.25-0.75km}$, the number of non-neighbor polling stations within 0.25km and between 0.25-0.75km of polling station p, and $T_{pc}^{0.25km}$and $T_{pc}^{0.25-0.75km}$, the numbers of such polling stations with mixed composition teams.[23] Second, while this specification allows the impact of team composition on

which Muslim/Yadav officer presence occurs, or the presence of single versus multiple Muslim/Yadav officers. Significant differences are not found across positions or by number. Appendix Table A3 additionally shows the absence of signficant heterogeneity in impacts by share Muslim/Yadav registered voters.

[22]For example, a group of polling stations may be listed in the administrative data as situated in "K L Primary School (South Part)", "K L Primary School (North Part)", and "K L Primary School (Middle Part)" and would be categorized as neighbors.

[23]The sample for this specification is slightly reduced, as it excludes polling stations which could not be matched to the 2010 polling station GPS coordinates.

other stations to vary with linear distance, it may also be that a more meaningful distinction is captured by administrative boundaries. I therefore employ a specification which augments equation (3) with variables for the total and mixed team numbers of non-neighbor polling stations within the same village as polling station p, N_{pc}^{vill} and T_{pc}^{vill}, and neighboring villages, N_{pc}^{nei} and T_{pc}^{nei}.[24]

The estimates of equation (3) in Table 4 identify the existence of chilling effects across polling stations in close proximity–minority officer presence on a given polling station team influences voting outcomes at neighboring stations in the same direction as the within-station impacts. I observe in column (1) that a change in a neighboring polling station from homogeneous to mixed team composition causes a highly significant 2.6 percentage point average cross-polling-station shift in vote share toward the RJD away from the BJP. Columns (2) and (3) show an imprecisely estimated 2.8 percent increase in RJD votes and a significant 4.4 percent decrease in BJP votes across polling stations. As expected given the randomization structure, the point estimates on the within-polling station mixed team indicator are unchanged as compared to those from equation (1).

The results of tests for spillover effects over greater distances, defined in linear distance and village boundaries, are presented in Panels A and B of Appendix Table A4. While both the within-station and cross-neighbor effects of team composition remain significant, the estimates show no evidence of chilling or displacement effects over longer ranges.

In line with the experimental evidence of spillover effects of team diversity over short distances, the survey of randomly sampled polling station officers shows that officer teams in close proximity do not typically operate in isolation, but instead are commonly in contact with one another. Among officials at stations with at least one neighboring station in the same location, 53 percent report interacting with officers on the other team(s) during proceedings on election day. In addition, 65 percent of officials indicate that their team coordinated with the other team(s) on management of the shared location.

[24]As the top 1 percent of the distribution of villages in terms of polling stations has a mean of 98.8 as compared to the overall mean of 2.4, I trim the sample for this specification to exclude polling stations located in or neighboring these villages, which are also urban and large in area relative to typical villages.

5.2.3 Heterogeneity in effects by voter identity card coverage

If mixed team composition shifts administration of the voter identification process to be more neutral and the possession of voter identity cards by individuals attempting to vote reduces the scope of potentially discriminatory discretion available to officers, a substitute relationship between the two in terms of impacts on polling-station-level voting outcomes would be expected. I test for this substitutability using specifications of the form:

$$Y_{pc} = \mu_c + \theta_o + \beta Mixed_{pc} + \eta(Mixed_{pc} * ID_c) + \mathbf{X'_{pc}}\lambda + \epsilon_{pc}, \tag{4}$$

where ID_c is the proportion of registered voters in sub-constituency c without a voter identity card.[25] The top one percent of observations in terms of the absolute value of the vote share margin between the RJD and BJP are trimmed.[26] Polling-station-level controls included are the log number of registered voters and the Muslim/Yadav and female shares of registered voters.

The main effect for ID_c is absorbed by the sub-constituency-level fixed effects, and the coefficient of interest is η, where an estimated sign opposite that of β indicates that polling station composition and voter identity card coverage exhibit substitutability in their impacts on voting outcomes. Sub-constituency-level voter identity card coverage is not randomly determined, and so may be correlated with other characteristics that mediate the impact of team composition on voting outcomes. As a robustness check I therefore consider a specification where I additionally interact officer team composition with sub-constituency-level measures of a number of such potential characteristics for which administrative data is available: the population proportions that are literate, Scheduled Caste/Scheduled Tribe, and Muslim/Yadav.

Columns (1) and (2) of of Table 5 show that the vote share margin shift toward the minority-aligned RJD caused by changing from a homogeneous non-minority team of officers to a mixed team is approximately 0.5 percentage points smaller per 1 percentage point increase in voter identity card coverage. Underlying these effects, in columns (3) and (4), I observe that the positive impact of mixed team composition on RJD votes decreases by

[25]Sub-constituency is the lowest level for which administrative data on voter identity card coverage is available.

[26]These are polling stations where one coalition won by a margin of at least 88 percent.

a significant 0.9 percentage points per 1 percentage point increase in voter identity card possession. The results for BJP votes in columns (5) and (6) also indicate that the team composition effects are strongest in areas with low voter identity coverage.

Voter identity card coverage in my sample of sub-constituencies ranges from 76.3 to 93.9 percent.[27] Figure 6 plots the implied effect of mixed team composition over a similar range of coverage and demonstrates that the significant impact observed at lower card coverage levels becomes insignificant as full coverage is approached. Section 5.3.2 presents additional evidence on the relevance of voter identity card possession to the impacts of officer team diversity on voting.

5.3 Election day experiences of potential voters

5.3.1 List randomization experiment: biased officer behavior

I next consider whether potential voters viewed biased behavior by government polling station officials as a relevant election day phenomenon. As direct elicitation of survey respondents may yield unreliable estimates of the occurrence of potentially sensitive topics such as discrimination by state personnel during elections, I included list randomization experiments in my survey of potential voters. This method of indirect elicitation has been used in a number of recent papers to generate measures of sensitive topics related to economic activity (Karlan and Zinman 2012) and political and electoral behavior (Gonzalo-Ocantos 2010, Corstange 2012, Kramon and Weghorst 2012, Ahlquist et al. 2013, Burzstyn et al. 2014).

Two list randomization experiments were conducted, where an individual randomly assigned to the control group in one experiment was assigned to the treatment group in the second, and vice versa. Members of each group were asked to indicate, from a list of statements read to them, only the total number of statements that occurred at their polling station during the 2014 elections. Control respondents were given a list of four statements on non-sensitive election day topics, while treatment respondents were read the same list but with an additional sensitive statement included. The sensitive statements in the two list randomization experiments were: "One or more of the election officers at your polling

[27] The coverage rate ranges state-wide between 76.3 and 95.6 percent.

station treated you or others differently based on your religion or caste" and "One or more of the election officers at your polling station tried to influence how you or others voted or to make it more difficult for you or them to cast votes".[28]

This approach prevents individual-level determination of which statements were chosen, but allows for the population-level prevalence of the sensitive statement's occurrence to be estimated as follows:

$$N_{ipc} = \alpha_c + \phi Treat_{ipc} + \mathbf{X}'_{\mathbf{ipc}}\lambda + \epsilon_{ipc}, \tag{5}$$

where N_{ipc} is the number of statements indicated as occurring at polling station p by respondent i, $Treat_{ipc}$ is an indicator variable for assignment to the group additionally receiving the sensitive statement, and $\mathbf{X_{ipc}}$ is a vector of polling station and individual characteristics.

Assuming that respondents assess the sensitive item truthfully and the inclusion of the sensitive topic does not influence their evaluation of the non-sensitive items, ϕ gives an unbiased estimate of the population proportion for whom the sensitive item occurred. Additionally included are polling-station-level controls for log registered voters, share Muslim/Yadav registered voters and fixed effects for polling station number of officers, location type, and the survey sampling strata. Individual-level controls for age, gender, log monthly household income, and household head status and fixed effects for occupation category and education level are included as well.

Table 6 presents the results of the list randomization experiments, where columns (1) and (2) show the average number of statements chosen by the control and treatment groups, respectively. The estimates from equation (5) of the sensitive statement prevalences are given in column (3). They indicate that 23 percent of potential voter respondents agree that election officials at their polling stations treated voters differently based on religion or caste, and 13 percent that election officers tried to influence voting behavior at their polling stations. Given that respondents may vary in their interpretations of the somewhat broad sensitive statements and list randomization has relatively low power because it is designed to provide aggregate- rather than individual-level measures (Bertrand and Duflo 2016), the aim of this set of experiments is to consider generally the occurrence of biased officer behavior connected to religion and caste on election day. The results suggest that officers do attempt to influence voting behavior on election day, and that religion and caste

[28]The appendix provides the introductory prompt used in these experiments.

influence their treatment of voters. In the following section, I conduct tests to disentangle more specifically how the impacts of team diversity vary with the identity of potential voters and the possession of voter identity cards.

5.3.2 Differences in election day experiences

In this section, I examine how the election day experiences of potential voters of different types vary with the diversity of the officer team they interact with on election day and whether they possess a government voter identity card. I estimate the following regression separately for individuals at stations where a Muslim/Yadav officer was present and where the team was homogeneous:

$$Y_{wpc} = \alpha_c + \phi MY_{wpc} + \lambda ID_{wpc} + \psi \left(MY_{wpc} * ID_{wpc} \right) + \mathbf{X'_{wpc}} \lambda + \epsilon_{wpc} \tag{6}$$

where Y_{wpc} is an outcome for respondent w at polling station p in sub-constituency c, and MY_{wpc} and ID_{wpc} are indicators for Muslim/Yadav identity and voter identity card possession. The individual and polling station controls included are the same as in equation (5) and standard errors are clustered at the polling station level.[29]

In Table 7, I first consider the likelihood of a potential voter having a satisfactory overall experience at the polling station on election day.[30] Column (1) shows that Muslim/Yadav potential voters facing homogeneous teams of officers are 6 percentage points less likely on average, as compared to non-minority voters, to rate their polling station experience as satisfactory. This difference disappears among individuals who possess voter identity cards. In addition, the insignificant value of λ shows that, for non-minority individuals, possession of a voter identity card does not significantly change the likelihood of having a satisfactory experience at the polling station. Turning to mixed team polling stations, I find in column (2) that Muslim/Yadav potential voters do not express lower overall satisfaction on average, nor does this change with voter identity card possession. Addtionally, non-Muslim/Yadav potential voters are not significantly less likely to express satisfaction with their polling

[29]To account for the difference in gender composition identified across mixed and homogeneous team polling stations in the sample of Muslim/Yadav respondents, the vector of individual level controls also includes an interaction of gender with voter identity card possession.

