Something to Complain About: How Minority Representatives Overcome Ethnic Differences*

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This Version: January 9, 2020

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JOB MARKET PAPER

Ethnic diversity adversely impacts public good provision, disproportionately affecting minority communities. While political representation could mitigate these effects, successful delivery of public goods often depends on how well minority and majority representatives collaborate. Using data from over 100,000 local politicians in India, we show that ethnic differences cause breakdowns in collaboration. We use a regression discontinuity (RD) design to show that delivery of public goods suffers when ethnic minority (low caste) representatives govern under non-minority (non-low caste) representatives. We then study an institutional innovation that can increase collaboration. In our setting, local politicians can issue complaints to the higher bureaucracy under a formal complaints technology. We show that ethnic minority representatives file over twice as many complaints when exogenously paired with non-minority representatives. Does filing complaints improve public good provision? We run a large field experiment involving 1629 minority representatives in which we randomize offers to file complaints on their behalf regarding project implementation. Our intervention increases filing of complaints by 41 p.p and implementation of public works projects by 24%, accounting for 60% of the initial gap in provision. Treatment has positive spillovers on neighboring jurisdictions. Our results are consistent with a Nash bargaining model featuring two politicians bargaining over project implementation in a setting with a costly complaints technology.

*We are grateful to officials in the Government of Bihar. This paper would not have been possible without the excellent research support offered by Chanchal Kumar Singh, Bhanu Shikha, Manasi Rao and Suraj Kumar at the IDFC Institute. Sharan is indebted to his advisers Abhijit Banerjee, Emily Breza, Asim Khwaja and Gautam Rao for advice and constant encouragement. We thank Apurva Bamezai, Moya Chin, Siddharth George, Parikshit Ghosh, Himanshu, Siddharth Hari, Varun Kapoor, Asad Liaqat, Kunal Mangal, Santhosh Mathew, Abhiroop Mukhopadhyay, Niranjan Rajyadhyakhsha, Kalyani Raghunathan, Sanjay Sahni, Tanmay Shukla, Niharika Singh, Dipa Sinha, Arvind Subramanian, Rohini Somanathan, Meghna Yadav and several seminar participants at Harvard and the Delhi School of Economics for many helpful comments. We thank the Rockefeller Foundation, the IDFC Institute and Weiss Family Foundation for the financial and operational support that made this study possible.

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1 Introduction

A vast literature argues that ethnic divisions adversely affect local public good provision (Alesina et al., 1999). Members of ethnic minority groups may be more acutely affected by reduced public good supply. They are, for instance, less able to capture the limited public goods on offer (Mansuri and Rao, 2004) and less likely to be able to access private substitutes (Anderson, 2011). Political representation for minorities, often through explicit quotas, is one instrument used to achieve a more equitable allocation of state resources (Pande, 2003). However, given that quotas explicitly prevent non-minorities from contesting elections, they are only feasible in a small share of jurisdictions for short periods of time. Furthermore, even when in government, representatives must often collaborate across administrative tiers to effectively deliver public goods (Khemani, 2007). Collaboration could break down when ethnic divisions are severe.

In this paper, we study how public good provision is affected when ethnically different politicians across two tiers of local government have to collaborate. Using a natural experiment (a Regression Discontinuity Design), we show that lower-tiered representatives from minority groups deliver fewer public goods when their upper-tiered representative is from a non-minority group. Minority group representatives respond by issuing complaints against their superiors using a formal complaints technology. The fact that these complaints are costly suggests significant breakdowns in collaboration between politicians. We then run a large field experiment involving 1629 minority representatives and demonstrate that the formal complaints technology is extremely effective in fixing politician incentives and that complaint filing increases public good provision. Together, these results make two key contributions: first, they provide evidence on a mechanism through which ethnic differences affect public good provision; second, they show that a formal complaints technology can mitigate these negative effects.

This paper is set in the Indian state of Bihar, whose local administrative structure comprises over 8400 Gram Panchayats (GPs –"village councils"), which are further divided into wards (13.6 per GP, on average). Both Gram Panchayats (GPs) and wards are represented by elected politicians[1], who we will simply refer to as "upper-tiered" (GP) and "lower-tiered" (ward) representatives. The ethnic differences we focus on are along caste lines and our main minority caste groups are "Scheduled Castes" (SCs). SCs are a collection of heterogeneous sub-castes[2] who occupy the bottom rung of the caste hierarchy and have historically experienced the most discrimination. Comprising about 17% of the entire population of the state and rarely forming the majority of persons in the GP, SCs are too marginalized to be elected as upper-tiered representatives in the absence of political

[1] These elections are non-partisan by law.

[2] While this paper focuses on SCs and non-SCs, both these broad groupings comprise within them many sub-castes, each with their (mostly unique) place in the caste hierarchy.

"reservation" (quotas). On the other hand, given that wards are both small (225 households, on average) and segregated along caste lines, SC-majority wards are not uncommon and often elect lower-tiered SC representatives. The overwhelming majority (over 80%) of lower-tiered SC representatives govern under a non-SC upper-tiered representative.

We study a set of key water and sanitation (WAS) public goods.[3] These public goods are created under a government scheme that funds construction across all wards over a three year period (2017-2020). We focus on these for three reasons: First, allocations are determined by a fixed set of rules mandated by the (non-local) government. This implies that all our results abstract away from preferences or rivalries over which wards should get which goods and when; Second, the allocation rule designed by the government prioritizes SC wards since they have a greater need for these public goods; Third, implementation necessitates explicit collaboration between politicians across the two tiers of local government. Funds for WAS schemes from the state's treasury reach the lower-tiered representative through the upper-tiered representative. In addition, the upper-tiered representative plays a role in overseeing project allocation across wards.

To answer our first question, whether caste differences lower public good provision, we exploit the algorithm used to reserve upper-tiered representatives' seats for Scheduled castes (SCs). This population-based rule mandates that GPs with SC populations above a threshold will only have SC upper-tiered representatives. In practice, GPs just above the population threshold are 80 percentage points (p.p) likelier to be reserved than those marginally below. By focusing on wards governed by lower-tiered SC representatives on either side of the threshold, we can causally measure the impact of caste differences between tiers of government on outcomes[4] using a fuzzy regression discontinuity (RD) design framework.

Our first finding is that caste differences worsen public good provision in jurisdictions governed by lower-tiered SC representatives. In particular, projects in SC wards are delayed and face implementation related hurdles. We measure WAS outcomes using an administrative dataset of over 98,000 ward-level public goods constructed across the state of Bihar during the first two years of the scheme being in place (March 2017 - March 2019). We show that caste differences cause 29% fewer WAS projects in year 1 for SC wards. While this gap reduces somewhat by the end of year 2,[5] it remains large (27%) and significant for those sub-castes among SCs who are at the bottom of the caste hierarchy.[6]

[3] The WAS assets are (i) laying of drains and village roads (ii) piped water connections to households.

[4] To be clear, SC wards from GPs that are above the threshold are extremely likely to have no caste differences and those from GPs below the threshold will almost always have differences.

[5] There is a 12% gap overall in total projects undertaken, but the effects are imprecise.

[6] Within each GP, we identify the socioeconomically weakest SC representative using a wealth score generated for the representative's sub-caste based on data on (nearly) every household in the GP. Kumar and Sharan (2019) show that this wealth score correlates strongly with caste hierarchies.

We complement this finding with two additional pieces of evidence based on primary surveys of representatives in wards around the RD threshold. First, when asked about projects implemented in their wards, SC representatives with non-SC upper-tiered representatives report more obstacles[7] while undertaking WAS projects. They are 18 percentage points (41%) likelier to name the upper-tiered representative as the main impediment to their effective functioning. Second, when projects are not undertaken, SC representatives are *more* likely to blame the upper-tiered representative for non-implementation.[8] Reversing roles does not have the same effect: when the upper-tiered representative is SC, non-SC wards do not suffer. This indicates that ethnic differences exacerbate inequality, with disadvantaged caste groups being most likely to be denied public goods by non-minority group upper-tiered representatives.

We then turn to a new institutional innovation which has the potential to mitigate the adverse effects of caste differences: a formal complaints technology. The Bihar Right to Public Grievance Redressal Act (BPGRA)[9] was passed in 2016 and gave every citizen a right to resolution of a wide range of complaints – officially called "grievances" – against the local state in a time-bound manner. Two features of the system are important to note here. First, because the system is new, its penetration is low: only 25% of lower-tiered SC representatives have heard of it and can answer basic questions about the formal complaints technology correctly; Second, complaint filing is costly for most lower caste persons, since it chiefly involves making multiple trips to a distant complaint resolution centre.[10]

Our second finding is that caste differences cause lower-tiered SC representatives to file more complaints pertaining to WAS project implementation. To arrive at causal estimates, we use the assignment algorithm that exogenously varies the upper-tiered representative's caste and compare complaint filing rates on either side of the population threshold. While governing under non-SC representatives, lower-tiered SC representatives file twice as many complaints regarding WAS public goods.[11] This provides strong evidence that one recourse for lower-tiered SC representatives is the formal complaints technology. On the other hand, exactly in line with our project implementation

[7] They are likelier to report that the project is actually incomplete, that there were significant delays in starting projects and that they had less control over where the project would happen.

[8] Moreover, using an entirely different causal empirical strategy – a close election regression discontinuity design based on narrow elections between two upper-tiered representatives of different sub-castes – we show that non-SC upper-tiered representatives discriminate along sub-caste lines too. Wards are more likely to report no projects being undertaken at the end of year 2 when an upper-tiered non-SC representative is paired with a lower-tiered representative from a different sub-caste.

[9] This is the government website for the BPGRS: http://lokshikayat.bihar.gov.in/AboutUsEn.aspx. A copy of the Act is here: http://lokshikayat.bihar.gov.in/PdfFiles/ACTS%20BPGRA.pdf.

[10] On average, the travel costs to file a complaint amount to 75% of the minimum unskilled wage. One must add the opportunity cost of time to calculate the full costs of complaining. Anecdotally, low caste representatives say it takes an entire day to travel to the complaints' centre and file a complaint. Complainants make multiple trips to the centre to attend three-person "hearings" involving the departmental bureaucrat responsible for providing the service, a Public Grievance Redressal Officer (a judge-like figure) and the complainant.

[11] They also file more complaints concerning local administrative problems and issues related to their wards.

results, lower-tiered non-SC representatives do not complain more under upper-tiered SC representatives. The asymmetric nature of these results strongly suggests the role of caste hierarchies in determining how divisions affect collaboration.

Does filing complaints change incentives[12] of upper-tiered representatives and improve WAS public good provision? We conduct a large field experiment across 1629 lower-tiered jurisdictions from GPs whose total population is nearly 15 million.[13] Given the low penetration of the system, our main treatment arm provides information regarding the formal complaints technology *and* offers to file complaints regarding WAS project initiation on behalf of randomly selected lower-tiered SC representatives.[14]

The formal complaints technology is extremely effective and significantly improves WAS public good provision. There exists significant demand for the formal complaints technology: official data on complaints shows an increase of 41 p.p in complaints filed in treated wards in the post-intervention period.[15] Our endline survey – conducted 3-4 months after complaints were filed – shows an additional 6 p.p (24%) increase in WAS projects being undertaken in treated wards.[16] Treated representatives are also more likely to report that the main problem preventing projects from being undertaken had been resolved. The effect sizes are sufficient to account for 60% of the impact of caste differences in year 1 and could potentially close whatever remains of the gap in year 2. Back-of-the-envelope calculations suggest that the intervention is highly cost-effective, costing 2.5 cents for every dollar's worth of public goods provided.

The treatment has positive spillovers on complaint filing and increases project initiation in neighboring jurisdictions.[17] Our endline survey of 945 neighboring wards where projects had not been undertaken indicates an 8 p.p (40%) increase in project initiation for neighbors of treated wards when compared to neighbors of control wards. Only 2.5 p.p of these representatives actually file complaints. The discrepancy between complaints filed and project initiation in neighboring wards suggests that the mere threat of a formal complaints technology could cause project initiation.

What then are the barriers to greater adoption of the new formal complaints mechanism? We conduct a smaller experiment where we treat lower-tiered SC representatives with information only,

[12] Other politician-level incentives could also mitigate the extent of under-provision of public goods in ethnically different jurisdictions. We show that upper-tiered representatives who win with relatively smaller margins collaborate equally with representatives across ethnic groups.

[13] This study is registered in the AEA RCT Registry and the unique identifying number is: AEARCTR-0004308.

[14] Complaint filing is done online and instantaneously.

[15] The patterns in take-up in our experimental wards line up nicely with our previous results: wards with caste differences within the RD bandwidth are more likely to accept our offer to file complaints on their behalf.

[16] This further rises to 11 p.p (33%) if we extend project initiation to include projects starting in the week of the survey.

[17] To calculate spillovers, we restrict attention to GPs with exactly one treated or one control ward (75% of our sample GPs).

but do not offer to file complaints (N = 271). Information alone improves complaint filing rates by 7 p.p.(much lower than the 41 p.p increase caused by the filing assistance treatment above). This result suggests that the main constraint to complaint filing is not information and that adoption would increase significantly with some form of mediation (Gupta, 2017), a reduction in transaction costs or improving beliefs in the efficacy of the state.

We develop a simple theory of collaboration between politicians that is consistent with our main findings. The setup involves two players, an upper-tiered and a lower-tiered representative engaging over multiple stages. The objective is to collaborate and implement a project that generates a surplus. Collaboration involves committing to put in some initial sunk effort to set up the project. If both players commit, collaboration occurs and they bargain over and split the surplus. Caste differences increase effort costs of collaboration of the upper-tiered non-SC representative. This is consistent with documented evidence of the significant negative stereotypes non-SCs have about the SCs (Chauchard, 2014), including the notion that SCs are "polluting" and "untouchable".[18] In the absence of collaboration, a lower-tiered representative can choose to file a costly complaint that triggers collaboration with a non-zero probability and imposes sanctions on the upper-tiered representative. This setup is sufficient to explain our main empirical findings: (i) caste differences reduce collaboration (by adding to initial effort costs) (ii) caste differences result in more complaints (iii) a formal complaints technology increases collaboration. The model predicts that this increase is the outcome of two mechanisms: first, a "threat" mechanism driven by the fact that non-collaboration could cause complaints; second, a "direct" mechanism where a complaint is filed and the formal complaints technology rules against the upper-tiered representative, thus forcing the upper-tiered representative to collaborate.

Our results contribute to the literature on how ethnic diversity affects public good provision by suggesting a mechanism through which this occurs. Alesina et al. (1999) show a negative correlation between share of public spending and ethnic fragmentation in U.S cities.[19] While several papers investigate this claim,[20] the literature on causal mechanisms is scarce. In this paper, we provide evidence for one causal mechanism: the inability of ethnically diverse elected representatives to collaborate and provide public goods.[21]

Two other bodies of literature have provided explanations for the uneven provision of public goods. First, the literature on political misalignment across tiers of government (Brollo and Nannicini

[18] Indeed, nearly 47% of households in Bihar report practising some form of untouchability against SCs (Desai and Vanneman, 2015).

[19] Banerjee and Somanathan (2007) perform a similar exercise for data from India and find broadly similar results.

[20] Prominent papers in the literature include Alesina et al. (2004), Miguel and Gugerty (2005), Khwaja (2009) among others. Banerjee and Pande (2007) argue that ethnic factionalization can positively affect outcomes by improving politician quality because dominant group elected representatives have lesser competitive advantages.

[21] This is especially true in settings where the diversity comes with its own hierarchies – like caste in South Asia or race in America.

(2012), Asher and Novosad (2017)).[22] Second, the vast literature on clientelism and coethnic favoritsm (Pande (2003), Munshi and Rosenzweig (2015) Lehne et al. (2018)).[23] This paper identifies a simple, novel mechanism – a formal complaints technology – that is very effective in mitigating the problem of inequitable provision documented by both these bodies of work.

Our work also speaks to a related literature documenting the positive impact of political representation in favor of minorities (Besley et al. (2004), Duflo (2005), Kumar and Sharan (2019) Dunning and Nilekani (2013)) by suggesting that one way outcomes change is through the improved ability of tiers of minority representatives to collaborate with others in government who are like them.

Finally, our paper contributes to the literature in organizational economics studying diversity within teams of workers (Bandiera et al. (2013), Marx et al. (2017)). A closely linked paper is by Hjort (2014), who shows that upstream workers in a firm in Kenya discriminate against non-coethnic downstream workers and that introducing "team-pays" can fix incentives. Our paper shows that where financial incentives are not feasible,[24] a formal complaints technology could be used to overcome ethnic biases and fix collaboration incentives.[25]

Our findings are also of relevance to policymakers. Our results show that ethnic quotas could be particularly potent when they are applied across tiers of government, since collaboration with others plays a key role in project implementation. Among the various tools being designed to increase transparency and accountability in government, formal complaints technologies are increasing in prominence. For instance, over 200 American cities have designed portals where citizens can log in and file complaints.[26] Our results are in favor of designing these technologies to provide avenues for complaints not merely by citizens but also by members of the local state. This may prove beneficial in highly decentralized settings, particularly for members of ethnic minority groups.

The rest of the paper is organized as follows: Section 2 provides the context for the paper; Section 3 presents our model; Section 4 lists our secondary and primary datasets; Section 5 presents our first set of results on the impact of caste differences on WAS public good projects; Section 6 focuses on results on how caste differences affect complaint filing; Section 7 describes in detail our experiment; Section 8 concludes.

[22] Misalignment could affect outcomes negatively (Brollo and Nannicini (2012)), positively (Callen et al. (2018)) or more ambiguously (Sarkar (2019)). Asher and Novosad (2017) and Solé-Ollé and Sorribas-Navarro (2008) find overall negative effects, but Das and Sabharwal (2016) argue otherwise.

[23] Also, see: Bardhan et al. (2010).

[24] For instance, firms could be profit constrained.

[25] Prat (2002) uses team theory to assess impacts of diversity. Other empirical works include: Hamilton et al. (2003), Hoogendoorn and Van Praag (2012).

[26] The literature documents the presence of complaints systems across the developing world, in, for example, South Asia, Africa (Raffler, 2016) and Latin America (Trucco, 2017).

2 Background and Context

2.1 Caste Divisions

This section discusses the historical causes for the existence of caste-barriers and briefly describes the main minority caste-group, Scheduled Castes. It then surveys the literature on the prevalence of caste-barriers and its impact on a host of socioeconomic outcomes.

2.1.1 Historical Roots

For over two millennia, much of Indian society has been divided along caste lines. Caste is defined at birth and is usually based on the caste of the father. A defining feature of caste is the presence of strict hierarchies: the castes at the very top of the ladder have historically enjoyed (and indeed, continue to do so) great privileges in society, while those at the bottom are discriminated against, both socially and economically. Much of the laws that defined the nature of caste-based society for the Indian subcontinent were laid down in the *Manusmriti* (or the "Laws of Manu") - a text written around the dawn of the common era. The text, *inter alia*, classified society into for broad hierarchical groups[27] that subsumed the thousands of sub-castes that constituted Indian society. The text prescribed strict rules for engagement between classes and castes, codified discriminatory practices by specifying punishments for rule violations and crystallized hierarchical norms. Lower castes and upper-castes were forbidden from dining together. Inter-marrying across castes continues to be rare in modern Indian society. The more egregious practices include notions of "pollution" emanating from contact with lower-castes, including the slightest touch with even their shadows. Modern India's first (and greatest) scholar of caste, Dr B.R. Ambedkar described the *Manusmriti* thus: "There is no code of laws more infamous regarding social rights than the Laws of Manu. Any instance from anywhere of social injustice must pale before it." (Ambedkar (1936)).

