Are Women Better Politicians? Discrimination, Gender Quotas, and Electoral Accountability*

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Abstract

Gender quotas have been instrumental in addressing the political underrepresentation of women, and there is growing evidence that politician gender may significantly affect public policy. Yet the sources of these gender differences have not been examined from an electoral accountability perspective, nor has the role of having a quota system in place. Using novel data on constituent evaluations of municipal councilors in Mumbai, India—where reserved-seat gender quotas are assigned by lottery—we develop and estimate an accountability model in which male incumbents face probabilistic term limits. We find that female councilors significantly outperform their male counterparts, but reserved-seat quotas have countervailing selection and discipline effects. Due to taste-based discrimination by voters, counterfactual experiments reveal that gender quotas are indispensable to ensure women are not politically underrepresented. However, the latter can be achieved while improving voter welfare by mitigating the perverse incentives of term limits.

Keywords: electoral accountability, gender discrimination, gender quotas, term limits

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1 Introduction

Close to 140 countries have adopted gender quotas in recent decades to address the political underrepresentation of women.[1] Typically, quotas mandate a percentage of candidate lists to be composed of women (candidate quotas), or they reserve a subset of positions for which only women can run (reserved-seat quotas). Although how they are implemented can limit their effectiveness,[2] gender quotas have been pivotal for the increased political representation of women around the world, helping raise the share of female national legislators from 13% at the end of the twentieth century to almost 25% today.[3]

Beyond their immediate impact on descriptive representation, a sizable literature has also examined the role of gender quotas, or gender per se, in shaping public policy. Since Chattopadhyay and Duflo (2004), multiple studies have shown female politicians improve the provision of public goods, particularly on issues important to women, such as health and education (Clots-Figueras, 2011, 2012; Bhalotra and Clots-Figueras, 2014; Funk and Philips, 2019; Clayton, 2021). Suggested mechanisms include shifting priorities (Besley and Case, 2003; Kittilson, 2008; Lippmann, 2022), skills and lower susceptibility to corruption (Brollo and Troiano, 2016; Eslava, 2021), strategic responses to perceived gender biases (Karekurve-Ramachandra and Lee, 2023; Chauvin and Tricaud, 2024), and increased political participation by women (Miller, 2008; Goyal, 2023*a*,*b*; Prillaman, 2023).

Despite growing evidence that female politicians may deliver better policy outcomes, there is little work investigating the sources of these gender differences explicitly from an electoral accountability perspective. Are they due to selection—are women simply better politicians? Or are they due to discipline—are women somehow incentivized to work harder for their constituents? Moreover, do gender quotas distort such incentives? This paper aims to answer

[1] https://www.idea.int/data-tools/data/gender-quotas-database.

[2] Numerous studies have documented political parties' reluctance to embrace gender parity, exploiting loopholes in quota legislation or relegating female candidates to uncompetitive constituencies (Jones, 2004; Hughes et al., 2019; Clayton, 2021; Fujiwara, Hilbig and Raffler, 2021; Le Barbanchon and Sauvagnat, 2022; Guajardo and Motolinia, 2024).

[3] https://www.unwomen.org/en/digital-library/multimedia/2020/2/infographic-visualizing-the-data-womens-representation.

these questions and to illuminate tradeoffs for the design of quota systems.

We use novel data on voter evaluations of municipal councilors in Mumbai, India. The Greater Mumbai municipal council is composed of 227 members who are elected in first-past-the-post constituencies. By constitutional mandate, local elections in India feature reserved-seat gender quotas. In Mumbai, the reservation status of constituencies is determined by public lottery three months before an upcoming election. We develop and estimate a model of electoral accountability in which male incumbents face probabilistic term limits. Although there are no formal term limits in Mumbai, a male incumbent whose constituency is reserved for women cannot stand for reelection and is thus effectively term-limited.[4] Our approach builds on related work examining the accountability implications of term limits for U.S. governors.[5] We similarly exploit the Mumbai context to estimate key parameters of voters' and incumbents' preferences, but we incorporate gender as an important dimension of politician heterogeneity. This allows us to (i) disentangle the sources of gender differences in politician performance; (ii) quantify taste-based versus statistical discrimination of women by voters, as well as discrimination by political parties; and (iii) evaluate the net voter-welfare impact of the quota system currently in place in Mumbai vis-à-vis alternative designs.

In our model, politicians can be of two types. Effort is costless for high types but not for low types. Voters' priors about candidates' types may vary by gender. If an incumbent chooses to exert effort, it shifts the mean of the distribution from which policy outcomes are drawn. Political parties—but not voters—know politicians' types and use this to decide whether to renominate an incumbent for reelection. Voters observe policy outcomes and the incumbent party's renomination decision, and they update their beliefs about types accordingly. They then decide whether to elect the incumbent party's candidate or a challenger. We allow voters

[4] Constituency switching is rare. In our sample, less than 6% of incumbents seek reelection in a different constituency, and less than 3% do so to evade a reservation.

[5] Closest to our setup is Aruoba, Drazen and Vlaicu (2019). Sieg and Yoon (2017) consider the tradeoff voters face between ideology and ability (see also Gieczewski, 2022). We abstract from ideological considerations in our analysis because Indian local elections are commonly held to be nonideological and focused on competence, which we confirm. Sieg and Yoon (2022) likewise abstract from ideology when looking at U.S. mayors, but they explore institutional reforms aimed at altering the pool of candidates or at improving monitoring and office benefits to incentivize incumbent effort.

to have expressive (taste-based) preferences over candidate gender, in addition to differential beliefs about politician quality.

Mumbai municipal councilors have a hybrid role: they make up the municipal legislature but are also in charge of basic public service provision within their constituency. The Praja Foundation is a nonprofit organization that seeks to improve governance standards in Mumbai. To that end, Praja conducts representative voter surveys in each of the 227 municipal constituencies. Respondents are asked to rate the performance of their councilor across a range of policy areas including the condition of roads, schools, hospitals, power and water supply, sanitation, and crime. Praja then assembles an aggregate performance score, which it uses to publicly grade sitting councilors. Using ordinary and two-stage least squares regressions (where random reservations instrument for councilor gender), we find that female councilors are consistently rated higher than their male counterparts, both in aggregate and by policy area.[6] We focus on the aggregate performance score as our measure of policy outcomes with which to estimate our model.

To determine the sources of gender differences in councilor performance, we take our accountability model to the data. The goal is to quantitatively assess whether the superior performance of women is due to *selection*—are they more likely than men to be high types who always work hard for their constituents?—or to *discipline*—do low-type women exert more effort than low-type men?[7] A considerable challenge is that voters' belief about an incumbent's type is an unobserved (for the researcher), continuous state variable. To pin down voters' initial beliefs, we exclude from our sample incumbents with previous experience as a municipal councilor prior to our first observation of their performance. We also remove elections (and subsequent histories) featuring challengers with previous experience. This results in a loss of 30% of the original sample but accords with the existing (empirical and theoret-

[6] Women's aggregate performance is almost a quarter of a standard deviation higher than men's, and the effect is statistically significant. By policy area, only five out of 17 gender differences are statistically significant, but point estimates suggest women perform better on all issues but two: traffic and the state of public gardens.

[7] To ensure high types always exert effort in equilibrium, we focus on stationary Markov perfect equilibria in which voters' reelection strategy is nondecreasing in their belief that an incumbent is a high type. This monotonicity constraint, however, is not binding at our parameter estimates.

ical) accountability literature (e.g., Aruoba, Drazen and Vlaicu, 2019; Gieczewski, 2022). As explained below, voters' priors are largely identified from first-time councilors' observed policy outcomes. And inexperienced challengers are key to disentangling taste-based and statistical considerations underlying voters' observed choices.

Our estimates indicate that selection is the source of female councilors' superior performance. Indeed, women are twice as likely as men to be high types. With regard to discipline, low-type men are substantially more likely to exert effort than low-type women, despite facing probabilistic term limits. This is due to parties' renomination behavior: a low-type male incumbent, even after accounting for the possibility of being term-limited by reservation, is over three times more likely to be renominated than a low-type female incumbent. Average renomination rates of women in reserved constituencies are only slightly lower than men's in unreserved constituencies, but parties do discriminate heavily against female incumbents in unreserved constituencies. Overall, the selection effect dominates, and women deliver better policy outcomes on average.

To evaluate the net voter-welfare impact of Mumbai's random reservations system, we conduct two counterfactual experiments. First, keeping parties' nomination behavior fixed, we compute equilibrium strategies for incumbents and voters in a setting with no gender quotas. Second, although we do not have data to adequately characterize parties' recruiting constraints and objectives, it is possible that their observed nomination choices reflect a desire to ensure ex-post gender parity in the municipal council. After all, Mumbai's 50% reserved-seat quotas ensure *at least* half of the council is composed of women (56% of incumbents in our sample elected under this system are women). In our second counterfactual, we compute equilibrium strategies for incumbents and voters assuming parties would nominate (and renominate) men and women at equal rates in the absence of gender quotas.

In terms of policy outcomes, the random reservations system, when keeping party behavior fixed in their absence, has countervailing selection and discipline effects. On one hand, it ensures more women get elected, who are of higher quality. But, on the other, the probabilistic term limits imposed on men considerably degrade their discipline incentives as they cannot reap the full reelection benefits of effort. Without quotas, low-type men would almost triple their likelihood of exerting effort, while low-type women's effort strategy would remain virtually unchanged.[8] The selection effect again dominates, so politician effort would be lower on average—by about 6%—without gender quotas in place. Yet the net welfare impact must also account for voters' expressive preferences.

Our estimates uncover a statistically significant distaste for female councilors among Mumbai voters, though the value they place on policy outcomes is almost eight times higher than this expressive component. Taking voters' revealed preferences at face value, we find that, despite the negative effect on expected policy outcomes, net voter welfare would be over 60% higher without quotas in place. This would result from a dramatic drop in the expected share of women in the municipal council—from 56% to only 3%. While stark, the latter is in fact consistent with the historical share prior to the introduction of quotas, which stood at 2% (Barry, Honour and Palnitkar, 2004).

If parties instead were to adjust nominations and treat men and women equally in the absence of quotas, the policy benefit of random reservations would disappear, and voter welfare would once again be higher without quotas—by about 40%—due to expressive gender preferences. In this case, the expected share of women in the council would drop to 35%. Thus, to prevent the political underrepresentation of women, even absent party discrimination, our counterfactual experiment reveals that gender quotas are indispensable.