[30]This variable takes value 1 if a respondent indicates that her overall voting experience at the polling station on election day was “Excellent”,”Good”, or ”Fair”, as opposed to “Poor”.

station experience when facing a mixed as opposed to homogeneous team of officers.

A similar pattern of results is observed when considering potential voters' ability to cast a vote. I find in column (3) that, at polling stations with homogeneous officer teams, Muslim/Yadav individuals are 9.9 percentage points less likely to be able to vote, but only if they are without a voter identity card. For non-Muslim/Yadav potential voters, possession of a voter identity card does not impact the likelihood of being able to cast a vote. In contrast, column (4) shows that, at polling stations with minority officers present, voter identity card possession significantly increases the likelihood of being allowed to cast a vote by 12.9 percentage points, and that this effect does not vary with potential voter minority identity.

Finally, I examine in columns (5) and (6) the potential effects on the overall environment at the polling station in terms of the absence of canvassing and disorderly behavior. I see no evidence of significant differences across different categories of potential voters for either team type, suggesting that stricter management of the area surrounding the polling station is not a primary channel through which the presence of minority officers on teams impacts polling station proceedings and voting outcomes.

To summarize, at polling stations where the officer team includes no minority officer members, identity cards influence voting ability for only Muslim/Yadav potential voters. However, at stations with mixed officer teams, identity cards matter for individuals of all types. As the religious/caste identity of potential voters and the possession of voter identity cards may be correlated with other characteristics relevant to the outcomes of interest, the findings in this section are necessarily suggestive. However, the results in Table 7 are consistent with the previous experimental estimates and provide additional evidence that mixed team composition and voter identity card provision each reduce the differential treatment of potential voters at polling stations, where homogeneous non-minority officer teams are otherwise relatively more stringent toward Muslim/Yadavs.

5.4 Can team composition influence who wins elections?

Having identified significant impacts of religous/caste diversity in officer teams on voting outcomes within and across polling stations, a natural question is whether team composition can influence who ultimately wins elections. To examine this possibility, I conduct

counterfactual calculations of the effects of alternative officer assignment mechanisms on the identities of winners in the 2014 parliamentary and 2010 state assembly elections in Bihar.

I first use administrative data available across the state of Bihar to calculate the sub-constituency-level average numbers of neighbor polling stations. Second, the observed margins of victory from these elections already reflect the effects of the underlying (but unobserved outside of the two study districts) proportions of mixed team polling stations in each parliamentary constituency. Finally, I assume that the proportion of mixed team polling stations in each sub-constituency is the same as the average value (0.324) across the two districts for which it can be directly observed in my data. I can then calculate the magnitudes of the shifts in the proportions of homogeneous and mixed team polling stations required to change the outcome of each election in which the RJD and BJP coalitions were both either winner or runner up.[31]

I use these magnitudes to consider the effects of two alternatives to the current method of randomized officer assignment: (1) requiring mixed team composition in all polling officer teams, and (2) excluding Muslim/Yadav officers from teams. During the 2014 elections, the RJD and BJP fielded the top two candidates in 29 of the 40 parliamentary constituencies in Bihar (Appendix Figure A4 provides the distribution of vote share margins). As shown in Table 8, a shift to Alternative 1 is estimated to switch one election outcome in favor of the RJD and a shift to Alternative 2 to change one outcome to a BJP victory. I repeat this exercise for the most recent prior state assembly elections in 2010, where the RJD and BJP fielded the top two candidates in 185 of 243 races. Reflecting the lower levels of voter identity card coverage and greater number of close contests, thirty-three races are estimated to change to an RJD victory under Alternative 1 and six elections to switch in favor of the BJP under Alternative 2, or a combined 21 percent of such races.

In addition, the religious composition of candidates put forward in elections differs considerably across the coalitions; 17.5 percent of RJD coalition candidates in the 2014 Bihar elections were Muslim, as compared to just 2.5 percent for the BJP coalition. Accounting for the religious identities of candidates, the previous counterfactual calculations also indicate that a shift to all mixed team polling stations in Bihar would have led to a 25 percent

[31]The appendix provides additional details. The vote share margins between the runner-up candidate and the remainder of the field are large enough that having a third place or lower candidate shift to become the winner could not feasibly occur as a result of changes in team composition.

increase in Muslim legislators both in the 2010 assembly and 2014 parliamentary elections. Recent work has shown that increasing Muslim representation in state legislatures in India results in significant reductions in child mortality rates and gains in educational attainment across both Muslim and non-Muslim households (Bhalotra et al. 2014). This suggests that the impacts on election outcomes associated with officer team composition may also have important downstream effects on outcomes directly relevant to citizen well-being.

5.5 Alternative channels

Apart from influencing the likelihood that local-level officials exhibit biased behavior in their election duties, introducing religious/caste heterogeneity into polling station teams may influence voting outcomes through a "team performance" channel. The literature on teams and heterogeneity has highlighted the potential tradeoff of benefits associated with a greater diversity of skills and information against increased communication and coordination costs and reduced motivation (Prat 2002, Hamilton et al 2003, Marx et al. 2015). However, for these types of effects, it is difficult to find a straightforward explanation that would lead to effects on votes received in opposite directions for each coalition, as found in this paper. For example, changes in the overall productivity of the officer team could affect the length of waiting time and consequently the proportion of potential voters for both coalitions willing to incur this cost of voting, with a reduction in overall voter turnout.

It could also be that the identities of the election officials with whom potential voters interact at the polling station impact voting behavior through an "identity salience" channel. The behavior of voters has been shown to be sensitive to small changes (Gerber and Rogers 2009, Shue and Luttmer 2009, Bryan et al. 2011), and, even if officer actions are unaffected by team composition, the religion and caste of the election officials present on election day may be discerned by potential voters and influence their behavior. Effects of this type would be expected primarily to influence the choice of candidate, rather than the extensive voting margin. Given that I observe impacts on the ability of potential voters to cast votes, this suggests that identity salience is unlikely to be driving the observed pattern of effects.

An additional possible concern in attributing the previously identified impacts to biased behavior associated with officers' religious and caste identities is that there may exist other characteristics that correlate with these identities and also influence voting outcomes. This

is unlikely to explain the above results for two reasons: the previous analysis captures the effects of the presence on teams of officers that are either Muslim or Yadav, two groups which are not particularly similar outside of their political alliance; and indviduals of different religions and castes serving as polling station officers are more likely to be similar along other dimensions than would be their populations in general.

First, Yadavs are a lower-caste Hindu group in Bihar and, other than in political orientation, it is unclear along what dimensions they would be systematically more similar to Muslims than to other Hindu groups, especially given the dispersed support for the BJP across upper- and lower-castes in these elections.[32] In Appendix Table A5, I examine the influence of Muslim and Yadav officer presence separately using a regression specification analogous to that of equation (1). The estimates across columns (1) through (4) reveal similar impacts for Muslim and Yadav officers. The coefficients for the two groups are statistically indistinguishable in each case, and the shift in vote share margin toward the RJD is significant at the 5 percent level for both Muslim and Yadav presence on officer teams.

Second, polling station officers are selected from pools of government employees who are likely more similar than would be average individuals from different religious and caste groups. I explicitly test in Table 9 for differences by Muslim/Yadav status in the sample of surveyed polling station officers across a number of characteristics plausibly proxying for experience and knowledge: age, log monthly salary, college graduation, and prior election officer experience. I regress each of these outcomes on an indicator variable for Muslim/Yadav identity and fixed effects for sub-constituency and team position. As a further check, I also construct measures of age and log monthly salary based on separate administrative data available for the full population of election officers in the district in which the officer survey was conducted. The results in columns (1) through (6) show that in no case is there a significant difference by Muslim/Yadav status.

[32]Highlighting the differences between the two groups, Lalu Prasad Yadav, the politician responsible for the creation of the Muslim/Yadav coalition, has even said "I have made an alliance between those who worship the cow [Yadavs] and those who eat the cow [Muslims]." (Wittsoe 2013, p.60)

6 Conclusion

Fair and well-functioning elections are critical to maintaining the responsiveness of elected officials to citizens in democracies. While the related literature on election reforms has focused in large part on the benefits of advances in monitoring and voting technology, this paper is to my knowledge the first to provide rigorous evidence of the remaining importance of the identities of local-level election personnel. Indian elections are technologically advanced and their administration is highly regulated, indicating that bias in discretionary decisions of government personnel can undermine the quality of service provision even near the present frontier of election practice.

Though my findings suggest that diversity within teams of election officers can improve the impartiality of polling station management, it may not always be politically or administratively feasible to mandate that such mixed composition occur. It could also be difficult in other contexts to determine the relevant dimensions of identity along which diversity should be defined. My results, however, additionally demonstrate that policies which reduce the scope for officer discretion in the first place, such as the widespread provision of voter identity cards, may be promising alternatives in reducing the ability of local-level election officials to influence voting outcomes. More generally, the findings of this paper demonstrate that institutions which require greater discretionary decision making by local-level bureaucrats or other government employees may be more susceptible to adverse impacts of these individuals' underlying biases on the quality of public services.