2.1.2 Scheduled Castes (SC)

Those sub-castes that fell outside the four broad caste-groupings were the untouchables, which are now grouped into a heterogeneous whole referred to as the Scheduled Castes. A term that is increasingly commonly used for this grouping is "Dalits" (literally - "the oppressed"). Historically these groups could not own land, conduct trade or business, receive education, or buy or sell in

[27] These four groups, ranked by hierarchy, were the Brahmins (priests), the Kshatriyas (warriors), the Vaishyas (traders) and Shudras (workers and farmers).

markets. Though the Indian state abolished untouchability in 1950, SCs lag severely on several socioeconomic indicators even today (Banerjee and Somanathan, 2007). Summarizing the literature - primarily in economics - from the two-decades leading up to 2012 and looking specifically at material well-being across castes, (Deshpande, 2011) argues that while there exists substantial regional variation, there is no "reversal of traditional caste hierarchies".

2.1.3 Caste-Barriers in India/Bihar today

Caste barriers continue to persist in India today, a fact rigorously documented across several social science disciplines, including economics. A mere 11 % of marriages in Bihar, the setting for our study, are inter-caste. On the other hand, 47 % of respondents surveyed say that someone in their household practices untouchability (Desai and Vanneman, 2015). Caste-barriers continue to dictate labor-market outcomes (Deshpande (2011), Singh and Thorat (2014)) and labor-market opportunities, with resume-studies confirming the presence of discrimination, even in urban India (Thorat and Newman, 2007); caste-networks are seen as barriers to rural-urban migration (Munshi and Rosenzweig, 2016). (Lowe, 2018) presents evidence of considerable prejudice among youths towards non-caste matched peers and rigorously documents discrimination against lower-caste members.

2.2 Local Administrative Structure

Bihar's over 100 million strong rural population live in villages that are grouped into administrative units called Gram Panchayats (GP). There are over 8400 GPs in Bihar. Each GP is headed by an elected representative called the "Mukhiya". In this paper, we will refer to the Mukhiya as the upper-tiered representative.

Each GP is divided into wards. Each ward is headed by a ward member. We will refer to the ward member as the lower-tiered representative. There are over 114000 wards in Bihar. There are no GP-level permanent bureaucrats. The lowest permanent bureaucrat is posted at the Block Headquarters and is called the Block Development Officer (BDO). In this paper, we will refer to the BDO as the upper-tiered bureaucrat. There is one Block Headquarter for every 15.8 GPs.

The elections for both the upper-tiered and the lower-tiered representative posts were held simultaneously in May 2016. Bihar's upper-tiered representatives are much more powerful than their lower-tiered counterparts. An upper-tiered politician represents, on average, a population of 13300 persons; on the other hand, the lower-tiered representative is elected from a population of approximately 1000.[28] Local bodies are responsible for, among other things, the implementation of

[28]These are back-of-the-envelope extrapolations. The last estimates of GP populations are from 2010: 10953

a wide array of development projects, dispute resolution between citizens and representing their constituents' issues at higher levels. Within a GP, nearly all of this has been traditionally done by the upper-tiered representative Gupta (2002). Thus, in the local context, a typical lower-tiered representative is a political minority.

2.3 Devolution of Water and Sanitation (WAS) Schemes

In late 2016, the state government of Bihar devolved implementation of two major water and sanitation schemes to the lower-tiered representative. The two schemes, called "Nal Jal" [piped water for every household] and "Nali Gali" [construction of village roads and drains] formed key planks of the incumbent government's "seven-resolves"[29] to development. An estimated sum of 4 billion dollars have been allocated to the implementation of these schemes. Over 93 % of lower-tiered representatives surveyed report that these two schemes prove extremely beneficial to households in their jurisdictions.

2.3.1 Scope for Local Contestation

The decision to transfer implementation powers to the lower-tiered representatives constituted an important decentralization move. In one stroke, the implementing authority was brought significantly closer to the citizen, by a factor of 13.5. For the first time in Bihar's history, lower-tiered representatives had a direct say in spending of state funds. Each lower-tiered representative was responsible for spending an average sum of $30,000 over a span of four years.

As per the rules, wards are selected for WAS asset construction in a specific manner. First, wards are ranked in the descending order of Scheduled Castes and Scheduled Tribe (ST) population and projects are allocated in sequence. Once all wards with SC/STs are exhausted, the rest of the wards are arranged in descending order of total population and are then allocated projects. Thus, the rule biases allocation in favor of wards with large SC/ST populations and, more generally, large populations. Every year, the list of wards where projects need to be implemented is drawn up by the upper-tiered bureaucrat. Often, in practice, this is done together with the upper-tiered representative of the GP. Money for WAS schemes is transferred from the state to the GP account, handled by the upper-tiered representative. The upper-tiered representative then transfers the amount to the lower-tiered representative. The lower-tiered representative is to then identify where

persons per GP. Since there exist 13.5 wards per GP. the average ward population for 2010 can be esitmated to be 806 persons. The figures of 13300 and 1000 are arrived at by assuming population growth for the decade to be 22 %

[29]The seven resolves - or "7-Nishchay" - include: skill development programs for youth, reservation for women in government jobs, electricity in every house, piped water to households, local drains, construction of toilets and improving higher education

the asset has to be created, find a suitable contractor or liaise with the relevant department to organize construction of and monitor implementation of WAS assets.[30]

Thus, the main way in which the upper-tiered representative can interfere with WAS projects is in withholding funds for implementation (*funding*). Another less direct way would be to collaborate with the upper-tiered bureaucrat (the BDO) and manipulate the order in which wards are to be allocated projects (*selection*). The latter is, of course, slightly more tricky, since it would require the explicit cooperation of the BDO who is the authority in-charge of drawing up lists.

Caste differences not merely affect when a ward begins projects, it also affects *how* projects are undertaken. To better understand how projects are undertaken, we undertook audits of projects and interviewed 234 lower-tiered SC representatives via the phone. Both these sources confirm the sanctity of the administrative data: over 95 % of projects reported are independently verified through audits and interviews.

Contrary to *de jure* procedures, our surveys with lower-tiered representatives confirm that the upper-tiered representative plays a somewhat oversized role in WAS projects implementation. In about 12 % of the cases, the upper-tiered representative is reported to be the sole implementing authority - clearly violating administrative rules. Furthermore, even when the lower-tiered representative claims they are the main implementing authority, less egregious violations occur. The upper tiered-representative (and the upper-tiered bureaucrat) have a disproportionately large say in ward-level opening of bank accounts, hiring contractors to construct the asset and, to a lesser extent, making payments to the contractor. Moreover, interactions with lower and upper-tiered representatives in focus-groups, interviews with district and state-level bureaucrats suggest that these numbers are biased downwards and that upper-tiered representatives have an even larger role to play than what is reported.

About 50 % of lower-tiered representatives report facing trouble while implementing WAS projects. Over half of those who face obstacles report that the upper-tiered representative or the bureaucrat are the main impediments to effective functioning.

2.4 Formal Complaints Technology

In 2016, the government of Bihar successfully passed the Bihar Right to Public Grievance Redressal Act (BPGRA) that gave every citizen the right to "redressal" (resolution) of any "grievance" (complaint) filed across 44 different departments of the state. Crucially, the Act mandated the creation

[30]This is not entirely true: for a third of the wards, the piped water scheme is being implemented by the Public Health Engineering Department (PHED). This is because these wards are seen to have problems with ground-water quality. There was, however, some confusion over PHED's role for much of 2017-18 and some parts of 2018-19.

of 102 posts for Public Grievance Redressal Officers (PGRO). Each district, on average, had about 2.5 PGROs who were tasked with the duty of hearing and resolving citizens' grievances. In these hearings, the complainant presented their grievance in the presence of the concerned departmental bureaucrat.The PGRO's job was to determine the validity of the grievance and, once determined as permissible to be acted upon under the law, ensure the grievance is disposed off within 60 days.[31]

Filing and following up on complaints is not costless. Over three-quarters of complaints are filed in person at the PGRO's office. Subsequently, the process of redressal involves making multiple trips to the PGRO's office to attend hearings. There is one PGRO for every 5.23 Blocks, 84.6 GPs and 1120 wards. Thus, the average complainant has to travel a considerable distance to ensure their cases are heard.[32] Our survey evidence suggests that travel and food alone cost INR 140 per hearing. There are, on average, 2.5 hearings per complaint. In addition to this, there are opportunity costs of attending hearings. Complainants we spoke to say that attending hearings takes up a whole day. Figure A1 shows a sharp drop in the likelihood of complaints as distance to the PGRO's office increases.

In the first three years of its functioning, over 500,000 grievances have been filed. PGROs are empowered to punish errant departmental bureaucrats with fines upto INR 5000 ($70). Inayat Anaita (2019) notes that the law is not only the first of its kind - awarding citizens with a right to redressal of their grievance - but is also "a fairly strong law that is being administered with political and bureaucratic will". A study conducted by the IDFC Foundation in collaboration with the government of Bihar finds that, on average, a third of the grievances are redressed. The government's own estimates are, however, close to 90 %. In either case, complainants report high satisfaction rates, at nearly 75%.

3 A Simple Theory of Collaboration Breakdowns & Formal Complaints Systems

In this section, we develop a simple model to examine (i) the nature of collaboration across representatives (ii) breakdowns caused by ethnic barriers and (iii) the role a formal complaints technology could play in affecting outcomes. The setup involves two players, an upper-tiered and a lower-tiered representative engaging over multiple stages. The objective is to collaborate to implement a project that generates a surplus. Collaboration involves some initial sunk effort (investment) to set up the project. If they both put in the effort investment, they bargain over the surplus with fixed weights.

[31] This time-limit has been relaxed in recent years.

[32] Recognizing this, the Government of Bihar has begun to mandate periodic hearings in the less distance "Block" Headquarters.

Caste barriers increases initial effort costs of representatives – especially for upper-tiered (upper-caste) representatives. The increase in effort costs could stem from the cost of overcoming inherent dislike/distaste of members of other (lower) castes. This could cause collaboration breakdowns. A formal complaints technology allows the lower-tiered representative to provide a costly signal regarding breakdowns in collaboration. Such a signal results in increased monitoring costs of the upper-tiered representative. However, this does not always result in collaboration: the system may not work perfectly. The presence of a formal complaints technology and the consequent threat of filing a complaint may be sufficient to make the upper-tiered representative want to collaborate. Thus, a complaint will only be filed if (a) it is cost-effective to do so (b) there is a collaboration breakdown caused by the upper-tiered representative (c) the threat of filing a grievance is insufficient to trigger collaboration. Since caste differences cause more breakdowns, more complaints are filed when there are differences.

3.1 The Environment

An upper-tiered representative, U and a lower-tiered representative L are collaborating to implement a project P. The surplus from implementing the project is τ^*.

Implementing the project involves some sunk effort costs e_j $(j = U, L)$ for each type of representative. Both players must commit to incurring this cost for collaboration to occur. Commitments are made in advance, but costs are incurred only if collaboration occurs. Costs are heterogeneous both across and within types. For type j, effort costs are drawn from a normal distribution $e_j \sim \mathcal{N}(\mu_j, \sigma_j)$ and $\mu_j > 0$. If both players choose to invest e_j, then the two players are involved in Nash bargaining in stage 2 with fixed weights δ and $1 - \delta$ for U and L respectively. The share of surplus derived from the second stage is u and v respectively (where $v = \tau^* - v$).

Caste differences Here, we model the explicit case where the upper-tiered representative is non-SC and the lower-tiered representative is SC. Caste differences (CM) add costs E to the effort costs e_U in stage 1 for the upper-tiered representative such that $e_U = \mathbb{1}\{CM = 1\} * E + e_U$.[33]

Formal Complaints System A formal complaints system allows the lower-tiered representative

[33]Here, we assume that caste differences impose no costs on the lower-tiered representative. This is a stricter assumption than what we would require for our results to go through. All we require is that differences impose greater costs on the upper-tiered representative than the lower-tiered representative and that the lower-tiered representative's costs of differences are sufficiently low. In practice, this assumption holds because of the caste hierarchy. Upper-tiered non-lower-caste representatives are much less likelier to want to collaborate with lower-tiered lower-caste representatives than the other way around. Other reasons for upper-tiered representatives facing greater costs include the fact that they could potentially collaborate with other partners, whereas the lower-tiered representative has to always collaborate with the upper-tiered representative. In the appendix section D, we discuss these assumptions in greater detail.

to provide a costly signal of breakdown. [34] The signal costs C.[35] When a complaint is filed, the upper-tiered representative faces increased monitoring costs M.[36] When a complaint is filed, collaboration occurs with probability p.[37]

We assume a setting of perfect information: all costs and parameters are known to both players as soon as they are revealed by nature. For simplicity, we assume risk-neutral preferences over payoffs here. Any increasing risk-averse utility functions would also generate the same results.

Timing

1. Effort costs of collaborating, e_U and e_L are revealed to both representatives. We assume that C, M, p and E are fixed and known to both players.
2. L commits to making the sunk effort investment e_L if collaboration occurs
3. U commits to making the sunk effort investment e_U if collaboration occurs
4. If there's no collaboration, L decides whether to file a complaint or not
5. If there is collaboration, both players incur e_U and e_L and proceed to nash bargain with fixed weights

Strategies U has to choose a pure strategy from the strategy set, $S_U = (\{\text{Collaborate, No Collaborate}\})$

L has to choose a pure strategy from the strategry set:

$S_L = (\{\text{Collaborate, Complain}\}, \{\text{Collaborate, No Complaint}\}, \{\text{No Collaborate, Complain}\}, \{\text{No Collaborate, No Complaint}\})$

A strategy profile $S = (S_U, S_L)$

Equilibrium We characterize nash equilibria by backward induction.

[34] A natural question that may arise is if upper-tiered representatives can also file complaints. In our setting, upper-tiered representatives do not use the technology to file complaints regarding breakdowns in collaborative projects. This is because, in contrast to the lower-tiered representative, the upper-tiered representative usually belongs to a powerful, traditional, political class of elites. They are also much more deeply embedded in the state machinery. So, we model a setting where the upper-tiered representative doesn't have the option to file complaints.

[35] Costs involve transaction and mediation costs of filing complaints, the opportunity costs of attending hearings etc.

[36] As per law, every complaint is subject to hearings. Irrespective of whether a complaint is legitimate or not, upper-tiered members of the state are called to hearings and are asked to present their side of the case. Thus, any complaint does increase scrutiny of the upper-tiered representative. This is captured by the parameter M.

[37] One interpretation of p is that it captures the quality of the local official tasked with resolving the complaint: the higher the quality, the likelier it is to ensure that the biased upper-tiered representative is forced to collaborate. Surveys of previously filed complainants and data from our experiment suggests that p is between 0.2 and 0.25.

3.1.1 Nash bargaining solution

In the nash bargaining stage, the two player optimize by solving for:

$$\begin{aligned} \max_{u,v}, \quad & (u)^{\delta}(v)^{1-\delta} \\ \text{s.t.}, \quad & u + v = \tau^* \end{aligned} \tag{1}$$

Solving for this, we have: [u*,v*] = $[\delta\tau^*,(1-\delta)\tau^*]$

Before we proceed to characterize the various equilibrium outcomes, note also that complaint-filing occurs only if it is not too costly for L. By filing a complaint after U has chosen not collaborate, L incurs an additional cost C. This triggers collaboration with probability p. In particular, for complaint filing to prove beneficial, we require:

$$\begin{aligned} & p * (e_L - (1-\delta)\tau^*) < C \\ \implies & e_L < (1-\delta)\tau^* - \frac{C}{p} \end{aligned} \tag{2}$$

Thus, there is an upper-bound on the effort-costs beyond which it is unprofitable for L to file complaints.

When it benefits L to file complaints in order to force collaboration, U's participation constraint slackens. To see this, consider U's payoffs to collaborating and not collaborating when L is likely to file complaints. When they collaborate, their payoff is: $e_U - \delta\tau^*$. Not collaborating, on the other hand, triggers a complaint being filed. So, their payoff is: $p * (e_U - \delta\tau^*) + M$. Comparing the two, we can derive the participation constraint for U under complaint filing:

$$e_U < \delta\tau^* + \frac{M}{1-p} \tag{3}$$

3.2 Outcomes

Collaboration could be an equilibrium outcome in 3 ways,[38] depending on effort costs of U and L. We describe them below:

[38] We assume that players do not play weakly dominated strategies in equilibrium.

3.2.1 ({Collaborate}, {Collaborate, No Complaint})

When equation 2 is not satisfied (complaint filing is too costly), but e_L is still below the surplus from collaboration, we will see collaboration if U benefits from collaborating. In particular, we require:

$$\begin{aligned} e_U &< \delta\tau^* \\ (1-\delta)\tau^* - \frac{C}{p} < e_L &< (1-\delta)\tau^* \end{aligned} \tag{4}$$

3.2.2 ({Collaborate}, {Collaborate, Complain})

Here, L's effort costs are low enough that it benefits them to file complaints if there is no collaboration. Knowing this, U's participation constraint slackens. For this to result in an equilibrium, we require:

$$\begin{aligned} e_U &< \delta\tau^* + \frac{M}{1-p} \\ e_L &< (1-\delta)\tau^* - \frac{C}{p} \end{aligned} \tag{5}$$

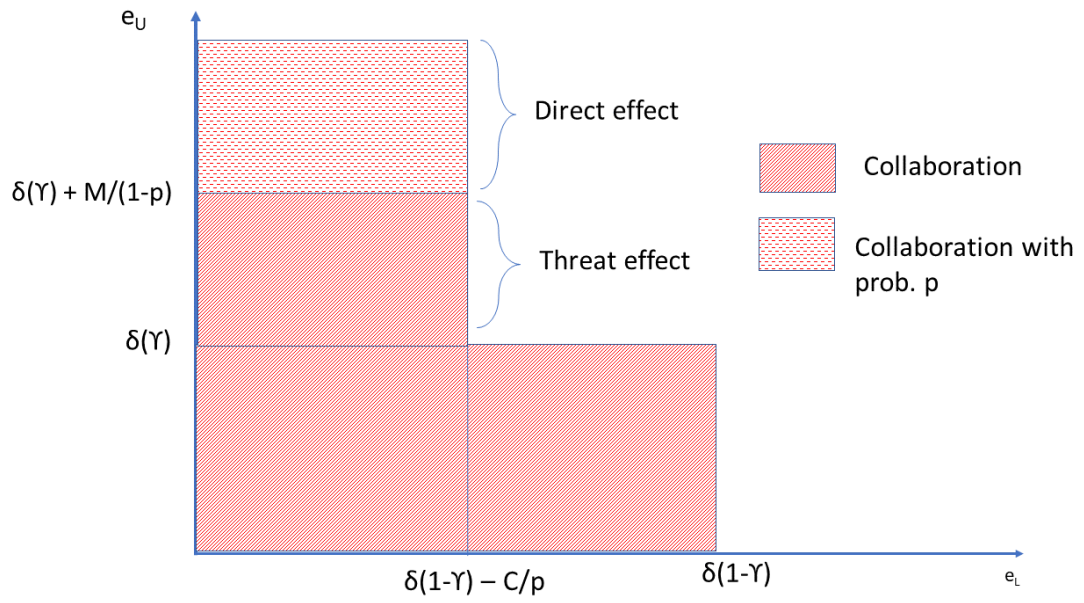
3.2.3 ({No Collaborate}, {Collaborate, Complain})

Here, collaboration is too costly for U. L files a complaint and collaboration occurs with probability p.