India's constitutional gender-quotas mandate gives discretion to local governments regarding their implementation. A natural question, then, is whether there are alternative systems that could achieve the same descriptive goal but yield superior policy outcomes. We consider two possibilities. One is the rotation system used in many Indian states, which effectively alternates reservations over time instead of randomizing them—i.e., a constituency that is

[8] This can be viewed as a violation of the stable unit treatment value assumption (SUTVA) typical of most research designs. In other words, when comparing the performance of female and male politicians using, e.g., the two-stage least squares regressions described above, "control men" may not be true controls as they have strategic incentives to behave differently than they would in the absence of quotas. This underscores the value of our methodological approach.

reserved in one electoral cycle becomes unreserved in the next (and vice versa). The other is to randomize reservations but keep them in place for two electoral cycles (ten years) instead of one. The largest party in Mumbai in our sample period, Shiv Sena, has advocated for the latter, precisely on the grounds that it would reduce uncertainty and encourage investment.[9]

Under the rotating reservations system, low-type men would face a hard one-term limit and exert no effort, and there would be little change in low-type women's equilibrium effort strategy. Thus, rotating reservations would reduce voter welfare by 16%. Under a two-term random reservations system, however, both low-type men and women would exert more effort on average. In fact, the increase in low-type men's equilibrium effort would be almost as large as without quotas. Two-term random reservations would therefore improve voter welfare by about 10%, confirming Shiv Sena's view, while achieving the same descriptive goal as the system currently in place in Mumbai.

We are not the first to recognize that political reservations effectively impose term limits on unprotected groups.[10] Parthasarathy (2017) and Brown, Genicot and Kochhar (2022) exploit rotating reservations in Indian villages to show that term-limited incumbents distort policy in favor of elites.[11] Our counterfactual experiments illustrate how, through institutional design, the perverse incentives of term limits may be mitigated and balanced with the descriptive goals of quota systems.

2 The Brihanmumbai Municipal Corporation

Mumbai is the financial capital of India and houses more than 22 million people in its metropolitan area. The Brihanmumbai (Greater Mumbai) Municipal Corporation (BMC)

[9]https://indianexpress.com/article/cities/mumbai/shiv-sena-electoral-ward-reservation-mumbai-7138781/.

[10]Unlike formal term limits, which bar a term-limited politician from ever running again for the same position, the effective term limits imposed by reservations are only temporary. In our model, we abstract from the possibility of running for nonconsecutive terms. This is in line with the standard approach in accountability models, which assume exit following removal from office even if an incumbent is eligible for another nonconsecutive term (Duggan and Martinelli, 2017; Gieczewski, 2022). As discussed below, politicians in our sample do sometimes seek nonconsecutive reelection, but this is not very common.

[11]For protected groups, Anderson and Francois (2023) show that reservations enable replacement of bad in-group village incumbents without electoral cost.

is the local governing body, composed of 227 members (councilors or corporators) elected under plurality voting in single-member districts (wards). Councilors serve five-year terms, face no formal term limits, and are responsible for the general development of their ward.[12] Together, the councilors also make up the municipal legislature, with limited powers of taxation on property and fees for public services. Local governments in India additionally receive transfers from the national and state governments.

The 73rd amendment of the Constitution of India established in 1992 that no less than a third of seats in local governments shall be reserved for women.[13] The constitutional mandate gives discretion to local governments, however, regarding the implementation and extent of gender quotas. In Mumbai, the reservation status of constituencies is determined by public lottery—managed by an independent state (Maharashtra) electoral authority—three months before an upcoming election. Initially, only a third of BMC seats were reserved for women, but the share was raised to 50% in 2011.

Table A1 in Appendix A provides evidence that reservations in Mumbai are indeed consistent with a true lottery.[14] Two potential concerns are whether large parties or entrenched incumbents might be able to manipulate the assignment. We find no significant differences concerning parties. Moreover, experienced councilors are not less likely to face a reservation at the end of their term, and reserved constituencies are less likely to elect an experienced candidate—as expected given the term-limiting effect of reserved-seat gender quotas at the heart of this paper.

[12] https://www.mcgm.gov.in. We use the terms ward and constituency interchangeably.

[13] https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-seventy-third-amendment-act-1992. This amendment also established reservation of seats for Scheduled Castes (SC) or Scheduled Tribes (ST) proportional to population shares. Reservations for women must be observed both within and beyond ethnic reservations. Although we abstract from SC/ST reservations in our main analysis, we show in Appendix F that our results are robust to accounting for this additional layer of term-limiting risk for BMC incumbents.

[14] The negative and significant coefficient for 2007 simply reflects that the share of reserved constituencies was raised from 33% to 50% in 2011.

2.1 Municipal Councilor Performance

We use data on citizen perception of councilors collected by the Praja Foundation, a nonprofit organization. Praja's stated aim is to "to track the performance of Elected Representatives on their constitutional duties." To do so, they "undertake extensive research and highlight civic issues to build the awareness of, and mobilize action by, the government and elected representatives." Our data come from Praja's "Municipal Councillor Report Card" project, which assigns performance grades to each municipal councilor every year. The grade assignment is based primarily on surveys of more than 22,000 citizens across all constituencies in Mumbai.[15] Additionally, Praja collects other performance measures—including attendance at BMC meetings—through "Right to Information Act" requests. We focus our analysis on councilor performance as perceived by voters.

Praja asks survey respondents to rate sitting councilors on a 0–100 scale across multiple policy areas within their purview. The first available survey is from 2011, and the last survey, due to the pandemic, is from 2019. Surveys are conducted only in nonelection years. Thus, for incumbents serving in 2007–2012, we observe their performance in the last nonelection year of their term (2011). For consistency—and because effort takes time to pay off—we similarly use the 2016 survey for 2012–2017 incumbents. And, for 2017–2022 incumbents, we have to rely on the 2019 survey.[16]

There are 17 questions common across all three waves of the survey. Respondents evaluate councilors on, e.g., the state of roads, public transportation, schools and hospitals, power and water supply, sanitation, and crime. They also rate councilors based on general perceptions of accessibility, corruption, and improvement in quality of life. Praja aggregates these responses into an overall-performance score, which it uses in grading councilors. We take Praja's overall score as our preferred measure of councilor performance.

[15] As noted in Karekurve-Ramachandra and Lee (2023), the surveys include at least 100 respondents per constituency and are designed to be representative, matching demographics from the large-scale Indian Readership Survey. The full survey research design and weighting criteria are described on Praja's website: https://www.praja.org/report-card. We do not have access to respondent demographics—only to constituency-level performance scores.

[16] Our results are robust to averaging performance scores by electoral cycle—see Appendix F.

Table 1 examines gender differences in perceived performance. The first five columns focus on the subsample of incumbents with no previous experience as a municipal councilor (going back to 1997). The last three columns look at all incumbents in the 2007–2022 period (with the exception of three for whom Praja provided no data). For first-time councilors, we regress perceived performance on gender using ordinary (OLS) and two-stage least squares (2SLS), where the random reservation status of a constituency instruments for councilor gender. Columns (I)–(IV) show that, regardless of specification, female councilors are rated significantly higher than men. The performance score is standardized, so point estimates suggest women deliver, on average, a 0.2 standard-deviation improvement in policy outcomes relative to men. Columns (III) and (IV) control for the party of the incumbent councilor.[17] The reference category is all "minor" parties other than the three largest. Almost 80% of incumbents in our sample belong to the three major parties. While councilors from the major parties seem to perform better than those from minor parties, the bottom panel of Table 1 shows that there are no statistically significant differences among the three largest parties. Finally, column (V) explores whether women elected in reserved constituencies perform differently from those who compete against men. As discussed further below, there are very few female candidates in unreserved constituencies, so estimates are imprecise. But, perhaps contrary to expectations in a setting where voters likely discriminate against women, the performance of female councilors elected in reserved constituencies appears to be better (Bhavnani, 2009).

Columns (VI)–(VIII) of Table 1 present OLS estimates using our full sample. Results are consistent with those in columns (I), (III), and (V). With the full sample, however, we control for councilor experience (having served more than once) and its interaction with gender. Coefficients are statistically insignificant, but experience is only associated with better performance in the case of male councilors. This suggests that the screening benefit of elections for voters might be stronger with regard to men than women, a result we discuss further in our main analysis.

[17] Columns (III) and (IV) also include year and administrative-ward fixed effects. Mumbai's 227 "electoral wards," or constituencies, are grouped into 24 "administrative wards."

Table 1: Perceived Incumbent Performance

	First-Time Councilors					All Councilors		
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
	OLS	2SLS	OLS	2SLS	OLS	OLS	OLS	OLS
Constant	-0.111	-0.136*	-0.547***	-0.568***	-0.541***	-0.111	-0.461***	-0.459***
	(0.069)	(0.074)	(0.195)	(0.196)	(0.195)	(0.069)	(0.171)	(0.171)
Female	0.157*	0.202*	0.192**	0.226**	0.053	0.157*	0.182**	0.026
	(0.093)	(0.104)	(0.091)	(0.101)	(0.224)	(0.093)	(0.091)	(0.165)
Reserved-Elected					0.154			0.174
					(0.222)			(0.150)
Term > 1						0.119	0.106	0.106
						(0.112)	(0.109)	(0.109)
(Term > 1) × Female						-0.035	-0.149	-0.118
						(0.167)	(0.163)	(0.165)
Bharatiya Janata Party (BJP)			0.239	0.241	0.231		0.217*	0.210
			(0.156)	(0.156)	(0.155)		(0.130)	(0.131)
Indian National Congress (INC)			0.361***	0.359***	0.359***		0.288***	0.284***
			(0.128)	(0.128)	(0.128)		(0.110)	(0.110)
Shiv Sena (SS)			0.283**	0.283**	0.275**		0.253**	0.250**
			(0.127)	(0.127)	(0.127)		(0.106)	(0.106)
2011			0.020	0.028	0.016		-0.076	-0.077
			(0.114)	(0.114)	(0.114)		(0.094)	(0.094)
2016			0.136	0.138	0.132		0.136	0.133
			(0.115)	(0.115)	(0.115)		(0.097)	(0.097)
Administrative-Ward F.E.	No	No	Yes	Yes	Yes	No	Yes	Yes
Observations	472	472	472	472	472	678	678	678
BJP = INC (p-value)			0.389	0.404	0.366		0.555	0.542
BJP = SS (p-value)			0.758	0.769	0.757		0.755	0.735
INC = SS (p-value)			0.519	0.526	0.488		0.732	0.736

Notes. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. For the subsample of first-time councilors, columns (I) and (II) regress our preferred measure of perceived incumbent performance (standardized) on gender. Columns (III) and (IV) control for the party of the incumbent (omitting parties other than the three largest) as well as year (omitting 2019) and administrative-ward fixed effects. Column (V) additionally controls for whether the incumbent was elected in a reserved ward. Using all incumbents with observed performance ratings, column (VI) regresses perceived performance on gender, an indicator of whether the incumbent was *not* a first-time councilor, and their interaction. Column (VII) additionally controls for party as well as year and administrative-ward fixed effects. Column (VIII) controls for whether the incumbent was elected in a reserved ward. Two-stage least squares (2SLS) regressions use ward reservation status as instrument for councilor gender. The bottom panel tests for differences across parties.