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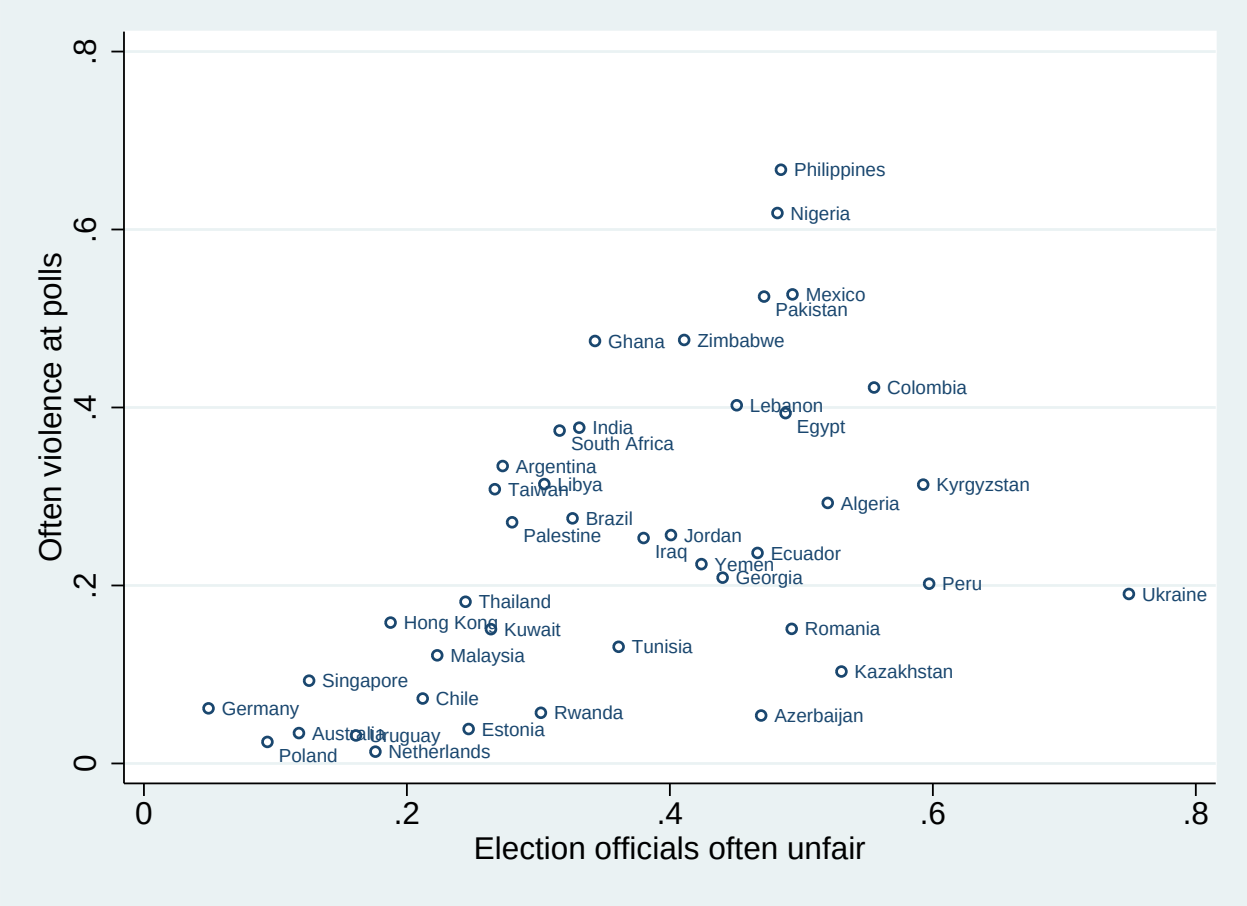
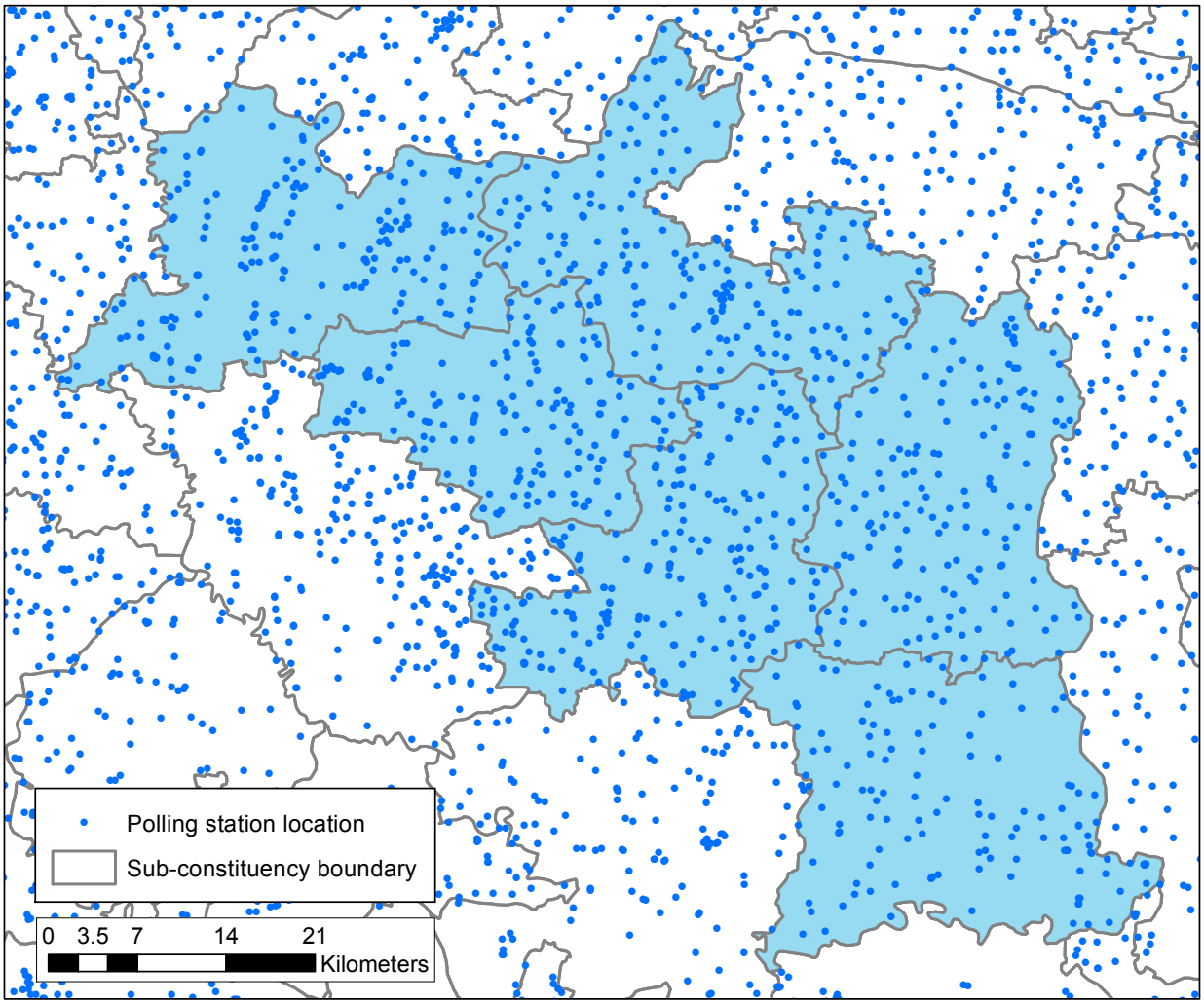


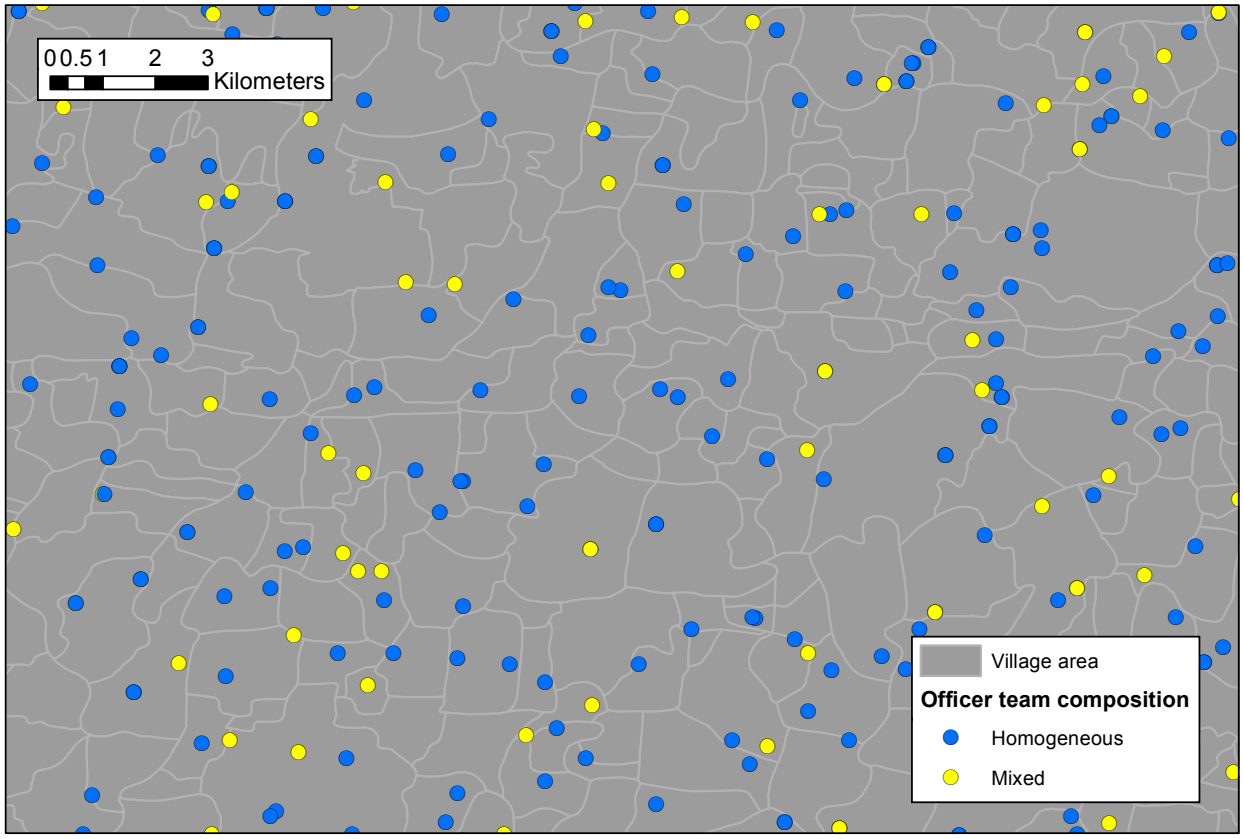
Notes: Measures computed using World Values Survey Wave 6 (2010-2014). "Election officials often unfair" is the weighted percentage of respondents in each country, when asked "In your view, how often do the following things occur in this country's elections?", answering "Not at all often" or "Not often" to "Election officials are fair", against the alternatives of "Very often", "Fairly often", or "Don't know/Not answer". "Often violence at polls" is the percentage answering "Very often" or "Fairly often" to "Voters are threatened with violence at the polls."