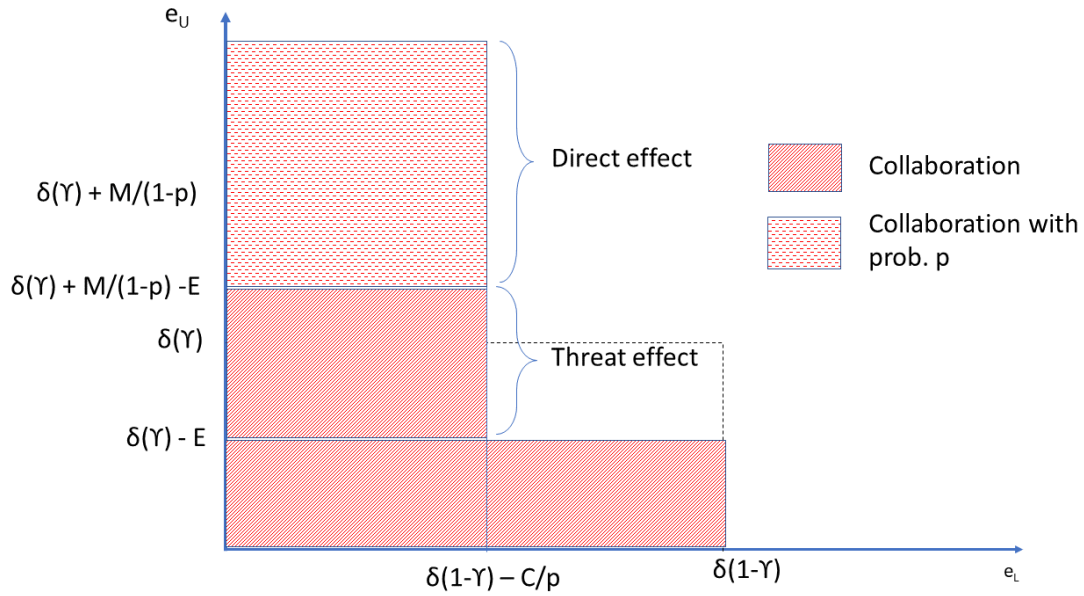
$$\begin{aligned} e_U &> \delta\tau^* + \frac{M}{1-p} \\ e_L &< (1-\delta)\tau^* - \frac{C}{p} \end{aligned} \tag{6}$$

3.2.4 Caste Differences

It is straightforward to see how caste differences make collaboration harder in this setting. Since it adds an additional cost E to U's initial effort costs, it manifests to tighten their participation



(a) Collaboration with Formal Complaints Technology



(b) Collaboration with Formal Complaints Technology and Caste Differences

Figure 1: Panel 1(a) shows how introducing the formal complaints technology expands the collaboration space from panel A3(a)'s baseline case. In particular, introduction of the technology expands the collaboration space in two different manners: first, a "threat" effect where the upper-tiered representative's constraint slackens because of the fear of filing complaints; second, a "direct" effect of filing a complaint and that triggering collaboration with probability p. Finally, panel 1(b) shows how the collaboration space from panel 1(a) shrinks somewhat because of caste differences. Collaboration is affected in two ways – first, for those lower-tiered representatives for whom the costs of complaining is too high, there is a direct negative impact on collaboration. For those for whom the costs make it worth complaining, we see that the threat effect shrinks and thus, complaining becomes more likely. Note that these are stylized representations and the actual effect sizes could vary depending on the various parameter values.

constraint, making them more likely to not want to collaborate. If complaint filing is not too costly for L, the breakdown caused by caste differences increases the likelihood of a complaint being filed.

Figure A3(a) visually plots the range of effort costs, e_U and e_L for which collaboration occurs and Figure A3(b) shows how caste differences affects outcomes.

3.3 Predictions

Our model makes the following 4 main predictions. For each prediction, we indicate the section of the paper where the empirical counterparts are shown.

1. Caste differences adversely impacts public good provision by increasing costs of collaboration (Section 5) . Increased caste differences implies reduced collaboration (Section 5.2.2).
2. Caste differences increases the likelihood of complaints being filed (Section 6). This is driven by cases where U doesn't collaborate because of caste differences and L's costs of filing complaints are sufficiently low.[39]
3. A formal complaints technology improves likelihood of collaboration in two ways (Section 7.3.4):
    - "Threat" mechanism: The mere threat of filing a complaint makes U more likely to collaborate. This 'threat effect is increasing in M and p i.e the monitoring costs the system imposes on U and the probability that the formal complaints technology triggers collaboration.[40]
    - "Direct" mechanism: By actually making U to collaborate via the system. Here, collaboration occurs with a probability p.
4. When costs of complaint filing C is reduced such that it is beneficial for L to file complaints (independent of whether it was beneficial *ex ante*) (Section 7):
    - More complaints are filed
    - More collaboration occurs, triggered by both the "threat" and the "direct" mechanisms

[39] In this simplified model, we assume that caste differences do not affect L's effort costs. We could relax that assumption to say that differences affect U's costs more than L and (L costs of differences are sufficiently low) we will still see more complaining under caste differences.

[40] This implies that a more effective formal complaints technology will induce greater collaboration but fewer complaints.

4 Data Sources

This project brings together multiple data sources, both primary and secondary in nature. All our secondary data sources, except for data from two rounds of the decennial census of India, are obtained from different administrative departments of the Government of Bihar. Our primary data sources are obtained via surveys of various local actors in the administrative machinery.

4.1 Secondary Data Sources

4.1.1 BPGRA Grievances Data

We have official government data on the universe of over 500,000 complaints filed under the BPGRA between June 2016 and August 2019. Our data contains personal information including name and address of complainant. Furthermore, we have phone numbers for 82% of these complainants. We also have data detailing complaints including the date filed, the exact text of the complaint, the number of hearings held, the date of redressal and whether appeals were filed.

4.1.2 WAS Scheme Data

This includes official government data regarding every single WAS asset constructed across Bihar's 114000 wards. This dataset is the source of our WAS-related outcome variables. The data records WAS assets with a lag, but our audits strongly suggest that "ghost" assets (assets found only on paper) are under 5%.

4.1.3 Local Representatives Data

We have official government data on both upper- and lower-tiered representatives for 94 % of the upper-tiered representatives and 81% of the lower-tiered representatives. We also have data on individuals who contested these elections at both tiers. In all, we have a dataset of over 350,000 local politicians. For each of these, we have personal characteristics including the name, age, education, gender, caste category of these representatives. We also have data on the number of votes won in the 2016 elections.

4.1.4 Census 2011 data

This comprises data from India's decennial census. The variables here can be classified into two groups: demographic and village-wise public goods. We use the demographic information to independently back out the rule for reservation of GPs for SCs.

4.2 Primary Data

All our primary data is collected via phone-based interviews of representatives or other politicians who contested and lost local elections.

4.2.1 Experimental Data

This includes primary data collected as part of the experiment. Here, we have baseline and endline data on the quantity and type of assets constructed in wards, self-reported impediments to effective functioning of the lower-tiered representative and knowledge about the formal complaints technology. In the endline data, we measure spillovers by interviewing one randomly sampled lower-tiered representative in the GP in whose wards projects were not yet undertaken.

4.2.2 Survey of Lower-Tiered Representatives

To understand better how WAS projects have been undertaken, we interviewed 234 lower-tiered representatives. In these interviews, we asked them about whether WAS works from the administration data existed in their wards, the role they played in implementing WAS projects and whether they faced any trouble during implementation.

5 Caste Differences & Public Good Provision

In this section, we describe how caste differences affect WAS projects. We present evidence from administrative and survey data and use two separate natural experiments (RDs) to argue that caste differences adversely affect public good provision. We argue that this is more likely to be true lower-tiered SC representatives.

5.1 Econometric Strategy 1: RD for Caste Differences

5.1.1 Stylized Representation

We use exogenous variation in the identity of the upper-tiered representative to causally establish the impact of caste differences on our main outcome variables.

Figure 2 offers a stylized representation of how this plays out in practice. Panel 2(a) of the figure displays a typical set of GPs with a single upper-tiered representatives and a cluster (13.58) lower-tiered representatives. Panel 2(b) marks out the lower-tiered SC representatives in red. Panel 2(c) then indicates the presence of exogenous variation in the upper-tiered representative's caste category based on an RD (described below). Panel 2(d) indicates that for many of our regressions we measure the impact of caste differences by restricting attention to only lower-tiered SC representatives in GPs with SC and non-SC upper-tiered representatives.

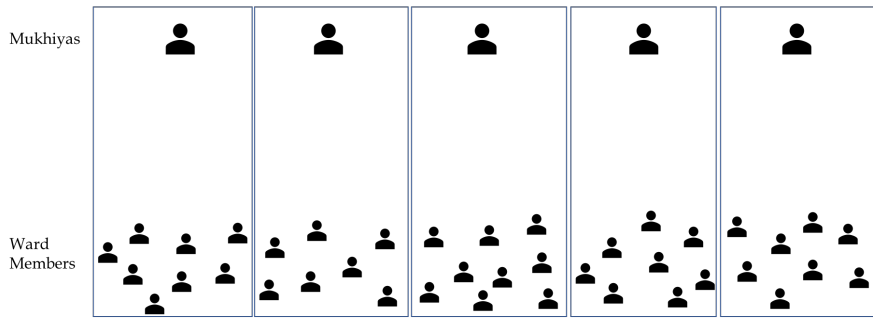
5.1.2 GP Reservation Rule for SCs

Upper-tiered representatives are elected at the Gram Panchayat (GP) level. GPs are reserved for SCs based on a population-based cutoff. This gives rise to a regression-discontinuity design where GPs marginally above the cutoff can be compared with those marginally below.

Bihar's 8400 GPs, as mentioned above, are housed in admistrative units called blocks, numbering 534 in all. The number of GPs to be reserved for SCs is a function of the proportion of SCs in the block in which the GP resides. This implies that within each block, the rule for reservation gives rise to an exogenous SC population cut-off below which no GP is reserved. Above the cut-off, not all GPs are reserved for SCs, as some are ruled to be reserved for OBCs. In practice, as Figure 3 shows, once we throw away GPs above the cut-off that are to be reserved for OBCs, the first stage results in a near 80% jump in the probability of reservation.[41] Thus, we have a fuzzy RD with a strong first stage.

Our running variable is the difference in SC population of a GP and the mean of the SC Population of the last Panchayat to not be reserved and the first GP to be reserved. Thus, for GP i in Block j:

[41] We asked election officials serving at the time about the small discrepancy on the prediction in theory and the actual reservation. We were told this may have been because of the following reasons: officers calculating the cut-off wrongly; disputes regarding actual SC population figures; manipulation by local officials of the status of reservation of GPs. At least one instance of manipulation was flagged and officials punished.



(a) Representation of all lower-tiered and upper-tiered representatives

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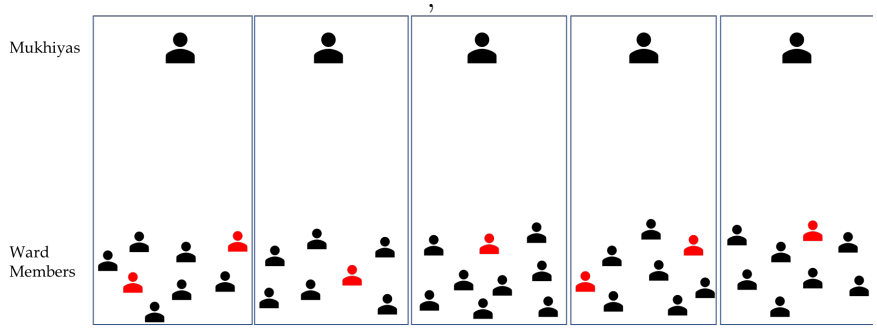

(b) Some lower-tiered representatives are SCs (marked in red)

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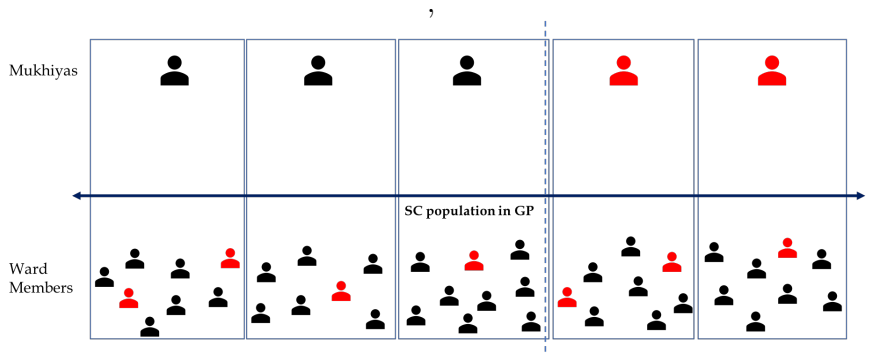

(c) Upper-tiered representatives to the right of the RD cutoff are quasi-exogenously SC too

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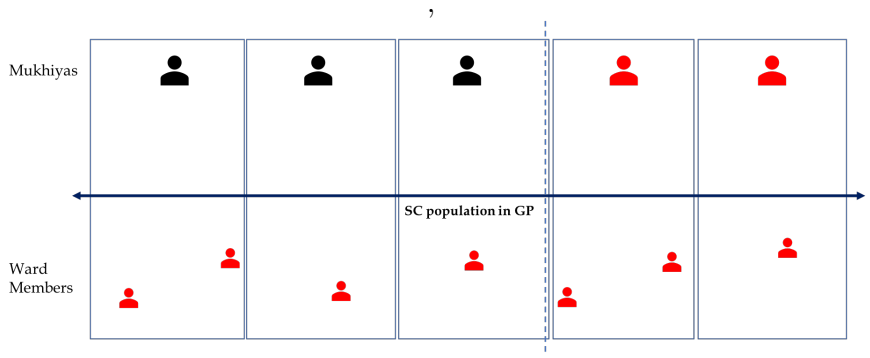

(d) We restrict attention to only lower-tiered SC representatives in most of our regressions

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Figure 2: Panel indicates our empirical strategy for measuring the impact of caste differences between lower- and upper-tiered SC representatives. In the figure, all SC representatives are marked in red. Figure is for demonstrative purposes only.

$$\text{Running}_{ij} = \text{SCPop}_{ij} - \left(\frac{\text{SCPop}_{1j} + \text{SCPop}_{0j}}{2}\right) \tag{7}$$

where SCPop refers to SC Population and 0 and 1 subscripts stand for the the last GP to not be reserved and the first GP to be reserved, respectively.

This reservation rule was first implemented in 2006 for a period of 10 years. In 2016, the algorithm rotates to ensure that GPs previously reserved for SCs/STs/OBCs are not reserved again. As before, the number of GPs to be reserved is a function of the proportion of SCs in the block and this gives rise to an exogenous SC population cut-off below which no GP is reserved. The running variable is as defined previously and Figure 3 shows the first stage, plotting the probability of reservation against the value of the running variable. Furthermore, Tables 1 and 2 show that a host of GP-level and ward-level covariates are balanced across the RD cutoff.

A more detailed discussion of the reservation rule is in the Appendix.

5.1.3 Main Estimating Equation

Under the assumption of continuity of all other GP characteristics, the fuzzy RD estimator calculates the local average treatment effect (LATE) of having an SC upper-tiered representative with population equal to the cutoff population for a block. Following Calonico et al. (2018), we estimate a fuzzy regression discontinuity design with covariates. Essentially, our primary specification uses a local linear regression within the CCT triangular bandwidth of the treatment threshold, and controls for the running variable (SC population in the GP) and a host of covariates - including block fixed effects, GP- and ward-level controls - on either side of the threshold. We use the following two stage instrumental variables specification:

$$\begin{aligned} Reserved_{igb} = \gamma_0 + \gamma_1 1(SCPop_{gb} > T_b) + \gamma_2(SCPop_{gb} - T_b) + \\ \gamma_3(SCPop_{gb} - T) * 1(SCPop_{gb} >= T_b) + \delta * X_g + \zeta * W_i + \psi + \eta_{igb} \end{aligned} \tag{8}$$

$$\begin{aligned} Y_{igb} = \beta_0 + \beta_1 Reserved_{igb} + \beta_2(SCPop_{gb} - T_b) + \\ \beta_3(SCPop_{gb} - T) * 1(SCPop_{gb} >= T_b) + \omega * X_g + \theta * W_i + \alpha + \epsilon_{igb} \end{aligned} \tag{9}$$

where Y_{igb} is the outcome of interest in ward i of GP g and Block b. T_b is the SC population cutoff for GPs in block b, $SCPop_{gb}$ is the SC-GP population, X_g is a vector of GP-level controls, W_i is a vector of ward level controls and psi indicates block fixed effects. eta_{igb} and ϵ_{igb} are error terms. GP level controls include total population of GP, distance to the nearest town/district head-quarters, whether GP was reserved for women/OBCs/STs in the previous/current term, herfindahl index of all castes/only SC castes in the GP, number of wards in the GP. Ward level controls include gender of lower-tiered representative and total candidates contesting ward-level elections in 2016. We cluster standard errors at the GP-level.

5.1.4 Threats to Validity

One threat to validity is if the reservation rule changes anything beyond the identity of the upper-tiered representative around the RD cutoff. Table 1 shows balance for a host of observables across a series of broad categories. In particular, reserved and unreserved GPs around the cutoff look similar across a series of variable related to the composition of SC citizens in the GP.

Another threat to validity emerges from whether reservation changes not merely the upper-tiered representative's caste-group, but also affects the pool of lower-tiered representatives in some way. Table 2 speaks directly to this concern. It shows that the SC lower-tiered winner is not significantly different along a host of observables including age, gender, education and electoral strength across the RD threshold. Furthermore, the total number of SC lower-tiered winners in a GP also doesn't change across the RD cutoff (see Table 1). This increases confidence in our claim that the RD effects are driven by caste differences across the lower-tiered SC representatives and upper-tiered non-SC representatives and not something else. Nevertheless, in our main regression specifications, we control for all these covariates.

Qualitatively, we have reasons to believe that the type of lower-tiered representative was unaffected by reservation. First, the lower-tiered representative's post was, up until 2016, a relatively low-stakes one. On paper, a few local government-related issues did involve consultations with the lower-tiered representatives.[42] However, since they never had direct control over funds or implementation, most lower-tiered representatives were only nominally members of local government. In particular, the upper-tiered representative would be unlikely to worry about the lower-tiered representative's identity in any ward. Secondly, the window of time available between when announcement of upper-tiered representative's reservation status and the actual elections is small. Even if lower-

[42]For instance, the shelf of MGNREGS projects to be undertaken for a given financial year in a GP was, on paper, to be arrived at bottom-up, with lower-tiered representatives planning projects in their wards. However, in practice, this usually plays out with the upper-tiered representative choosing work-sites and projects with little or no inputs from the lower-tiered representative.

tiered representatives had to strategically react, to form coalitions across tiers may take longer than the window available.

Finally, we test for whether there was any manipulation in the running variable. Figure 4 shows that we find no evidence that the there was bunching around the cutoff (normalized to zero here) for the running variable.

5.2 Results for Caste Differences

5.2.1 Administrative Data

We begin by showing that the provision of WAS public goods is adversely affected when there are caste differences between upper- and lower-tiered representatives.

Table 3 presents the results using regressions specified in equations 8 and 9. In the presence of caste differences, wards with lower-tiered SC representatives see 0.14 (40 %) fewer projects being undertaken in the first year of the scheme's existence (column 2 of Table 3). This is direct evidence of significant delays. By end of year 2, differences still results in 0.15 fewer projects, but the effects are imprecise, since the overall number of projects across the spectrum increases (column 4 of Table 3).

We do not see similar effects for wards represented by non-SCs (see Tab C9).

Table C10 shows that the effects hold even if we halve or multiply the RD bandwidth by a factor of 1.5. Figure A2 plots time trends in projects being undertaken in SC wards with and without caste differences. We see that caste differences result in lower estimated projects throughout the entire the two year period.

Thus, consistent with predictions from our model, caste differences lead to more breakdowns in collaboration between tiers of representatives and this adversely affects WAS public good projects in lower-tiered SC jurisdictions.

5.2.2 Extent of Caste Differences

Our model predicts that the extent of caste differences, captured by the parameter E matters for collaboration. There are many reasons why this could be true in the real world too. The SCs, as discussed previously, are not a homogeneous whole. SCs higher up in the intra-SC hierarchy have been able to carve a niche for their own, emerging as sub-castes with considerable social and

political presence and have, to some extent, broken the shackles of the caste hierarchy. Thus, an upper SC, such as a *Paswan*, is often seen and treated very differently by non-SCs than a lower SC, such as a *Dom*. Collaborating with upper SCs could prove easier, since there are less notions of pollution attached with these sub-castes and there are some network overlaps too.

We proxy for caste hierarchies by the socioeconomic wealth of the sub-caste. We calculate wealth of the sub-caste within each GP using an asset wealth score based on every household belonging to that sub-caste in the GP. Thus, our wealth scores are constructed from a dataset of over 17 million households. We proxy for sub-caste using surnames. Kumar and Sharan (2019) discusses both the creation of the wealth score and the mapping between surnames and sub-castes in detail. In that paper, we also discuss how caste hierarchies map very neatly to our socioeconomic wealth score.

