# Borui Sun

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September 15, 2026

Dear Professors Breza, Chandrasekhar, and Viviano,

I am a fifth-year Ph.D. student in Agricultural and Resource Economics at the University of Maryland, College Park, and I am writing to apply to the NBER Workshop on Development Economics and Networks for Early-Career Researchers. I study development economics and political economy, with a focus on collective decision-making in local governments in India.

The pages that follow contain my curriculum vitae, my statement of research interests, and my working paper, "Team Expansion and the Costs of Homogeneity: Evidence from West Bengal Local Councils."

My contact information is provided above. If I am shortlisted, my advisor, Professor M. R. Sharan (sharan@umd.edu), can provide a letter of recommendation on my behalf.

Thank you very much for considering my application.

Sincerely,

Borui Sun
Ph.D. Student, Agricultural and Resource Economics
University of Maryland, College Park

# Borui Sun (she/her)

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University of Maryland, College Park

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## Education

Ph.D., Agricultural and Resource Economics, University of Maryland *2028 (expected)*
M.P.P. & Certificate in Data Analytics, University of Chicago, Harris School of Public Policy *2020*
B.A., Political Science & International Affairs (Double Major), George Washington University *2018*

## Research Fields

Development Economics, Political Economy, Labor Economics

## Working Papers

**1. "Political Selection in an Unequal Democracy: The Tradeoff Between Competence and Representation"** *(with Apurva Bamezai, Siddharth George, and M.R. Sharan)*
Draft available here; previously circulated as *"Who Becomes a Local Politician?"*

**2. "Team Expansion and the Costs of Homogeneity: Evidence from West Bengal Local Councils"**
Draft available here

## Works in Progress

**1. "Reducing Inequality Through Efficient Policing"** *(with Erich Battistin and Richard Fletcher Hahn)*

*Abstract.* This project studies how routine police deployment decisions affect crime and inequality in public safety. We exploit a natural experiment created by the redrawing of Police Service Area boundaries in Washington, DC, which induced quasi-random variation in police presence at the census-block level. In contrast to interventions that temporarily concentrate officers in crime hotspots, the setting captures persistent changes in routine patrol allocation. Combining incident-level crime reports with granular measures of patrol intensity derived from anonymized officer smartphone location data, we estimate the effects of these changes on crime. We then develop a spatial equilibrium model of criminal behavior to evaluate counterfactual deployment strategies and their implications for the distribution of public safety across neighborhoods.

**2. "Algorithmic Bias and Gender Pay Gaps in Digital Labor Markets"** *(with Gaurav Chiplunkar, Erin Kelley, and Greg Lane)*

*Abstract.* Using data from a leading Indian job portal, we study how algorithmic hiring practices shape gender pay disparities. We document that employers offer lower salaries to women and that the platform's algorithm systematically recommends lower-paying jobs to female workers. We then conduct a randomized experiment modifying the platform's wage suggestion algorithm. Employers exposed to the revised algorithm offer higher salaries to women without increasing hiring requirements, while treated vacancies attract higher-quality applicants. The results show how the design of algorithmic recommendations can affect gender pay disparities in digital labor markets.

## Policy Writing & Public Scholarship

**1.** "Washington, D.C.'s Crime Decline and Its Lessons for American Policing" (with Erich Battistin, Richard Fletcher Hahn, and Samantha Pérez-Dávila). [Niskanen Center Report], May 2026.
*Selected media coverage:* [New York Times], [Washington Post], [Reuters], [CNN], [NPR], [The Atlantic], [The Guardian], [Al Jazeera], [El País], [PBS NewsHour], [USA Today], among others.

## Research Experience

**Research Assistant, University of Maryland, College Park**
Supervisor: Dr. M.R. Sharan — *2022 – 2026*
Supervisor: Dr. Erich Battistin — *2026 – Present*

**Research Assistant, World Bank Development Impact (DIME)**
Supervisor: Dr. Erin Kelley — *2020 – 2022*

**Research Fellow, Energy Policy Institute at the University of Chicago (EPIC)**
Supervisor: Dr. Tamma Carleton — *2019 – 2020*

## Teaching Experience

**University of Maryland, College Park**
AREC 623: Applied Econometrics I – Dr. Erich Battistin — *Fall 2024; Fall 2026*

**University of Chicago, Harris School of Public Policy**
PPHA 34600: Program Evaluation – Dr. Fiona Burlig — *Spring 2020*
PPHA 31002: Statistics for Data Analysis I — *Fall 2019*

## Grants and Awards

| | | |
|---|---|---|
| 2026–2027 | Dean's Fellowship, University of Maryland | *$5,000* |
| 2025–2026 | Arnold Ventures Criminal Justice Planning Grant<br>*(Co-PI, with Erich Battistin and Richard Fletcher Hahn)* | *$99,360* |
| 2025–2026 | Faculty–Student Research Award, University of Maryland<br>*(Co-PI, with Erich Battistin and Richard Fletcher Hahn)* | *$15,000* |
| 2025–2026 | Puri Family Dissertation Enhancement Award, University of Maryland | *$5,000* |
| 2025–2026 | Jacob K. Goldhaber Travel Grant, University of Maryland | *$1,500* |

## Conference Presentations

Southern Economic Association Annual Meeting, Houston, TX *(scheduled)* — *2026*
QMUL Economics and Finance Workshop for PhD & Post-doctoral Students **(Best Paper Award)** — *2026*
DMV PhD Conference on Political Economy & Development, Georgetown University — *2025*

## Other Talks & Short Courses

Invited Speaker (with Erin Kelley), "High-Frequency Check Dashboards," SurveyCTO Webinar — *2022*
Session Instructor, "Managing Successful Impact Evaluation Surveys," World Bank Short Course — *2022*

## Miscellaneous

**Ph.D. Coursework:** Microeconomic Theory I–II; Applied Econometrics I–II; Optimization in Agricultural and Resource Economics; Advanced Labor Economics; Political Economy of Development; Firm Growth in Developing Countries; Environmental and Development Economics; Experimental and Behavioral Economics; Policy Design in the Social Sciences; Microeconomic Applications in Agricultural and Resource Markets; Agricultural Policy Analysis.
**Computing:** R, Stata, Python, LaTeX
**Languages:** English (fluent), Chinese (native)

**Statement of Research Interests and Motivation**

Borui Sun
University of Maryland, College Park

I am applying to the workshop because I would value feedback on both the paper submitted with this application and a related lab-in-the-field experiment that I am developing to investigate the mechanisms behind its main findings. The paper shows that adding a representative to a local council in West Bengal lowers infrastructure provision when the members share a caste, but not when they do not. While the administrative data shed some light on the mechanisms behind this result, the finding raises a broader question about the interaction between team size and social composition. These dimensions are typically studied separately: work on team size asks how adding members changes coordination and incentives, while work on diversity asks how social differences affect performance at a given team structure. Yet the two are naturally intertwined. How a team responds to an additional member may depend on how its members bargain, share information, and hold one another accountable; the effects of diversity may likewise depend on the number of members over whom these interactions take place. This interaction is relevant not only for representative institutions, but also for firms and other organizations in which teams expand and make collective decisions.

The lab-in-the-field experiment is designed to study these interactions directly. I plan to recruit around 700 sitting local representatives in Bihar, who will be randomly assigned to two- or three-member teams that are either caste-homogeneous or caste-diverse. The experiment will use incentivized collective tasks to distinguish two potential channels. Shared identity may facilitate coordination around narrow interests and weaken internal accountability, while socially diverse representatives may bring complementary information, social ties, and constituency knowledge. Because the participants are sitting politicians, I also plan to link their experimental behavior to administrative records from their own panchayats, allowing me to examine whether behavior observed in the experiment is related to how they govern in practice. As the project is still at an early stage of development, I would particularly value feedback on the experimental design and on how its findings could speak to broader questions about how teams form, interact, and make collective decisions.

More broadly, my research spans development economics, political economy, and labor economics. I study how institutions shape political representation, collective decision-making, and the distribution of economic and public resources. In related work on local politics in India, I study the tradeoff between competence and representativeness in political selection, its consequences for governance, and how electoral quotas reshape who enters politics over time. My other work examines inequality in public safety and gender disparities in digital labor markets.

# Team Expansion and the Costs of Homogeneity: Evidence from West Bengal Local Councils *

Borui Sun †

September, 2026

**Abstract**

What determines whether team performance improves or deteriorates as teams expand? I study this question in local governments in West Bengal, India, where public-good provision depends on collective decisions by small teams of elected representatives. Institutional rules generate separate, plausibly exogenous variation in both team size and caste composition: voter-population thresholds determine the number of representatives, while reservation rotation generates same-caste and mixed-caste delegations. Leveraging both sources of variation, I find that the effect of team expansion differs sharply by composition. Neither team expansion nor mixed-caste composition has a substantial effect on infrastructure provision on its own, but their interaction is large: among same-caste delegations, adding a representative reduces infrastructure provision by 0.43 standard deviations, while this expansion penalty is absent in mixed-caste delegations. This difference is not explained by political participation, fiscal resources, or the type of representative added. Instead, mixed-caste expansion leaves the worst-served villages better off than same-caste expansion does and prevents the rise in infrastructure inequality across villages. Together, these results show that diversity can mitigate the costs of team expansion: the consequences of adding a member depend on the composition of the team that absorbs it.