Figure 1: World Values Survey: election administration problems



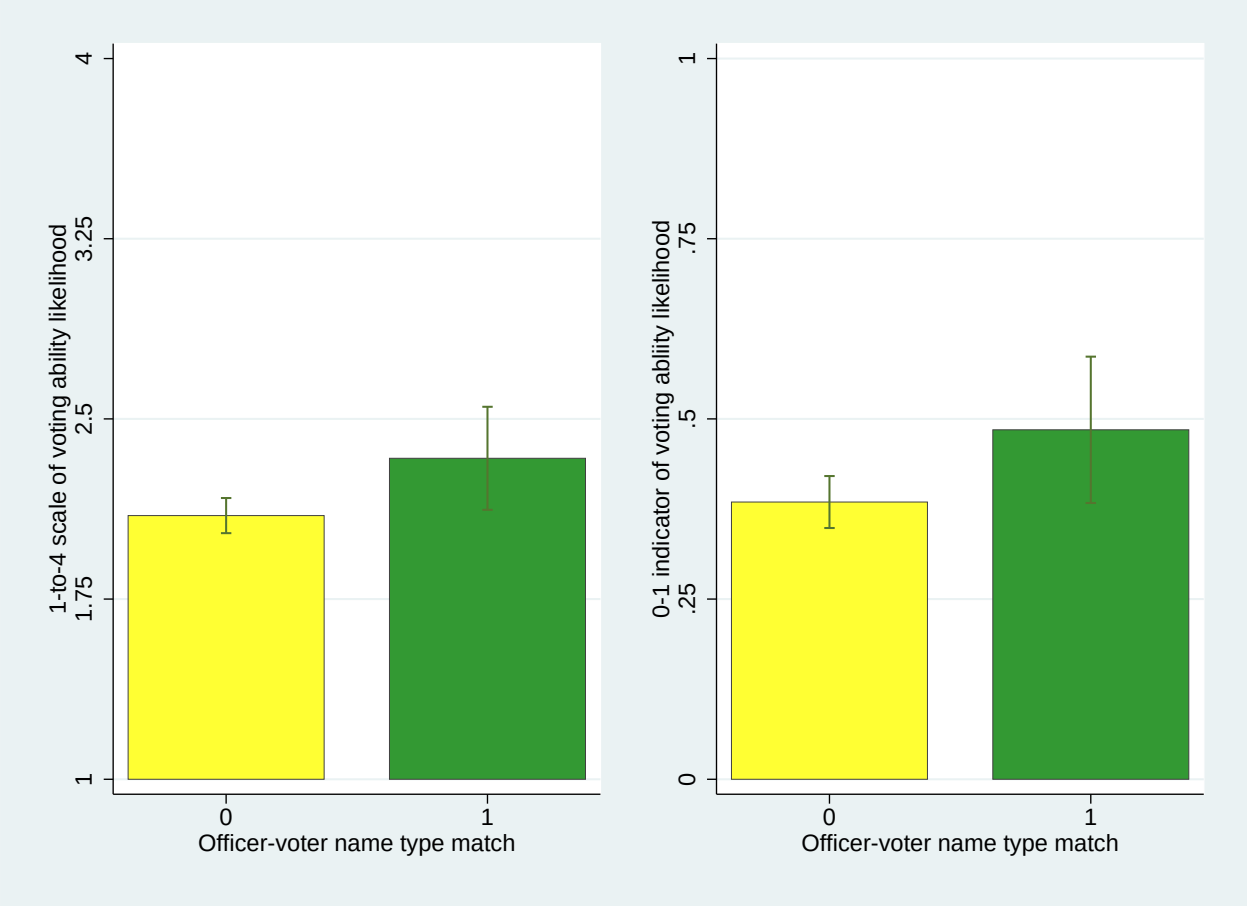
Notes: Shaded area in the figure indicates the extent of an example parliamentary constituency.

Figure 2: Polling station distribution across example parliamentary constituency



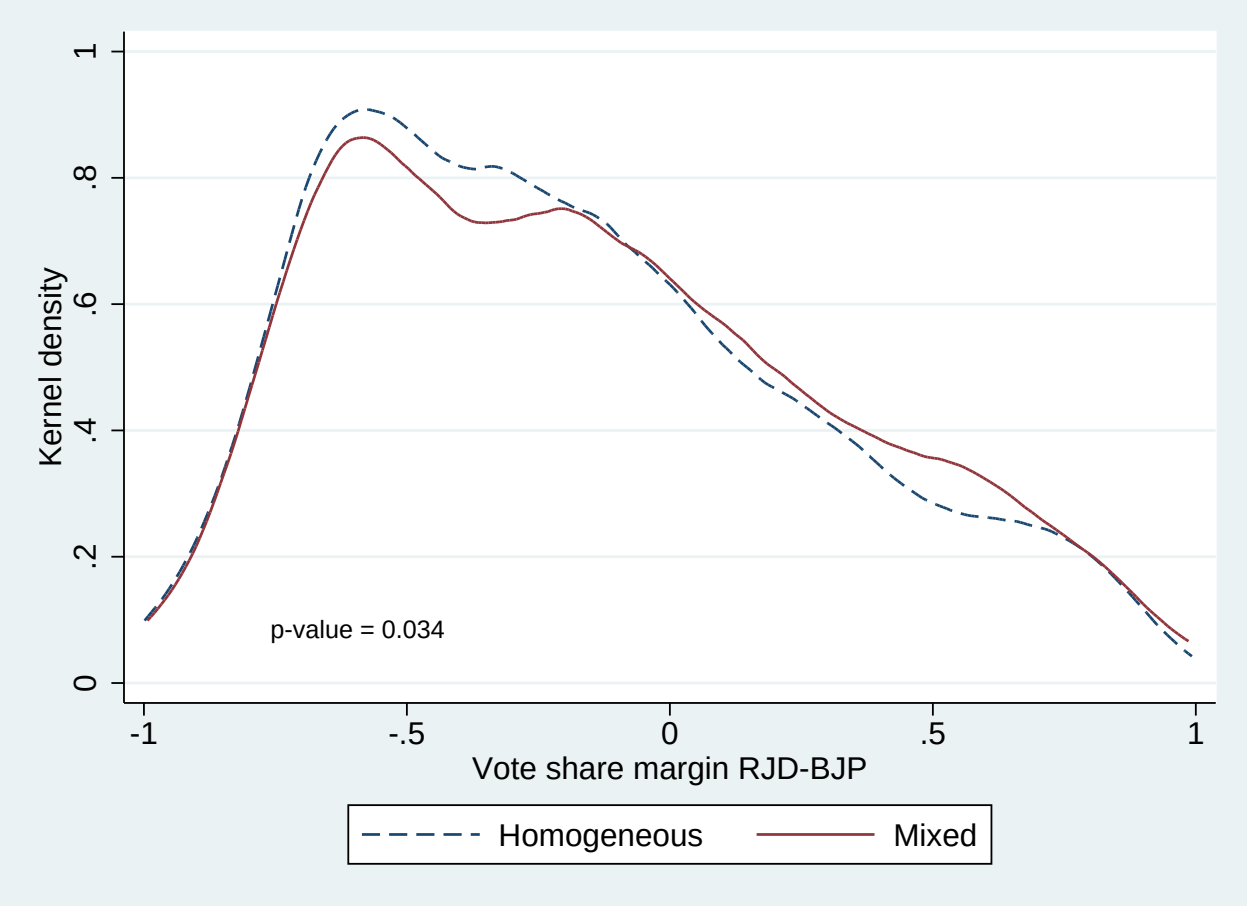
Notes: Each circle represents a polling station, with the color signifying whether the officer team was homogeneous or mixed in composition.