We estimate the effects of the extent of caste differences on outcomes in the following manner. Among our lower-tiered SC representatives (on either side of the cutoff), we restrict attention to those from the socioeconomically lowest (highest) sub-caste. We then causally estimate the impact of differences on this group using our population-based RD employed (and described) above.[43] Table 4 presents the results for the socioeconomically lowest sub-caste. We see that, as the model predicts, caste differences are most severe for these sub-castes: they continue to see fewer projects being undertaken in their jurisdictions even at the end of year 2. On the other hand, as Table B1 shows, some of the catch-up at the end of year 2 seems to be driven by higher sub-castes among SCs. Note, however, that everyone seems to suffer equally from delays caused by lack of project implementation by the end of year 1. This suggests to us that while the extent of the hierarchy matters, it matters more for catch-up and everyone is discriminated against initially.

5.2.3 Survey Data

To understand *how* caste differences affect the manner in which projects are undertaken, we interviewed lower-tiered representatives[44] in whose wards at least one WAS project had been completed. These wards were sampled from GPs that fall on either side of the RD cutoff (within a bandwidth of 100). Thus, we have exogenous variation in caste differences among our sampled lower-tiered representatives.

We present results with the following caveat: while there is exogenous variation in the upper-tiered representative, the results are not strictly causal. Wards where projects have been completed *and* there are caste differences may be very different from their counterparts where there are no

[43] The gender, education status, age and poverty score of the socioeconomically lowest (highest) sub-caste does not change across the cutoff. This gives us confidence that our samples are comparable on either side of the cutoff.

[44] These were phone interviews.

differences. Thus, we are not looking at strictly comparable wards on either side of the RD cutoff. Two factors mitigate some concerns: first, we control for observable ward characteristics in our regression (including age, gender and educational qualifications of representative); second, as of May 2019, a majority of SC wards have undertaken projects in GPs on either side of the cutoff. Thus, it is likely that at least some of the wards where projects are undertaken are directly comparable, even in the absence of controls.

With that caveat in mind, Table B2 presents the results. We find that caste differences result in more reported incomplete projects (Table B2, col (1)) and wait-times to begin projects once a ward is "selected" also rise (Table B2, col (2)). Moreover, lower-tiered representatives report facing significantly more obstacles created by the upper-tiered representative (Table B2, col (4)).[45]

We now present another piece of survey evidence using data from our experiment baseline. As part of our experiment, we randomly sampled lower-tiered SC representatives in whose wards WAS projects had not been undertaken and, to a random subset, offered to file complaints on their behalf. Mechanically, some of these wards lie in GPs that fall on either side of the RD cutoff.[46] We test whether take-up varies when the upper-tiered representative is randomly SC (using specifications in equations 8 and 9).

A similar caveat to the results in Table B2 apply here. While there is exogenous variation in caste differences, wards where projects have not occurred *and* there are differences may be very different from similar wards in GPs with no caste differences. In addition to the two mitigating factors mentioned above, we have a third here: our experimental wards covered a large subset of wards since there was variation in the number and types of projects undertaken in their jurisdictions. Any ward with at least one of the 2 WAS types of projects not being undertaken was part of our experimental sample. Thus, a ward with absolutely no WAS projects represents a very egregious violation of the rule and those with at least one project is more representative of a typical ward.

Table B3 presents findings: caste differences increase the likelihood that the lower-tiered representative reports that projects have not been undertaken because the upper-tiered representative refuses to release funds. Furthermore, col (2) shows that they are more likely to report that the upper-tier fund problem is because of caste-favoring[47].

[45] Table C13 shows that on dropping GP- and ward-specific controls, the effect sizes remain the same, but the standard errors increase to make most results insignificant at the 10 % level of significance.

[46] Note that we did not purposively sample wards that fall within a specific bandwidth of the cutoff, but restricted our attention to all wards where WAS projects had not yet been undertaken.

[47] This could be mechanically true. However, the sign and magnitudes don't change even when we restrict our sample to only those wards that report an upper-tiered fund problem, we find that there is 11 percentage point drop in likelihood of the caste matched lower-tiered representative saying this was because of caste-favoring ($p = 0.22$, $n = 587$)

Tables B2 and B3 are, as explained, drawn from two separate samples of wards on either side of the cutoff. Together, these samples cover the universe of wards i.e wards where there are no projects (Experimental Sample), there is only one WAS projects (Experimental Sample/Survey Sample) and where both WAS projects have been undertaken (Survey Sample). The fact that caste differences results in greater reported impediments – particularly those caused by the upper-tiered representative for all these samples – across both these samples suggests to us that implementation of WAS projects is affected when there are differences.

5.3 Econometric Strategy 2: RD for Sub-caste Differences

Two representatives match on sub-caste lines if (i) their broad caste category matches *and* (ii) their last names also match. This definition of matching is used in (Kumar and Sharan, 2019).

We causally estimate the impact of differences across sub-castes in the following manner. First, we restrict our attention to GPs where the upper-tiered representative's election was close. We then consider wards that within these GPs who lower-tiered representatives are of the same sub-caste as either the winning or the losing candidate. Again, following Calonico et al. (2018), we estimate a sharp RD design with covariates and our primary specification uses a local linear regression within the CCT triangular bandwidth. The main estimating equation is as follows:

Again, following Calonico et al. (2018), we estimate a sharp RD design with covariates and our primary specification uses a local linear regression within the CCT triangular bandwidth. The main estimating equation is as follows:

$$\begin{aligned} Y_{ij} = \beta_0 + \beta_1 1(VoteMargin_i > 0) + \beta_2(VoteMargin_i) + \\ \beta_3(VoteMargin_i) * 1(VoteMargin_i >= 0) + \eta_{ij} \end{aligned} \tag{10}$$

where Y_{ij} is project-level outcomes from GP i and ward j; $VoteMargin_i$ represents the share of votes polled by the upper-tiered politician in the election. η_{ij} represents the error term.

5.3.1 Threats to Validity

Our main treatment and control groups emerge from settings where there is a close election at the upper-level *and* some lower-tiered representative belongs to the either of the two upper-tiered sub-castes. Thus, any close-election RD of this sort may not be valid if there is some shock

in a non-matched neighboring ward that simultaneously influences both who comes to power in the upper-tiered election and who becomes a representative in the neighboring ward. This is extremely unlikely in our setting since we have over 13 wards in every GP, so any single ward is unlikely to influence outcomes of the upper-tiered representative's election. Second, it is unclear that neighboring wards will have influence over how elections proceed in local wards.

5.4 Results for Sub-Caste Differences

Table B4 documents the results: sub-caste differences negatively affects project implementation at the end of Year 2. Overall, the results suggest that being exogenously assigned to an upper-tiered representative of one's own own sub-caste increases the likelihood of projects being undertaken by 8% (column 1). Columns (2) and (3) measure impacts of differences for two separate samples: GPs "reserved" for SCs at the upper-tier and those not reserved. Once more – as we saw previously in the case for caste differences – upper-tiered SC representatives do not discriminate across ethnic lines. It is the upper-tiered non-SC representative who is more likely to favor their own sub-caste group.

Section E in the appendix presents additional evidence that caste differences with the upper-tiered bureaucrat (the BDO - block development officer) adversely affects WAS projects.

Taken together, all these disparate pieces of evidence point to the fact that collaboration breakdowns are likelier to occur in the presence of caste differences. This effect is driven by SC lower-tiered representatives. It manifests in fewer projects, more delays and more hurdles in implementation.

5.5 Discussion: Why do caste differences cause collaboration breakdowns?

5.5.1 Ethnic Discrimination or Homophily?

In this section, we present evidence on whether the hierarchical nature of the caste system affects outcomes. To fix ideas, we define two types of biases. "Homophily" occurs when there is bias towards one's own caste. "Discrimination" occurs when bias manifests only towards those lower in the hierarchy. We argue that, in our setting, it is discrimination that is more common than homophily.

We begin by emphasizing the asymmetric nature of the impact of differences. Table 3, as described above, shows that lower-tiered SC representatives are less likely to implement projects when governing under non-SC upper-tiered representatives. On the other hand, Table C9 shows that non-SC

lower-tiered representatives do not face any difficulties in implementing projects while working with SC upper-tiered representatives.[48] These results suggest that non-SC upper-tiered representatives practice discrimination, while their SC counterparts do not. Seen another way, non-SCs are not holding up projects in SC wards because they are implementing more projects in non-SC wards.

We find no evidence that non-SCs discriminate more when there are more of their own type. We test for this in the following manner. The median non-SC upper-tiered representatives has 3 lower-tiered representatives belonging to their own broad caste category.[49] We partition our non-SC upper-tiered sample into 2: (i) those that had above 3 members from their own broad category (ii) those that had under 3 members from their own broad category. We run the RD separately across these two samples. Our regressions control for the total number of wards and the number of SC wards in the GP. Table C14 presents results. We find no difference in outcomes for SC lower-tiered representatives across these two types of GPs. While these results are not strictly causal, they still seem to indicate that non-SCs do not hold up projects in SC wards because they are substituting it with projects in their own wards.

On the surface, our sub-caste differences results could point to homophily (Table B4). Unlike our population-based RD sample, the close-election RD sample is not restricted to differences that are hierarchical in nature. However, we have reason to believe that sub-caste differences could also be a product of caste hierarchies. Sub-caste differences don't matter in cases where GPs have an SC upper-tiered representative. Indeed, as column (2) of the table shows, the entire effects of sub-caste differences are driven by non-SC upper-tiered representatives. This, once more, suggests to us that SCs are less likely to discriminate than non-SCs.

Our surveys allow us to piece together a narrative of how hierarchical discrimination affects SC lower=tiered representatives. They are more likely to report that the upper-tiered representative favors their own caste when there are differences (col (2) of Table B3). They also are less likely to informally approach their upper-tiered representatives to discuss starting projects (col (4) of Table B3). The upper-tiered non-SC representatives are more likely to be reported as the main impediment during project implementation ((col (4) of Table B2).

Thus, while caste differences could worsen public good outcomes through a combination of both hierarchy-based prejudice and homophily, our results indicate that the former plays a bigger role in this setting.

[48] Non-SCs are not a homogeneous whole. Non-SCs could be General Castes, OBCs, EBCs or STs. So, focusing on a collection of these groups gives us the impact of going from potential no differences (to the left of the cutoff) to definite differences (to the right of the RD cutoff, since upper-tiered representative is always SC). Thus, the effect sizes are muted by design. But the presence of positive coefficients assuages concerns that what we are mistaking for non-discrimination is a weak negative effect muted by a preponderance of nulls.

[49] (The four broad categories we have data for are: Extremely Backward Castes, Other Backward Castes, General and Scheduled Castes)

5.6 Electoral Incentives & Caste Differences

Can electoral incentives override ethnic barriers? We test for this in the following way. We use margin of victory in the 2016 GP-elections as a predictor of the strength of incentives an upper-tiered representative faces. Within each group (SC and non-SC), we calculate the median margin of victory. We then compare above (below) median SC margin victors with above (below) median non-SC margin victors. To estimate effects, we run our RD specification separately across the two samples. Thus, we independently estimate the effects of caste differences across "Small Margin Victors" and "Large Margin Victors". We also run balance tests separately across these two samples and none of the control variables vary discontinuously across the cutoff.

Our results indicate that re-election incentives matter quite strongly. Table 5 presents results. Small margin victors do not differentiate along caste lines. Indeed, the estimates of caste differences are centred around zero. On the other hand, SC lower-tiered representatives benefit considerably from matching with large margin victors. Put differently, the effects of caste differences seem to be entirely driven by areas where the upper-tiered representative is a comfortable winner. [50]

The tension between re-election incentives and ethnic barriers can be described more formally by extending our model. We require that the indirect utility of the surplus s is a function of re-election incentives. s in our model can be modeled as $V(s, \theta)$ where θ is a parameter capturing re-election incentives. We require: $\frac{\partial V}{\partial s} >= 0$ for our prediction that collaborations are more likely to breakdown in settings with weak re-election incentives.

6 Caste Differences & Filing of Complaints

This section describes in detail how local representatives repurpose the formal complaints technology to lobby on behalf of their constituents. We show that when there are caste differences, SC lower-tiered representatives are particularly likely to file complaints with respect to local public goods and WAS projects. We use data on the universe of nearly 500,000 complaints filed in the first three years of the Act being in place. We match data on local representatives to our data on complaints to identify complaints filed by representatives.[51]

[50] This is a result of two separate factors among large margin victors: first, the non-SC upper-tiered representative collaborates on fewer projects with SCs (compare control means in Cols (1) and (3) of Table 5); second, a comfortable upper-tiered SC winner considerably outperforms a small margin upper-tiered SC winner.

[51] We match the two dataset using phone numbers. Unlike string matches used in other cases, these matches are extremely precise – since phone numbers function as a unique 10 digit string that links both the complaints dataset and the dataset on local representatives. However, insofar as politicians numbers use multiple phone number – a not uncommon occurrence in our setting – our results could be under-estimates of the true rate of complaining by local representatives.

6.1 Lower-Tiered Representatives & Formal Complaints Technology

Lower-tiered representatives have filed over 6000 complaints in the past 3 years. This translates to them being at least five times likelier than citizens to file complaints under the BPGRA. This discrepancy is even larger for WAS projects: SC lower-tiered representatives are roughly 20 times as likely to file complaints regarding WAS public goods than citizens. Below, using a close election RD design, we argue that this increase is not driven by lower-tiered representatives being selected from a class of politically active citizens. On the other hand, the increase in complaint filing is linked to their explicit role as implementers of WAS public good programs in their wards.

6.2 Econometric Strategy 3: RD for Lower-tiered Representatives

We causally estimate the impact of being a lower-tiered representative on complaint filing using a close-election RDD. We restrict our attention to the top 2 candidates in every ward.[52] Again, following Calonico et al. (2018), we estimate a sharp RD design with covariates and our primary specification uses a local linear regression within the CCT triangular bandwidth. The main estimating equation is as follows:

$$\begin{aligned} Y_{ij} = \beta_0 + \beta_1 1(Votes_{ij} > T_j) + \beta_2(Votes_{ij} - T_j) + \\ \beta_3(Votes_{ij} - T_j) * 1(Votes_{ij} >= T_j) + \gamma * X_{ij} + \psi + \eta_{ij} \end{aligned} \tag{11}$$

where Y_{ij} is the outcome variable of interest - usually, the number and types of complaints filed by the lower-tiered politician i from ward j; $Votes_{ij}$ represents the number of votes polled by politician; T_j represents the mean of the votes polled by the first and second candidates from ward j, X_{ij} represents candidate-level controls including age, gender and education of candidate; ψ represents GP or Block fixed effects, η_{ij} represents the error term.

6.2.1 Results

Figure 6 shows that lower-tiered narrow SC winners are twice as likely to file grievances than their losing counterparts. Table B5 shows that for local administration and WAS-related issues, the overall trend is even more pronounced for SC lower-tiered representatives. The mean complaint filing rate for narrow SC losers regarding WAS projects is very nearly zero. Thus, WAS grievances

[52] We drop uncontested wards altogether.

by representatives are not driven by their political activism, but more by their role as implementing partners of WAS projects.

6.3 Results for Caste Differences & Filing of Complaints

We once again turn to our population-based RD strategy from section 5 to measure the impact of caste differences on complaint filing. Panel A of table 6 presents the results. SC lower-tiered representatives are less likely to file a grievance when exogenously governing under an SC upper-tiered representative. Crucially, they are much less likely to file a grievance that is public in nature (column 1) or pertains to the department handling GP-administration (column 2). Analysing the text of the complaint, we find that caste differences lower the likelihood of the upper-tiered representative being directly named (column 4) or the ward being mentioned (column 3).

As a robustness check, we test to see if complaint filing for non-SC lower-tiered representatives is affected across the RD cutoff. Panel B of table 6 presents the results - no such pattern emerges.[53] Another robustness check is to see if complaints related to private issues change differentially across the RD cutoff. Col (6) of Table 6 shows that caste differences have no impact on the likelihood of filing private complaints.

We now discuss if caste differences affect complaints regarding WAS schemes. As discussed previously, while collaboration across tiers is important across a host of government programs, WAS schemes mandate collaboration in explicit terms. Furthermore, WAS project outcomes are worse when there are caste differences.

Do marginalized lower-tiered representatives use the formal complaints technology to signal breakdowns in collaboration regarding WAS projects? Column (4) of Panel A of Table 6 shows the results: caste differences significantly increase likelihood of filing a WAS complaint for SC lower-tiered representatives.

Once more, as a robustness check, we see that there is no such effect for non-SC representatives (col (6) of Panel B of table 6).

We now corroborate this finding from our experimental sample. These lower-tiered representatives have experienced some form of breakdown in collaboration.[54] Keeping in mind the caveats regarding comparability of wards across the RD cutoff from our experimental sample (discussed above), col

[53] A question remains: why don't we see *increased* complaint filing for non-SC lower-tiered representatives when paired with SC upper-tiered representatives in Panel B of table 6? One reason, as pointed out in the Discussion in Section 5.5, is that non-SCs are less likely to face discrimination.

[54] This is particularly true of those wards where neither WAS project was undertaken.

(5) of Table B3 presents the results. Caste matching significantly reduces the likelihood of take-up of our offer to file complaints in treated wards.

In sum, these results form robust evidence that caste differences increase the likelihood of complaints being filed by SC lower-tiered representatives. This is in line with the predictions from our model. However, our model also indicates that increased complaints alone is not enough to conclude that the formal complaints technology is effective at improving collaboration. To test if the formal complaints technology has "bite", we run a field experiment which we describe in the following section.

7 Experiment

In this section, we describe our experiment in detail. Our main aim is to understand how filing grievances affects WAS project implementation in wards. We go over our experimental design, estimating equations, main results; we discuss patterns in adoption of the formal complaints technology and perform a simple cost-benefit analysis of our main treatment arm.

7.1 Experimental Design

7.1.1 Main Questions

The purpose of the experiment is to understand how, if at all, complaint filing by incumbent lower-tiered representatives from marginalized groups affects provision of water-and-sanitation (WAS) public goods in their jurisdictions. Specifically, we seek to answer the following questions:

1. Does complaint filing by SC lower-tiered representatives initiate construction of WAS public goods in these jurisdictions?
2. Are there spillover effects of complaint filing - i.e does complaint filing by a lower-tiered representative in one jurisdiction result in more (a) complaint filing and (b) WAS public good construction in jurisdictions of other lower-tiered representative close to treated jurisdiction?

7.1.2 Treatments

All treatments are administered over the phone in our setting. The experiment comprises two treatments arms: a complaint filing assistance treatment and an information-only treatment.

In the complaint filing assistance treatment arm, we call randomly sampled SC lower-tiered representatives where, as per official records, no WAS project has been undertaken and provided them information about the formal complaints technology and offer to file grievances on the representatives' behalf. Our main objective here is to measure the impact of complaint filing on WAS public good provision.

In the information only treatment arm, we call randomly sampled SC lower-tiered politicians and only provide information. The key difference from the complaint filing assistance treatment arm is that we do not offer to file grievances. Our main objective here is to see if information alone suffices to increase the number of grievances filed.

7.1.3 Design

On piloting, we realized that the official data is observed with a lag. About a third of wards that have "no wok" in the official data actually have both WAS projects either completed or ongoing on checking with representatives/visiting wards.

We, therefore, decided to have a set of screening questions to weed out such wards. Once we ascertain that at least one of the two WAS projects have not been undertaken - based on the ward representatives' testimony during the call - we then proceed to randomly offer to file grievances on their behalf.