Table A2 in Appendix A reproduces columns (III) and (IV) of Table 1 for each individual question of the Praja surveys that appears in all three waves. Gender differences for only five out of 17 performance indicators are statistically significant: public transportation, schools, power supply, water supply, and general improvement in quality of life. Yet point estimates suggest women perform better in all but two policy areas: traffic (OLS) and the state of public gardens (2SLS). Notably, the largest and most precise effect concerns perceptions of quality-of-life improvement. This indicator appears to be the main driver of the overall-performance score, which we find reassuring as the framing of the question allows respondents to focus on whatever matters most to them.

2.2 Candidate Nomination (and Renomination)

Indian political parties are highly centralized and exercise near-complete, top-down control over candidate nominations, including the renomination of sitting incumbents (Farooqui and Sridharan, 2014; Magesan, Szabó and Ujhelyi, 2024). To explore whether parties treat female and male candidates differently, we digitized and translated electoral-results handbooks from the Maharashtra State Election Commission.[18] We note, however, that the 2022 election was postponed due to the pandemic and has not yet taken place. So, for incumbents in our sample serving in 2007–2022, we observe only 2012 and 2017 election outcomes. (See Appendix B for a detailed description of our data and their sources.)

We identify candidates' gender from their names, verifying this with publicly available news reports, social media profiles, and political party websites. Although BMC elections typically feature multiple candidates, for tractability in our main analysis we focus hereafter on the top two candidates in each contest.

Table 2 examines the likelihood of a female-candidate nomination in an unreserved open ward—i.e., where the sitting incumbent is not running for reelection. The first two columns look at candidates with no previous experience as a municipal councilor, and the last two

[18] We are grateful to Rikhil Bhavnani for sharing with us data from 1997 and 2002, which we use to identify candidates with previous experience as a municipal councilor prior to 2007.

columns use the full sample. Across specifications, the likelihood of a female nomination is very low—5.5% on average—and there is no significant difference when comparing the incumbent-party candidate with the challenger. In other words, there is no evidence of an attempt by parties to match, or mismatch, candidates by gender. Columns (II) and (IV) control for the party of the candidate, and we find all parties in Mumbai nominate women at similar rates.

Table 2: Likelihood of Female-Candidate Nomination in Unreserved Open Ward

	Candidates with No Prior Experience as Councilor		All Candidates	
	(I)	(II)	(III)	(IV)
Constant	0.066***	0.044	0.060***	0.049*
	(0.021)	(0.029)	(0.020)	(0.029)
Challenger	-0.006	-0.006	0.007	0.008
	(0.027)	(0.029)	(0.026)	(0.027)
Bharatiya Janata Party		0.043		0.017
		(0.040)		(0.038)
Indian National Congress		0.010		-0.006
		(0.035)		(0.033)
Shiv Sena		0.042		0.033
		(0.036)		(0.035)
Observations	321	321	372	372

Notes. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. For the subsample of top-two candidates in unreserved wards with no prior experience as a councilor, column (I) regresses via OLS a female-candidate indicator on a challenger dummy (0 = incumbent-party candidate). Column (II) controls for the party of the candidate (omitting parties other than the three largest). Using all top-two candidates in unreserved open wards (i.e., incumbent councilor was not renominated), columns (III) and (IV) reproduce the regressions in columns (I) and (II), respectively.

Column (I) of Table 3 reports the average rates at which incumbent parties renominate sitting councilors for reelection. Male incumbents are renominated in 48% of unreserved constituencies, and they are renominated in 0% of reserved constituencies, which provides evidence that reservations are indeed enforced. While female incumbents are renominated in 46% of reserved constituencies, they are only renominated in 24% of unreserved constituencies. Overall, these renomination rates may seem low, but this is consistent with related work documenting efforts by Indian parties to prevent individual politicians from becoming overly popular (Magesan, Szabó and Ujhelyi, 2024). Moreover, although women in reserved constituencies are renominated at a similar rate to men's in unreserved constituencies, parties do seem to discriminate against female incumbents when their ward is unreserved. We discuss potential motivations behind such differential treatment in our main analysis.

Table 3: Incumbent Renomination

	Renominated in Same Ward				Renominated in Any Ward			
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Constant	0.483***	0.483***	0.478***	0.523***	0.586***	0.587***	0.579***	0.565***
	(0.054)	(0.054)	(0.054)	(0.091)	(0.050)	(0.049)	(0.050)	(0.091)
Reserved	-0.483***	-0.480***	-0.562***	-0.339*	-0.586***	-0.583***	-0.690***	-0.492***
	(0.054)	(0.054)	(0.136)	(0.183)	(0.050)	(0.050)	(0.123)	(0.147)
Female	-0.236***	-0.239***	-0.245***	-0.247***	-0.315***	-0.319***	-0.327***	-0.337***
	(0.065)	(0.065)	(0.065)	(0.065)	(0.063)	(0.062)	(0.062)	(0.063)
Reserved × Female	0.695***	0.693***	0.698***	0.397	0.822***	0.820***	0.828***	0.561***
	(0.088)	(0.087)	(0.087)	(0.245)	(0.085)	(0.084)	(0.084)	(0.210)
Perceived Performance		0.036*	0.040**	0.002		0.043**	0.047**	0.010
		(0.019)	(0.019)	(0.020)		(0.020)	(0.019)	(0.022)
Female × Perc'd Performance				0.060*				0.067*
				(0.034)				(0.036)
Female Challenger			0.087	-0.116			0.115	-0.072
			(0.132)	(0.190)			(0.121)	(0.156)
Female × Female Challenger				0.247				0.240
				(0.247)				(0.212)
Bharatiya Janata Party (BJP)				0.136*				0.149**
				(0.070)				(0.073)
Indian National Congress (INC)				0.068				0.073
				(0.054)				(0.056)
Shiv Sena (SS)				0.086*				0.101**
				(0.049)				(0.051)
Year F.E.	No	No	No	Yes	No	No	No	Yes
Administrative-Ward F.E.	No	No	No	Yes	No	No	No	Yes
Observations	448	447	445	445	448	447	445	445
BJP = INC (p-value)				0.341				0.304
BJP = SS (p-value)				0.470				0.496
INC = SS (p-value)				0.496				0.572

Notes. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Column (I) regresses via OLS an indicator of whether the incumbent councilor was renominated, in the *same* ward, on reservation status, gender, and their interaction. Column (II) additionally controls for perceived incumbent performance. Column (III) controls for challenger gender. Column (IV) interacts incumbent gender with perceived performance and challenger gender, controls for the party of the incumbent (omitting parties other than the three largest), and adds year and administrative-ward fixed effects. Columns (V)–(VIII) reproduce columns (I)–(IV), respectively, but focus instead on whether the incumbent councilor was renominated in *any* ward (reservation status in this case corresponds to that of the destination ward). The bottom panel tests for differences across parties.

Columns (II)–(IV) of Table 3 add a number of controls. First, councilor performance as perceived by voters is positively and significantly associated with renomination, though the correlation is stronger for female incumbents. Second, echoing Table 2, there is no evidence of an attempt by incumbent parties to match, or mismatch, the gender of challengers. Finally, the bottom panel of Table 3 shows that there are no significant differences in renomination behavior among the three major parties in Mumbai.

Columns (I)–(IV) of Table 3 focus on whether a sitting incumbent is renominated for reelection in the *same* ward. Occasionally, however, parties renominate an incumbent in a *different* ward. Only 6% of incumbents in our sample are moved to another ward, and only half of these are men who would have been prevented from running again due to their original ward being reserved. Thus, there is some evidence of strategic evasion of reservations, but this is extremely rare. We discuss below how we deal with constituency switching in our main analysis. Columns (V)–(VIII) of Table 3 reproduce columns (I)–(IV), respectively, but focus on whether a sitting incumbent is renominated in *any* ward. Results are virtually identical, though renomination rates are, naturally, slightly higher in columns (V)–(VIII).

2.3 Electoral Performance

Lastly, Table 4 explores the electoral performance of incumbent parties. As in Table 3, columns (I)–(III) consider whether the incumbent-party candidate is renominated from the *same* ward, and columns (IV)–(VI) do so from *any* ward. Results are nearly identical. There are five main takeaways. First, BMC elections are very competitive: the average likelihood with which the incumbent party wins reelection is only 46%.

Second, the most important significant predictor of electoral success for the incumbent party is having a sitting councilor running for reelection. Given that renomination rates are generally low, we view this as evidence that voters take renomination as a strong signal of politician quality.