Figure 3: Example of variation in officer team composition across polling stations



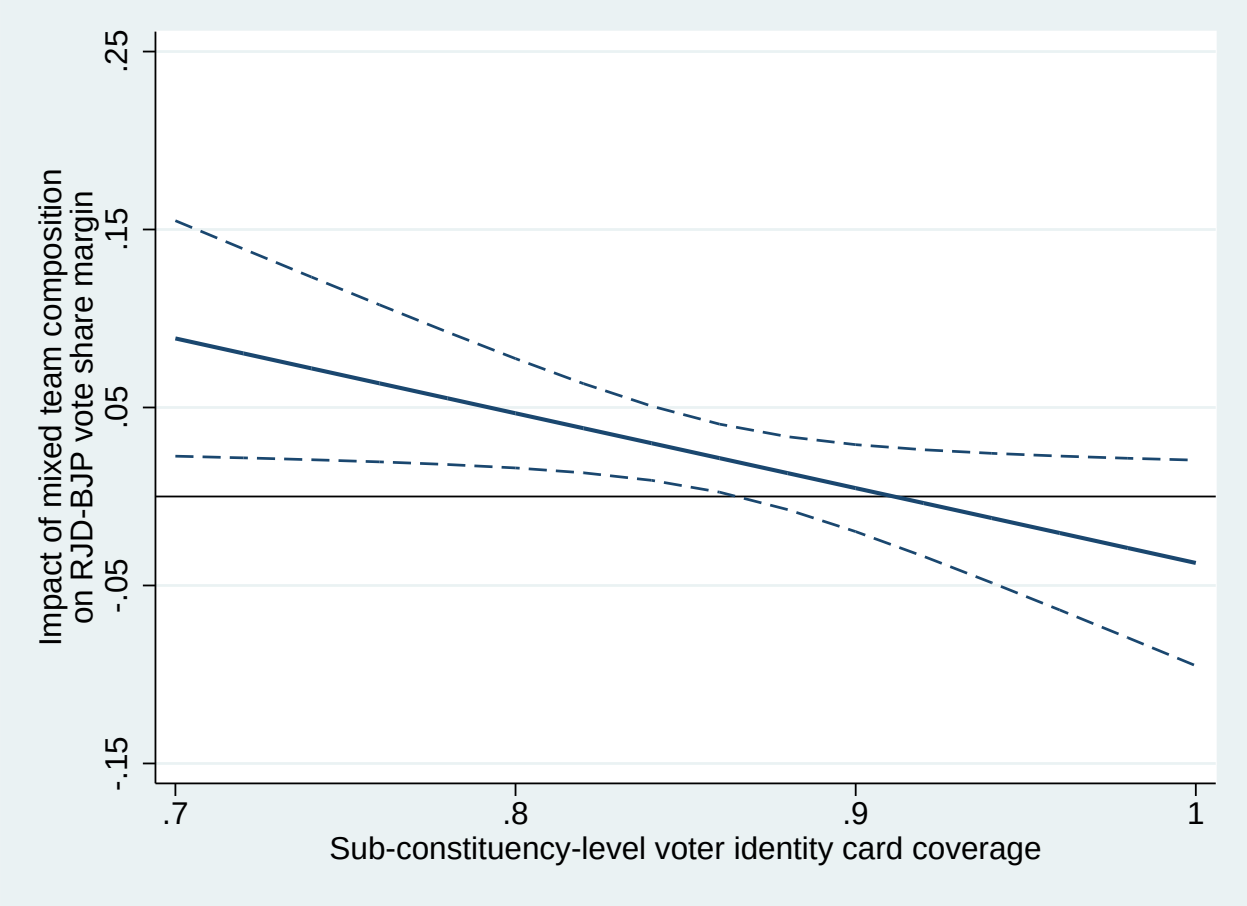
Notes: The figure in the left panel depicts the estimated 4-point scale values of the voting ability likelihood of the the hypothetical individual described in the vignette. The estimates are based on the regression in column (1) of Table 2, assuming mean values of all control variables. The left bar represents the randomly assigned subset of officer respondents for whom the hypothetical individual's type (Muslim, Yadav, Brahmin) did not match the officer's own type, while the right bar represents the subset for whom the types match. The figure in the right panel depicts the estimated probabilities of an officer respondent indicating that the hypothetical individual would be "(3) Likely" or "(4) Very Likely" able to cast a vote, as opposed to "(2) Unlikely" or "(1) Very Unlikely". The estimates are based on the regression in column (2) of Table 2, assuming mean values of all control variables. The notes to Table 2 provide the full vignette question text. Error bars signify 95 percent confidence intervals.

Figure 4: Own-type bias in officer assessment of voting qualification



Notes: The figure plots kernel density estimates of the polling station-level vote share margin between the RJD and BJP coalitions, separately for polling stations with homogeneous (dashed line) and mixed (solid line) teams of polling stations officers. Estimated using an Epanechnikov kernel. The p-value is computed using the Kolmogorov-Smirnov equality-of-distributions test for the two groups of polling stations.

Figure 5: Empirical distribution of coalition vote share margins by team composition



Notes: Figure plots the estimated polling-station-level impact of mixed team composition on the vote share margin between the RJD and BJP coalitions at different levels of sub-constituency-level voter identity card coverage. Dashed lines signify 95 percent confidence intervals. Calculated using the estimates from Column (5) of Table 5.

Figure 6: Heterogeneity by voter identity card coverage in impact of team composition

Table 1a: Balance Test

	Homog. team (1)	Mixed team (2)	Difference (3)	p-value (4)	Obs. (5)
Panel A. Electorate characteristics					
Ln total registered voters	6.873	6.905	0.009	0.160	5,561
	[0.314]	[0.305]	(0.007)		
Share female registered voters	0.463	0.463	0.000	0.864	5,561
	[0.023]	[0.022]	(0.001)		
Share Muslim/Yadav registered voters	0.128	0.135	0.005	0.312	5,561
	[0.172]	[0.175]	(0.005)		
Panel B. Prior election (2010) characteristics					
Ln total votes	6.061	6.057	-0.007	0.412	5,275
	[0.332]	[0.319]	(0.009)		
Vote share margin RJD-BJP coalition	-0.287	-0.272	0.000	0.992	3,947
	[0.378]	[0.376]	(0.009)		
Ln votes RJD coalition	3.941	3.945	-0.009	0.694	5,246
	[1.424]	[1.403]	(0.023)		
Ln votes BJP coalition	4.940	4.901	-0.003	0.899	3,946
	[0.995]	[1.019]	(0.025)		
Panel C. Spatial characteristics					
Number mixed team neighbor stations	0.385	0.386	-0.012	0.493	5,561
	[0.746]	[0.719]	(0.018)		
Number mixed team stations within 0.25km	0.420	0.452	0.026	0.392	5,097
	[1.078]	[1.159]	(0.030)		
Number mixed team stations within 0.25-0.75km	2.536	2.622	0.066	0.430	5,097
	[4.263]	[4.470]	(0.084)		
Number mixed team stations within village	1.210	1.309	0.043	0.607	3,231
	[2.178]	[2.287]	(0.083)		
Number mixed team stations in neighboring villages	4.688	4.829	-0.040	0.768	3,216
	[3.908]	[4.015]	(0.136)		
Total neighbor stations	1.200	1.191	-0.027	0.420	5,561
	[1.614]	[1.647]	(0.034)		
Total stations within 0.25km	1.357	1.336	-0.025	0.735	5,097
	[2.930]	[2.904]	(0.073)		
Total stations within 0.25-0.75km	7.893	7.958	0.069	0.768	5,097
	[12.830]	[12.904]	(0.232)		
Total stations within village	3.686	3.812	0.088	0.676	3,231
	[5.551]	[5.868]	(0.212)		
Total stations in neighboring villages	14.259	14.479	0.065	0.861	3,216
	[10.694]	[10.544]	(0.369)		

Notes: Columns (1) and (2) report variable means with standard deviations in brackets for homogeneous and mixed officer teams. Column (3) reports the coefficient from an OLS regression of the listed outcome on an indicator for polling station mixed team composition. Also included are sub-constituency and number of officer fixed effects. Column (4) reports the associated p-value. Prior election outcome values in Panel B are based on the average value across all polling stations from 2010 in the same location as the 2014 station. 2014 coalition definitions are used. In Panel C, neighbor stations are located within the same building/compound of a given polling station. Total stations with 0.25 and within 0.25-0.75km are located within those distances of a given polling station. The Panel C sample is restricted to stations matchable to the dataset of station GPS coordinates. Village-related outcomes further exclude stations in villages which are in the top 1 percent of the distribution in terms of number of polling stations contained within, or their neighboring villages.

Table 1b: Balance Test (cont.)

	Homog. team (1)	Mixed team (2)	Difference (3)	p-value (4)	Obs. (5)
Panel D. Officer characteristics					
Age	42.313	43.264	0.910	0.294	517
	[9.781]	[9.677]	(0.866)		
College graduate	0.695	0.675	-0.014	0.728	516
	[0.462]	[0.469]	(0.041)		
Ln monthly salary	9.539	9.584	0.047	0.371	503
	[0.609]	[0.562]	(0.053)		
First time officer	0.342	0.325	-0.017	0.686	511
	[0.475]	[0.469]	(0.042)		
Panel E. Registered voter characteristics					
Muslim/Yadav	0.424	0.440	0.017	0.246	4,266
	[0.494]	[0.497]	(0.015)		
Age	45.562	45.483	-0.057	0.920	4,235
	[16.822]	[16.466]	(0.561)		
Female	0.411	0.458	0.046	0.003	4,267
	[0.492]	[0.498]	(0.015)		
Literate	0.381	0.407	0.025	0.154	4,265
	[0.486]	[0.491]	(0.017)		
Household head	0.457	0.461	0.005	0.778	4,267
	[0.498]	[0.499]	(0.017)		
Ln monthly household income	8.277	8.311	0.031	0.354	3,430
	[0.787]	[0.795]	(0.033)		
Voter identity card possession	0.944	0.941	-0.002	0.769	4,264
	[0.229]	[0.235]	(0.008)		

Notes: Columns (1) and (2) report variable means with standard deviations in brackets for homogeneous and mixed officer teams. Column (3) reports the coefficient from an OLS regression where the listed outcome is regressed on an indicator for polling station mixed team composition and column (4) reports the associated p-value. Panel D is restricted to non-Muslim/Yadav officer respondents, due to the definition of mixed teams. Additionally included are sub-constituency fixed effects. Panel E considers registered voter respondents and additionally includes strata fixed effects (sub-constituency and above-below district-level Muslim/Yadav registered voter percentage median).