The complaint filing treatment is carried out as follows: first, a call is made to a randomly sampled SC lower-tiered representative in whose ward, as per official data, WAS projects have not been undertaken. Subsequently, we screen out wards where the representative claims that at least one project has been undertaken. Once a representative clears the screening, she is randomized (with equal probability) into one of two arms: (a) treatment arm where she is given information about the formal complaints technology and then offered the chance to file a complaint regarding non-implementation of WAS projects in her ward or (b) a control arm where she is given information about other welfare programs implemented on a priority basis by the state government. Once a complaint is filed in treated wards, a follow-up reminder call is sent to the representative the day of the first hearing of the complaint.

The information-only treatment mirrors the process in the complaints filing assistance arm with the key difference being that lower-tiered representatives are not offered the choice to file complaints through our enumerator. Control group representatives are randomized into the control group after screening questions ensure that they are eligible for treatment. Control group members are provided information too - about key government schemes, aside from the water and sanitation,

that have been introduced by the incumbent government.

The Appendix (Section I) has more details on the sampling and randomization. Our pre-analysis plan has a comprehensive set of details on our outcome variables and empirical strategy.[55]

7.1.4 Sample selection

While the sample was randomly drawn from the population, we could only get through to about half the lower-tiered representatives over the phone. The main reason for our inability to get through to more representatives was because phone numbers were switched off or not reachable.[56] Table B7 compares the population with our sample on observables - while the sample is representative along most dimensions, contacted lower-tiered representatives are likelier to be somewhat less educated, marginally younger and would have obtain 3 more votes on average than the population. Based on the small magnitudes of these differences, we are confident, if not certain, that the estimates from our experiment cannot be vastly different from what we would have seen with our ideal population.

7.2 Experimental Regressions

We causally estimate the impact of filing complaints on behalf of (or providing information on formal complaints technology to) lower-tiered representatives on a host of outcome variables - including the quantity and quality of projects that occur/complaints being filed in treated/spillover wards – from our experiment. We estimate two main types of regression equations.

7.2.1 ITT Direct Impact

$$Y_{ig} = \beta_0 + \beta_1 * T_{ig} + X + S + \eta_{ig} \tag{12}$$

here, Y_{ig} could include whether a project was initiated (as per official data or endline survey), project completed, total projects undertaken, total money spent on projects and whether a complaint was filed in ward i of GP g. X is a vector of controls at the GP and ward-level. S indicates block fixed effects. T_i takes the value of 1 if the lower-tiered representative i is treated with either of two treatment arms.

[55] This study is registered in the AEA RCT Registry and the unique identifying number is: AEARCTR-0004308.

[56] We attempted to get around this problem by trying to call neighboring lower-tiered representatives for information on experimental representatives' phone numbers. However, we did not pursue this strategy too strongly for fear of contaminating spillover effects. An easy source of phone numbers would have been upper-tiered representatives themselves, but, for obvious reasons, we felt it unwise to use them as the source.

7.2.2 ITT Spillover Impact

To measure within-GP spillovers in complaint filing, we first ask and identify who the closest lower-tiered representatives are to participants in the experiment. We restrict our attention to a maximum of 3 such representatives. Next, we run:

$$N_{ig} = \beta_0 + \beta_1 * T_{ig} + C_{ig} + X + S + \eta_{ig} \tag{13}$$

where N_{ig} could include, among others, the number of close wards where, after the experiment, (a) WAS projects have been undertaken or (b) complaints are being filed by representatives. C_{ig} is the number representatives who are deemed "close" by the experimental lower-tiered representative.

7.3 Experimental Results: Complaint Filing Assistance Treatment

We have, thus far, shown that caste differences worsen public good provision. We now turn to whether increasing access to a formal complaints technology changes outcomes. In this section, we focus on our main treatment arm run over 1487 SC lower-tiered representatives. We randomly selected 727 and provided them information about the formal complaints technology and offered to file complaints on their behalf. Below, we describe effects of treatment on WAS projet initiation in treated and neighboring wards.

7.3.1 WAS Public Good Provision

Our complaints filing assistance treatment significantly improved the likelihood of lower-tiered representatives filing complaints. The difference in complaint filing between treated and control representatives is 41 percentage points (see Figure 7) as per administrative data.

We now turn to impacts on projects being undertaken. We focus on three outcome variables from our Endline survey:[57] (i) whether the problem preventing projects from starting had been resolved, (ii) whether projects had, consequently, started and (iii) number of projects that had started or had started this week.

Figure 8 plots treatment effects for our main estimating equation.[58] The complaints filing assistance treatment had strong positive effects on project initiation. Treatment improves project initiation

[57] Outcomes were pre-registered.
[58] This specification - with block fixed effects - is our pre-registered specification.

by 6.4 p.p over a control mean of 26 p.p. This translated to a 24% increase in the likelihood of project initiation. The effects are even stronger if we look at project initiation up to the end of the current week: 33%. Table 8 lists out the effects across specifications. The results are robust to changing the level of fixed effects and adding additional controls.

If we assume that the reduced form ITT impacts on project completion come only from the individuals that indeed filed complaints, then the ToT impact is 52%. However, the exclusion restriction could not hold in this context: for instance, it is possible that that the threat of filing a complaint was enough to ensure projects were initiated.

Overall, it appears that the complaints filing assistance treatment did significantly improve outcomes in the treated group. In the Appendix section G, we investigate whether our treatments caused backlash or threats against lower-tiered representatives in the study. While the point estimates in Table G16 on our measures of backlash are all positive, we find no statistically significant impacts. This suggests that lack of faith in the state or other costs of filing (information, transaction costs of filing complaints, mediation) could be more binding costs.

7.3.2 Spillovers in Complaining

To calculate spillovers in complaint filing, we restrict our attention to GPs that have only one experimental ward. This excludes a mere 25% of GPs from our sample. We then test the impact of having either one treated or one control ward in the GP on complaints filed by non-experimental wards from that GP.

Table 9 sheds light on this question using administrative data on complaints filed. Having a treated neighboring lower-tiered representative significantly increases the likelihood that a representative files grievances. Indeed, for WAS related grievances, having a neighboring treated ward more than doubles the likelihood of complaints being filed. The filing rate increases from 0.23% to 0.53% in these neighboring wards.

7.3.3 Spillovers in Projects Undertaken

To understand if projects are undertaken in neighboring wards, we conducted interviews with one randomly sampled neighboring representative in whose wards projects had not yet been undertaken (as per official data) from GPs that had exactly one experimental ward. We were able to contact one such representative in over 96% of these GPs.

Table 10 presents the results. Neighboring wards report more projects being undertaken in the post-

intervention period. In particular, wards neighboring treated wards are 8 p.p (40%) more likely to report that any project had been undertaken in the post-experimental period. The effect sizes vary considerably by the type of fixed effects we put in (col (3) and (4)), but, for our pre-specified and preferred specification, the effects are both large and significant.

7.3.4 Threat & Direct effects?

Our model predicts that a formal complaints technology improves public good provision in two ways. First, there exists a "threat" effect, driven by the fact that the upper-tiered representative, anticipating the prospect of a lower-tiered representative filing complaints, collaborates more. The second is a direct effect, occurring through the formal complaints technology. Our main experiment's impact is a combination of these two effects.

We argue that the spillover results provide suggestive evidence of the "threat" effect. Treatment did not cause a large increase in complaint filing in neighboring wards (as shown above). Table 9 restricts the set of neighboring wards to those we surveyed as part of our endline survey of neighboring wards. Remember, these are wards where projects had not yet been undertaken. Here, the effect sizes on complaining are, as expected, larger – treatment results in a 2.5 p.p increase in likelihood of complaints being filed. Still, as noted before, we see an increase in project provision in the same wards by 8 p.p (col (1) of Table 10 runs the same specification). The gap between these two numbers – the additional 5.5 p.p – is suggestive evidence of the threat effect being in place. These are representatives who did not file any complaints, yet, by virtue of being in a GP where there exists a treated ward, they see projects being undertaken in their wards.

While we believe that this is the impact of a threat effect being in place, there could be alternate explanations. For instance, the upper-tiered representative could simply find it easier to undertaken multiple projects in one go, if there are some economies of scale in implementation. However, this is unlikely, since the median GP has undertaken 9 projects over 2 years. This implies that there are projects being undertaken frequently and if economies of scale has to kick in, it should do so anyway.

7.4 Understanding Constraints to Adoption of Formal Complaints Technology

7.4.1 Information Treatment

Aside from our complaints filing assistance treatment arm, we ran a smaller experiment with a sample of SC lower-tiered representatives where we offered them information about the formal

complaints technology. These respondents were told of where to file grievances in person and also given the call-centre's toll-free number. We did not, however, offer any filing assistance.

We find that information alone increases filing rates, but at a relatively lower rate. Compared to the control group, information results in 7 p.p more grievances (see Figure 7). Compare this to our complaint filing assistance treatment arm where complaints filed increased by 41 p.p. Thus, information *is* a constraint, but there are other costs to grievance-filing that make it less commonly used.

7.4.2 Other Constraints

In our setting, complaints can be filed in three ways: via the phone, via the internet and in person. During piloting, we experimented with trying to get lower-tiered representatives to file complaints via the phone. This proved extremely difficult, since complaint filing is a complex process, involving clear communication of the nature of the problem that extends beyond yes-no binaries. The call-centres were manned by urban youth; the representatives speaking to them were leaders, but from extremely marginalized groups in villages. As per government data, the median SC representative is barely literate, having not even completed primary school. As one research associate who listened in on these conversations evocatively put it: "it was as if they were from different countries". Only 3 % of complaints are filed via the call-centre. If complaining via the phone is difficult, accessing the internet and filling up text on an online portal is even harder. Thus, an intermediary is necessary for both these ways of filing complaints. These results echo closely the work of Gupta (2017), who finds that information and *mediation* are both crucial factors in helping marginalized citizens access the state.

Complaining in person is easier to navigate relative to via the phone or the internet. This is because the grievance centres often have trained operators who convert verbal or written complaints into a standardized format that is fed into the online system. However, there is one grievance centre for every 80 GPs on average. Traveling to these centres is costly. Our survey estimates put it at INR 140 per trip and the loss of a full day's wage. Indeed, as figure A1 shows, the number of complaints filed falls away sharply as distance to the grievance redressal centre increases.

Two possible policy solutions emerge to make complaint filing less costly: first, re-locate complaint filing centres closer to representatives' villages; second, create intermediaries and/or re-train call-centre youth to be more sensitive to a wider range of callers. The government is experimenting with the former, but the cost-benefits of the latter are easier to estimate. We attempt to do this below.

7.5 Estimating Costs & Benefits

We examine cost-effectiveness of the intervention in creating public goods in lower-tiered jurisdictions. The baseline survey hired ten enumerators on average and ran for 25 days. Subsequent follow-ups were conducted with a smaller team of 3 surveyors for another twenty days. The total amount paid to the survey company was Rs. 341020. In addition, the office and staff costs at the IDFC Institute for the pilot and intervention period is estimated at 375,000. About 25 % of those offered treatment attended hearings. Our survey estimates suggest that, conditional on doing so, the median respondent attends 2 hearings. We assume that the opportunity cost of attending hearings to be INR 220 (1.25 times the daily minimum wage). The total costs of the intervention, therefore, amount to 791990 Indian Rupees or $11,314.

Our primary measure of benefits is the total monetary costs of the public goods created. Our treatment impact on public good creation varies from an increase in 6.4 percentage points (currently started) to 11 p.p (includes projects to start within a week). This translates to an additional 46-80 projects in treated areas. The median project in SC wards costs 559900 in the administrative data. We extrapolate to estimate total costs of additional projects to be between 26 million ($360,000) to 45 million ($628,000) rupees. The cost per incremental dollar delivered is 1.8 - 3.1 cents. Note also that we

The true benefits can vary significantly. If, eventually, control wards "catch up", then our estimates may overestimate the true benefits. Furthermore, the reported monetary costs of these projects are anecdotally higher than true costs of financing them. However, even halving the cost estimates still results in an estimated surplus of 12.5-20 million rupees.

We have reason to believe that these may actually be significant underestimates. We do not consider the spillover effects onto neighboring wards. As described above, WAS public goods are essential to ensuring connectivity and access to potable water at the household level. The true welfare benefits - emanating from factors as diverse as reductions in the disease-burden from clean water to a fall in transaction costs due to better roads – could be immense. Moreover, these are intention to treat estimates – only half of those offered treatment agreed to file complaints. Finally, the opposite of the "catch-up" mechanism could occur, resulting in a widening gap between treatment and control wards over the course of time. Overall, these estimates suggest that phone-based mediation could be cheaply applied to large and important public good programs and create substantial economic benefits.

8 Conclusion

This paper provides two key pieces of evidence from the Indian state of Bihar: first, using a natural experiment, we show that caste differences between tiers of local government adversely affect implementation of key water and sanitation public good programs in jurisdictions governed by ethnic minorities. Second, we document a novel strategic response on their part - to use formal complaints technologies to signal breakdowns in collaboration within local government. Our RCT shows that these mechanisms can prove to be powerful tools for local members of the state to lobby for better public good provision. Thus, on the whole, we draw the following conclusions: first, the ethnic composition of the local state matters for public good provision and second, that a formal complaints technology, properly designed, can be used to right some of the collaboration breakdowns caused by ethnic differences. More broadly, formal complaints technologies give voice to elected local representatives from disadvantaged backgrounds, improving their strategic bargaining power with upper-tiered members of the local state.

An interesting aspect of our setting is that the formal complaints technology was designed primarily for citizens. Lower-tiered representatives repurpose the technology to lobby for public goods on behalf of their constitutents. One implication is that a formal complaints technology can be used not merely to solve individual complaints of citizens against the state – as is common practice aross the world – but by lower-tiered members of the local state themselves to petition on behalf of their constituents.

Our findings, therefore, speak to two different policy agendas in developing country settings: first, it complicates our understanding of how formal complaints technologies should be designed and their role in making the state more accountable; second, it also contributes to the thinking around making decentralization most effective, by arguing in favor of an active formal complaints technology to be used *by* members of the local state. While ethnic quotas are one way in which ethnic tensions between tiers of government can be broken, they are blunt instruments that occur only at specific (mostly five-year) intervals. Furthermore, not all seats can be reserved under ethnic quotas – often only a small proportion are at any given point in time. The presence of a formal complaints technology provides an alternate, nuanced and real-time option.

One limitation of this paper is that it doesn't speak about the role citizens play in formal complaints technologies. We have projects lined up with the Government of Bihar that aim to understand how formal complaints technologies can be used to improve welfare of citizens. Our companion papers will look into these. Another limitation is that it doesn't delve into what makes this particular formal complaints technology effective. Our ongoing partnership with the state has given us some understanding of the nature of the political and bureaucratic will, the incentive structures for high-

level bureaucrats to perform their duties as grievance redressal officers and the systemic tweaks being made to build an effective platform. We hope to rigorously document these in future work.

We are currently working with the state on a scale up of our filing assistance intervention. This will allow us a rich laboratory to study these – and other – questions in the coming years.

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9 Figures

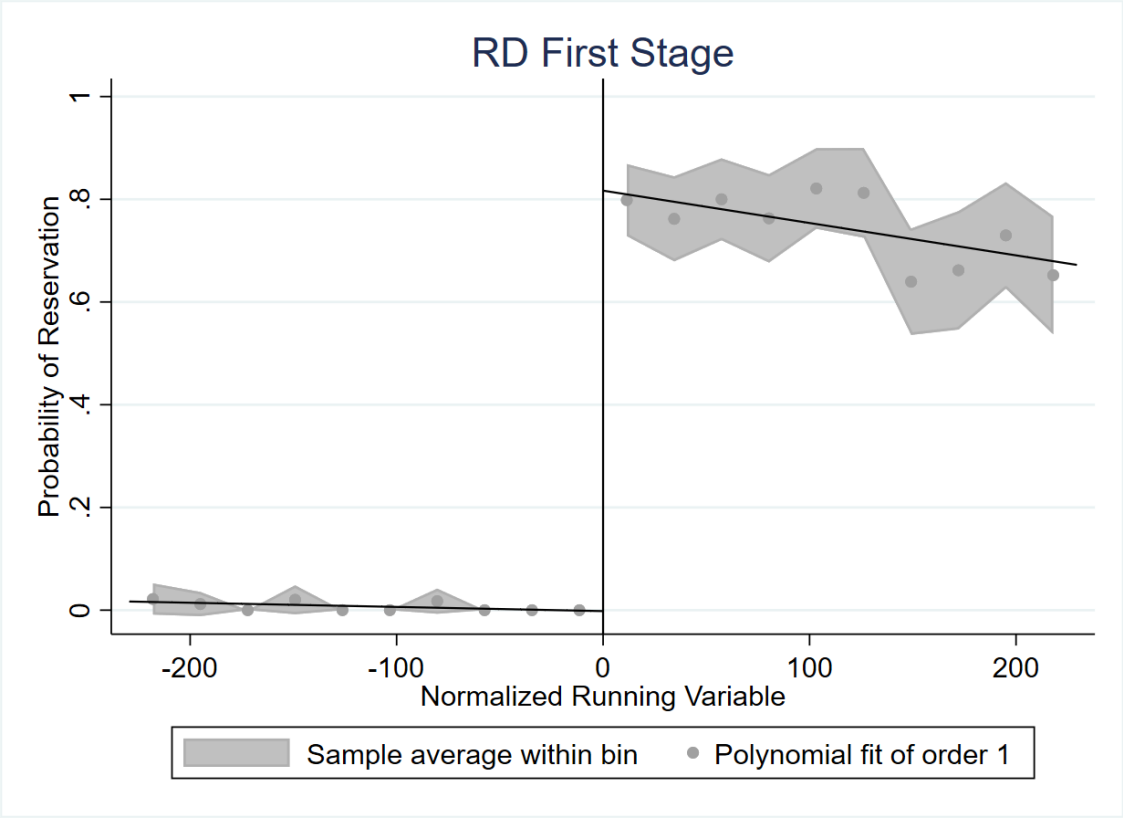


Figure 3: Figure plots the impact of an upper-tiered representative's seat being "reserved" for SCsagainst the running variable. The running variable is normalized such that for all values above 0,a GP has to be reserved as per the rule.