*I am especially grateful to M. R. Sharan, Cory Smith, and Erich Battistin for their guidance and feedback. I also thank Jing Cai and Sebastian Axbard, as well as seminar participants at the QMUL Economics and Finance Workshop, for helpful comments and suggestions.

†Department of Agricultural and Resource Economics, University of Maryland

# I Introduction

Organizations often respond to greater demands by adding members to a team. Yet larger teams need not perform better. Additional members can bring information, expertise, and capacity, but they can also make coordination more difficult and diffuse responsibility (Holmstrom, 1982; Hamilton et al., 2003; Weber, 2006). How these tradeoffs play out may depend on the composition of the team. Social identity is one important dimension. Social divisions can reduce trust and cooperation (Hjort, 2014; Lyons, 2017), suggesting that homogeneous teams may be better able to accommodate additional members. At the same time, diversity may improve information aggregation (Prat, 2002; Enke and Zimmermann, 2019), or limit coordination around narrow interests (Chen and Li, 2009; Bandiera et al., 2009), potentially making diverse teams more resilient to expansion. Whether diversity mitigates or magnifies the costs of team expansion is therefore theoretically ambiguous. This paper asks whether the effect of adding a member depends on the social composition of the team that absorbs it.

Answering this question empirically is difficult because team size and composition rarely vary independently. Larger teams mechanically create more opportunities for diversity, while organizations often choose both the number and type of their members in response to the tasks they face. I study this question in local governments in West Bengal, India. Rural areas are governed through elected councils in which each Gram Panchayat (GP) sends a small delegation, or team, of representatives to the block-level Panchayat Samiti. These representatives jointly make decisions over local development resources and public works, including roads, drainage, and transport infrastructure, and GP-level public works require approval from the Panchayat Samiti. The setting combines high-stakes collective decision-making with substantial social diversity: more than two-thirds of the state's population lives in rural areas, and caste constitutes a salient dimension of diversity both in the underlying population and within elected political teams.

This setting also provides separate, plausibly exogenous variation in delegation size and caste composition through two institutional rules. First, statutory thresholds at 4,500 and 9,000 registered voters determine whether a GP elects one, two, or three representatives, generating discontinuous variation in delegation size. Second, a predetermined reservation roster rotates caste-reserved seats across constituencies between elections, generating variation in delegation composition. Delegations containing both reserved and unreserved seats are classified as mixed-caste (*heterogeneous*), while those with either all reserved or all unreserved seats are classified as same-caste (*homogeneous*). I combine these sources of variation to estimate the effects of team expansion and caste composition separately, and then ask how the effect of expansion differs between same-caste and mixed-caste teams. The identifying variation is supported by smooth predetermined characteristics around the voter thresholds and balance across reservation-rotation assignments.

I first examine the average effects of team expansion and caste composition on local infrastructure provision, measured using village-level access to drainage, public transport,

all-weather roads, and internal pucca roads. I combine these four outcomes into a standardized infrastructure index. Adding a representative has a weakly negative effect on infrastructure provision on average. Access to drainage falls by 13.0 percentage points and public transport by 7.8 percentage points, both significant at the 10 percent level. In contrast, mixed-caste composition has essentially no effect by itself. The estimated effect on the infrastructure index is 0.017 standard deviations (SE 0.041), and the estimates for each of the four components are close to zero.

These average effects conceal substantial heterogeneity. The effect of adding a representative depends sharply on team composition. Among same-caste delegations, expansion reduces the infrastructure index by 0.428 standard deviations (SE 0.208), while the corresponding effect among mixed-caste delegations is small and statistically indistinguishable from zero. The difference between the two expansion effects is 0.502 standard deviations (SE 0.232). The component outcomes show a similar pattern. In same-caste delegations, expansion reduces the share of villages with public transport by 13.9 percentage points, relative to a baseline of 77 percent, whereas the corresponding effect in mixed-caste delegations is close to zero. For internal pucca roads, expansion instead increases provision by 22.7 percentage points in mixed-caste delegations while having essentially no effect in same-caste delegations. The differential expansion effect is robust to alternative donut widths, bandwidths, kernels, polynomial orders, and predetermined controls.

The magnitude of these differential effects is particularly notable given the scale of the expansion studied here. The two-to-three-member transition increases team size by 50 percent and gives the additional representative substantial relative weight in collective decision-making. This expansion therefore represents a meaningful change in team structure rather than a marginal increase in an already large organization.

Next, turning to mechanisms, I first consider whether the differential effect of expansion reflects changes in political participation or resource inputs. I find little support for these explanations. Expansion has no differential effect by caste composition on electoral competition or participation, employment-program budgets, or representative training. If anything, natural-resource-management expenditure increases modestly with expansion in same-caste delegations, despite the decline in infrastructure provision in those delegations. Moreover, differences in the type of representative added also do not appear to account for the main result. While I observe differences in the effects of expansion across homogeneous delegation types, the point estimates for mixed-caste expansion are substantially larger. Within mixed-caste delegations, the improvement from expansion is nearly identical whether the additional representative holds a reserved or unreserved seat.

Instead, the evidence points to differences in how expanded delegations distribute infrastructure across villages. In same-caste delegations, adding a representative increases within-GP infrastructure inequality and raises the share of villages receiving none of the four amenities by 6.8 percentage points (SE 2.6). Neither pattern appears in mixed-caste delegations. Expansion instead leaves the worst-served village better off relative to same-

caste expansion and increases the share of villages receiving all four amenities by 21.8 percentage points (SE 8.1). Together, these results point to a potential channel through which diversity mitigates the costs of expansion: expanded mixed-caste teams appear better able to distribute infrastructure broadly across villages, without leaving the least-served villages behind.

This paper contributes to three literatures. The first studies team production and the organizational costs of size. Classic team theory shows that effort is difficult to sustain when output is produced jointly and individual contributions are imperfectly observed (Marschak and Radner, 1972; Holmstrom, 1982), and experimental work finds that coordination deteriorates as groups grow (Van Huyck et al., 1990; Weber, 2006), though size alone need not bind once individual stakes are held fixed (Isaac and Walker, 1988). A related literature on organizational structure studies how organizations absorb additional members by reallocating knowledge and tasks across layers rather than by simply adding them (Garicano, 2000; Caliendo et al., 2015). Causal evidence on team size itself remains limited, because organizations choose it alongside the tasks they face. Hamilton et al. (2003) is a notable exception, studying self-selected teams under explicit incentive contracts. I use statutory population thresholds that fix team size independently of the task, in a setting where incentives operate through elections rather than contracts, and show that the effect of adding a member depends on the composition of the team being expanded.

A second literature studies how the social composition of a team shapes its performance. Most of this work estimates the level effect of diversity, and much of it finds that effect to be negative: ethnic divisions reduce output within firms (Hjort, 2014), national diversity raises communication costs (Lyons, 2017), and peer diversity lowers output in a large Kenyan organization (Marx et al., 2021). Theory allows for offsetting gains when members hold complementary information (Lazear, 1999; Prat, 2002), and the empirical record is mixed (Hoogendoorn et al., 2013; Berge et al., 2020). In my setting, composition on its own has essentially no effect on infrastructure provision, with confidence intervals ruling out effects larger than roughly one tenth of a standard deviation. Yet composition substantially changes the effect of expansion: the interaction between mixed-caste composition and adding a member is 0.50 standard deviations. Diversity therefore matters here not through its level effect on performance, but through how teams respond to expansion.

Finally, the paper speaks to work on the design of representative institutions and the provision of local public goods. One strand studies who holds office, showing that caste and gender reservations change both the identity of representatives and what they deliver (Pande, 2003; Chattopadhyay and Duflo, 2004). Another studies the size of representative institutions, estimating the effects of legislature size on public spending and of polity size on local government performance (Egger and Koethenbuerger, 2010; Narasimhan and Weaver, 2024). These institutional margins are typically studied separately. I show that their effects are intertwined: the consequences of adding a representative depend on the caste composition of the delegation that receives the additional seat. Seat allocation and

the reservation roster are set by separate administrative rules, but their consequences for local provision are not separable.

Section II.A describes the institutional setting, Sections III and IV present the empirical strategy and data, Section V reports the main results, Section VI examines mechanisms, and Section VII concludes.