Third, perceived performance of the sitting councilor is not significantly associated with electoral success for the incumbent party. This is unsurprising when the incumbent-party

Table 4: Incumbent-Party Reelection

	Renominated from Same Ward			Renominated from Any Ward		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Constant	0.381***	0.382***	0.012	0.380***	0.381***	0.070
	(0.041)	(0.042)	(0.107)	(0.043)	(0.043)	(0.107)
Female	0.067	-0.020	-0.018	0.039	-0.090	-0.056
	(0.054)	(0.121)	(0.111)	(0.056)	(0.118)	(0.106)
Renominated	0.216**	0.222***	0.225***	0.259***	0.259***	0.260***
	(0.085)	(0.085)	(0.080)	(0.075)	(0.076)	(0.073)
Female × Renominated	-0.150	-0.130	-0.091	-0.163	-0.125	-0.108
	(0.110)	(0.119)	(0.109)	(0.102)	(0.110)	(0.102)
Perceived Performance	0.011	0.010	0.019	0.004	0.003	0.011
	(0.028)	(0.028)	(0.026)	(0.029)	(0.029)	(0.027)
Renominated × Perceived Performance	-0.142*	-0.141	-0.114	-0.088	-0.086	-0.065
	(0.085)	(0.086)	(0.079)	(0.072)	(0.072)	(0.064)
Female × Renom'd × Perc'd Performance	0.051	0.069	0.043	0.007	0.029	0.007
	(0.098)	(0.100)	(0.095)	(0.085)	(0.087)	(0.080)
Female Challenger		-0.159	-0.066		-0.022	0.087
		(0.166)	(0.164)		(0.161)	(0.160)
Female × Female Challenger		0.247	0.172		0.153	0.043
		(0.200)	(0.195)		(0.193)	(0.189)
Bharatiya Janata Party (BJP)			0.376***			0.313***
			(0.080)			(0.084)
Indian National Congress (INC)			-0.042			-0.077
			(0.061)			(0.062)
Shiv Sena (SS)			0.178***			0.157**
			(0.062)			(0.064)
BJP Challenger			-0.026			-0.074
			(0.071)			(0.070)
INC Challenger			-0.091			-0.132*
			(0.069)			(0.068)
SS Challenger			-0.056			-0.057
			(0.064)			(0.064)
Year F.E.	No	No	Yes	No	No	Yes
Administrative-Ward F.E.	No	No	Yes	No	No	Yes
Observations	447	445	445	447	445	445

Notes. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Column (I) regresses via OLS an indicator of incumbent-party victory on (i) the incumbent-party candidate's gender; (ii) a binary indicator of whether the candidate was the incumbent serving in the *same* ward; (iii) the interaction of (i) and (ii); (iv) the perceived performance of the incumbent; (v) the interaction of (ii) and (iv); and the triple interaction of (i), (ii) and (iv). Column (II) additionally controls for challenger gender and its interaction with the incumbent-party candidate's gender. Column (III) controls for the incumbent party and the party of the challenger (omitting parties other than the three largest), as well as year and administrative-ward fixed effects. Columns (IV)–(VII) reproduce columns (I)–(III), respectively, but indicator (ii) corresponds to whether the candidate was an incumbent serving in *any* ward.

candidate is not the sitting councilor. Otherwise, given that performance is positively correlated with renomination, and that the latter is predictive of electoral success, it appears renomination is a stronger signal of quality for voters.

Fourth, male incumbent-party candidates seem to fare worse against female challengers. As noted above, however, these matchups are rare, so the effect is not statistically significant.

Finally, Shiv Sena (SS) and the Bharatiya Janata Party (BJP) appear to have an electoral edge. This is unsurprising considering SS is the largest party in Mumbai (with 35% of incumbents in our sample), and our sample period coincides with a sharp rise in national prominence for the BJP (20% of BMC incumbents) at the expense of the Indian National Congress (INC, 23% of incumbents). Yet incumbent parties fare worst against an INC challenger, so the three major parties seem to be fairly evenly matched.

In our main analysis, we reevaluate these empirical patterns in the light of our model. But two features of the data inform a couple of key assumptions: (i) we assume parties know politicians' quality, and voters update their beliefs accordingly conditional on renomination; and (ii) we abstract from considering party affiliation explicitly in accordance with the results in Tables 1–4. Indeed, Indian local elections, particularly in urban areas, are often regarded to be nonideological and focused on last-mile public service provision (Suri, 2013).

3 An Empirical Model of Electoral Accountability with Random Gender Reservations

Time is discrete with an infinite horizon, $t = 1, 2, \ldots$, and wards are indexed by $n = 1, \ldots, N$. The sitting incumbent in ward n and period (electoral cycle) t is characterized by $I^0_{nt} = (g^0_{nt}, \omega^0_{nt})$, where $g^0_{nt} \in \{F, M\}$ denotes the politician's gender, and $\omega^0_{nt} \in \{L, H\}$ is their type. Types are observed by parties but not by voters (nor the researcher). Voters' prior that an inexperienced politician of gender g is of type H is given by $\pi^g \in [0, 1]$.

At the beginning of period t, incumbents choose whether to exert effort ($e_{nt} = 1$) or not ($e_{nt} = 0$) to improve policy outcomes. Effort shifts the mean of the distribution from which policy outcomes are drawn: specifically, given effort choice $e_{nt} \in \{0, 1\}$, policy outcome $y_{nt} \overset{\text{i.i.d.}}{\sim} \mathcal{N}(\mu_y + e_{nt}\lambda, \varsigma_y^2)$. High-type ($H$) politicians face no cost of exerting effort. For a low-type (L) incumbent, the cost of effort is $c_{nt} \overset{\text{i.i.d.}}{\sim} U[0, 1]$, privately observed. A sitting councilor enjoys an office benefit β, so their per-period payoff is given by

$$u(e_{nt}, \omega_{nt}^0, c_{nt}; \beta) = \beta - \kappa(e_{nt}, \omega_{nt}^0, c_{nt}),$$

where

$$\kappa(e_{nt}, \omega_{nt}^0, c_{nt}) = \begin{cases} c_{nt} & \text{if } (e_{nt}, \omega_{nt}^0) = (1, L), \\ 0 & \text{otherwise.} \end{cases}$$

At the end of period t, ward n's reservation status, q_{nt}, is realized. The ward is reserved for women ($q_{nt} = 1$) or not ($q_{nt} = 0$) with equal probability. The incumbent does not know q_{nt} at the time of their effort choice (recall that the BMC reservation lottery takes place three months prior to the end of a five-year electoral cycle).

Given q_{nt}, the incumbent party faces the choice whether to renominate the sitting councilor for reelection ($\eta_{nt} = 1$) or to nominate a new (inexperienced) candidate ($\eta_{nt} = 0$).[19] We do not have data to fully characterize parties' recruiting constraints and objectives—for complementary work in the context of Indian national elections, see Magesan, Szabó and Ujhelyi (2024). We simply assume parties play some equilibrium renomination strategy, which we parsimoniously specify as

$$\mathbb{P}(\eta_{nt} = 1 \,|\, g_{nt}^0, \omega_{nt}^0, q_{nt}; \alpha) = \begin{cases} \dfrac{\exp\left\{\alpha_0 + \left(\mathbb{1}_{g_{nt}^0 = F}\right)\left[(1-q_{nt})\alpha_g^0 + q_{nt}\alpha_g^1\right] + \left(\mathbb{1}_{\omega_{nt}^0 = H}\right)\alpha_\omega\right\}}{1 + \exp\left\{\alpha_0 + \left(\mathbb{1}_{g_{nt}^0 = F}\right)\left[(1-q_{nt})\alpha_g^0 + q_{nt}\alpha_g^1\right] + \left(\mathbb{1}_{\omega_{nt}^0 = H}\right)\alpha_\omega\right\}} & \text{if } (g_{nt}^0, q_{nt}) \neq (M, 1), \\ 0 & \text{otherwise.} \end{cases} \quad (1)$$

Thus, male incumbents cannot be renominated if $q_{nt} = 1$. This is the term-limiting effect of reserved-seat gender quotas at the heart of our paper. Otherwise, α_0 characterizes the

[19] As discussed below, for estimation we need to pin down voters' initial beliefs over candidates' types. We therefore drop observations (and subsequent histories) wherein a sitting incumbent is replaced by a candidate with previous experience as a municipal councilor. This amounts to 17% of observed renomination decisions.

baseline rate at which low-type male incumbents are renominated in unreserved wards; α_ω captures the degree to which parties condition renominations on type; and α_g^0 and α_g^1 determine, respectively, whether there is differential treatment of female incumbents in unreserved and reserved wards. The incumbent party's candidate in the election at the end of period t is characterized by $I_{nt}^1 = (g_{nt}^1, \omega_{nt}^1)$. If $\eta_{nt} = 1$, then $I_{nt}^1 = I_{nt}^0$. Otherwise, $g_{nt}^1 = F$ with probability $q_{nt} + (1 - q_{nt})\gamma \in [0, 1]$, and $\omega_{nt}^1 = H$ with probability $\pi^{g_{nt}^1}$.

A representative voter in ward n then faces a choice between the incumbent-party candidate, I_{nt}^1, and a challenger, $C_{nt} = (g_{nt}', \omega_{nt}')$, where, again, $g_{nt}' = F$ with probability $q_{nt} + (1 - q_{nt})\gamma$, and $\omega_{nt}' = H$ with probability $\pi^{g_{nt}'}$.[20] Letting $r_{nt} = 1$ ($r_{nt} = 0$) if the voter selects the incumbent-party candidate (challenger), the voter's per-period payoff is given by

$$w(r_{nt}, y_{nt}, g_{nt}^1, g_{nt}', \epsilon_{nt}; \xi) = \begin{cases} y_{nt}\xi_y + (\mathbb{1}_{g_{nt}^1 = F})\xi_g + \epsilon_{nt}^1 & \text{if } r_{nt} = 1, \\ y_{nt}\xi_y + (\mathbb{1}_{g_{nt}' = F})\xi_g + \epsilon_{nt}^0 & \text{if } r_{nt} = 0. \end{cases} \tag{2}$$

Here, ξ_y measures the value the voter places on policy outcomes, ξ_g captures expressive (taste-based) gender preferences, and $\epsilon_{nt} = (\epsilon_{nt}^0, \epsilon_{nt}^1)$ are i.i.d. mean-zero Type-I Extreme Value (TIEV) random-utility shocks. Notice that the voter, regardless of their candidate choice, enjoys the policy outcome, y_{nt}, produced by the sitting councilor, I_{nt}^0, in that period. Election outcomes are thus determined in expectation of future policy outcomes, along with expressive gender considerations. Incumbents and voters discount future payoffs with a common discount factor $\delta \in (0, 1)$.