Table 2: Vignette experiment: own-type bias in officer assessment of voting qualification

	Ability to cast vote	
	4-point scale	0-1 indicator
	(1)	(2)
Officer-potential voter type match	0.238**	0.102*
	(0.120)	(0.057)
Observations	817	817
Name fixed effects	X	X
Officer type fixed effects	X	X
Individual and polling station controls	X	X
Non-match group outcome mean	2.106	0.380

Notes: Column (1) reports OLS estimates from regressions at the officer level of an indicator variable taking value 1 if the respondent answers "Very likely (4)" or "Likely (3)" as opposed to "Unlikely (2)" or "Very unlikely (1)" to the question: "A voter named [RANDOMLY ASSIGNED] arrives at the polling station without an EPIC card but has a government voter's slip without a photograph. He can recite his name and other particulars. On a scale of 1 to 4, how likely do you think it is that he would be allowed to cast a vote based on this information?" and 0 otherwise, on an indicator variable for whether the officer's own type matches that (Muslim, Yadav, Brahmin) of the randomly assigned voter name. Column (2) reports OLS estimates from regressions with the 1-4 scale value as the outcome. Columns include fixed effects for respondent name and officer type, the stratification variables (sub-constituency in which officer was assigned to a polling station and officer category [Muslim/Yadav at mixed polling station, non-Muslim/Yadav at mixed polling station, non-Muslim/Yadav at homogeneous polling station] plus the following individual level controls: age, age squared, log monthly salary, an indicator for first term of service at a polling station, and fixed effects for occupation type, education level, and polling station position. Further included are polling station level controls for log total registered voters and proportion Muslim/Yadav registered voters, and fixed effects for station location type and number of team officers. Standard errors are clustered at the polling station level. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table 3: Impacts of randomized officer team composition on voting outcomes

	Vote share margin RJD-BJP (1)	Ln votes RJD (2)	Ln votes BJP (3)	Ln total votes (4)
Mixed team	0.023**	0.046*	-0.040*	0.001
	(0.010)	(0.027)	(0.021)	(0.008)
Muslim/Yadav registered voter %	0.015***	0.031***	-0.030***	-0.000
	(0.000)	(0.001)	(0.001)	(0.000)
Female registered voter %	0.002	-0.016***	-0.007	0.007***
	(0.002)	(0.006)	(0.004)	(0.002)
Ln total registered voters	-0.060**	1.004***	1.176***	0.937***
	(0.023)	(0.060)	(0.048)	(0.018)
Observations	5,552	5,535	5,549	5,552
Homogeneous team mean	-0.181	4.451	5.143	6.180

Notes: All columns report OLS estimates from regressions at the polling station level of the listed variable on an indicator for mixed team composition. Additionally included are sub-constituency and number of officer fixed effects and controls for Muslim/Yadav and female shares of registered voters and log total registered voters. Standard errors clustered at the station level. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table 4: Cross-station externalities of officer team composition

	Vote share margin RJD-BJP	Ln votes RJD	Ln votes BJP	Ln total votes
	(1)	(2)	(3)	(4)
Number mixed team neighbor stations	0.026***	0.028	-0.044**	0.003
	(0.010)	(0.027)	(0.019)	(0.008)
Mixed team	0.023**	0.045*	-0.040*	0.000
	(0.010)	(0.027)	(0.021)	(0.008)
Total neighbor stations	-0.032***	-0.045***	0.046***	-0.017***
	(0.005)	(0.015)	(0.010)	(0.005)
Observations	5,552	5,535	5,549	5,552
Number locations	3,619	3,619	3,619	3,619

Notes: All columns report OLS estimates from regressions at the polling station level of the listed variable on an indicator for mixed team composition and variables for the numbers of total and mixed composition team neighboring polling stations. Additionally included are sub-constituency and number of officer fixed effects and controls for Muslim/Yadav and female shares of registered voters and log total registered voters. Standard errors clustered at the station level. Neighbor stations are polling stations within the same location (building/compound) as a given polling station. Standard errors in Panel B clustered at the location level. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table 5: Heterogeneity in effects of team composition by voter identity card coverage

	Vote share margin RJD-BJP		Ln votes RJD		Ln votes BJP	
	(1)	(2)	(3)	(4)	(5)	(6)
Mixed team *	-0.004**	-0.006**	-0.009*	-0.014*	0.005	0.010*
Voter identity card coverage %	(0.002)	(0.003)	(0.005)	(0.008)	(0.004)	(0.006)
Mixed team	0.383**	0.558*	0.809	1.072	-0.453	-0.960*
	(0.173)	(0.314)	(0.457)	(0.768)	(0.332)	(0.579)
Observations	5,442	5,442	5,429	5,429	5,439	5,439
Polling station controls	X	X	X	X	X	X
Sub-constituency fixed effects	X	X	X	X	X	X
Interacted sub-constituency controls		X		X		X
Implied effect: minimum sample	0.063***	0.072***	0.129**	0.152***	-0.079**	-0.086**
card coverage sub-constituency	(0.022)	(0.024)	(0.054)	(0.057)	(0.040)	(0.043)

Notes: All columns report OLS estimates from regressions at the polling station level of the listed variable on an indicator for mixed team composition interacted with the sub-constituency-level percentage of registered voters with a voter ID card. Also included are sub-constituency and number of officer fixed effects and controls for Muslim/Yadav share of registered voters and log total registered voters. Even-numbered columns additionally include interactions (not shown) with sub-constituency-level measures of the population proportions that are literate and Schedule Caste/Schedule Tribe, and the share of registered voters that are Muslim/Yadav (none of these interaction effects are statistically significant). The implied effect given in each column reflects the estimated impact of mixed team composition for the sub-constituency with the lowest level of voter identity card coverage observed in the sample. Coverage ranges between 76.3 and 93.9 percent in sample sub-constituencies. The sample trims the top one percent of observations in terms of absolute value of coalition vote share margin (polling stations with a margin greater than 88 percentage points). *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table 6: List randomization: biased officer behavior on election day

	Control (1)	Treatment (2)	Difference (3)	Obs. (4)
Election officials treated voters differently by religion/caste	2.043 [0.760]	2.289 [0.912]	0.232*** (0.022)	3,810
Election officials attempted to influence voting	2.397 [0.682]	2.541 [0.807]	0.137*** (0.020)	3,827

Notes: Columns (1) and (2) report unconditional means and standard deviations of the control (individuals receiving a list of four questions with the listed statement omitted) and treatment (individuals receiving a list of the same four questions plus the listed statement included). Column (3) reports the coefficient of an OLS regression at the individual level of the total number of statements the respondent indicated occurred at the polling station during the 2014 elections and sub-constituency fixed effects. Additionally included are polling-station-level controls for log total registered voters, share Muslim/Yadav registered voters, and fixed effects for location type and number of officers. Additional registered-voter-level controls are fixed effects for education level and occupation type and controls for age, sex, household head status, and log monthly household income Standard errors are clustered at the polling station level. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table 7: Election day experiences of potential voters

	Satisfactory overall experience		Able to cast vote		Orderly environment	
	Homog. team	Mixed team	Homog. team	Mixed team	Homog. team	Mixed team
	(1)	(2)	(3)	(4)	(5)	(6)
Possess voter identity card	-0.015	0.025	-0.001	0.129**	0.055	-0.013
	(0.011)	(0.032)	(0.025)	(0.056)	(0.044)	(0.034)
Muslim/Yadav	-0.062*	0.041	-0.099*	0.003	-0.031	0.021
	(0.036)	(0.041)	(0.054)	(0.066)	(0.065)	(0.068)
Muslim/Yadav *	0.061*	-0.046	0.089+	-0.001	0.012	-0.040
Possess voter identity card	(0.037)	(0.036)	(0.055)	(0.062)	(0.063)	(0.066)
Observations	2,086	2,038	2,131	2,088	2,100	2,074
Polling stations	180	178	180	178	180	178
Mean for non-Muslim/Yadav without voter identity card	1.000	0.943	0.961	0.857	0.907	0.891

Notes: All columns report OLS estimates from regressions at the individual level of the listed variable on an interaction of the Muslim-Yadav respondent indicator with an indicator for voter identity card possession, for the sample of polling stations indicated in each column. Additionally included are polling station-level fixed effects and individual-level controls for age, gender, education level, , household structure type, occupation type, and log monthly household income. "Satisfactory overall station experience" is an indicator for whether the respondent indicated that their overall voting experience at the polling station on election day was "Excellent"/"Good"/"Fair", as opposed to "Poor". Standard errors clustered at the polling station level. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent. + p-value = 0.108.

Table 8: Changes in election outcomes under alternative officer assignment mechanisms

	National parliament 2014			State assembly 2010		
	BJP to RJD victory (1)	Vote share margin range (2)	Share RJD/BJP races (3)	BJP to RJD victory (4)	Vote share margin range (5)	Share RJD/BJP races (6)
All mixed teams	1	-0.024	0.034	33	[-0.066,-0.0003]	0.178
No mixed teams	-1	0.010	0.034	-6	[0.004,0.023]	0.032

Notes: This table reports the counterfactual estimates of the number of races for which the winning candidate would have switched between the RJD coalition and the BJP coalition, assuming an initial 0.324 proportion of mixed teams (that observed in the available 2014 data), under three alternative officer assignment scenarios. Alternative 1 is the presence of all mixed composition teams. Alternative 2 is the absence of any mixed composition officer teams. Columns (1) and (4) give the number of races for which the winning party would change as indicated. Columns (2) and (5) give the range of the RJD-BJP coalition vote share margins actually observed in the impacted constituencies. Columns (3) and (6) give the proportion of races in which the RJD and BJP coalitions fielded the top two candidates that would be affected by the policy change. The calculation accounts for spillover effects from neighboring mixed team polling stations and heterogeneity in impact by voter identity card coverage (at the sub-constituency level).