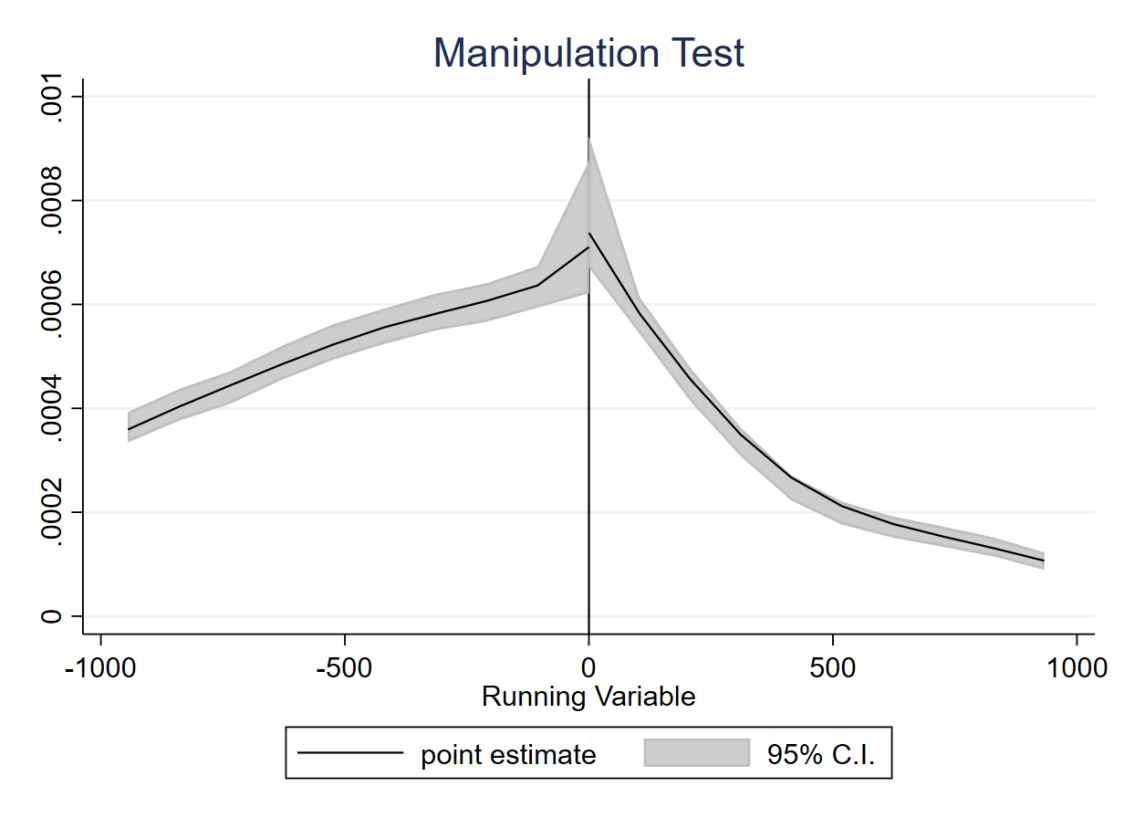


Figure 4: Figure implements manipulation testing procedures using the local polynomial density estimators based on Cattaneo et al. (2016). Robust standard errors are calculated. p value of difference in densities across the cut-off is 0.61

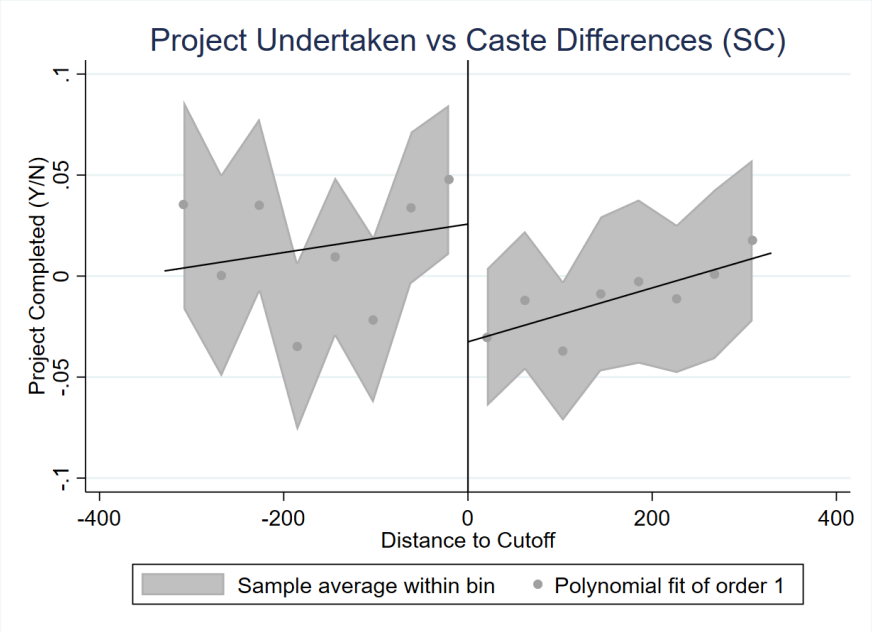


Figure 5: Figure shows the impact of caste differences on projects being undertaken in the first year of the WAS schemes being fully in place. We cluster standard errors at the GP level. CCT triangular bandwidths are used.

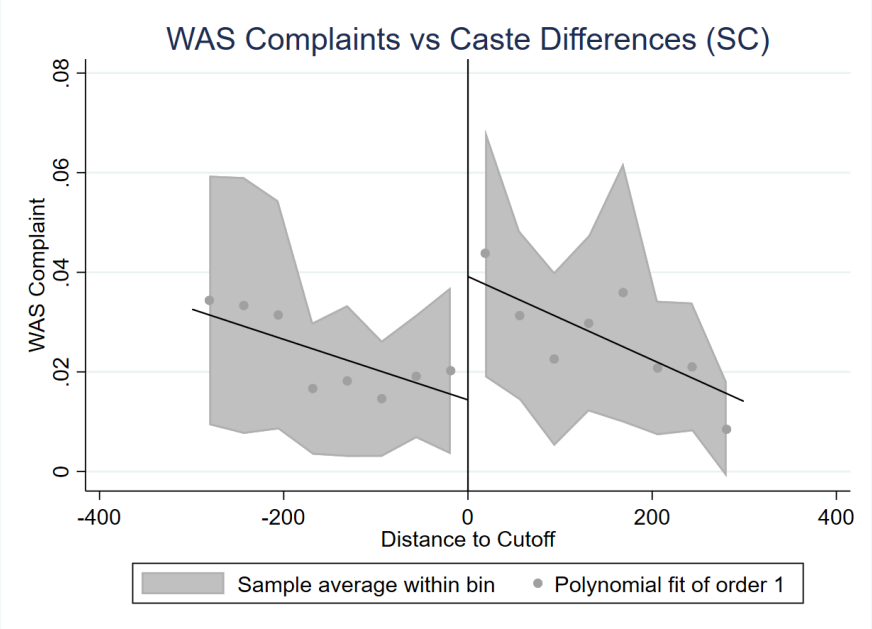


Figure 6: Figure shows the impact of narrowly winning or losing an election on likelihood of filing complaints for SC lower-tiered candidates.CCT triangular bandwidths are used.

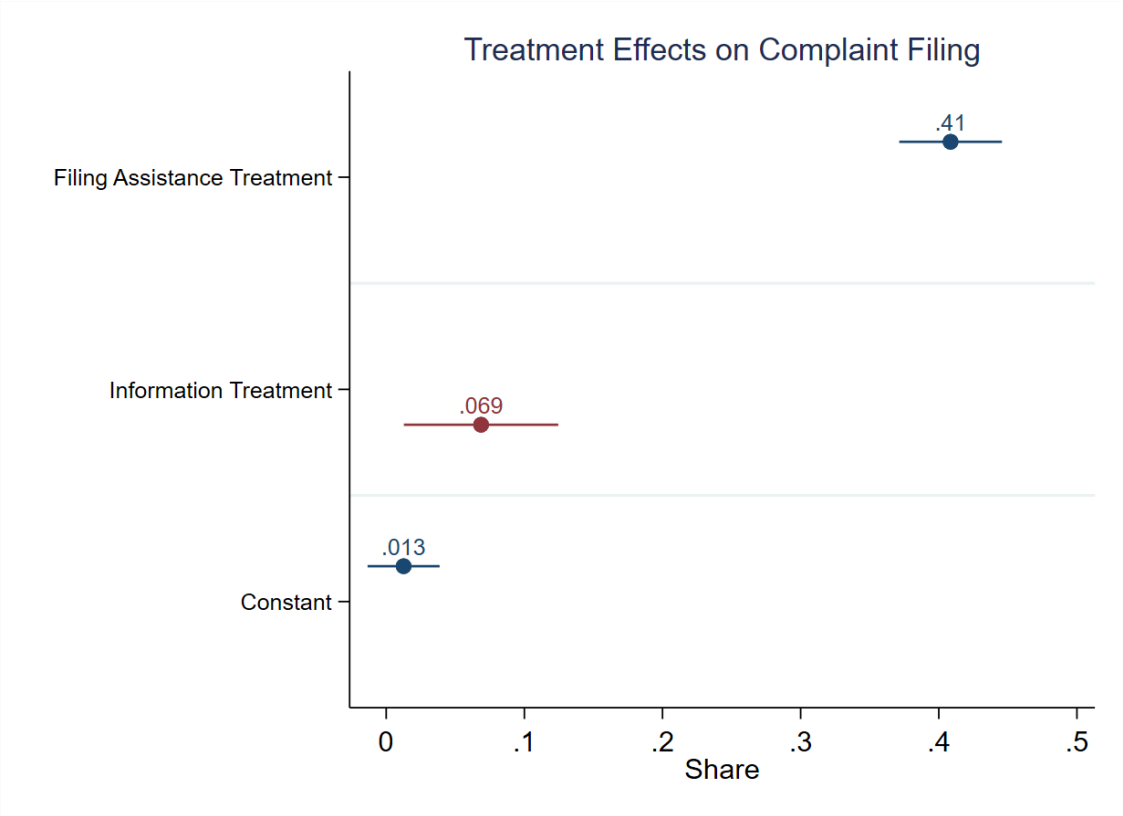


Figure 7: Figure plots the impact of (a) our filing assistance treatment (b) our information only treatment.

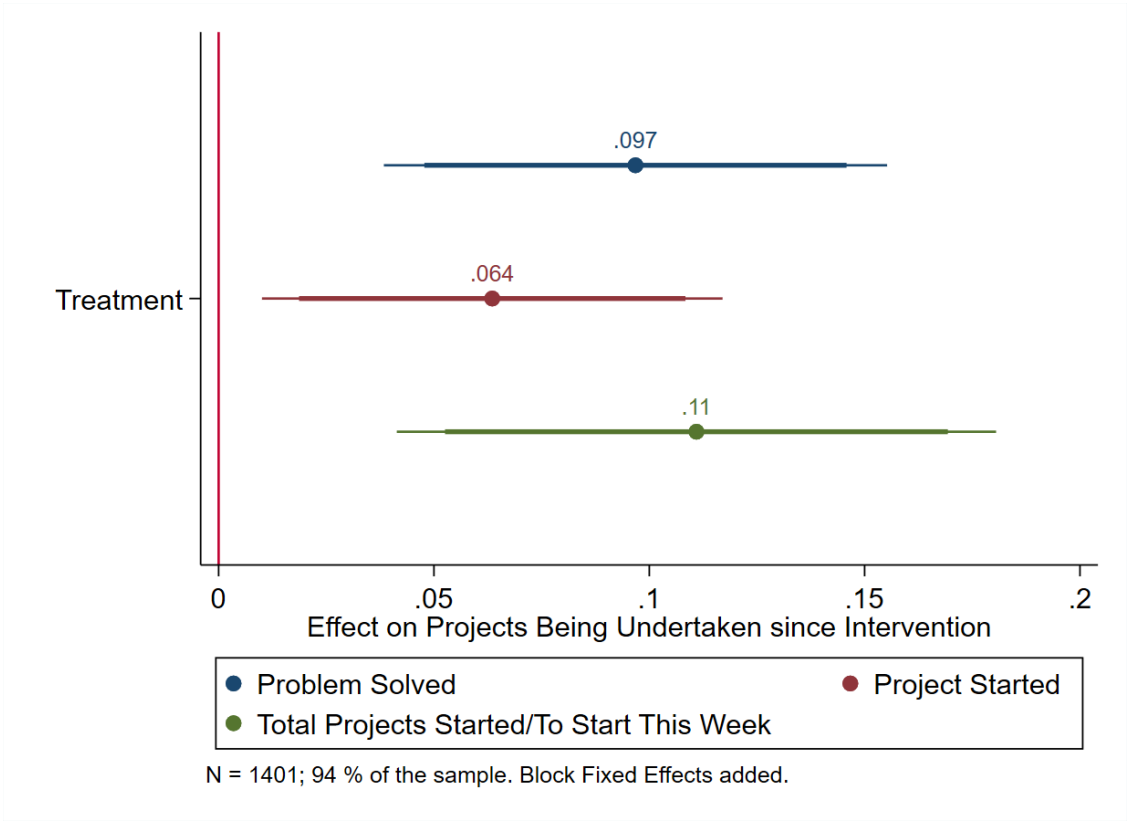


Figure 8: Figure plots impact of the complaint filing assistance treatment on outcomes. "Problem Solved" is a binary that captures whether the problem preventing projects from starting at baseline had been resolved; "Project Started" is a binary that captures whether projects had started; "Total Projects Started/To Start This Week captures number of projects that have been started or are to start this week. Block fixed effects are added. This graph plots outcomes based on our pre-specified regression equation: this includes GP-level controls, block fixed effects and unclustered standard errors.

10 Tables

Table 1: Balance Across the RD Sample (GP-level Controls)

Variable	Treatment	Control	Difference	pvalue
Total Population of GP (Census 2011)	11,142.88	11,043.60	99.28	0.79
Proportion of SCs (Census 2011)	0.16	0.17	-0.01	0.44
Distance to Nearest Statutory Town (Census 2011)	25.55	23.49	2.06	0.20
Distance to District Headquarters (Census 2011)	34.82	34.95	-0.13	0.96
Number of Villages in GP (Census 2011)	5.04	5.81	-0.77	0.17
Total GP Area (Census 2011)	1,054.79	1,092.53	-37.74	0.67
Percentages of SCs in Main SC Village (Census 2011)	25.84	29.45	-3.61	0.14
Index of Public Goods (Census 2011)	0.12	0.12	0.00	0.94
Total SC Wards	2.75	2.97	-0.22	0.22
Mean non-SC Wealth Score	-0.04	0.02	-0.06	0.31
Mean SC Wealth Score	0.10	0.10	0.00	0.97
Upper-Tiered Representative Age	38.89	41.60	-2.71**	0.05
Wealth Score of Upper-Tiered Representative's Sub-caste	0.84	0.89	-0.05	0.66
Mean Wealth of SC Lower-Tiered Representatives	0.31	0.29	0.02	0.76

NOTE: Table presents results from a series of balance tests for GP-level variables across the population-based RD cutoff. We operationalize tests in the following manner: we run a fuzzy RD with bandwidth = 230. Standard errors are clustered at the GP level. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 2: Balance Across the RD Sample (Ward-level SC Winners)

Variable	Difference	Reserved	Unreserved	pvalue
Margin of Victory	-2.85	24.14	26.99	0.38
Gender	0.06	0.47	0.41	0.17
Age	-1.26	38.30	39.56	0.32
Votes Obtained	-6.21	153.49	159.70	0.39
Barely Literate Or Below	0.03	0.74	0.71	0.64
Total Candidates	-0.17	2.57	2.74	0.18

NOTE: Table presents results from a series of balance tests for ward winner level variables across the population-based RD cutoff. We operationalize tests in the following manner: we run a fuzzy RD with bandwidth = 230. Standard errors are clustered at the GP level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3: Impact of Caste Differences on WAS Projects and Delays (RD)

	Year 1		Year 2	
	(1) **Project Undertaken (Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Caste Differences (SC)	-0.10***	-0.14*	-0.03	-0.15
	(0.04)	(0.08)	(0.04)	(0.13)
Observations	17075.00	17075.00	17075.00	17075.00
Control Mean	.29	.49	.59	1.26
Bandwidth	241	241.94	257.2	266.52
Upper Band	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9). We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4: Impact of Caste Differences on WAS Projects and Delays for SC lower-tiered representatives from poorest sub-caste (RD)

	Year 1		Year 2	
	(1) **Project Undertaken (Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Caste Differences (SC)	-0.12**	-0.21*	-0.09*	-0.34**
	(0.05)	(0.11)	(0.05)	(0.17)
Observations	8746.00	8746.00	8746.00	8746.00
Control Mean	.28	.46	.6	1.23
Bandwidth	223	223	223	223
Upper Band	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9). We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 5: Caste Differences vs Electoral Incentives (RD)

	Small Margin Victors		Large Margin Victors	
	(1) **Total Projects (Year 1)**	(2) **Total Projects (Overall)**	(3) **Total Projects (Y1)**	(4) **Total Projects (Overall)**
Caste Differences (SC)	-0.05	0.11	-0.20*	-0.37**
	(0.11)	(0.15)	(0.10)	(0.18)
Observations	8511	8511	8564	8564
Control Mean	.44	1.23	.5	1.31
Bandwidth	256.38	393.35	307.62	262.29
Block FE	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Small margin victors (columns (1) and (2) are those upper-tiered representatives who won their elections by a margin smaller than the median margin of victory. Large margin victors (columns (3) and (4)), consequently, are those who won elections by above median margin of victory. We run the same specification across these two different samples and report results. Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9).We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 6: How do caste differences affect complaining rates?

	PANEL A: SC Lower-Tiered Representatives				
	(1) **Local Government**	(2) **Public Goods**	(3) **WAS Goods**	(4) **Mention Ward**	(5) **Placebo Private**
Caste Differences (SC)	0.027**	0.046**	0.029**	0.014**	-0.000
	(0.014)	(0.019)	(0.014)	(0.006)	(0.011)
Observations	15821	15821	15821	15821	15821
Control Mean	.02	.03	.02	0	.02
Upper Band	222.14	213.5	217.97	262.82	288.7
Block FE	YES	YES	YES	YES	YES
	PANEL B: Non-SC Lower-Tiered Representatives				
	(1)	(2)	(3)	(4)	(5) e5
Caste Differences (NSC)	0.005	0.005	0.005	0.003	0.012*
	(0.006)	(0.008)	(0.004)	(0.004)	(0.006)
Observations	49629	49629	49629	49629	49629
Control Mean	.01	.02	.01	.01	.01
Upper Band	170.5	188.56	224.77	184.57	156.48
Block FE	YES	YES	YES	YES	YES

Outcome variables are as follows: in column (1), we look at whether a grievance is filed by the lower-tiered representative; column (2) indicates whether a public grievance is filed; column (3) refers to whether a grievance is filed regarding GP-administration; column (4) indicates whether a grievance was filed that directly named the upper-tiered representative; column (5) indicates whether the text of the grievance contained the term "ward". In panel A, Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. In Panel (B), Caste Differences (NSC) is the treatment variable which takes the value of 1 if the SC-GP population is above the population threshold. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9).We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 7: Balance Checks for Complaints filing assistance treatment

Variable	(1) Control	(2) Treatment	(3) Difference
Mean SC Wealth Score	0.083	0.115	0.032
	(0.656)	(0.687)	(0.035)
Mean non-SC Wealth Score	0.067	0.074	0.007
	(0.532)	(0.504)	(0.027)
Upper-Tiered Representative Age	40.710	40.838	0.128
	(10.561)	(9.891)	(0.534)
Proportion of SCs (Census 2011)	0.206	0.199	-0.007
	(0.096)	(0.088)	(0.005)
Distance to Nearest Statuatory Town (Census 2011)	24.252	23.726	-0.526
	(13.634)	(13.671)	(0.717)
Distance to District Headquarters (Census 2011)	35.800	34.912	-0.889
	(20.496)	(19.585)	(1.052)
Number of Villages in GP (Census 2011)	5.868	6.011	0.143
	(3.896)	(4.354)	(0.217)
Total GP Area (Census 2011)	1,166.405	1,111.029	-55.376
	(871.227)	(658.712)	(40.420)
Total Population of GP (Census 2011)	11,073.166	11,038.147	-35.019
	(3,372.965)	(2,779.267)	(159.983)
Percentages of SCs in Main SC Village (Census 2011)	32.956	32.205	-0.750
	(19.935)	(19.834)	(1.087)
Index of Public Goods (Census 2011)	0.087	0.095	0.008
	(0.325)	(0.323)	(0.017)
Wealth Score of Upper-Tiered Representative's Sub-caste	0.346	0.381	0.036
	(0.579)	(0.655)	(0.034)
Lower-Tiered Representative's Age	39.190	38.713	-0.478
	(11.169)	(10.854)	(0.572)
Lower-Tiered Representative's Gender	0.362	0.370	0.008
	(0.481)	(0.483)	(0.025)
Observations	760	727	1,487

NOTE: Tables present category-wise averages and t-tests of difference in means.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 8: ITT Impact on WAS projects in a ward (Endline Survey)

	PANEL A: Problem Solved			
	(1)	(2)	(3)	(4)
Treatment	0.10***	0.07***	0.07***	0.10***
	(0.03)	(0.03)	(0.03)	(0.03)
Control Mean	.41	.41	.41	.41
	PANEL B: Total Projects Started/Starting This Week			
	(1)	(2)	(3)	(4)
Treatment	0.11***	0.08***	0.09***	0.11***
	(0.04)	(0.03)	(0.03)	(0.04)
Control Mean	.34	.34	.34	.34
	PANEL C: If Project Started			
	(1)	(2)	(3)	(4)
Treatment	0.06**	0.04*	0.04*	0.06**
	(0.03)	(0.02)	(0.02)	(0.03)
Control Mean	.27	.27	.27	.27
Observations	1370.00	1370.00	1370.00	1370.00
FE	Block	District	SubDivision	Block
Cluster	NO	NO	NO	YES
Pre-Specified	YES	NO	NO	NO