To summarize, the timing of events in each ward within an electoral cycle is as follows. First, the sitting councilor makes an effort choice, and a policy outcome is realized accordingly. Second, the ward's reservation status is determined by lottery. Third, the incumbent party decides whether to renominate the sitting councilor or to nominate a new candidate, and a challenger is drawn. Finally, the ward's representative voter chooses between the incumbent-

[20] We similarly drop, as discussed in the previous footnote, observations (and subsequent histories) featuring challengers with previous experience as a municipal councilor. This amounts to 13% of observed elections.

party candidate and the challenger.

3.1 Beliefs, Strategies, and Equilibrium

We focus on stationary Markov perfect equilibria of the game incumbents and voters play across wards, imposing two assumptions. First, we adopt the standard one-equilibrium-in-the-data assumption for estimation of dynamic games (Aguirregabiria and Mira, 2007)—that is, the incumbent's and voter's equilibrium strategies are assumed to be the same across wards. Second, we focus on an equilibrium in which the voter's reelection strategy, characterized below, is nondecreasing in their belief about the incumbent's type. This ensures high types exert effort in equilibrium, giving our description of types and effort costs substantive meaning. At our parameter estimates, however, the monotonicity constraint is not binding.

In each ward and period, the voter moves last and is the only player uninformed about the incumbent's type. We first describe the voter's equilibrium beliefs and reelection strategy and then turn to the incumbent's effort strategy.

Voter's beliefs. Let $b^0_{nt} \in [0,1]$ denote ward n's voter's belief at the beginning of period t that $\omega^0_{nt} = H$. By the time of the election, the voter observes realizations of y_{nt}, q_{nt}, η_{nt}, and g^1_{nt}. Let $\sigma^g(b^0_{nt};\theta)$ denote the equilibrium probability, characterized below, with which a low-type politician of gender g exerts effort given b^0_{nt}, where $\theta = (\pi, \alpha, \beta, \gamma, \delta, \lambda, \mu_y, \varsigma_y, \xi)$ collects all model parameters. Using Bayes' rule, the voter updates their belief about the incumbent-party candidate's type, at the time of the election, to $b^1_{nt} = \rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt};\theta)$, where

$$\rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt};\theta) = (1-\eta_{nt})\pi^{g^1_{nt}} + \frac{\eta_{nt} b^0_{nt}\phi\left(y_{nt};\mu_y+\lambda,\varsigma_y^2\right)\left(\frac{1}{2}\right)\mathbb{P}(\eta_{nt}=1\,|\,g^1_{nt},\omega^1_{nt}=H,q_{nt};\alpha)}{b^0_{nt}\phi\left(y_{nt};\mu_y+\lambda,\varsigma_y^2\right)\left(\frac{1}{2}\right)\mathbb{P}(\eta_{nt}=1\,|\,g^1_{nt},\omega^1_{nt}=H,q_{nt};\alpha)+(1-b^0_{nt})d^{g^1_{nt}}(y_{nt}|b^0_{nt};\theta)\left(\frac{1}{2}\right)\mathbb{P}(\eta_{nt}=1\,|\,g^1_{nt},\omega^1_{nt}=L,q_{nt};\alpha)}, \tag{3}$$

$\phi(\cdot;\mu,\varsigma_y^2)$ denotes the $\mathcal{N}(\mu,\varsigma_y^2)$ density, and

$$d^g(y_{nt}|b^0_{nt};\theta) = \sigma^g(b^0_{nt};\theta)\phi\left(y_{nt};\mu_y+\lambda,\varsigma_y^2\right) + \left[1-\sigma^g(b^0_{nt};\theta)\right]\phi\left(y_{nt};\mu_y,\varsigma_y^2\right) \tag{4}$$

is the mixture density of y_{nt}, conditional on b^0_{nt}, given a low-type gender-g incumbent's equilibrium effort strategy. Thus, if the sitting councilor is not renominated ($\eta_{nt} = 0$), the voter's belief resets to the prior corresponding to the gender of the incumbent-party candidate, $\pi^{g^1_{nt}}$. Otherwise, the voter uses the observed policy outcome and renomination to update on the councilor's type, in accordance with the incumbent's and party's equilibrium strategies.

In deriving the likelihood of the data below, it is useful to also consider an update on the sitting incumbent's type given observed policy outcomes only:

$$\rho^y(b^0_{nt}, g^0_{nt}, y_{nt}; \theta) = \frac{b^0_{nt}\phi\left(y_{nt}; \mu_y + \lambda, \varsigma^2_y\right)}{b^0_{nt}\phi\left(y_{nt}; \mu_y + \lambda, \varsigma^2_y\right) + (1 - b^0_{nt})d^{g^0_{nt}}(y_{nt}|b^0_{nt}; \theta)}. \tag{5}$$

The voter's initial belief in period $t + 1$ is determined as follows. If the voter elects the incumbent-party candidate, then $b^0_{n,t+1} = b^1_{nt}$. On the other hand, if the voter elects the challenger, of gender g'_{nt}, then $b^0_{n,t+1} = \pi^{g'_{nt}}$.

Voter's equilibrium strategy. Let W^r denote the voter's conditional value function given choice $r \in \{0, 1\}$, *net of the contemporaneous policy outcome and random-utility shock*. In period t, the voter faces a choice between the incumbent-party candidate—who is of gender g^1_{nt} and a high type with probability b^1_{nt}—and the challenger—who is of gender g'_{nt} and a high type with probability $\pi^{g'_{nt}}$. Thus, the voter conditions their decision on state $s_{nt} = (b^1_{nt}, g^1_{nt}, g'_{nt})$. The voter's optimal choice is given by $r_{nt} = \mathbb{1}_{y_{nt}\xi_y + W^1(s_{nt};\theta) + \epsilon^1_{nt} \geq y_{nt}\xi_y + W^0(s_{nt};\theta) + \epsilon^0_{nt}}$, where W^r satisfies the Bellman condition

$$W^r(s_{nt}; \theta) = \left[r\mathbb{1}_{g^1_{nt}=F} + (1 - r)\mathbb{1}_{g'_{nt}=F}\right]\xi_g + \\ \delta\mathbb{E}\left[\max_{\tilde{r}\in\{0,1\}} y_{n,t+1}\xi_y + W^{\tilde{r}}(s_{n,t+1}; \theta) + \epsilon^{\tilde{r}}_{n,t+1} \,\middle|\, s_{nt}, r_{nt} = r; \theta\right].$$

The first term above is the contemporaneous expressive payoff from electing a candidate of the corresponding gender, and the second term is the continuation value from making an optimal choice in the next period.

Since random-utility shocks are distributed mean-zero TIEV, we have

$$\begin{aligned}
W^1(s_{nt};\theta) &= (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\mathbb{E}\left[\max_{r\in\{0,1\}} y_{n,t+1}\xi_y + W^r(s_{n,t+1};\theta) + \epsilon^r_{n,t+1} \,\middle|\, s_{nt}, r_{nt}=1;\theta\right] \\
&= (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\mathbb{E}\left[\log\left(\sum_{r\in\{0,1\}} \exp\left\{y_{n,t+1}\xi_y + W^r(s_{n,t+1};\theta)\right\}\right) \,\middle|\, s_{nt}, r_{nt}=1;\theta\right] \\
&= (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\mathbb{E}\left[y_{n,t+1}\xi_y + \log\left(\sum_{r\in\{0,1\}} \exp\left\{W^r(s_{n,t+1};\theta)\right\}\right) \,\middle|\, s_{nt}, r_{nt}=1;\theta\right] \\
&= (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\left\{\mu_Y + \left[b^1_{nt} + (1-b^1_{nt})\sigma^{g^1_{nt}}(b^1_{nt};\theta)\right]\lambda\right\}\xi_y \\
&\quad + \delta\mathbb{E}\left[\log\left(\sum_{r\in\{0,1\}} \exp\left\{W^r(s_{n,t+1};\theta)\right\}\right) \,\middle|\, s_{nt}, r_{nt}=1;\theta\right]
\end{aligned}$$

and

$$\begin{aligned}
W^0(s_{nt};\theta) = (\mathbb{1}_{g'_{nt}=F})\xi_g &+ \delta\left\{\mu_Y + \left[\pi^{g'_{nt}} + (1-\pi^{g'_{nt}})\sigma^{g'_{nt}}(\pi^{g'_{nt}};\theta)\right]\lambda\right\}\xi_y \\
&+ \delta\mathbb{E}\left[\log\left(\sum_{r\in\{0,1\}} \exp\left\{W^r(s_{n,t+1};\theta)\right\}\right) \,\middle|\, s_{nt}, r_{nt}=0;\theta\right].
\end{aligned}$$

To simplify notation and characterize equilibrium reelection probabilities, notice that $s_{n,t+1}$ is independent of g'_{nt} given $r_{nt}=1$, and it is independent of (b^1_{nt}, g^1_{nt}) given $r_{nt}=0$. We can then write $W^1(s_{nt};\theta) = W^{1,g^1_{nt}}(b^1_{nt};\theta)$ and $W^0(s_{nt};\theta) = W^{0,g'_{nt}}(\theta)$, where

$$\begin{aligned}
W^{1,g^1_{nt}}(b^1_{nt};\theta) &= (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\left\{\mu_Y + \left[b^1_{nt} + (1-b^1_{nt})\sigma^{g^1_{nt}}(b^1_{nt};\theta)\right]\lambda\right\}\xi_y \\
&+ \delta\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\} + \exp\left\{W_n^{0,g'_{n,t+1}}(\theta)\right\}\right) \,\middle|\, b^1_{nt}, g^1_{nt}, r_{nt}=1;\theta\right]
\end{aligned} \tag{6}$$

and

$$\begin{aligned}
W^{0,g'_{nt}}(\theta) = (\mathbb{1}_{g'_{nt}=F})\xi_g &+ \delta\left\{\mu_Y + \left[\pi^{g'_{nt}} + (1-\pi^{g'_{nt}})\sigma^{g'_{nt}}(\pi^{g'_{nt}};\theta)\right]\lambda\right\}\xi_y \\
&+ \delta\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\} + \exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right) \,\middle|\, g'_{nt}, r_{nt}=0;\theta\right].
\end{aligned} \tag{7}$$

Using again the TIEV distribution of random-utility shocks, the likelihood that the voter reelects the incumbent party ($r_{nt} = 1$) is

$$\begin{aligned}\sigma^w(b^1_{nt}, g^1_{nt}, g'_{nt}; \theta) &= \frac{\exp\left\{y_{nt}\xi_y + W^{1,g^1_{nt}}(b^1_{nt};\theta)\right\}}{\exp\left\{y_{nt}\xi_y + W^{0,g'_{nt}}(\theta)\right\} + \exp\left\{y_{nt}\xi_y + W^{1,g^1_{nt}}(b^1_{nt};\theta)\right\}} \\ &= \frac{\exp\left\{W^{1,g^1_{nt}}(b^1_{nt};\theta)\right\}}{\exp\left\{W^{0,g'_{nt}}(\theta)\right\} + \exp\left\{W^{1,g^1_{nt}}(b^1_{nt};\theta)\right\}}.\end{aligned} \tag{8}$$

This expression makes clear that the voter's choice is made in expectation of future policy outcomes. In Appendix C, we fully characterize the voter's continuation values in (6) and (7).