# II Background

## II.A Panchayat Samiti Councils and Representation

Rural local governments in West Bengal are organized around elected councils at the village, block, and district levels. Panchayat Samitis (PSs) form the intermediate, block-level tier, between Gram Panchayats (GPs) at the village-cluster level and Zilla Parishads at the district level. West Bengal has 346 PSs, each overseeing roughly 10 GPs. These local governments serve a predominantly rural state: 68 percent of West Bengal's 91 million residents lived in rural areas as of the 2011 Census.

PS representatives are directly elected from constituencies contained within their GP. A GP elects between one and three PS representatives, depending on its number of registered voters. Figure 1(a) maps this variation across GPs throughout the state. When a GP is entitled to multiple seats, it is divided into a corresponding number of PS constituencies, each of which elects one representative. Despite being elected from separate constituencies, these representatives remain institutionally tied to the GP: PS members elected from within a GP also serve ex officio as members of their GP council.[1] Representatives from the same GP thus serve together both on the block-level PS and on the GP council.

Funds for local development flow through this hierarchy, with each tier retaining substantial discretion over the resources allocated within its jurisdiction (Mookherjee and Nath, 2023; Bardhan et al., 2024). At the block level, Panchayat Samitis prepare budgets, allocate grants, coordinate development programs across their constituent GPs, and manage public works. The West Bengal Panchayat Act, 1973, also assigns the PS regulatory authority over land development and provides for roads, bridges, ferries, channels, and other public works within the block to be placed under its control and management.[2] The PS's authority also extends downward into its constituent GPs. A GP must secure administrative, technical, and financial approval from the Samiti before undertaking each public works project, with funds released from the Samiti's finance standing committee (Bardhan et al., 2024, Appendix A). The PS further supervises the work of its GPs, with

[1] West Bengal Panchayat Act, Section 4(2A)(ii).

[2] Sections 114A and 110–113, West Bengal Panchayat Act, 1973 (as amended). Once a development plan is notified for an area, land development by any private person or body requires the Samiti's permission (Section 114A); the state government may place roads, bridges, ferries, and channels under the Samiti's control and management, and the Samiti may take over such works from other owners (Sections 110–113).

the authority to inspect property, works, and funds under GP control.[3] Decisions over the allocation and implementation of development resources across a block's GPs therefore pass through the Panchayat Samiti.

### II.B Rules Governing Council Size and Composition

The number of Samiti members a GP elects is set by thresholds on its registered voters.[4] A GP outside the hill areas elects one member if its registered voters number at most 4,500, two members if they exceed 4,500 but not 9,000, and three members if they exceed 9,000.[5] Registered voters are measured using the panchayat electoral roll, which the State Election Commission ordinarily adopts from the separately prepared West Bengal Legislative Assembly roll. Seat counts are fixed at delimitation, and once determined, a GP's allocation may not be varied for two successive general elections. Consistent with this rule, seat allocations are identical in the 2013 and 2018 elections for over 98 percent of GPs matched across the two elections.

Reservation of Samiti seats is set at the block level and frozen over the same two elections. Following the 73rd Amendment, seats are reserved for Scheduled Caste (SC), Scheduled Tribe (ST), and, since 2012, Backward Class (BC) candidates. The number of seats reserved for each group in a block is proportional to the group's share of the block population, subject to a joint ceiling of one half of all seats. The data bear this out: the number of reserved seats is unchanged across elections in 92 percent of blocks.

Which constituencies carry the reserved seats is set by a block-wide roster that alternates between two consecutive elections. For each group, constituencies whose group share is at least half the block share are ranked in descending order of that share. Among constituencies reached by the roster, those in odd-ranked positions are reserved in the first election and unreserved in the second, while those in even-ranked positions follow the reverse pattern. In my setting, the first and second elections are 2013 and 2018, respectively. Constituencies beyond the roster remain unreserved in both elections.[6]

## III Empirical Strategy

A GP's delegation to the Panchayat Samiti varies in both size and caste composition. I exploit two institutional rules that generate plausibly exogenous variation along these dimensions: statutory voter thresholds determine delegation size, while the reservation roster generates variation in whether a GP's delegation is same-caste or mixed-caste by

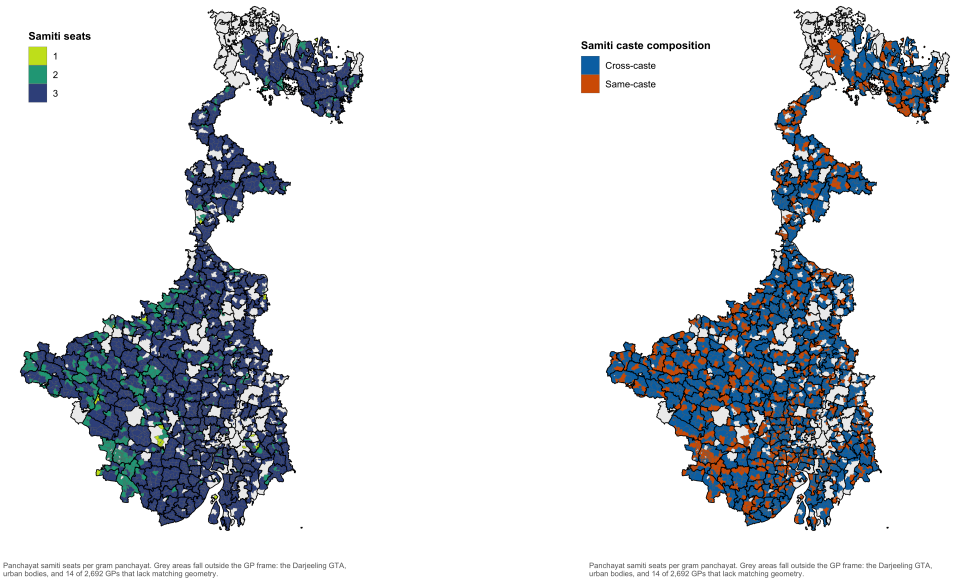
[3] Section 115, West Bengal Panchayat Act.

[4] The rules in this subsection are set out in the West Bengal Panchayat Elections Act, 2003 (Section 14 for the seat thresholds and Section 17 for reservation shares) and the West Bengal Panchayat Elections Rules, 2006 (Rule 24 for the rotation roster).

[5] The thresholds, as they stood at the 2018 election, are lower in hill areas: 1,200 and 2,000. The state's only hill region, Darjeeling, is excluded from this study.

[6] If two lists select the same constituency in one election, ST takes precedence over SC over BC and the displaced group moves to the next position on its list.

Figure 1: Panchayat Samiti Representation Across Gram Panchayats




(a) Samiti seats (b) Delegation composition

*Notes:* Grey areas are excluded from the analysis: the Darjeeling hills, urban local bodies, and 14 of 2,692 GPs that lack matching geometry.

rotating caste-reserved seats across constituencies between elections. Together, these designs identify the effect of team expansion, the effect of team diversity, and how the effect of expansion varies with team composition.

### III.A Team Size: Regression Discontinuity Design

The number of representatives a GP elects to the Panchayat Samiti is determined by statutory thresholds in its registered voter population: crossing 4,500 registered voters increases delegation size from one to two, while crossing 9,000 increases it from two to three. I exploit these discontinuities to identify the causal effect of adding one member to a GP's delegation.

I estimate local linear regressions around each threshold and pool the two discontinuities by recentering the running variable at the relevant cutoff. Most identifying variation comes from the 9,000 threshold, as relatively few GPs fall near the 4,500 threshold (Figure 2(a)). For GP $i$ assigned to cutoff $c \in \{4{,}500,\ 9{,}000\}$, let $R_i = V_i - c$ denote registered voters relative to the applicable cutoff. The estimating equation is

$$Y_i = \beta_0 + \beta_1 \mathbb{1}\{R_i > 0\} + \beta_2 R_i + \beta_3 R_i\, \mathbb{1}\{R_i > 0\} + \zeta' X_i + \varepsilon_i, \tag{1}$$

by local linear regression using a triangular kernel and an MSE-optimal bandwidth. $Y_i$ is an outcome standardized across GPs. The vector $X_i$ includes a cutoff indicator, district fixed effects, and, where applicable, baseline GP characteristics included to improve pre-

cision (Calonico et al., 2019). The coefficient of interest, $\beta_1$, captures the effect of crossing a statutory threshold and receiving an additional Samiti representative.

The running variable is observed with one-sided measurement error, which I address using a donut RD design. Seat counts were fixed at delimitation using the electoral rolls then in force, whereas the closest observed count is from the 2013 roll. Because electoral rolls grow over time, the observed count weakly exceeds the count used at delimitation. As a result, a GP observed just above a cutoff may have been below it at delimitation, while a GP observed below the cutoff must have been below it at delimitation. Figure 2(b) shows that the resulting discrepancies are concentrated just above each cutoff, as this measurement error predicts. I therefore exclude GPs within 500 registered voters above each cutoff. Outside this window, crossing the observed threshold increases delegation size by 0.997 representatives. Results are robust to alternative donut widths (Figure 4).