Table delineates the impact of the complaint filing assistance treatment on our three main outcome variables across different specifications. Each panel lists a different outcome. The first column - i.e specification (1) - across all three outcomes is our pre-specified estimating equation. Other columns vary the level of fixed effects and cluster errors at different levels. All regressions contain GP-level controls.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 9: Spillover Impact of Treatment on Complaint Filing

	Impact of Treatment on Complaints Filed in Neighbouring Wards		
	(1) **Complaints**	(2) **Local Admin**	(3) **WAS**
Treated GP	0.0049**	0.0024**	0.0030**
	(0.0020)	(0.0012)	(0.0012)
Mean	.0051	.0024	.0023
Observations	1.0e+04	1.0e+04	1.0e+04
Block FE	YES	YES	YES
GP Controls	YES	YES	YES

Outcome variables are as follows: (1) Total complaints per ward; (2) Total local administration-related complaints per ward; (3) Total WAS project-related complaints per ward. All regressions restrict attention to GPs with only one experimental ward (either treatment or control). These form 75% of our GPs. All regressions include *all* non-experimental lower-tiered representatives (for whom data is available) in these GPs. Standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 10: Spillover Impact of Treatment on Projects Undertaken

	Impact on neighbouring wards			
	(1) **Project Undertaken(Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Treated GP	0.08**	0.10*	0.04	0.05
	(0.04)	(0.05)	(0.03)	(0.04)
Constant	0.20	0.22	0.31***	0.29**
	(0.14)	(0.19)	(0.09)	(0.12)
Observations	788.00	780.00	918.00	908.00
Fixed Effects	Block	Block	District	District

Outcome variables are of two types: (1) and (3) If WAS project was undertaken in the neighboring ward; (2) and (4) Total WAS projects undertaken in neighboring ward. All regressions are run over our one randomly sampled ward from GPs with only one experimental ward (either treatment or control). These form 75% of our GPs. All regressions include one randomly sampled non-experimental lower-tiered representative in whose wards projects were stalled in these GPs. Standard errors are clustered at the GP-level. Block fixed effects are added in columns (1) and (2); GP fixed effects are added in columns (3) and (4). *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Appendix

A Figures

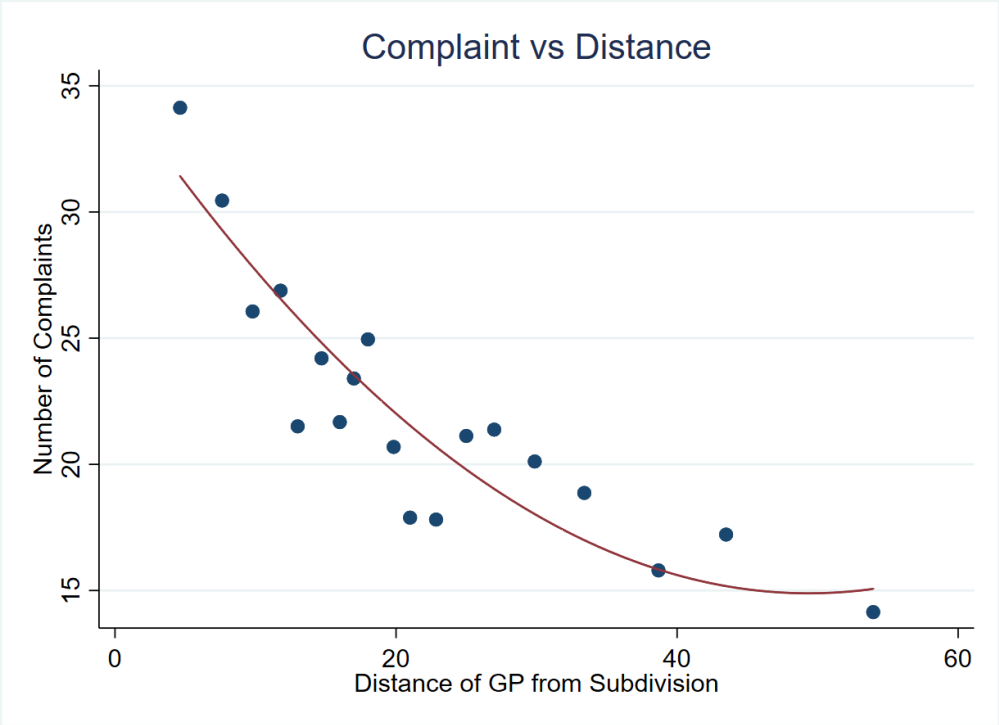


Figure A1: Figure plots number of complaints filed against distance to the grievance redressal centre where citizens need to file complaints. The downward relationship suggests considerable transactional costs of filing complaints and attending hearings

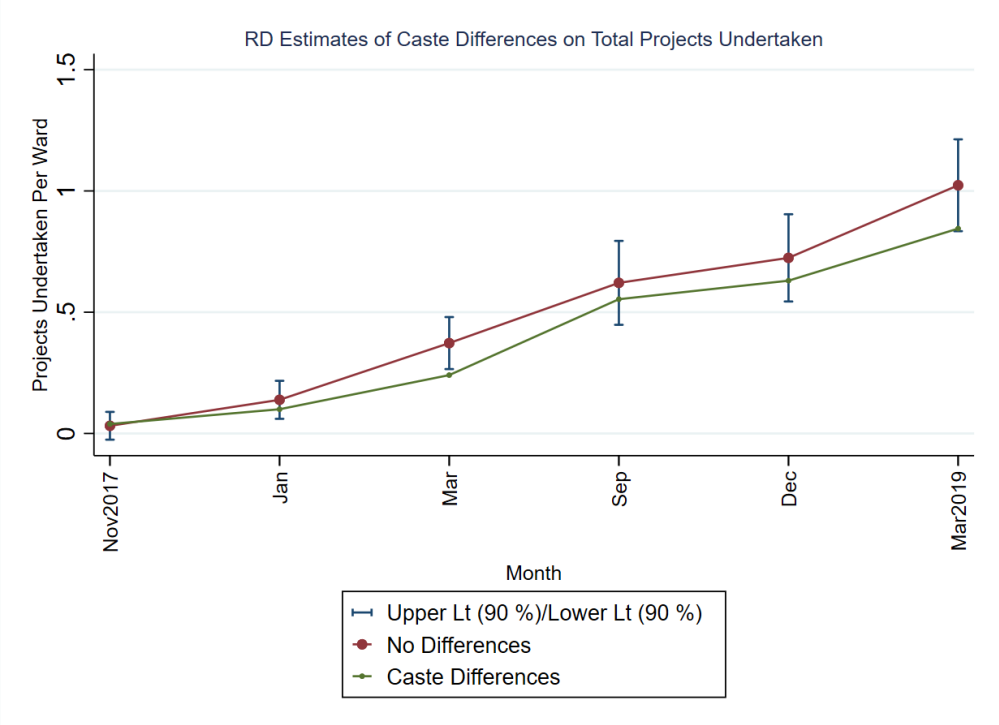
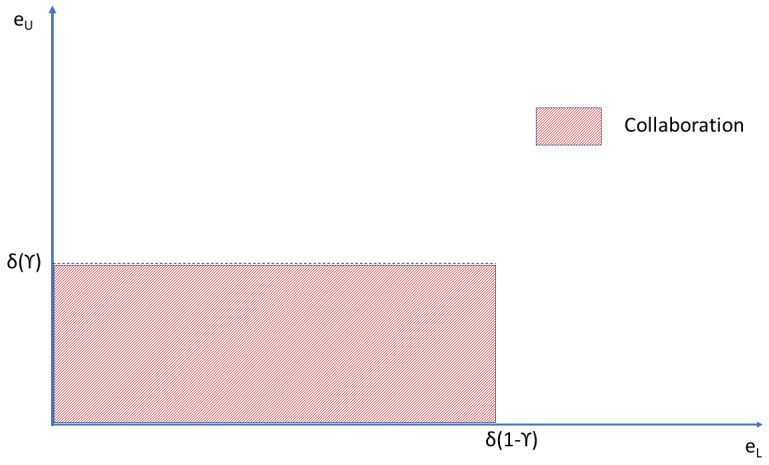
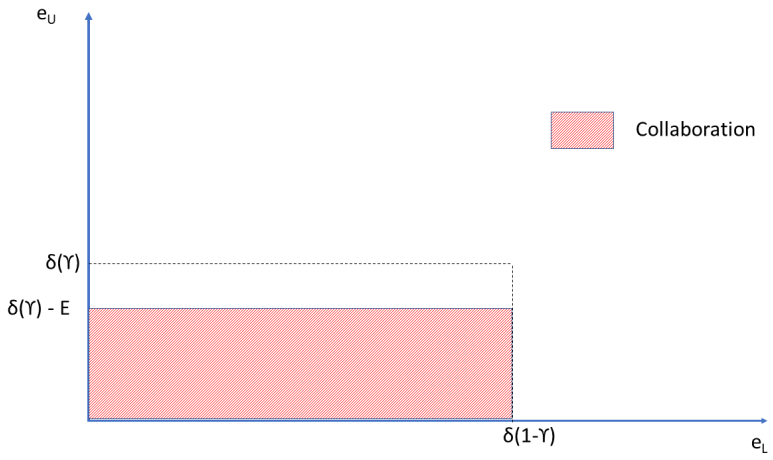


Figure A2: Figure plots the RD estimates on total projects undertaken in SC wards that are caste matched and those that have caste differences. The green line plots the "control group" estimates – i.e within a bandwidth of 200 below the RD cutoff; the red line shows the same plot, but by adding the RD treatment impacts to the control estimate. Block fixed effects and other controls are also added. As the figure shows, caste differences decrease likelihood of projects being undertaken across the board.



(a) Collaboration



(b) Collaboration with Caste Differences

Figure A3: Panel A3(a) displays the range of effort costs where collaboration is feasible, assuming each player obtains their fixed share of the surplus. Panel A3(b) shows how caste differences reduces collaboration by tightening the upper-tiered representative's collaboration constraints.

B Additional Tables

Table B1: Impact of Caste Differences on WAS Projects and Delays for SC lower-tiered representatives from richest sub-caste (RD)

	Year 1		Year 2	
	(1) **Project Undertaken (Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Caste Differences (Non-SC)	-0.11**	-0.26***	0.03	-0.09
	(0.05)	(0.10)	(0.06)	(0.19)
Observations	8243.00	8243.00	8243.00	8243.00
Control Mean	.3	.5	.59	1.27
Bandwidth	223	223	223	223
Upper Band	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occurs). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9). We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B2: Impact of Caste Differences on How Projects Are Implemented (RD)

	Impact of Caste Differences on WAS Projects in SC Wards (RD)		
	(1)	(2)	(3)
	Incomplete	**Delay**	**Report Trouble by Upper-Tier**
Caste Differences (SC)	0.27**	0.34***	0.12**
	(0.11)	(0.11)	(0.06)
Observations	213	208	213
Control Mean	-.17	-.35	-.07
Bandwidth	100	100	100
GP Controls	YES	YES	YES

Outcome variables are in the following order: (1) Scheme Incomplete or Not done (2) Delay of over 5 months in implementation (3) Faced trouble from the upper-tiered representative. Our sample comprises SC-wards in randomly sampled GPs from either side of the RD cutoff within a bandwidth of 100. Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9).We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table B3: Impact of Caste Differences on Why Projects Are Not Implemented and Responses (RD)

	Impact of Caste Differences on Public Goods (RD)				
	(1) **Upper-Tier Fund**	(2) **Caste-Favoring**	(3) **Procedural Reason**	(4) **Informal Approach**	(5) **Formal Complaint**
Caste Differences (SC)	0.24*	0.06*	-0.19**	-0.24**	0.48**
	(0.13)	(0.04)	(0.08)	(0.11)	(0.20)
Observations	1610	1610	1610	1610	774
Control Mean	0.33	0.03	0.16	0.76	0.49
Lower Band	284.90	438.14	229.37	267.34	280.69
Upper Band	284.90	438.14	229.37	267.34	280.69
Controls	YES	YES	YES	YES	YES

Outcome variables are in the following order: (1) Whether no project due to upper-tier representative refusing to pass on funds (2) Whether no project due funding issues caused by caste-favoring by the upper-tiered representative (3) whether no project due to procedural reasons (4) Whether informally approached the upper-tiered representative/bureaucrat regarding non-implementation (4) Whether take-up our offer to file formal complaints on their behalf. Our sample comprises SC-wards where at least one of the WAS projects haven't been undertaken yet. Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential this implies potential caste matching above and caste differences below. We use CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9).We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table B4: Impact of Sub-caste Differences on WAS Projects and Delays (RD)

	Project Undertaken (Year 2)		
	(1) **All GPs**	(2) **Non-SC Upper-Tier**	(3) **SC Upper-Tier**
Sub-Caste Differences	-0.05*	-0.06*	0.00
	(0.03)	(0.03)	(0.08)
Observations	9623	8174	1449
Control Mean	0.60	0.57	0.74
Bandwidth	0.16	0.14	0.13

The main outcome variable is a binary that looks at whether any WAS project was undertaken at the end of Year 2. We restrict attention to all pairs of lower- and upper-tiered representatives where the surname of the lower-tiered representative matches with either the winner or the loser of the upper-tiered post's election. Sub-caste differences is the treatment variable which takes the value of 1 if the lower- and upper-tiered representatives' surnames are different because the upper-tiered representative narrowly won (or lost) an election. Our running variable is the vote-margin of victory. We estimate an equation of the form described in the paper (equations 10. We estimate local linear regressions on either side of the cutoff and use CCT triangular bandwidths. We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table B5: Do SC lower-tiered representatives file more complaints upon winning elections? (RD)

	Impact of Winning on Grievances				
	(1) **Grievance Filed**	(2) **Public Grievance**	(3) **Local Government**	(4) **WAS Project**	(5) **Placebo: Private**
Winning Election RD	0.047***	0.038***	0.030***	0.028***	-0.001
	(0.011)	(0.007)	(0.004)	(0.004)	(0.005)
Observations	35763	35763	35763	35763	35763
Control Mean	.04	.01	0	0	.02
Bandwidth	.15	.15	.21	.2	.16

Outcome variables are as follows: (1) Total complaints filed by candidate; (2) Total Public complaints filed by candidate (3) Total local administration related complaints filed (4) Total WAS project-related complaints filed. Our sample comprises all winning and losing lower-tiered SC candidates. We estimate close-election based RD specification described in equation 11. We estimate CCT triangular bandwidths.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table B6: How Representative is the Final Sample?

Variable	(1) Population	(2) Sample	(3) Difference
Margin of Victory (Ward)	27.051	27.806	0.756
	(23.800)	(24.305)	(0.721)
Votes Obtained (Ward)	157.134	161.389	4.254***
	(54.642)	(54.736)	(1.632)
Total Candidates (Ward)	2.659	2.680	0.021
	(1.253)	(1.264)	(0.035)
Age (Lower-Tiered Representative)	39.825	38.950	-0.875***
	(13.350)	(11.068)	(0.329)
Literate (Lower-Tiered Representative)	0.576	0.531	-0.045***
	(0.494)	(0.499)	(0.014)
Illiterate (Lower-Tiered Representative)	0.145	0.106	-0.039***
	(0.352)	(0.308)	(0.009)
Ward Reserved for SCs	0.645	0.616	-0.029**
	(0.479)	(0.486)	(0.013)
Margin of Victory (GP)	169.732	171.240	1.509
	(170.502)	(172.391)	(4.754)
Votes Obtained (GP)	1,242.712	1,260.360	17.648
	(500.574)	(504.305)	(13.892)
Total Candidates (GP)	12.470	12.504	0.035
	(5.456)	(5.459)	(0.151)
Age (Upper-Tiered Representative)	40.318	40.712	0.394
	(12.398)	(10.449)	(0.310)
Total Candidates (GP)	12.470	12.504	0.035
	(5.456)	(5.459)	(0.151)
Literate (Upper-Tiered Representative)	0.347	0.323	-0.025*
	(0.476)	(0.468)	(0.013)
Illiterate (Upper-Tiered Representative)	0.016	0.014	-0.001
	(0.124)	(0.118)	(0.003)
Observations	3,588	2,117	5,705

NOTE: Tables present category-wise averages and t-tests of difference in means.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$..

Table B7: Balance Checks for Information Only Treatment

Variable	(1) Control	(2) Treatment	(3) Difference
Mean SC Wealth Score	0.068	0.035	-0.033
	(0.571)	(0.703)	(0.079)
Mean non-SC Wealth Score	0.022	0.082	0.060
	(0.515)	(0.529)	(0.064)
Upper-Tiered Representative Age	40.797	40.808	0.011
	(10.224)	(10.071)	(1.240)
Proportion of SCs (Census 2011)	0.193	0.198	0.005
	(0.090)	(0.075)	(0.010)
Distance to Nearest Statuatory Town (Census 2011)	25.004	23.449	-1.555
	(14.904)	(15.655)	(1.884)
Distance to District Headquarters (Census 2011)	36.478	33.685	-2.793
	(22.046)	(17.323)	(2.431)
Number of Villages in GP (Census 2011)	5.504	5.693	0.189
	(3.875)	(4.292)	(0.505)
Total GP Area (Census 2011)	1,100.919	1,008.475	-92.444
	(692.032)	(535.960)	(75.880)
Total Population of GP (Census 2011)	11,080.661	10,933.098	-147.563
	(3,021.192)	(3,046.847)	(368.973)
Percentages of SCs in Main SC Village (Census 2011)	29.822	34.375	4.553*
	(16.646)	(23.093)	(2.645)
Index of Public Goods (Census 2011)	0.140	0.094	-0.046
	(0.347)	(0.384)	(0.045)
Wealth Score of Upper-Tiered Representative's Sub-caste	0.238	0.326	0.088
	(0.502)	(0.649)	(0.075)
Lower-Tiered Representative's Age	38.411	38.138	-0.273
	(10.663)	(10.427)	(1.282)
Lower-Tiered Representative's Gender	0.348	0.446	0.098
	(0.478)	(0.499)	(0.060)
Observations	141	130	271

NOTE: Tables present category-wise averages and t-tests of difference in means.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table B8: Spillover Impact of Treatment on Complaint Filing (Surveyed Sample)

	Impact of Treatment on Complaints Filed in Neighbouring Wards		
	(1)	(2)	(3)
	Complaints	**Local Admin**	**WAS**
Treated GP	0.0254**	0.0203**	0.0250**
	(0.0115)	(0.0098)	(0.0106)
Mean	.0051	.0024	.0023
Observations	789.0000	789.0000	789.0000
Block FE	YES	YES	YES
GP Controls	YES	YES	YES

Outcome variables are as follows: (1) Total complaints per ward; (2) Total local administration-related complaints per ward; (3) Total WAS project-related complaints per ward. All regressions are run over our one randomly sampled ward from GPs with only one experimental ward (either treatment or control). These form 75% of our GPs. All regressions include *all* non-experimental lower-tiered representatives (for whom data is available) in these GPs. Standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

C Robustness Checks

C.1 Caste Differences and Public Goods

Table C9: Impact of Reservation for SC on WAS Projects and Delays in non-SC wards (RD)

	Year 1		Year 2	
	(1) **Project Undertaken (Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Caste Differences (Non-SC)	0.03**	0.06	0.07	0.02
	(0.02)	(0.04)	(0.07)	(0.03)
Observations	52468.00	52468.00	52468.00	52468.00
Control Mean	.11	.17	.72	.35
Bandwidth	230	230	230	230
Upper Band	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences (NSC) is the treatment variable which takes the value of 1 if the SC-GP population is above the cutoff and thus there are caste differences for the non-SC group between the two tiers of representatives. We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table C10: Robustness 1: 50 % Bandwidth

	Year 1		Year 2	
	(1) **Project Undertaken (Y/N)**	(2) **Project Undertaken (Y/N)**	(3) **Total Projects**	(4) **Total Projects**
Caste Differences (SC)	-0.11**	-0.12	-0.03	-0.17
	(0.05)	(0.11)	(0.06)	(0.19)
Observations	17075	17075	17075	17075
Control Mean	.3	.51	.6	1.27
Bandwidth	120	120	120	120
Block FE	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use 50% of the CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9). We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table C11: Robustness 2: 150 % Bandwidth