Table 9: Variation in other officer characteristics by Muslim/Yadav identity

	Survey data				Administrative data	
	Age	Ln monthly salary	College graduate	First time officer	Age	Ln monthly salary
	(1)	(2)	(3)	(4)	(5)	(6)
Muslim/Yadav officer	-0.39	-0.002	-0.010	-0.020	0.44	0.001
	(0.57)	(0.031)	(0.031)	(0.033)	(0.37)	(0.012)
Observations	863	842	863	856	5,983	6,198
Non-Muslim/Yadav outcome mean	43.08	9.582	0.669	0.342	44.98	9.291

Notes: All columns report OLS estimates from regressions at the officer level of the listed variable on an indicator for Muslim/Yadav identity. Additionally included are sub-constituency and officer-position fixed effects. Columns (1) through (4) are based on reported data from the survey of officers. Columns (5) and (6) are based on the full sample of administrative data available for the same district in which the surveys were conducted. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Appendix

Vignette experiment names and list experiments prompt

Vignette experiment names

Muslim: Najam Uddin, Mustak Ansari, Mohammed Alam
Yadav: Ajay Yadav, Kailesh Yadav, Surendra Yadav
Brahmin: Arjun Tripathi, Rohit Mishra, Alok Chaturvedi

Vignette experiment prompt

"The vignette question was worded as: "Please consider the following situation: A voter named [RANDOMLY ASSIGNED] arrives at the polling station without an EPIC card but has a government voter's slip without a photograph. He can recite his name and other particulars. On a scale of 1 to 4, how likely do you think it is that he would be allowed to cast a vote based on this information?", where the potential responses are "Very unlikely (1)", "Unlikely (2)", "Likely (3)", "Very likely (4)"."

List experiments prompt

"I'm going to read you a list of various statements, and I would like for you to tell me how many of them occurred during the previous 2014 Lok Sabha election. Please, count to yourself. Do not tell me which ones, only HOW MANY IN TOTAL. For example, it might be that none of them occurred, all of them occurred, or any number in between."

Survey sampling

Registered voters survey

Polling stations in urban areas, where locating specific individuals based on the information available in the electoral roll would not have been feasible, were excluded from the sample (8.3 percent). Additionally excluded were polling stations with only three election officers (0.7 percent), as were polling stations that were split across a main polling station and an extension station (9.8 percent). The list of registered voters was at the (main+extension) level, so it was not possible to determine to which of the main station or extension individuals were assigned. The only difference between having a main and extension station versus two polling stations in the same location is whether the threshold for maximum registered voters

at a single station was reached after the formal yearly deadline to split polling stations. Administration is otherwise identical.

In some locations, fewer than three Muslims or two Yadavs were identified in the list. If too few Muslims were available, Yadavs were randomly drawn to fill the positions when possible, and vice versa. If fewer than five Muslims and Yadavs in total were identified, individuals that were neither Muslim nor Yadav were randomly drawn to fill the position.

Seasonal migration is common in the survey area and the electoral rolls contain errors (e.g. listed individuals may be duplicates or have moved and registered at another polling station without being deleted from the list at the previous station). Therefore, randomly drawn backup respondents were also identified for each primary respondent. In the final sample, 36.6 percent of respondents were from the primary sample, 22.6 percent were the first backup, 14.6 percent were the second backup, 11.2 percent were the third backup, and 15 percent were fourth backup or higher. These rates of replacement are similar to those of other surveys in the region which identified respondents based on the electoral roll (Banerjee 2014). The rate of primary versus backup respondents does not differ significantly by whether the polling station is mixed versus homogeneous team. The consent rate among located respondents was very high, with more than 98.5 percent of individuals agreeing to participate. If an individual indicated that they did not go to the polling station to attempt to vote on election day, the next backup individual was then substituted.

Election officers survey

A total of 6,251 officers served at polling stations during the 2014 election in the district in which the survey was conducted. Out of these officers, 6,045 had phone numbers listed in the administrative data which were not obviously incorrect (i.e. having the wrong number of digits or all zero numerals). Of these 6,045 individuals, 614 officers were inferred as Muslim or Yadav. Each of these individuals was attempted to be reached by phone. One non-Muslim/Yadav officer was randomly selected for calling from each of the mixed composition teams of which the previous 614 Muslim/Yadav officers were a member. If the officer could not be reached or did not consent, another non-Muslim, non-Yadav officer was selected as a replacement, if possible. An additional 600 homogeneous polling teams were randomly chosen and an officer from within the team was randomly selected. Again, if the officer could not be reached or did not consent, another officer was selected as a replacement, if possible. A total of 2,350 officers were called in total. In 30 percent of instances the individual was not reachable (in the vast majority of cases due to the listed phone number not being functional). Willingness to participate was very high among the officers who were reachable, with only 2 percent (33) of officers not consenting to be surveyed in the future. Calling yielded 380 mixed team polling stations with at least one M-Y officer and non-MY officer each confirmed as consenting and 436 homogeneous polling stations with at least one officer

confirmed as consenting, from which 305 mixed team and homogeneous pollling stations each were randomly selected as described in the main text.

Counterfactual calculation details

The total estimated effect on the RJD-BJP vote share margin of shifting to a mixed composition polling team is the sum of the within-station effect and the cross-station spillover effect multiplied by the number of neighbor polling stations, adjusting for the sub-constituency level of voter identity card coverage, ID_c. Using available sub-constituency-level administrative data for the entire state of Bihar, I calculate the average number of neighbors for a polling station in each sub-constituency, N_c. Taking the coefficients from a modified version of equation (3) allowing for heterogeneity by identity card coverage, estimated on the sample districts for which I possess officer assignment information:

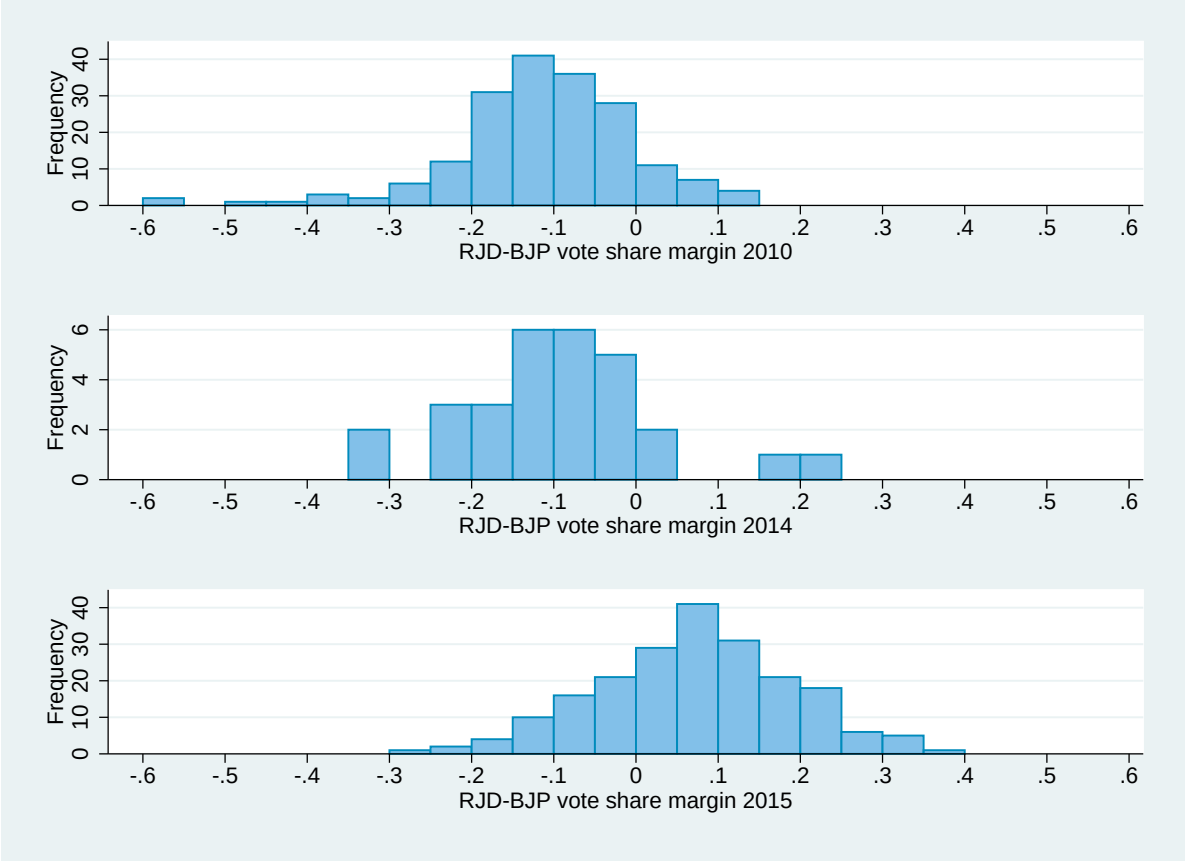
$$Y_{pc} = \mu_c + \theta_o + \beta Mixed_{pc} + \gamma T_{pc} + \phi N_{pc} + \beta_2 \left[Mixed_{pc} * ID_c\right] + \gamma_2 \left[T_{pc} * ID_c\right] + \phi_2 \left[N_{pc} * ID_c\right] + \mathbf{X'_{pc}}\lambda + \epsilon_{pc}$$

the impact of a change of magnitude, X, in the proportion of mixed polling stations in a sub-constituency can be estimated as $X * [(\beta + \gamma * N_c) + (\beta_2 + \gamma_2 * N_c) * ID_c]$. While I do not observe the actual baseline proportion of mixed teams outside of my sample area, the value of X needed to change the outcome of the race between the RJD and BJP coalitions can be calculated using the formula above together with the constituency level margins of victory. When calculating impacts at the parliamentary constituency level, I take a weighted average (based on number of polling stations) across the sub-constituencies within that parliamentary constituency. The impacts of alternative team composition scenarios can then be assessed based on the range within which one assumes the baseline proportion of mixed team polling stations in each constituency falls. I assume that the baseline proportion in all sub-constituencies is the same as that in the observable sample, 0.324.