Incumbent's equilibrium strategy. As noted, we focus on an equilibrium in which the voter's value of reelecting the incumbent, $W^{1,g^1_{nt}}(b^1_{nt};\theta)$, is nondecreasing in b^1_{nt}. This ensures high-type incumbents always exert effort as doing so is costless and improves (at our parameter estimates) beliefs and thus reelection prospects. Let $V^{e,g}$ denote a low-type gender-g incumbent's conditional value function given effort choice $e \in \{0,1\}$, *net of the cost of effort.* At the beginning of period t, the incumbent knows the voter will condition their candidate choice on state $s_{nt} = (b^1_{nt}, g^1_{nt}, g'_{nt})$. Given (b^0_{nt}, g, c_{nt}), and normalizing to zero the payoff from being out of office, the optimal choice for a low-type incumbent of gender g is $e_{nt} = \mathbb{1}_{V^{1,g}(b^0_{nt};\theta) - c_{nt} \geq V^{0,g}(b^0_{nt};\theta)}$, where $V^{e,g}$ satisfies the Bellman condition

$$\begin{aligned}&V^{e,g}(b^0_{nt};\theta) \\ &\quad= \beta + \delta \int_{-\infty}^{\infty} \phi\left(y_{nt}; \mu_y + e\lambda, \varsigma^2_y\right) \sum_{q_{nt}\in\{0,1\}} \frac{1}{2}\mathbb{P}(\eta_{nt} = 1 \,|\, g^0_{nt} = g, \omega^0_{nt} = L, q_{nt}; \alpha) \cdots \\ &\qquad\sum_{g'_{nt}\in\{F,M\}} \left[(q_{nt} + (1-q_{nt})\gamma)\,\mathbb{1}_{g'_{nt}=F} + (1-q_{nt})(1-\gamma)\mathbb{1}_{g'_{nt}=M}\right] \cdots \\ &\qquad\sigma^w(\rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt} = 1, g; \theta), g, g'_{nt}; \theta) \cdots \\ &\qquad\mathbb{E}\left[\max_{\tilde{e}\in\{0,1\}} V^{\tilde{e},g}_n(b^0_{n,t+1};\theta) - \tilde{e}c_{n,t+1} \,\middle|\, b^0_{nt}, g^0_{nt} = g, y_{nt}, q_{nt}, \eta_{nt} = 1, g'_{nt}, r_{nt} = 1; \theta\right] \mathrm{d}y_{nt}.\end{aligned} \tag{9}$$

The first term in (9) is the contemporaneous payoff from being in office. The expectation at the end of (9) captures the incumbent's payoff from making an optimal effort choice in the next period—conditional on remaining in office. To remain in office, the incumbent must secure renomination ($\eta_{nt} = 1$) and reelection ($r_{nt} = 1$), which depend on: the policy outcome, y_{nt}, generated by the incumbent's effort choice, e; the ward's reservation status, q_{nt}; and the challenger's gender, g'_{nt}. These are unknown to the incumbent at the time of their effort choice, so the continuation value in (9) integrates over potential realizations accordingly.

Since effort costs are uniformly distributed, a low-type gender-g incumbent's equilibrium probability of exerting effort is

$$\sigma^g(b^0_{nt};\theta) = \max\left\{0, \min\left\{V^{1,g}(b^0_{nt};\theta) - V^{0,g}(b^0_{nt};\theta), 1\right\}\right\}. \tag{10}$$

If $\lambda \geq 0$ and the voter's value of reelecting the incumbent is nondecreasing in beliefs (as in our parameter estimates), then $V^{1,g} \geq V^{0,g}$. This implies that high types always exert effort, and we simply have

$$\sigma^g(b^0_{nt};\theta) = \min\left\{V^{1,g}(b^0_{nt};\theta) - V^{0,g}(b^0_{nt};\theta), 1\right\}.$$

In Appendix C, we fully characterize the incumbent's continuation values.

3.2 Empirical Strategy

We estimate our model via maximum likelihood (MLE) following the Mathematical Programming with Equilibrium Constraints (MPEC) approach of Su and Judd (2012). We derive next an augmented likelihood of the data, treating incumbents' and voters' conditional value functions as auxiliary parameters. The MPEC-MLE approach then imposes the Bellman optimality conditions (6), (7), and (9) as explicit constraints on the maximum likelihood program. A considerable challenge, however, is that $W^{1,g}$ and $V^{e,g}$ are infinite-dimensional unknowns as they depend on a continuous state variable (the voter's beliefs). We follow Jia Barwick and Pathak (2015) and implement sieve approximations of these conditional value functions. Specifically, we use B-splines since they facilitate imposing/verifying monotonicity of $W^{1,g}$. Let $W^{1,g}(\cdot;\zeta^g_W)$ and $V^{e,g}(\cdot;\zeta^{e,g}_V)$ denote B-spline approximations of $W^{1,g}$ and $V^{e,g}$, respectively, with coefficients $\zeta = (\zeta^g_W, \zeta^{0,g}_V, \zeta^{1,g}_V)_{g\in\{F,M\}}$. In our main specification, we employ quadratic

B-splines with four interior (uniform) knots in $[0,1]$, the beliefs space.[21] We show below that our results are robust to alternative B-splines.

Data and likelihood. To pin down voters' initial beliefs over incumbents' types, and thus deal with the classic "initial conditions" problem in dynamic nonlinear models (Heckman, 1981), we restrict our sample to incumbents with no previous experience as a municipal councilor prior to our first observation of their performance in office. We now identify index n with an individual councilor, whom we observe from their first period in office, $t=1$, to their last, $t=T_n \leq 3$. This last period is determined by one of the following: (i) the incumbent does not secure renomination or reelection, (ii) the incumbent is replaced or challenged by a candidate with previous experience as a councilor, or (iii) the end of our sample period. In the case of (ii), since we need to pin down voters' beliefs over all candidates' types, we drop from our sample elections and subsequent histories featuring candidates—other than the sitting incumbent—with previous experience as a councilor. Overall, we lose about 30% of the original sample.

Let $Z_n^\tau = \{Z_{nt}\}_{t=1}^\tau$ collect the data concerning councilor n up to period τ, where

$$Z_{nt} = (y_{nt}, q_{nt}, \eta_{nt}, g_{nt}^1, g_{nt}', r_{nt}, g_{n,t+1}^0).$$

At time $t=1$, we also observe the gender of the councilor, g_{n1}^0, and we have $\omega_{n1}^0 = H$ with probability $\pi^{g_{n1}^0}$ (from both the voter's and researcher's perspectives). At time $t=T_n$, we have one of the following: (i) $Z_{nT_n} = (y_{nT_n}, q_{nT_n}, \eta_{nT_n}, g_{nT_n}^1, g_{nT_n}', r_{nT_n}, g_{n,T_n+1}^0)$ if both candidates are inexperienced and the sitting incumbent is not renominated or reelected, (ii) $Z_{nT_n} = (y_{nT_n}, q_{nT_n}, \eta_{nT_n})$ if the incumbent is replaced or challenged by a candidate with previous experience as a councilor, or (iii) $Z_{nT_n} = (y_{nT_n})$ for the 2017–2022 cycle due to the indefinite postponement of the 2022 election. In what follows, to simplify exposition, we derive the likelihood of the data considering case (i) only. But the likelihood can be easily adjusted to

[21] We augment the interior knots to ensure the approximation is smooth (twice continuously differentiable). This results in seven coefficients to be estimated for each conditional value function.

accommodate the other two cases by trimming the contributions of missing components of the last-period history.

With a slight abuse of notation—using $\mathcal{L}$ to denote arbitrary densities of the data, and letting $Z_n^0 = (g_{n1}^0)$—the (conditional) likelihood of the data can be written as

$$\mathcal{L}\big(\{Z_n^{T_n}\}_{n=1}^N \,\big|\, \{Z_n^0\}_{n=1}^N; \tilde{\theta}\big) = \prod_{n=1}^{N} \prod_{t=1}^{T_n} \mathcal{L}(Z_{nt} \,|\, Z_n^{t-1}; \tilde{\theta}),$$

where $\tilde{\theta} = (\theta, W^{0,F}, W^{0,M}, \zeta)$ denotes the model parameters, θ, augmented with the auxiliary parameters of the incumbent's and voter's conditional value functions. Given history Z_n^{t-1}, let $b_{nt}^0 = b_{nt}^0(Z_n^{t-1}; \tilde{\theta})$ denote the voter's belief at the beginning of period t that councilor n is a high type. If $t = 1$, we simply have $b_{n1}^0 = \pi^{g_{n1}^0}$. Otherwise, the belief is obtained by recursive application of Bayesian update (3). The likelihood of the data generated in period t, Z_{nt}, is then given by

$$\begin{aligned}
\mathcal{L}(Z_{nt} \,|\, Z_n^{t-1}; \tilde{\theta}) &= \mathcal{L}(Z_{nt} \,|\, b_{nt}^0, g_{nt}^0; \tilde{\theta}) \\
&= \mathcal{L}(y_{nt}, q_{nt}, \eta_{nt}, g_{nt}^1, g_{nt}', r_{nt}, g_{n,t+1}^0 \,|\, b_{nt}^0, g_{nt}^0; \tilde{\theta}) \\
&= \mathcal{L}(g_{n,t+1}^0 \,|\, b_{nt}^0, g_{nt}^0, y_{nt}, q_{nt}, \eta_{nt}, g_{nt}^1, g_{nt}', r_{nt}; \tilde{\theta}) \cdots \\
&\quad \mathcal{L}(r_{nt} \,|\, b_{nt}^0, g_{nt}^0, y_{nt}, q_{nt}, \eta_{nt}, g_{nt}^1, g_{nt}'; \tilde{\theta}) \cdots \\
&\quad \mathcal{L}(g_{nt}' \,|\, b_{nt}^0, g_{nt}^0, y_{nt}, q_{nt}, \eta_{nt}, g_{nt}^1; \tilde{\theta}) \cdots \\
&\quad \mathcal{L}(g_{nt}^1 \,|\, b_{nt}^0, g_{nt}^0, y_{nt}, q_{nt}, \eta_{nt}; \tilde{\theta}) \cdots \\
&\quad \mathcal{L}(\eta_{nt} \,|\, b_{nt}^0, g_{nt}^0, y_{nt}, q_{nt}; \tilde{\theta}) \cdots \\
&\quad \mathcal{L}(q_{nt} \,|\, b_{nt}^0, g_{nt}^0, y_{nt}; \tilde{\theta}) \cdots \\
&\quad \mathcal{L}(y_{nt} \,|\, b_{nt}^0, g_{nt}^0; \tilde{\theta}).
\end{aligned}$$