	Year 1		Year 2	
	(1) **Project Undertaken (Y/N)**	(2) **Project Undertaken (Y/N)**	(3) **Total Projects**	(4) **Total Projects**
Caste Differences (SC)	-0.09***	-0.11	-0.03	-0.10
	(0.03)	(0.07)	(0.04)	(0.12)
Observations	17075	17075	17075	17075
Control Mean	-.29	-.51	-.58	-1.28
Bandwidth	360	360	360	360
Block FE	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the population threshold (and hence differences occur). Upper-tiered representatives are almost always SC above the cutoff and virtually never SC below the cutoff. For SC lower-tiered representatives (who we restrict attention to here), this implies potential caste matching above and caste differences below. We use 150% of the CCT triangular bandwidths and estimate fuzzy RD specifications described in the paper (equation 8 and 9). We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

C.2 Caste Differences and Formal Complaints Technology

Table C12: Robustness

	PANEL A: Half Bandwidth				
	(1) **Local Government**	(2) **Public Goods**	(3) **WAS Goods**	(4) **Mention Ward**	(5) **Placebo Private**
Caste Differences (SC)	0.041**	0.067***	0.040**	0.018**	0.007
	(0.017)	(0.022)	(0.017)	(0.008)	(0.016)
Observations	15821	15821	15821	15821	15821
Control Mean	.02	.03	.02	0	.02
Upper Band	144.35	144.35	144.35	144.35	144.35
Block FE	YES	YES	YES	YES	YES
	PANEL B: 1.5 Bandwidth				
	(1) **Local Government**	(2) **Public Goods**	(3) **WAS Goods**	(4) **Mention Ward**	(5) **Placebo Private**
Caste Differences (SC)	0.023**	0.031**	0.023**	0.014***	-0.003
	(0.010)	(0.013)	(0.010)	(0.005)	(0.008)
Observations	15821	15821	15821	15821	15821
Control Mean	.02	.03	.02	0	.01
Upper Band	433.05	433.05	433.05	433.05	433.05
Block FE	YES	YES	YES	YES	YES

Panel A replicates Table 6 but with half the CCT triangular bandwidth. Panel B replicates Panel A of table 6 but with 1.5 times the CCT triangular bandwidth. The effects remain consistently negative across both types of bandwidths.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table C13: Impact of Caste Differences on How Projects Are Implemented (RD)

	Impact of Caste Matching on WAS Work (RD)			
	(1)	(2)	(3)	(4)
	Incomplete	**Delay**	**Contractor**	**Trouble Upper Tier**
Caste-Matching	-0.21	-0.23*	0.09	-0.11
	(0.13)	(0.12)	(0.12)	(0.07)
Observations	237.00	232.00	223.00	237.00
Control Mean	.24	.41	.62	.09
Lower Band	100	100	100	100
Upper Band	100	100	100	100
Block FE	NO	NO	NO	NO
GP Controls	NO	NO	NO	NO

Outcome variables are in the following order: (1) Scheme Incomplete or Not done (2) Delay of over 5 months in implementation (3) Whether they hired the contractor or somebody else did (4) Faced trouble from the upper-tiered representative. Our sample comprises SC-wards in randomly sampled GPs from either side of the RD cutoff within a bandwidth of 100. Caste differences is the treatment variable which takes the value of 1 if the SC-GP population is below the cutoff and thus caste differences occur between the two tiers of representatives. All standard errors are clustered at the GP-level where indicated.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table C14: Do non-SCs with more of their own type discriminate more against SC lower-tiered representatives?

	PANEL A: 3 or Below			
	(1) **Project Undertaken (Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Caste Differences (SC)	-0.10**	-0.15	-0.03	-0.24
	(0.05)	(0.10)	(0.05)	(0.15)
Observations	13072.00	13072.00	13072.00	13072.00
Control Mean	.29	.49	.59	1.24
Bandwidth	230	230	230	230
Upper Band	YES	YES	YES	YES
	PANEL A: 4 or Above			
	(1) **Project Undertaken (Y/N)**	(2) **Total Projects**	(3) **Project Undertaken (Y/N)**	(4) **Total Projects**
Caste Differences (SC)	-0.11**	-0.12	-0.04	-0.10
	(0.05)	(0.11)	(0.05)	(0.21)
Observations	13236.00	13236.00	13236.00	13236.00
Control Mean	.29	.49	.59	1.24
Bandwidth	230	230	230	230
Upper Band	YES	YES	YES	YES

Outcome variables are either: (a) a binary variable that capture whether any WAS project was undertaken (Project Undertaken (Y/N); (b) The total number of projects undertaken (Total Projects). Caste differences (SC) is the treatment variable which takes the value of 1 if the SC-GP population is below the cutoff and thus there are caste differences for the SC group between the two tiers of representatives. We control for GP-level covariates, ward-level covariates and Block-fixed effects. All standard errors are clustered at the GP-level.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

D Model Assumptions Revisited

In this section, we relax assumptions in the model described in section 3 and discuss conditions under which we see the results we do in our empirical section.

D.1 Modeling caste and administrative hierarchies

Our model assumes that the upper-tiered representative faces greater costs because (a) they are non-lower caste and hence dislike working with lower caste lower-tiered representatives (b) they face greater opportunity costs of collaboration since they can potentially collaborate with other lower-tiered representatives. Thus, the costs we see arise from the simultaneous occurrence of two separate hierarchies: (a) caste (b) administrative.

One potential way to nest these hierarchies in our setting is to model four separate costs, for each combination of tiers (U and L) and castes (NSC and SC). Thus, we would have $E_{U,NSC}$, $E_{U,SC}$, $E_{L,NSC}$, $E_{L,SC}$. We believe that while this could potentially make for a fuller model, it doesn't add much to our understanding of how hierarchies affect collaboration or square with how these intertwining hierarchies play out in the real world.

Two important factors from the real world are important to note here: first, the lower-tiered representative, irrespective of caste, would be extremely willing to collaborate. The reasoning is simple: these schemes constitute the universe of projects the lower-tiered representative has control over. If they wish to be re-elected, it will largely rest on their ability to successfully implement these projects. Thus, as our results also show, the implementation hold up is unlikely to be driven by lower-tiered representatives. In other words, it is not at all unreasonable to assume that $E_{L,NSC} = E_{L,SC} \approx 0$. Secondly, as the vast literature on caste in India shows, caste hierarchies are extremely rigid and, given the gradedness of the system, always result in asymmetric costs. In particular, SCs are unlikely to face collaboration costs from working with non-SCs. Thus, it is not far-fetched to assume $E_{U,SC} \approx 0$. This leaves us with the following claim, as our model also assumes: $E_{U,NSC} > 0$.

D.2 Introducing E_L

If, despite these above caveats, we assume that both U and L face additional costs E_U and E_L respectively from collaboration. How does that affect whether or not (a) collaboration occurs under differences (b) whether complaints are filed?

We consider the case where the formal complaints technology is in place. Thus, for the L, the collaboration constraint changes from 2 to:

$$\begin{aligned} & p * (e_L - (1-\delta)\tau^*) < C \\ \implies & e_L < (1-\delta)\tau^* - \frac{C}{p} + E_L \end{aligned} \tag{14}$$

This makes the answer to (a) above straightforward: collaboration will be further reduced if E_L is introduced in addition to E_U.

Put simply, the collaboration constraint tightens. How does this affect complaining rates? If $E_L > e_L - (1-\delta)\tau^* - \frac{C}{p}$, then L would never want to collaborate under caste differences. Then, irrespective of how caste differences affects U's participation constraint, complaint filing never occurs.

Consider the case where $E_L < e_L - (1-\delta)\tau^* - \frac{C}{p}$. We will now only see more complaints in equilibrium when the additional complaints arising from U's unwillingness to collaborate is greater than the reduction in complaints because L does not want to collaborate because of differences.

If ϕ_U and ϕ_L are the c.d.fs for e_U and e_L, this translates to: $[\phi_U(\delta\tau^* + \frac{M}{1-p}) - \phi_U(\delta\tau^* + \frac{M}{1-p} + E_U)](\phi_L((1-\delta)\tau^* - \frac{C}{p} - E_L)) > [\phi_L((1-\delta)\tau^* - \frac{C}{p}) - \phi_L((1-\delta)\tau^* - \frac{C}{p} - E_L)](1 - \phi_U(\delta\tau^* + \frac{M}{1-p}))$

The limiting case of $E_L = 0$ implies that the RHS of the equation above mechanically reduces to 0 and we will always see, as our main model shows, more complaints under equilibrium. On the other hand, when $E_L > (1-\delta)\tau^* - \frac{C}{p}$, the LHS goes to 0 and one will see fewer complaints under equilibrium. Thus, this implies there exists an intermediate $\hat{E_L}$ below which more complaints will be filed and above which fewer complaints will be filed.

E Caste Differences with the upper-tiered bureaucrat (BDO)

E.0.1 BDO Demographic Data

We collect demographic (including caste) information on over 600 Bihar Administrative Bureaucrats who have served as Block Development Officers in the period June 2016 - May 2019. The lists of bureaucrats - including transfers - are collected from government sources, but demographic information is obtained via interviews with upper-tiered representatives who function in close contact with BDOs. For every BDO, we triangulate information across a minimum of 3 upper-tiered representatives.

E.1 OLS Fixed Effects

To understand how caste differences with the upper-tiered bureaucrat affects outcomes in wards, we run an OLS specification with both ward- and bureaucrat fixed effects. Thus, for each ward-bureaucrat combination, we measure the number of projects initiated in the following manner:

$$Y_{ib} = \gamma_0 + \gamma_1 CasteMatch_{ib} + \gamma_2 CasteMatch_{ib} * 1(C_i = SC) + \zeta + \psi + \eta_{ib} \tag{15}$$

where Y_{ib} is the number of projects constructed in ward i under bureaucrat b. C_i indicates the caste of the member i. $CasteMatch_{ib}$ is a dummy that takes the value 1 when the caste of the bureaucrat and the lower-tiered representative matches. We are interested in γ_2 - the impact of caste matching when the lower-tiered representative is an SC.

We present OLS estimates (with bureaucrat and ward fixed effects) as in equation 15 for caste matching between the upper-tiered bureaucrat and the lower-tiered representative on WAS outcomes. Table E15 presents the results. Columns (2) and (5) document that caste matching results in more WAS assets being constructed in the SC lower-tiered representative's ward. In column (3), we restrict our attention to wards where an SC narrowly won or lost elections against non-SC members - thus, for these wards, caste matching is as if random for SC ward members. Here too, we find strong and significant effects of caste matching on WAS projects being undertaken.

Table E15: Impact of caste matching with bureaucrat on WAS Projects and Delays (RD)

	Before March 2018		Overall	
	(1) **Total Projects**	(2) **Total Projects**	(3) **Total Projects**	(4) **Total Projects**
BDO+Ward Caste Match	0.01	0.05	0.00	-0.17
	(0.01)	(0.09)	(0.01)	(0.16)
BDO+Ward Caste Match=1 × SC	0.07***		0.14***	
	(0.02)		(0.03)	
BDO+Ward Caste Match=1 × NarrowWin=1		0.07		0.51*
		(0.17)		(0.30)
Constant	0.13***	0.10***	0.37***	0.38***
	(0.00)	(0.02)	(0.00)	(0.04)
Observations	98497.00	1365.00	98497.00	1365.00
Ward Fixed Effects	YES	YES	YES	YES
BDO Fixed Effects	YES	YES	YES	YES

Outcome variable is the number of projects initiated in the term-period of a bureaucrat. We control for ward-level fixed effects and bureaucrat-fixed effects. NarrowLoss indicates a dummy variable where an SC-ward member narrow lost an election in an unreserved ward. All standard errors are clustered at the GP-level where indicated.

F Reservation Rule

F.1 Reservation rule for 2006

The reservation rule proceeds in the following manner:

- First, based on the proportion of SCs (STs) in the block, the number of GPs to be reserved for SCs (STs) is decided. If there are N_j GPs in block j and θ_j is the proportion of SCs (STs) in block j, then the number of GPs, n_j, to be reserved is

$$n_j = round(\theta_j * N_j, 1)$$

- Let n_{SC} and n_{ST} be the number of GPs to be reserved in block j for SCs and STs, respectively. The number of GPs to be reserved for OBCs is given by

$$n_{OBC} = min(round(0.2 * N_j, 1), round(0.5 * N_j - n_{SC} - n_{ST}, 1))$$

- If there are no STs in the block or n_{ST} is 0 (which is true in 480 of the 534 blocks), then the rule skips to the next step. However, if $n_{ST} > 0$, the rule proceeds by arranging all GPs in descending order of their ST population. The first GP in the list is then reserved for STs.
- Now, all remaining GPs are rearranged in the descending order of their non SCST population. The first GP on this truncated list is "blocked". The choice of word is deliberate and conveys an important distinction: the GP is not "reserved", it is merely blocked.
- Now, all unreserved and unblocked GPs are rearranged in descending order of their SC population. The first GP in this further truncated list is now reserved for SCs.
- This algorithm proceeds until the number of GPs reserved for STs = n_{ST} or the number reserved for SCs is n_{SC}. Once, a group hits its quota of reserved GPs, then the rearranging of GPs is no longer done by that group. For instance, if $n_{ST} = 1$, then, in the second round, GPs are no longer rearranged by ST population - instead, the rule proceeds straight to rearranging by non-SCST population.
- The algorithm further proceeds till the second group also hits its quota of reserved GPs. This throws up two sets of GPs, n_{ST} GPs that are reserved for STs and n_{SC} GPs that are reserved for SCs.
- Now, all the unreserved GPs (including the "blocked" ones) are collected and arranged by descending order of GP population.

- The first n_{OBC} GPs in this list is reserved for OBCs.
- Thus, for each block, one can arrive at an SC population cut-off - the population of the last GP to be reserved for SCs - below which no GP is reserved.

F.2 Reservation rule for 2016

The reservation rule for 2016 proceeds in a similar manner to that of 2006, with two major changes. First, it changes the order in which GPs are arranged. In 2006, GPs were arranged first by STs, then non-SCSTs, then SCs. In 2016, GPs are arranged first by non-SCSTs, then by SCs, then by STs. Second, since there is no provision for recurring reservation, no GP previously reserved for SCs (STs/OBCs) can again be reserved for the same. So, when GPs are arranged by descending order of population of a particular group, those previously reserved are struck off the list, even before the algorithm begins.

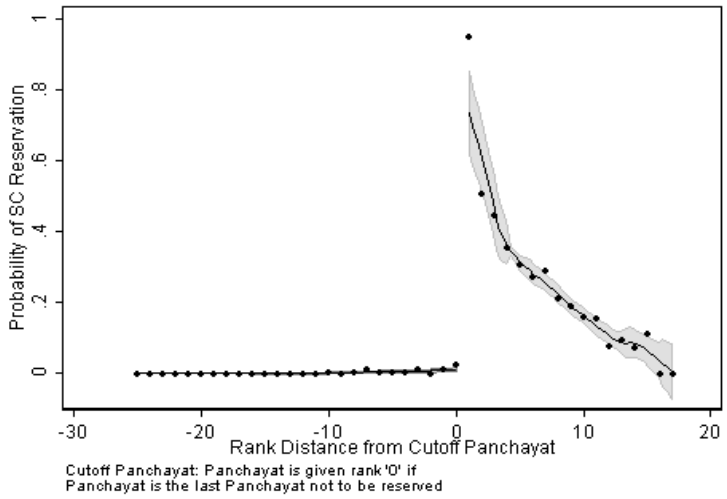


Figure F4: Figure plots the probability of reservation based on the rank of a GP within a Block for the elections of 2016. The last GP not to be reserved is given a rank 0 and the first GP to be reserved is ranked 1 and so on. Therefore, all negative ranks correspond to GPs not to be reserved and positive ones to GPs to be reserved. We keep all GPs reserved for OBCs too, which explains the sharp drop in the probability of reservation above the cutoff (since OBC reservation results in some top-ranked GPs in terms of SC population to be reserved for OBCs). Panel B plots the probability of reservation based on the rank of a GP within a Block for the elections of 2016, but we keep all GPs.

G Spillovers and Backlash

G.1 Spillovers

For spillovers in projects undertaken, we can only observe administrative data with a considerable lag. Thus, there exist few reported projects in the administrative data in the post-experimental period. We instead use survey data to measure spillovers on a specific subset of wards. At baseline, we asked every respondent to name a maximum of 3 other lower-tiered representatives who they were "close" to. In the endline, we ask if projects were initiated in these "close"-representatives' wards in the experimental period. We expect this data to have some noise - since estimating timelines of projects in neighboring jurisdictions could be tricky - but limiting our attention to only those wards that are governed by members "close" to our experimental respondent allows us to be more confident of our reported estimates. As Panel C of Table G16 shows, we find no effect of the intervention on reported projects being undertaken in neighboring wards.

G.2 Backlash

We now turn to effects on backlash from the upper-tiered representative. As Table G16 shows, we cannot reject the null that treatment does not increase contact by the upper-tiered representatives or that the respondents report facing no greater threats (though the signs of the coefficients are positive).

Table G16: ITT Impact of Grievance Treatment on Outcomes (Endline Survey)

	PANEL A: Someone Approached	
	(1)	(2)
Treatment	0.02	0.02
	(0.03)	(0.04)
Control Mean	.49	.49
	PANEL B: Someone Threatenned	
	(1)	(2)
Treatment	0.01	0.01
	(0.01)	(0.01)
Control Mean	.02	.02
	PANEL C: Close Ward Projects (Number)	
	(1)	(2)
Treatment	0.04	0.04
	(0.05)	(0.05)
Control Mean	.61	.61
Observations	1370.00	1370.00
FE	Block	Block
Cluster	NO	YES
Pre-Specified	YES	NO

Table delineates the impact of complaint filing assistance treatment on three ancillary outcome variables across different specifications. Each panel considers lists a different outcome Panel A Outcome is whether someone from the administration approached our respondent post intervention. Panel B is whether anybody from the administration threatened them. Panel C is the average number of projects undertaken in close wards. The first column - i.e specification (1) - across the two columns is our pre-specified estimating equation. Other columns vary the level of fixed effects and cluster at different levels.*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

H Classifying Complaints

To get a better sense of the types of complaints being filed, we classify complaints into "Public(-Spirited)" and "Private" complaints. In our data, complaints are sorted by Department (44 departments - land, police, rural development etc) and Type (there are over 2000 types). We focus on the top 280 types of complaints which account for nearly 90 % of the grievances filed and classify them using the following definitions:

- *Any complaint is considered public or public-spirited if the resolution to the complaint benefits more than one person (say, construction of a Panchayat Bhavan in the Panchayat).*
- *Any complaint is considered private if the resolution of the complaint results in the benefits of only oneself.*
- *For the class of complaints where it is difficult to ascertain who the final beneficiary is, we consider them neither Private nor Public.*

I Sampling and Randomization for RCT

Our sampling frame comprising all wards that, according to official government data in May 2019, had:

1. Had not seen any water-and-sanitation asset construction AND
2. Have a representative who belongs to a Scheduled caste.

Now, as explained previously, upon piloting we discovered that the official data reports asset construction with a lag. Hence, we have a series of screening questions to screen out wards where WAS projects have been completed.

Subsequently, local representatives are randomized into one the two treatments arms or the control arm. Randomization occurs in real-time on the survey app the enumerators use. Representatives are equally likely to be randomized into either of the treated arms or the control arm. However, since we want to detect smaller sized effects in Treatment G and power calculations suggest that we would require about 6 times as many wards to see the effect sizes we want to see, our experiment began with only two arms, Treatment G and Control, occurring with equal probability. Subsequently, the third treatment arm - Treatment I - was added and all three arms were to occur with equal probability.

We attempted to cover about 800 Treatment G wards, 150 Treatment I wards and 800 control wards. The actual numbers were as follows: 722 Treatment G wards, 130 Treated I wards and 760 Control wards.