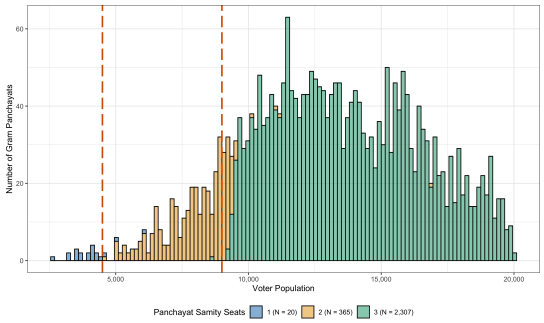
Identification then requires that potential outcomes vary smoothly with the observed voter count at the cutoff (Dong and Kolesár, 2023). Changes in the electoral rolls between delimitation and 2013 reflect population growth and registration updates, neither of which should change discontinuously at the statutory seat thresholds. Manipulation around the cutoffs is also unlikely: electoral rolls are prepared outside the Panchayat system, and seat assignments are fixed at delimitation for two successive elections. Consistent with this institutional setting, a density test on the pooled running variable shows no discontinuity at the cutoff (robust test statistic $-0.81$, $p = 0.42$; Figure 2(c)).

Table 1 estimates equation (1) for 24 GP characteristics measured before the 2013 election, covering demographics, economic activity, and village infrastructure from the 1991, 2001, 2005, and 2011 Censuses. Demographic composition, economic activity, and 2011 infrastructure are smooth through the cutoff. Two 1991 measures exhibit statistically significant discontinuities: GPs just above the cutoff had fewer villages with a paved approach road and were farther from the nearest town. The corresponding 2011 road measure shows no discontinuity, and the main estimates are robust to controlling for both 1991 characteristics (Figure 4).

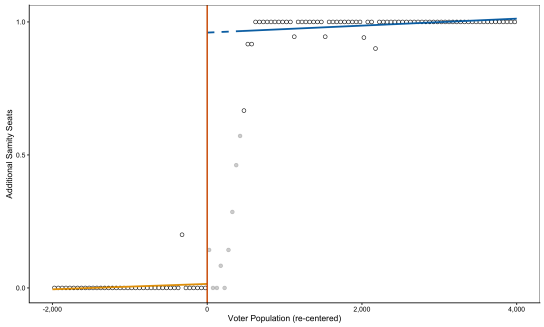
### III.B Team Composition: Reservation Rotation

Variation in delegation composition comes from the rotation of caste reservations across elections. I measure composition using the reservation status of the seats in a GP's delegation. I classify a delegation as *mixed-caste* if it contains both reserved and unreserved seats, and as *same-caste* if all of its seats share the same reservation status. I use reservation status rather than the elected representatives' realized caste because reservation status is set by the rotation schedule described in Section II.B, whereas the caste of the winning candidate reflects electoral selection. Reserved seats can only be contested by candidates from the designated group, while unreserved seats are predominantly won by general-caste candidates, so this measure closely tracks whether representatives from the same GP share caste identity.

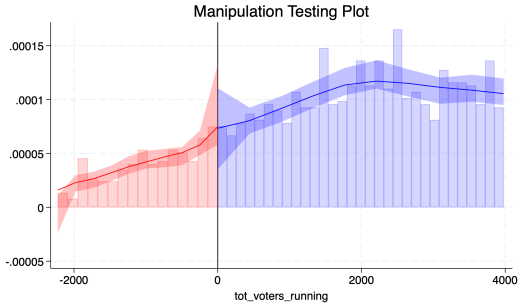
Figure 2: Voter Population, First Stage, and Density of the Running Variable




(a) Voter population by seat count




(b) First stage




(c) Density of the running variable

*Notes:* Panel (a) plots the distribution of registered voters in 2013 by the number of Samiti seats, with the 4,500 and 9,000 thresholds marked. Panel (b) plots the share of GPs with the additional seat against registered voters recentered at the applicable cutoff; the shaded band marks the 500-voter donut. Panel (c) reports the McCrary density test on the recentered running variable, pooling both cutoffs; the robust bias-corrected test statistic is $-0.81$ ($p = 0.42$).

Under the roster, whether a reservation-eligible constituency is reserved in 2018 depends on the odd-even parity of its rank on the block-level caste list. The probability that the rotation produces a mixed delegation therefore depends only on delegation size, $n_i$, and the number of reservation-eligible seats, $k_i$, which I measure as the number of seats reserved in either election. Figure 3(a) enumerates the rotation outcomes for each combination of $n_i$ and $k_i$ and the implied probability of a mixed delegation. Conditional on these two quantities, variation in 2018 composition comes from the parity of the eligible seats' ranks. The identifying assumption is that this parity is as good as randomly assigned conditional on $n_i$ and $k_i$. This is plausible because parity depends on a constituency's position among all constituencies in the block-level caste ranking rather than on its own caste share. Consistent with this assignment mechanism, Figure 3(b) shows that observed mixed-caste shares closely track the probabilities implied by a 50–50 odd-even assignment of eligible seats.

I therefore recenter the mixed-caste indicator by its expectation under the rotation rule, following Borusyak and Hull (2023). Let $M_i$ indicate a mixed-caste delegation and let $\mu(k_i, n_i)$ denote its rule-implied probability. I define

$$\widetilde{M}_i = M_i - \mu(k_i, n_i),$$

and estimate

$$Y_i = \alpha + \gamma \widetilde{M}_i + \zeta' X_i + \varepsilon_i, \tag{2}$$

where $X_i$ includes delegation-size and district fixed effects. Under the assignment mechanism, $\mathbb{E}\left[\widetilde{M}_i \mid k_i, n_i\right] = 0$, so $\gamma$ compares mixed-caste and same-caste delegations with the same exposure to the reservation roster. GPs with a single seat or no reservation-eligible seat are same-caste by construction and contribute no identifying variation. Robust standard errors are reported.

Balance tests further support the identifying assumption. The right panel of Table 1 regresses each of the 24 predetermined characteristics on the recentered mixed-caste indicator with delegation-size and district fixed effects. No coefficient is significant at the 10 percent level, and the estimates are small relative to the same-caste means. Together with Figure 3(b), these results support the assumption that parity is unrelated to predetermined GP characteristics.

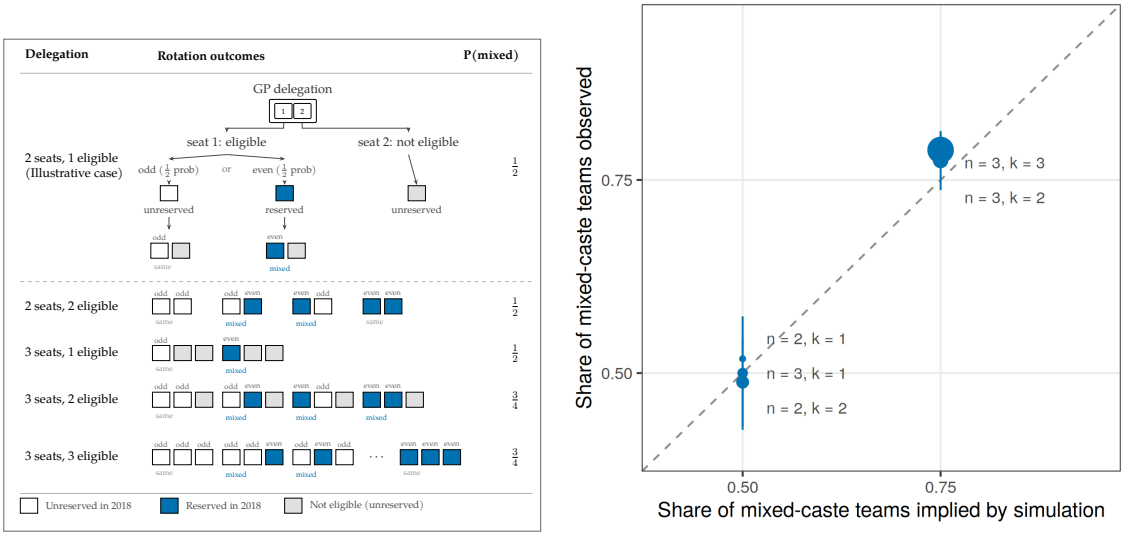
### III.C Expansion Effect by Team Composition

To estimate how the effect of team expansion varies with composition, I augment the donut RD design in Section III.A by interacting the additional-seat indicator with the recentered mixed-caste indicator:

$$Y_i = \alpha + \tau D_i + \theta D_i \widetilde{M}_i + \gamma \widetilde{M}_i + \rho_1 R_i + \rho_2 R_i D_i + \zeta' X_i + \varepsilon_i, \tag{3}$$

where $D_i = \mathbb{1}\{R_i > 0\}$. Estimation follows the same donut, weighting, bandwidth-selection, and control specifications described above, with robust standard errors. I re-

Figure 3: Reservation Rotation and Delegation Composition




(a) Rotation mechanism

(b) Rule-implied and observed probability

strict the analysis to the 9,000 cutoff, where delegation composition varies on both sides of the two-to-three seat threshold. The 4,500 cutoff cannot be used because single-seat delegations below it are same-caste by construction.