Figure A1: Example of polling officer team during election day proceedings

Figure A2: Example of government-issued voter identity card

Figure A3: Example of neighboring polling stations in close proximity



Notes: Figure plots the distribution of the vote share margin between the RJD and BJP coalitions in Bihar, for the 185 of 243 races where these two coalitions fielded the top two candidates in the 2010 state assembly elections, the 29 of 40 races in the 2014 national parliamentary elections, and the 206 of 243 races in the 2015 state assembly elections.

Figure A4: Distribution of coalition vote share margins

Table A1: Cross-position balance

	Presiding officer (1)	Polling officer 1 (2)	Polling officer 2 (3)	Polling officer 3 (4)	Polling officer 4 (5)
Muslim/Yadav presiding officer		-0.007	0.007	-0.005	-0.018
		(0.014)	(0.014)	(0.014)	(0.029)
Muslim/Yadav polling officer 1	-0.007		-0.001	-0.019	-0.015
	(0.012)		(0.013)	(0.013)	(0.027)
Muslim/Yadav polling officer 2	0.007	-0.001		0.013	-0.009
	(0.014)	(0.014)		(0.015)	(0.026)
Muslim/Yadav polling officer 3	-0.004	-0.019	0.012		-0.020
	(0.013)	(0.012)	(0.014)		(0.029)
Muslim/Yadav polling officer 4	-0.016	-0.014	-0.009	-0.017	
	(0.026)	(0.030)	(0.031)	(0.025)	
Observations	5,561	5,561	5,561	5,523	1,178

Notes: Each column reports coefficients from an OLS regression where the outcome is Muslim/Yadav assignment to the specified position, and is regressed on dummies for Muslim/Yadav assignment to the other polling officer team positions specified in table. Additionally included are sub-constituency and number of officer fixed effects. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table A2: Position- and number-specific impacts on voting outcomes

	Vote share margin RJD-BJP (1)	Ln votes RJD (2)	Ln votes BJP (3)	Ln total votes (4)
Panel A. Position				
Muslim/Yadav presiding officer	0.007	-0.004	-0.016	-0.013
	(0.020)	(0.052)	(0.043)	(0.018)
Muslim/Yadav polling officer 1	0.031*	0.087*	-0.014	0.017
	(0.019)	(0.049)	(0.037)	(0.011)
Muslim/Yadav polling officer 2	0.021	0.049	-0.064	0.003
	(0.020)	(0.052)	(0.044)	(0.014)
Muslim/Yadav polling officer 3	0.037*	0.056	-0.086**	-0.001
	(0.019)	(0.050)	(0.040)	(0.019)
Muslim/Yadav polling officer 4	0.042	0.103	-0.004	0.005
	(0.087)	(0.189)	(0.170)	(0.033)
F-test p-value: equality of coeffs.	0.822	0.757	0.617	0.567
Observations	5,293	5,276	5,290	5,293
Panel B. Number				
Any Muslim/Yadav officer	0.027**	0.055*	-0.046**	0.002
	(0.011)	(0.028)	(0.022)	(0.008)
Multiple Muslim/Yadav officers	-0.024	-0.061	0.040	-0.010
	(0.024)	(0.061)	(0.053)	(0.018)
Observations	5,549	5,535	5,535	5,549

Notes: All columns in Panel A report OLS estimates from regressions at the polling station level of the listed variable on indicators for Muslim/Yadav presence in each polling party position, conditional on there being 1 or fewer total MY officers at the polling station. All columns in Panel B report OLS estimates from regressions at the polling station level of the listed variable on indicators for the degree of Muslim/Yadav presence. Additionally included in all regressions are sub-constituency and number of officer fixed effects and controls for the log number of registered voters at the polling station and the Muslim/Yadav and female shares of registered voters *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table A3: Heterogeneity in impacts of team composition by electorate composition

	Vote share margin RJD-BJP (1)	Ln votes RJD (2)	Ln votes BJP (3)	Ln total votes (4)
Mixed team	0.018	0.039	-0.023	0.002
	(0.014)	(0.037)	(0.027)	(0.010)
Mixed team * Muslim/Yadav registered voter %	0.0003	0.001	-0.001	-0.000
	(0.0005)	(0.002)	(0.002)	(0.000)
Muslim/Yadav registered voter %	0.015***	0.030***	-0.029***	-0.000
	(0.000)	(0.001)	(0.001)	(0.000)
Observations	5,552	5,535	5,549	5,552

Notes: Each column reports OLS estimates from regressions at the polling station level of the listed outcome on indicators for mixed team composition, interacted with a continuous measure of the polling station level proportion of registered voters that are Muslim or Yadav. Additionally included are sub-constituency and number of officer fixed effects and a controls for share female registered voters and log total registered voters. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table A4: Cross-station spillovers - extended range

	Vote share margin RJD-BJP (3)	Ln votes RJD (1)	Ln votes BJP (2)	Ln total votes (4)
Panel A. Buffer radius				
Number mixed team neighbor stations	0.026***	0.024	-0.049**	-0.001
	(0.010)	(0.026)	(0.020)	(0.008)
Number mixed team stations within 0.25km	-0.006	0.012	0.013	-0.003
	(0.009)	(0.026)	(0.014)	(0.007)
Number mixed team stations within 0.25-0.75km	-0.003	-0.006	0.005	0.001
	(0.004)	(0.009)	(0.008)	(0.002)
Mixed team composition	0.033**	0.062**	-0.060***	-0.001
	(0.011)	(0.028)	(0.022)	(0.008)
Total neighbor stations	-0.021***	-0.028**	0.027***	-0.011***
	(0.005)	(0.013)	(0.010)	(0.003)
Total stations within 0.25km	-0.007**	-0.028**	0.007	-0.006**
	(0.003)	(0.011)	(0.006)	(0.003)
Total stations within 0.25-0.75km	-0.003*	0.001	0.007***	0.001
	(0.001)	(0.004)	(0.003)	(0.001)
Observations	5,090	5,074	5,087	5,090
Number locations	3,307	3,307	3,307	3,307
Panel B. Village boundaries				
Number mixed team neighbor stations	0.047**	0.067	-0.109***	0.012
	(0.019)	(0.054)	(0.041)	(0.011)
Number mixed team stations within village	0.010	-0.017	-0.044	-0.003
	(0.016)	(0.039)	(0.029)	(0.007)
Number mixed team stations in neighboring villages	0.009	0.007	-0.020*	0.004
	(0.006)	(0.013)	(0.011)	(0.003)
Mixed team composition	0.037**	0.083**	-0.070**	0.010
	(0.015)	(0.038)	(0.031)	(0.010)
Total neighbor stations	-0.044***	-0.037	0.102***	-0.001
	(0.012)	(0.033)	(0.026)	(0.010)
Total stations within village	-0.004	0.016	0.016	-0.000
	(0.007)	(0.019)	(0.013)	(0.003)
Total stations in neighboring villages	-0.004*	0.001	0.011**	0.000
	(0.002)	(0.005)	(0.004)	(0.001)
Observations	3,212	3,196	3,210	3,212
Number villages	1,247	1,247	1,247	1,247

Notes: Each column within a panel reports OLS estimates from a regression at the polling station level of the listed variable on an indicator for mixed team composition. Each regression includes sub-constituency and number of officer fixed effects and controls for log total registered voters and shares Muslim/Yadav amd female registered voters. Neighbor stations are those within the same building/compound of a given polling station. Stations within 0.25 and 0.25-0.75km are non-neighbor stations within the stated distance of a given polling station. Numbers of stations within a village and in neighboring villages are the numbers of non-neighbor polling stations within the same village as a given station and in villages adjacent to a given station's village. Panel A is restricted to stations matched to the dataset of station GPS locations. Panel B further excludes stations in the top 1 percent of villages in terms of number of stations contained within, or their neighboring villages. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.

Table A5: Type-specific impacts of officer identity on voting outcomes

	Vote share margin RJD-BJP (1)	Ln votes RJD (2)	Ln votes BJP (3)	Ln total votes (4)
Any Muslim officer	0.023**	0.050*	-0.034	0.011
	(0.012)	(0.030)	(0.024)	(0.008)
Any Yadav officer	0.044**	0.070	-0.100**	-0.033
	(0.022)	(0.057)	(0.044)	(0.025)
Muslim/Yadav registered voter %	0.015***	0.031***	-0.030***	-0.000**
	(0.000)	(0.001)	(0.001)	(0.000)
Female registered voter %	0.002	-0.015***	-0.006	0.007***
	(0.002)	(0.006)	(0.004)	(0.002)
Ln total electors	-0.068***	1.003***	1.197***	0.936***
	(0.024)	(0.062)	(0.050)	(0.019)
Homogeneous team mean	-0.181	4.451	5.143	6.180
Observations	5,293	5,276	5,290	5,293

Notes: All columns report OLS estimates from regressions at the polling station level of the listed variable on indicators for Muslim and Yadav presence, conditional on there being 1 or fewer total Muslim/Yadav officers at the polling station. Additionally included are sub-constituency and number of officer fixed effects and controls for Muslim/Yadav and female shares of registered voters and log total registered voters. *Significant at 10 percent. **Significant at 5 percent. ***Significant at 1 percent.