We consider each factor in turn:

- The gender of the incumbent in period $t+1$ is deterministic conditional on $(g_{nt}^1, g_{nt}', r_{nt})$:

$$\mathcal{L}(g^0_{n,t+1} \mid b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt}, g'_{nt}, r_{nt}; \tilde{\theta}) = \mathcal{L}(g^0_{n,t+1} \mid g^1_{nt}, g'_{nt}, r_{nt})$$
$$= r_{nt} \mathbb{1}_{g^0_{n,t+1} = g^1_{nt}} + (1 - r_{nt}) \mathbb{1}_{g^0_{n,t+1} = g'_{nt}}.$$

- The likelihood of the period-t election outcome is

$$\mathcal{L}(r_{nt} \mid b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt}, g'_{nt}; \tilde{\theta})$$
$$= \sigma^w(\rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt}; \tilde{\theta}), g^1_{nt}, g'_{nt}; \tilde{\theta})^{r_{nt}} \left[1 - \sigma^w(\rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt}; \tilde{\theta}), g^1_{nt}, g'_{nt}; \tilde{\theta})\right]^{1-r_{nt}},$$

  where the voter's equilibrium strategy, σ^w, is defined by (8), and the voter's belief update, $\rho^{y,\eta}$, is defined by (3).

- The gender of the challenger depends only on the ward's reservation status and the probability of a female-candidate nomination in an unreserved ward:

$$\mathcal{L}(g'_{nt} \mid b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt}; \tilde{\theta}) = \mathcal{L}(g'_{nt} \mid q_{nt}; \tilde{\theta})$$
$$= (q_{nt} + (1 - q_{nt})\gamma)\, \mathbb{1}_{g'_{nt} = F} + (1 - q_{nt})(1 - \gamma) \mathbb{1}_{g'_{nt} = M}.$$

- The incumbent-party candidate's gender additionally depends on the party's renomination decision:

$$\mathcal{L}(g^1_{nt} \mid b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}; \tilde{\theta})$$
$$= \mathcal{L}(g^1_{nt} \mid g^0_{nt}, q_{nt}, \eta_{nt}; \tilde{\theta})$$
$$= \eta_{nt} \mathbb{1}_{g^1_{nt} = g^0_{nt}} + (1 - \eta_{nt}) \left[(q_{nt} + (1 - q_{nt})\gamma)\, \mathbb{1}_{g^1_{nt} = F} + (1 - q_{nt})(1 - \gamma) \mathbb{1}_{g^1_{nt} = M}\right].$$

- The incumbent party's renomination strategy conditions on the sitting councilor's type. By iterating expectations, we have

$$\mathcal{L}(\eta_{nt} \mid b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}; \tilde{\theta})$$
$$= \mathbb{E}\left[\mathcal{L}(\eta_{nt} \mid b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}, \omega^0_{nt}; \tilde{\theta}) \,\middle|\, b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}; \tilde{\theta}\right]$$
$$= q_{nt} \mathbb{1}_{g^0_{nt} = M} (1 - \eta_{nt})$$
$$+ (1 - q_{nt} + q_{nt} \mathbb{1}_{g^0_{nt} = F}) \left[\frac{\rho^y(g^0_{nt}, b^0_{nt}, y_{nt}; \tilde{\theta}) \exp\left\{\alpha_0 + \mathbb{1}_{g^0_{nt} = F} \left[(1 - q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right] + \alpha_\omega\right\}^{\eta_{nt}}}{1 + \exp\left\{\alpha_0 + \mathbb{1}_{g^0_{nt} = F} \left[(1 - q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right] + \alpha_\omega\right\}} \right.$$
$$\left. + \frac{\left[1 - \rho^y(g^0_{nt}, b^0_{nt}, y_{nt}; \tilde{\theta})\right] \exp\left\{\alpha_0 + \mathbb{1}_{g^0_{nt} = F} \left[(1 - q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right]\right\}^{\eta_{nt}}}{1 + \exp\left\{\alpha_0 + \mathbb{1}_{g^0_{nt} = F} \left[(1 - q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right]\right\}} \right].$$

If the ward is unreserved or the councilor is a woman, then $1 - q_{nt} + q_{nt}\mathbb{1}_{g^0_{nt}=F} = 1$, and the terms in square brackets correspond to the expected probability of observing η_{nt}—given the party's renomination strategy defined by (1)—using the observed policy outcome, y_{nt}, to update on the likelihood that the councilor is a high type. This update, ρ^y, is defined by (5). On the other hand, if the ward is reserved and the councilor is a man, then $q_{nt}\mathbb{1}_{g^0_{nt}=M} = 1$, and the councilor is not renominated with probability one.

- The ward's reservation status is determined by lottery: $\mathcal{L}(q_{nt} \,|\, b^0_{nt}, g^0_{nt}, y_{nt}; \tilde{\theta}) = \frac{1}{2}$.

- Finally, the density of the observed policy outcome is given by

$$\mathcal{L}(y_{nt} \,|\, b^0_{nt}, g^0_{nt}; \tilde{\theta}) = b^0_{nt}\phi\left(y_{nt}; \mu_y + \lambda, \varsigma^2_y\right) + (1 - b^0_{nt})d^{g^0_{nt}}(y_{nt}|b^0_{nt}; \tilde{\theta}),$$

where $d^{g^0_{nt}}$ is defined by (4) given a low-type incumbent's equilibrium effort strategy, which in turn is defined by (10).

Identification. Inspection of the likelihood provides intuition regarding the primary sources of variation in the data that identify the model parameters. For related results and discussion, see Crawford and Shum (2005), Aguirregabiria and Mira (2007), and Jia Barwick and Pathak (2015). Parameters $(\mu_y, \lambda, \varsigma_y)$ are primarily identified from the (Normal) finite mixture distribution of observed policy outcomes in $\mathcal{L}(y_{nt} \,|\, b^0_{nt}, g^0_{nt}; \tilde{\theta})$. Furthermore, since $b^0_{n1} = \pi^{g^0_{nt}}$, $\mathcal{L}(y_{n1} \,|\, b^0_{n1}, g^0_{n1}; \tilde{\theta})$ also helps identify the voter's priors, (π^F, π^M). Parameters $(\alpha_0, \alpha^0_g, \alpha^1_g, \alpha_\omega)$ are then identified from parties' observed renomination decisions given $\mathcal{L}(\eta_{nt} \,|\, b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}; \tilde{\theta})$. The prevalence of female candidates in unreserved constituencies, γ, is directly observed. Office benefit β drives a low-type incumbent's effort choice given (9) and (10). This in turn affects observed policy outcomes and belief updates ρ^y and $\rho^{y,\eta}$. Lastly, man-versus-woman election outcomes identify the voter's taste-based gender preference, ξ_g, and election outcomes in general identify the value of policy outcomes for the voter, ξ_y, given (6), (7), and (8).

Estimation. Let $\Phi^{W^{1,g}}(b^1_{nt};\tilde{\theta})$ and $\Phi^{W^{0,g}}(\tilde{\theta})$ denote the right-hand sides of Bellman conditions (6) and (7), respectively. Similarly, let $\Phi^{V^{e,g}}(b^0_{nt};\tilde{\theta})$ denote the right-hand side of (9). Following Jia Barwick and Pathak (2015), since players' conditional value functions are approximated using B-splines, we implement the equilibrium constraints of the model by minimizing squared violations of the Bellman conditions. Specifically, our MPEC-MLE estimator of θ is defined by

$$\max_{\theta,W^0,\zeta} \log \mathcal{L}\big(\{Z_n^{T_n}\}_{n=1}^N \,\big|\, \{Z_n^0\}_{n=1}^N;\theta,W^0,\zeta\big) \ \text{ subject to}$$

$$(W^0,\zeta) \in \operatorname*{arg\,min}_{\tilde{W}^0,\tilde{\zeta}} \sum_{g\in F,M} \int_0^1 \Bigg\{ \Big[\tilde{W}^{0,g} - \Phi^{W^{0,g}}(\theta,\tilde{W}^0,\tilde{\zeta})\Big]^2 + \Big[W^{1,g}(b;\tilde{\zeta}^g_W) - \Phi^{W^{1,g}}(b;\theta,\tilde{W}^0,\tilde{\zeta})\Big]^2 + \sum_{e\in\{0,1\}} \Big[V^{e,g}(b;\tilde{\zeta}^{e,g}_V) - \Phi^{V^{e,g}}(b;\theta,\tilde{W}^0,\tilde{\zeta})\Big]^2 \Bigg\} \mathrm{d}Q(b), \tag{11}$$

where $W^0 = (W^{0,F}, W^{0,M})$, and Q is a probability measure over $[0,1]$. Monotonicity of $W^{1,g}$ can be imposed by constraining the B-spline coefficients ζ^g_W to be nondecreasing, but this constraint is not binding at our parameter estimates.

To treat all possible belief realizations symmetrically, we set $Q \sim U[0,1]$, and we rely on sparse-grid integration as implemented by Heiss and Winschel (2008) to compute all integrals in the model. Consistency and asymptotic normality of our estimator are guaranteed by Kristensen et al.'s (2021) results for sieve maximum likelihood estimation. We calculate standard errors using a nonparametric bootstrap procedure (in N, resampling incumbents' entire histories).