Identification combines the RD and reservation-rotation assumptions described above. Because $\widetilde{M}_i$ has mean zero on both sides of the cutoff, $\tau$ is the expansion effect at the composition expected under the rotation rule, and $\gamma$ is the composition effect among two-seat delegations. The coefficient of interest, $\theta$, captures the difference in the expansion effect between mixed-caste and same-caste delegations, and the expansion effect within each type follows as a linear combination of $\tau$, $\theta$, and $\gamma$.

# IV Data

## IV.A Election Data and Council Composition

I combine administrative records from the 2013 and 2018 West Bengal Panchayat elections with village-level measures of public infrastructure and predetermined socioeconomic characteristics. The analysis is conducted at the Gram Panchayat (GP) level, corresponding to the level at which the number and composition of representatives to the Panchayat Samiti are determined.

The election records come from the West Bengal State Election Commission and contain results for each Panchayat Samiti constituency. For each constituency, the records report the number of registered voters, the seat's reservation status, and candidates' caste category, gender, party affiliation, and vote totals. I aggregate constituencies within each GP to construct the GP's registered voter population and the number of representatives

it elects to the Samiti. The election records also provide measures of electoral participation and competition, including turnout, the number of candidates, victory margins, and whether a seat was uncontested.

Classifying delegations by the reservation status of their seats (Section III.B), the analysis sample comprises 2,692 GPs in 305 blocks across 17 districts, covering rural West Bengal outside the Darjeeling hills. Of these, 1,900 GPs have mixed-caste delegations and 792 have same-caste delegations; among the latter, 475 contain only unreserved seats and 317 contain only reserved seats. Figure 1(b) maps the two delegation types across the state.

### IV.B Public Infrastructure and Other Covariates

My primary outcomes measure realized village infrastructure using the 2020 Mission Antyodaya survey. Mission Antyodaya is a Government of India census of village amenities conducted through the Gram Panchayat machinery, and I use the 2020 round as distributed by the SHRUG data platform (Asher et al., 2021).[7] The survey records whether facilities physically exist in a village, independent of which program or funding stream delivered them. It thus measures realized infrastructure rather than sanctioned or budgeted projects. My primary outcomes fall within the types of local public works over which Panchayat Samitis exercise statutory authority.

Village records are linked to GPs through the village-to-local-body directory published by the Local Government Directory of the Ministry of Panchayati Raj, which reports each village's census codes alongside its Gram Panchayat.[8] Village-level survey records carry census codes and match to SHRUG identifiers directly; GP names in the election records are harmonized to the directory by fuzzy matching, with 99.8 percent of GPs matched.

The primary outcome is an infrastructure index built from four amenities under the public works responsibilities of Panchayat Samitis: an internal pucca (paved) road, a drainage system of any type, an all-weather road connection passable year round, and public transport service. For each GP, the index is the share of these amenities present, averaged across the GP's villages and standardized. The survey also records amenities delivered by state or central agencies, including health centres, bank branches, post offices, and broadband; these lie outside the Samiti's statutory authority.

I supplement the infrastructure outcomes with the 1991, 2001, and 2011 Population Censuses and the 2005 Economic Census, also accessed through SHRUG. These data provide pre-treatment measures of population, demographic composition, village infrastructure, employment, and economic activity. Table 1 reports means of these characteristics for GPs just below the cutoff and for same-caste delegations, alongside the balance tests described in Section III.

[7] Mission Antyodaya is administered by the Ministry of Rural Development; see https://missionantyodaya.nic.in.

[8] https://lgdirectory.gov.in.

Table 1: Summary statistics and balance

| | Seat count (RD) | | | Composition (rotation) | | |
|---|---|---|---|---|---|---|
| | Mean | Estimate (SE) | $p$-value | Mean | Estimate (SE) | $p$-value |
| **Demographics (2001)** | | | | | | |
| Population | 13,738.3 | -639.7 (1,142.8) | 0.576 | 17,114.3 | 45.4 (247.1) | 0.854 |
| SC share | 0.297 | -0.033 (0.028) | 0.228 | 0.259 | -0.007 (0.006) | 0.280 |
| ST share | 0.126 | 0.028 (0.020) | 0.164 | 0.081 | 0.003 (0.005) | 0.513 |
| Literate share | 0.536 | -0.016 (0.014) | 0.263 | 0.544 | 0.003 (0.003) | 0.390 |
| Worker share | 0.278 | -0.008 (0.009) | 0.394 | 0.279 | -0.002 (0.002) | 0.413 |
| Ag. labourer share | 0.084 | -0.006 (0.007) | 0.417 | 0.077 | 0.000 (0.002) | 0.785 |
| **Firms and employment (2005)** | | | | | | |
| Firms | 581.9 | -113.0 (114.8) | 0.325 | 756.9 | 3.1 (22.6) | 0.893 |
| Employment | 1,200.5 | -230.6 (222.7) | 0.300 | 1,465.5 | -3.7 (49.3) | 0.940 |
| Manufacturing share | 0.278 | 0.015 (0.034) | 0.668 | 0.290 | -0.002 (0.007) | 0.743 |
| Services share | 0.682 | -0.008 (0.034) | 0.816 | 0.669 | 0.006 (0.008) | 0.471 |
| **Infrastructure (1991)** | | | | | | |
| Primary school | 0.792 | 0.006 (0.053) | 0.913 | 0.812 | 0.006 (0.008) | 0.442 |
| Medical facility | 0.341 | -0.050 (0.062) | 0.423 | 0.353 | -0.002 (0.015) | 0.892 |
| Power supply | 0.167 | -0.019 (0.058) | 0.744 | 0.131 | -0.019 (0.013) | 0.144 |
| Market | 0.148 | 0.016 (0.035) | 0.647 | 0.157 | 0.004 (0.009) | 0.672 |
| Pucca road | 0.405 | -0.254 (0.061) | 0.000 | 0.409 | -0.001 (0.014) | 0.952 |
| Dist. to town (km) | 21.275 | 6.567 (2.334) | 0.005 | 22.216 | 0.646 (0.716) | 0.367 |
| Irrigated/unirrigated | 2.612 | -21.106 (20.043) | 0.292 | 8.802 | -9.395 (8.571) | 0.273 |
| **Infrastructure (2011)** | | | | | | |
| Pucca road | 0.410 | -0.035 (0.060) | 0.557 | 0.402 | 0.003 (0.013) | 0.832 |
| Power supply | 0.450 | -0.013 (0.090) | 0.884 | 0.441 | -0.009 (0.016) | 0.574 |
| Market | 0.097 | 0.068 (0.036) | 0.061 | 0.141 | 0.005 (0.008) | 0.521 |
| Health centre | 0.081 | -0.041 (0.038) | 0.272 | 0.059 | 0.008 (0.006) | 0.180 |
| Bus service | 0.434 | -0.028 (0.075) | 0.712 | 0.423 | 0.006 (0.018) | 0.747 |
| Unirrigated land (ha) | 824.8 | -28.3 (122.5) | 0.817 | 806.4 | -9.8 (31.2) | 0.753 |
| Govt. primary school | 0.904 | -0.024 (0.020) | 0.229 | 0.915 | -0.002 (0.005) | 0.681 |

Means are for GPs below the cutoff within the RD bandwidth and for same-caste teams. Sources: 2001 and 2011 Population Census, 1991 and 2011 Village Directory, 2005 Economic Census. RD effective sample ranges from 506 to 1,261 GPs within the MSE-optimal bandwidths; the rotation sample ranges from 2,348 to 2,658 of 2,692 GPs.

# V Main Results

This section examines how delegation size and composition affect local infrastructure provision. I first estimate the average effect of adding a representative and the average effect of mixed-caste composition. Neither margin alone produces a clear improvement in infrastructure: the average expansion effect is weakly negative, while the average composition effect is close to zero. I then show that the effect of expansion depends sharply on delegation composition. Adding a representative reduces infrastructure provision in same-caste delegations, while no such decline appears in mixed-caste delegations.

## V.A Team Expansion and Diversity

Adding a representative does not improve infrastructure on average. Panel A of Table 2 reports the donut RD estimates of the effect of one additional Samiti seat, pooling the

4,500 and 9,000 cutoffs. The infrastructure index falls by 0.196 standard deviations (SE 0.164), an estimate that is negative but not statistically distinguishable from zero. Most components point in the same direction. The share of villages with drainage falls by 13.0 percentage points and the share with public transport by 7.8 percentage points, both significant at the 10 percent level, while the estimate for all-weather roads is negative and insignificant. Internal pucca roads are the exception, with a positive but insignificant estimate of 11.2 percentage points. Taken together, the estimates provide no evidence that a larger delegation increases infrastructure provision and, if anything, point toward a decline.

Delegation composition, on its own, has no effect on infrastructure. Panel B of Table 2 compares mixed-caste and same-caste delegations with the same exposure to the reservation roster, using the recentered indicator from Section III.B. The estimate for the index is 0.017 standard deviations (SE 0.041), and the component estimates are all within 1.5 percentage points of zero with standard errors of similar size. The confidence intervals rule out composition effects on the index larger than about one tenth of a standard deviation in either direction. Whether a GP's representatives share caste identity does not, by itself, predict how much infrastructure its villages receive.

Table 2: Team expansion, team diversity, and village infrastructure

| | Infrastructure component | | | | Index |
|---|---|---|---|---|---|
| | All-weather road | Pucca road | Drainage | Public transport | Infrastructure index |
| | (1) | (2) | (3) | (4) | (5) |
| *Panel A: Expansion effect* | | | | | |
| Additional seat | -0.094 | 0.112 | -0.130* | -0.078* | -0.196 |
| | (0.063) | (0.080) | (0.072) | (0.044) | (0.164) |
| Left-side mean | 0.736 | 0.555 | 0.673 | 0.769 | -0.282 |
| Bandwidth (left) | 724 | 594 | 632 | 916 | 653 |
| Bandwidth (right) | 2911 | 3558 | 2913 | 3431 | 4080 |
| Observations | 791 | 964 | 779 | 947 | 1,105 |
| *Panel B: Diversity effect* | | | | | |
| Mixed-caste (recentered) | 0.011 | 0.010 | -0.015 | 0.009 | 0.017 |
| | (0.015) | (0.016) | (0.015) | (0.012) | (0.041) |
| Same-caste mean | 0.723 | 0.671 | 0.746 | 0.816 | -0.054 |
| Observations | 2,534 | 2,534 | 2,534 | 2,534 | 2,534 |

Panel A estimates equation (1) by donut RD, pooling the 4,500 and 9,000 voter cutoffs: GPs within 500 voters above a cutoff are excluded, bandwidths are MSE-optimal on each side, weights are triangular, and the specification includes a cutoff indicator and district fixed effects. Conventional estimates are reported. Panel B regresses the outcome on mixed-caste composition recentered on its expected value under the reservation roster (Section III.B), with seat-count and district fixed effects. The sample is restricted to delegations with at least two seats and at least one roster-eligible seat, the only delegations for which the recentered indicator varies. Heteroskedasticity-robust standard errors. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

## V.B Expansion Effects by Team Composition

The effect of adding a representative depends critically on delegation composition. Table 3 estimates equation (3) at the 9,000 cutoff, where two-seat delegations become three-seat delegations and composition varies on both sides. Panel A reports the regression coefficients. The interaction between the additional seat and recentered mixed-caste composition is positive for four of the five outcomes and significant at the 5 percent level for internal pucca roads (0.219), public transport (0.131), and the infrastructure index, where it equals 0.502 standard deviations (SE 0.232). The additional-seat coefficient, which measures the expansion effect at the composition expected under the rotation rule, is $-0.160$ standard deviations for the index, similar in magnitude to the pooled estimate in Table 2.

Table 3: Expansion effect by team composition

| | Infrastructure component | | | | Index |
|---|---|---|---|---|---|
| | All-weather road | Pucca road | Drainage | Public transport | Infrastructure index |
| | (1) | (2) | (3) | (4) | (5) |
| *Panel A: Regression coefficients* | | | | | |
| Additional seat × Mixed-caste (recentered) | 0.061 | 0.219** | -0.001 | 0.131** | 0.502** |
| | (0.079) | (0.104) | (0.087) | (0.053) | (0.232) |
| Additional seat | -0.103 | 0.122 | -0.087 | -0.075* | -0.160 |
| | (0.065) | (0.088) | (0.082) | (0.043) | (0.184) |
| Mixed-caste (recentered) | -0.020 | -0.175* | 0.024 | -0.127*** | -0.382* |
| | (0.071) | (0.099) | (0.078) | (0.048) | (0.216) |
| *Panel B: Expansion effect by delegation composition* | | | | | |
| Same-caste delegation | -0.142* | 0.008 | -0.093 | -0.139*** | -0.428** |
| | (0.078) | (0.089) | (0.098) | (0.045) | (0.208) |
| Mixed-caste delegation | -0.081 | 0.227* | -0.093 | -0.007 | 0.074 |
| | (0.074) | (0.116) | (0.087) | (0.056) | (0.230) |
| Bandwidth (left) | 728 | 574 | 611 | 886 | 601 |
| Bandwidth (right) | 2885 | 3536 | 2623 | 3869 | 3360 |
| Observations | 716 | 885 | 634 | 1,010 | 834 |

The sample is Gram Panchayats near the 9,000-voter cutoff (two versus three seats) within the MSE-optimal bandwidth, excluding the 500-voter donut above the cutoff, with triangular weights and district fixed effects. Panel A estimates equation (3): the outcome is regressed on the additional-seat indicator, its interaction with recentered mixed-caste composition, recentered composition, and the running variable with side-specific slopes. The additional-seat coefficient is the expansion effect at the composition expected under the rotation rule. Panel B reports the expansion effect holding composition fixed on both sides of the cutoff: same-caste $= \tau - \theta\bar{\mu}_R - \gamma(\bar{\mu}_R - \bar{\mu}_L)$ and mixed-caste $=$ same-caste $+ \theta$, where $\bar{\mu}_R$ and $\bar{\mu}_L$ are the weighted mean rule-implied mixed-caste probabilities above and below the cutoff. The difference between the two is the interaction coefficient in Panel A. Heteroskedasticity-robust standard errors, computed by the delta method for Panel B. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The composition-specific estimates show that expansion lowers infrastructure provision in same-caste delegations but not in mixed-caste delegations. Panel B reports the expansion effect holding composition fixed on both sides of the cutoff. Among same-caste delegations, moving from two to three representatives lowers the infrastructure index by 0.428 standard deviations (SE 0.208), significant at the 5 percent level. Among mixed-caste delegations, the corresponding estimate is 0.074 standard deviations (SE 0.230) and indistinguishable from zero. The difference between the two, 0.502 standard deviations,

corresponds to the interaction coefficient in Panel A. Mixed-caste composition therefore mitigates the expansion penalty: the decline in infrastructure provision that accompanies expansion in same-caste delegations is absent in mixed-caste delegations.

The component estimates broadly reinforce this pattern. In same-caste delegations, expansion lowers public transport by 13.9 percentage points (SE 4.5) and all-weather roads by 14.2 percentage points (SE 7.8), while the corresponding mixed-caste estimates are smaller and statistically insignificant. For internal pucca roads, the contrast goes further: expansion raises their prevalence by 22.7 percentage points (SE 11.6) in mixed-caste delegations but has essentially no effect in same-caste delegations. Expansion has no statistically detectable effect on drainage in either delegation type.

### V.C Robustness

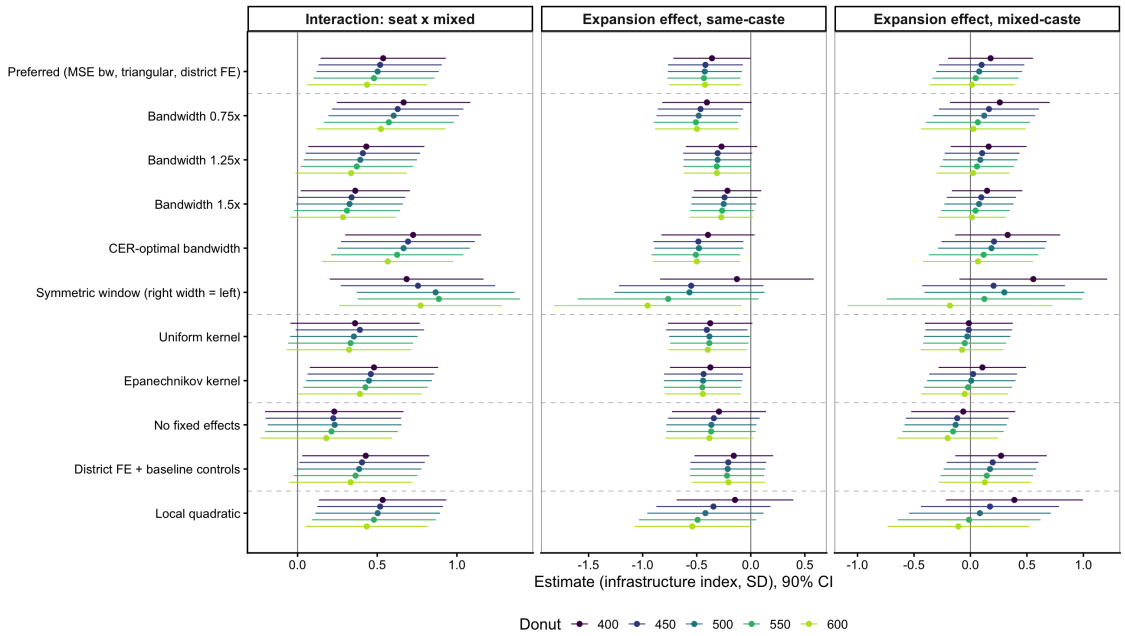
The composition-specific expansion effects are robust to alternative choices in the RD specification. Figure 4 varies the donut width, bandwidth, kernel, polynomial order, and inclusion of fixed effects and baseline controls. Across specifications, the interaction between expansion and mixed-caste composition remains positive, while the expansion effect for same-caste delegations remains negative. The corresponding effect for mixed-caste delegations is consistently closer to zero and generally positive.

The estimates are also stable across donut widths from 400 to 600 voters, addressing sensitivity to the window used to exclude GPs whose observed voter counts may differ from those used at delimitation. Results are similar using narrower or wider MSE-optimal bandwidths, a CER-optimal bandwidth, a symmetric window, uniform or Epanechnikov kernels, a local quadratic specification, and specifications with either no district fixed effects or additional predetermined controls. The pattern in Table 3 therefore does not depend on a particular implementation of the donut RD.

## VI Mechanism

To further investigate why team expansion reduces infrastructure provision in same-caste delegations but not in mixed-caste delegations, I examine three sets of evidence. I first consider whether the result can be explained by differences in political competition or resource inputs. I then ask whether it reflects the type of representative added. Finally, I examine how expansion changes the distribution of infrastructure across villages within a GP. The evidence points away from differences in political inputs or member type and toward differences in how expanded delegations allocate infrastructure across villages.

Figure 4: Robustness of Expansion Effects by Team Composition




*Notes:* Each point reports an estimate for the infrastructure index at the 9,000-voter cutoff, with 90 percent confidence intervals. The left panel reports the interaction between the additional-seat indicator and re-centered mixed-caste composition; the middle and right panels report the implied expansion effects for same-caste and mixed-caste delegations, respectively. Colors indicate donut widths from 400 to 600 registered voters. The preferred specification uses a 500-voter donut, MSE-optimal two-sided bandwidths, a triangular kernel, local linear trends with side-specific slopes, and district fixed effects. Each row changes one feature of this specification as indicated. Baseline controls are the 1991 share of villages with a paved approach road, the 1991 distance to the nearest town, and the 2001 Scheduled Caste share. Standard errors are heteroskedasticity-robust.

### VI.A Political Competition and Resource Inputs

One possibility is that the differential effect of expansion reflects changes in the political or fiscal environment rather than how representatives work together. For example, expanding a same-caste delegation could weaken electoral competition or participation, or provide the GP with fewer resources or less investment in representative capacity.

Tables 4 and 5 provide little support for these explanations. Table 4 examines electoral participation and competition in the 2018 Panchayat Samiti election. Expansion has no differential effect by delegation composition on the prevalence of uncontested seats, whether representatives belong to the same party, the number of candidates or parties per seat, or voter participation. The interaction estimates are small and statistically insignificant across all five outcomes. Although voter participation falls modestly with expansion in same-caste delegations, the interaction is small and statistically insignificant (0.020, SE 0.019), making differential voter participation unlikely to explain the infrastructure result.

Table 5 similarly shows no evidence that mixed-caste delegations receive greater fiscal resources or investments in representative capacity when they expand. The interaction estimates for NREGA labour budgets, natural-resource-management expenditure, and representative training are all statistically insignificant and, if anything, point in the opposite direction. Expansion increases natural-resource-management expenditure by Rs 1,226 per household (SE 735) in same-caste delegations, relative to a pre-expansion mean of Rs 1,091, while the corresponding estimate for mixed-caste delegations is smaller and statistically insignificant. Yet infrastructure provision declines only in the former. The differential infrastructure response therefore does not appear to reflect differences in electoral competition, participation, available resources, or representative training.

### VI.B Is the Expansion Effect Driven by the Type of Member Added?

The results in Section V.B could reflect differences in the effectiveness of reserved and unreserved representatives rather than team composition. If the two types of representatives differ in effectiveness, the expansion penalty in same-caste delegations may arise from who enters the delegation rather than whether the expanded team is homogeneous or mixed. I distinguish these explanations by separating the four ways in which a two-seat delegation can expand to three seats. This yields four expansion paths: expansion within all-unreserved delegations (UUU), expansion to an unreserved-majority mixed delegation (UUR), expansion to a reserved-majority mixed delegation (URR), and expansion within all-reserved delegations (RRR).

Figure 5 provides little evidence that representative type explains the main result. The cleanest comparison is between the two mixed-caste paths. Both begin with one reserved and one unreserved representative, but expansion adds an unreserved representative in UUR and a reserved representative in URR. Despite this difference, the estimated effects on the infrastructure index are nearly identical: 0.074 standard deviations (SE 0.236) for

Table 4: Electoral participation, competition, and party

| | Participation and party | | Competition | | Participation |
|---|---|---|---|---|---|
| | Uncontested seats (1) | Winners same party (2) | Candidates per seat (3) | Parties per seat (4) | Votes per 2013 voter (5) |
| *Panel A: Regression coefficients* | | | | | |
| Additional seat × | | | | | |
| Mixed-caste (recentered) | -0.027 | 0.105 | -0.243 | -0.053 | 0.020 |
| | (0.091) | (0.104) | (0.249) | (0.216) | (0.019) |
| Additional seat | -0.073 | -0.037 | -0.039 | 0.068 | -0.022 |
| | (0.078) | (0.084) | (0.222) | (0.187) | (0.015) |
| Mixed-caste (recentered) | 0.092 | -0.049 | 0.009 | -0.129 | -0.018 |
| | (0.087) | (0.097) | (0.225) | (0.197) | (0.018) |
| *Panel B: Expansion effect by delegation composition* | | | | | |
| Same-caste delegation | -0.077 | -0.100 | 0.134 | 0.139 | -0.032** |
| | (0.095) | (0.095) | (0.268) | (0.230) | (0.016) |
| Mixed-caste delegation | -0.104 | 0.005 | -0.109 | 0.087 | -0.012 |
| | (0.087) | (0.105) | (0.246) | (0.206) | (0.020) |
| Same-caste left-side mean | 0.258 | 0.800 | 2.367 | 2.354 | 0.933 |
| Bandwidth (left) | 425 | 633 | 631 | 555 | 638 |
| Bandwidth (right) | 4349 | 3742 | 3021 | 2956 | 3100 |
| Observations | 1,120 | 974 | 753 | 729 | 532 |

Specification and sample as in Table 3. Outcomes are from the 2018 Panchayat Samiti election, aggregated over the seats in a Gram Panchayat: the share of seats with a single candidate; an indicator that all winners belong to the same party (independents count as no shared party); the mean number of candidates and of parties per seat; and votes cast per registered voter on the 2013 roll, over contested seats only. The same-caste left-side mean is the average among same-caste delegations below the cutoff. Heteroskedasticity-robust standard errors, computed by the delta method. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: NREGA budget and representative training

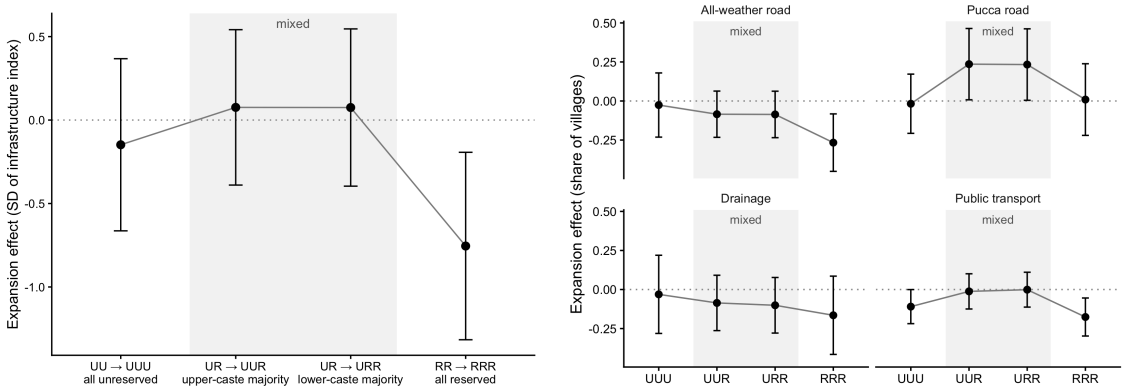
| | NREGA 2018-19 (Rs) | | RGSA training | |
|---|---|---|---|---|
| | Labour budget per household (1) | NRM expenditure per household (2) | Reps oriented per village (3) | Reps trained per village (4) |
| *Panel A: Regression coefficients* | | | | |
| Additional seat × Mixed-caste (recentered) | -942.587 | -315.745 | -0.372 | -0.569 |
| | (1213.793) | (635.930) | (0.422) | (0.397) |
| Additional seat | 1334.830 | 1140.057** | -0.092 | 0.043 |
| | (1156.138) | (562.331) | (0.345) | (0.323) |
| Mixed-caste (recentered) | 986.106 | 593.229 | 0.294 | 0.567 |
| | (889.121) | (515.895) | (0.391) | (0.367) |
| *Panel B: Expansion effect by delegation composition* | | | | |
| Same-caste delegation | 1776.019 | 1226.071* | 0.104 | 0.315 |
| | (1369.964) | (734.903) | (0.258) | (0.233) |
| Mixed-caste delegation | 833.432 | 910.326 | -0.267 | -0.255 |
| | (1280.376) | (559.997) | (0.514) | (0.488) |
| Same-caste left-side mean | 2014.741 | 1090.966 | 0.639 | 0.423 |
| Bandwidth (left) | 807 | 889 | 739 | 698 |
| Bandwidth (right) | 3102 | 4868 | 2671 | 2809 |
| Observations | 772 | 1,267 | 658 | 697 |

Specification and sample as in Table 3. Outcomes are from the 2020 Mission Antyodaya survey: the approved NREGA labour budget for 2018-19 and the expenditure approved within it for natural resource management, both in rupees per household; and the number of elected representatives oriented and given refresher training under the Rashtriya Gram Swaraj Abhiyan, per village. All outcomes are winsorized at the 99th percentile. The same-caste left-side mean is the average among same-caste delegations below the cutoff. Heteroskedasticity-robust standard errors, computed by the delta method. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

UUR and 0.074 (SE 0.239) for URR, with a difference of 0.001 (SE 0.090). The component outcomes show the same pattern, with little difference between the two paths across all four infrastructure measures.

Although the estimates for the two same-caste paths suggest that representative type may matter, the estimates are inconsistent with a simple averaging explanation for the mixed-caste result. Expansion reduces the infrastructure index by 0.756 standard deviations (SE 0.285) when an all-reserved delegation expands but remains all reserved, and by 0.150 standard deviations (SE 0.265) when an all-unreserved delegation expands but remains all unreserved, although the latter estimate is imprecise. By contrast, the estimated expansion effects are positive and nearly identical for the two mixed-caste paths. Both mixed-caste point estimates therefore lie above both same-caste estimates. Thus, differences between reserved and unreserved representatives alone cannot account for the absence of an expansion penalty in mixed-caste delegations.

Figure 5: Expansion effect by three-seat delegation composition




(a) Infrastructure index (b) Components

*Notes:* Each point is the expansion effect for a delegation type, holding type fixed on both sides of the 9,000 electorate cutoff, with 95 percent confidence intervals. Types are labeled by the two-seat delegation and the three-seat delegation it becomes (U, unreserved seat; R, reserved seat): UUU adds an unreserved seat to an all-unreserved delegation, UUR and URR add an unreserved or a reserved seat to a one-of-each delegation, and RRR adds a reserved seat to an all-reserved delegation. The shaded region marks the two mixed-caste types. Estimates extend equation (3) with type indicators recentered on their probability under the rotation rule given the seats reached by the roster; sample, window, weights, and fixed effects as in Table 3. Panel (a) is in standard deviations of the index; panel (b) is in shares of villages.

## VI.C Who Gains and Loses from Team Expansion?

I next ask whether team expansion changes how infrastructure is distributed across villages within a GP. Table 6 reports effects on within-GP inequality and on the lower and upper tails of village infrastructure provision. In same-caste delegations, adding a representative increases the Gini coefficient of village infrastructure by 0.082 points (SE 0.030), relative to a pre-expansion mean of 0.119. The corresponding estimate for mixed-caste delegations is 0.004 (SE 0.034), and the difference between the two is statistically significant. Expansion therefore increases inequality in infrastructure provision within same-caste GPs but not within mixed-caste GPs.

The increase in inequality under same-caste expansion is concentrated at the bottom of the village distribution. Adding a representative increases the share of villages with none of the four infrastructure amenities by 6.8 percentage points (SE 2.6), from a pre-expansion mean of 1.6 percent. The infrastructure index of the worst-served village also declines, although the estimate is imprecise. These patterns are absent in mixed-caste delegations. The share of villages with no amenities changes little, while the infrastructure index of the worst-served village increases by 0.116 (SE 0.087). The difference in the latter response across delegation types is 0.177 (SE 0.079).

The upper tail shows a complementary pattern. In mixed-caste delegations, expansion increases the share of villages possessing all four amenities by 21.8 percentage points (SE 8.1). The corresponding estimate for same-caste delegations is negative and statistically insignificant at $-9.5$ percentage points (SE 7.7), yielding a difference of 31.3 percentage points (SE 7.4). The aggregate decline under same-caste expansion thus coincides with greater inequality across villages and an increase in the share receiving no amenities. Mixed-caste expansion produces a different pattern, with better outcomes for the worst-served villages relative to same-caste expansion and more villages receiving all four amenities.

Table 6: Expansion effect by team composition: within-GP distribution of village infrastructure

| | Dispersion | Bottom of the distribution | | Top |
|---|---|---|---|---|
| | Infrastructure Gini | Villages with 0 of 4 amenities | Index of worst village | Villages with all 4 amenities |
| | (1) | (2) | (3) | (4) |
| *Panel A: Regression coefficients* | | | | |
| Additional seat × Mixed-caste (recentered) | -0.078** | -0.048* | 0.177** | 0.313*** |
| | (0.035) | (0.025) | (0.079) | (0.074) |
| Additional seat | 0.040 | 0.043** | 0.041 | 0.071 |
| | (0.026) | (0.018) | (0.069) | (0.070) |
| Mixed-caste (recentered) | 0.059* | 0.038* | -0.108 | -0.252*** |
| | (0.032) | (0.022) | (0.072) | (0.068) |
| *Panel B: Expansion effect by delegation composition* | | | | |
| Same-caste delegation | 0.082*** | 0.068*** | -0.061 | -0.095 |
| | (0.030) | (0.026) | (0.071) | (0.077) |
| Mixed-caste delegation | 0.004 | 0.020 | 0.116 | 0.218*** |
| | (0.034) | (0.018) | (0.087) | (0.081) |
| Same-caste left-side mean | 0.119 | 0.016 | 0.472 | 0.384 |
| Bandwidth (left) | 583 | 523 | 658 | 754 |
| Bandwidth (right) | 3979 | 4684 | 3013 | 4055 |
| Observations | 811 | 945 | 597 | 839 |

Specification and sample as in Table 3, restricted to Gram Panchayats with at least five surveyed villages. Outcomes describe the distribution of the village-level infrastructure index across a Gram Panchayat's villages: its Gini coefficient, the share of villages with none of the four amenities, the index of the worst-served village, and the share with all four. The same-caste left-side mean is the average among same-caste delegations below the cutoff. Heteroskedasticity-robust standard errors, computed by the delta method. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$.

# VII Conclusion

This paper asks whether the consequences of team expansion depend on the social composition of the team being expanded. I study this question in local governments in West Bengal, where institutional rules generate separate, plausibly exogenous variation in delegation size and caste composition. I find that neither team expansion nor mixed-caste composition has a clear effect on infrastructure provision on its own. Yet the effect of expansion differs sharply by composition. Adding a representative reduces infrastructure provision in same-caste delegations, while this expansion penalty is absent in mixed-caste delegations.

The evidence also helps distinguish why these effects differ. The differential response to expansion is not explained by political participation, fiscal resources, representative training, or whether the additional representative holds a reserved or unreserved seat. Instead, the difference appears in how infrastructure is distributed across villages. Same-caste expansion increases within-GP inequality and raises the share of villages receiving none of the four infrastructure amenities. These patterns are absent under mixed-caste expansion, which leaves the worst-served villages better off relative to same-caste expansion and increases the share of villages receiving all four amenities.

The results point to a broader implication for the study of team expansion. Adding a member is not simply a change in team size: its consequences can depend on the structure of the team that absorbs that member. In this setting, diversity has essentially no effect on performance at a given team size, yet substantially changes how teams respond when they grow. More generally, evaluating the consequences of team expansion therefore requires considering not only how many members are added, but also how those additions interact with the composition of the existing team.

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