Computationally, we implement the equilibrium constraint in (11) by replacing it with the corresponding first-order conditions of the Bellman least-squares problem. Thus, the augmented log-likelihood of the data is maximized subject to a square system of nonlinear equations in (W^0,ζ). The second-order conditions of the equilibrium constraint are verified ex post. See Appendix D for technical details.

4 Estimation Results

Table 5 presents our parameter estimates. Column (I) reports results from our preferred specification, which has three distinguishing features. First, we set the incumbent and voter's discount factor to $\delta = 0.95$. Second, as noted above, we employ quadratic B-splines with four interior (uniform) knots to approximate the incumbent's and voter's conditional value functions. Third, if an incumbent in the data switches constituency (only 6% of incumbents do so), we treat this as the incumbent having been renominated, and we append the new constituency's subsequent history to the incumbent's original history.[22] In other words, $Z_n^{T_n}$ follows incumbent n wherever they go. Our results are robust to all of these features as discussed below. In Appendix F, we also show our model fits the data well and validate it against alternative (reduced-form) approaches.

Does incumbent effort—and hence politicians' type—matter? We find that it does: λ is positive and statistically significant. As in Table 1, councilors' observed performance scores are standardized. We then estimate a baseline policy-outcome mean, with *no* effort, of $\hat{\mu}_y = -0.313$ (0.150). The estimated effect of effort is $\hat{\lambda} = 0.369$ (0.198). Thus, exerting effort increases expected policy outcomes by over 100%. Alternatively, given $\hat{\varsigma}_y = 0.989$ (0.040), effort can be viewed as raising expected policy outcomes by almost 40% of a standard deviation.

Are women better politicians? In terms of their prior probability of being a high type who always works hard for their constituents, we find that, indeed, women are of higher quality. For a female politician, $\hat{\pi}^F \approx 1.000$ (0.146), whereas $\hat{\pi}^M = 0.526$ (0.133) for a male politician. The difference is statistically significant, with $\hat{\pi}^F - \hat{\pi}^M = 0.474$ (0.183). This is consistent with related work showing women in BMC elections tend to be younger, better educated, and less susceptible to criminality (Karekurve-Ramachandra and Lee, 2023, Table A.3), descriptive traits that are typically associated with candidate quality.

Do parties discriminate against women? They do, both in the nomination of new can-

[22] Most constituency switching takes place within the same administrative ward.

Table 5: Parameter Estimates

	(I)	(II)	(III)	(IV)	(V)
π^F (Voter Prior: Female)	1.000***	1.000***	1.000***	1.000***	1.000***
	(0.146)	(0.358)	(0.121)	(0.335)	(0.308)
π^M (Voter Prior: Male)	0.526***	0.515**	0.514***	0.494**	0.429**
	(0.133)	(0.240)	(0.118)	(0.220)	(0.211)
α_0 (Renomination: Low-Type Male)	-1.623*	-1.594	-1.574**	-1.518	-1.490
	(0.907)	(1.819)	(0.797)	(1.707)	(2.335)
α_g^0 (Renom'n: Female, Unreserved Ward)	-2.626***	-2.677	-2.673***	-2.763	-2.110
	(0.840)	(1.985)	(0.724)	(2.314)	(2.019)
α_g^1 (Renom'n: Female, Reserved Ward)	-1.586*	-1.637	-1.633**	-1.723	-1.109
	(0.869)	(2.035)	(0.758)	(2.418)	(2.120)
α_ω (Renomination: High Type)	2.970**	2.992	2.969***	3.003	2.239
	(1.338)	(2.613)	(1.082)	(2.642)	(3.169)
β (Office Benefit)	9.299	8.600	4.468	2.593	8.782
	(7.615)	(7.779)	(9.626)	(6.779)	(5.474)
γ (Female Nomination, Unreserved Ward)	0.068***	0.068***	0.068***	0.068***	0.061
	(0.020)	(0.021)	(0.021)	(0.022)	(0.039)
λ (Effect of Effort)	0.369*	0.364	0.363***	0.352	0.303
	(0.198)	(0.706)	(0.136)	(0.560)	(0.445)
μ_y (Policy-Outcome Mean, No Effort)	-0.313**	-0.307	-0.306**	-0.294	-0.243
	(0.150)	(0.422)	(0.122)	(0.301)	(0.256)
ς_y (Policy-Outcome St. Dev.)	0.989***	0.989***	0.989***	0.989***	0.995***
	(0.040)	(0.068)	(0.042)	(0.065)	(0.108)
ξ_y (Voter: Value of Policy)	9.831***	9.790***	9.797***	9.782**	10.489**
	(2.841)	(3.748)	(3.320)	(3.888)	(4.200)
ξ_g (Voter: Expressive Gender Preference)	-1.296**	-1.303**	-1.311***	-1.328**	-1.271*
	(0.577)	(0.581)	(0.495)	(0.611)	(0.682)
Observations	1,091	1,091	1,091	1,091	1,070
Log-Likelihood	-1,090	-1,090	-1,090	-1,090	-1,059
Total Sq. Bellman Violation	2.4×10^{-6}	3.9×10^{-7}	1.8×10^{-6}	9.1×10^{-8}	9.0×10^{-7}

Notes. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Bootstrapped standard errors are shown in parentheses. In all specifications, $\delta = 0.95$. Columns (I)–(IV) present results using the full sample wherein we follow incumbents if they switch constituencies. Column (V) uses an alternative sample wherein, if an incumbent switches constituency, we treat them as not having been renominated and drop their subsequent history. Column (I) corresponds to our preferred specification using quadratic B-splines with four interior (uniform) knots. Column (V) similarly uses quadratic B-splines with four knots. Column (II) uses cubic B-splines with four knots. Columns (III) and (IV) use quadratic B-splines with two and six interior (uniform) knots, respectively. The total number of observations includes observed policy outcomes, y_{nt}; observed renomination decisions, η_{nt}; and observed election outcomes, r_{nt}. There are $N = 472$ individual councilors in both samples.

didates in unreserved wards (including challengers) and in the renomination of sitting incumbents. As previewed in Table 2, the probability of a female-candidate nomination in an unreserved ward is only $\hat{\gamma} = 0.068$ (0.020). Our parameter estimates of parties' equilibrium renomination strategy are: $\hat{\alpha}_0 = -1.623$ (0.907), $\hat{\alpha}_g^0 = -2.626$ (0.840), $\hat{\alpha}_g^1 = -1.586$ (0.869), and $\hat{\alpha}_\omega = 2.970$ (1.338). Parties do condition on quality, renominating high-type incumbents at significantly higher rates. This gives voters a strong signal of quality, as suggested by Tables 3 and 4. However, all else equal, parties are less likely to renominate female incumbents, particularly if their ward is unreserved. The renomination rates implied by our estimates are summarized in Table 6. Although we do not have data to adequately characterize parties' recruiting constraints and objectives, we discuss below potential motivations and how might parties adjust their behavior in counterfactual scenarios.

Table 6: Equilibrium Incumbent Renomination Rates

	Low Type	High Type
Male (Unreserved Ward)	16.5%	79.4%
Female (Reserved Ward)	3.9%	44.1%
Female (Unreserved Ward)	1.4%	21.8%

Notes. Probabilities are computed using parties' equilibrium renomination strategy defined by (1) and parameter estimates from column (I) of Table 5.

For the value of holding office, we estimate $\hat{\beta} = 9.299$ (7.615). This estimate is imprecise as we observe short histories of councilors' tenure ($T_n \leq 3$). Yet being a BMC councilor appears to be fairly valuable, especially relative to the cost of effort for a low-type incumbent, which is normalized to $c_{nt} \in [0, 1]$.

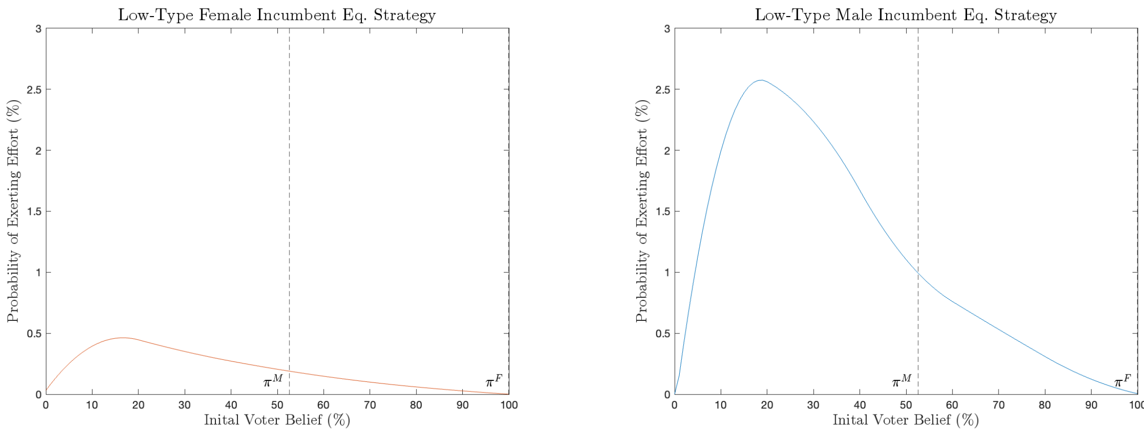
Finally, do voters discriminate against women? The value of policy outcomes for voters is considerably high, with $\hat{\xi}_y = 9.831$ (2.841). This is relative to the (normalized) unit scale of idiosyncratic factors, $(\epsilon_{nt}^0, \epsilon_{nt}^1)$, affecting election choices that are unrelated to candidate gender or policy. But, all else equal, voters in Mumbai significantly dislike female candidates, with $\hat{\xi}_g = -1.296$ (0.577). The implications of these estimates for equilibrium reelection behavior depend on incumbents' equilibrium effort choices and voters' corresponding expectations about future policy outcomes. Before disentangling this, we briefly discuss robustness of our parameter estimates to alternative specifications.

As noted, our preferred specification in column (I) of Table 5 uses quadratic B-splines with four interior (uniform) knots to approximate conditional value functions. Columns (II)–(IV) consider alternative B-splines: column (II) uses cubic B-splines with four knots, column (III) uses quadratic B-splines with two (uniform) knots, and column (IV) uses quadratic B-splines with six (uniform) knots. While point estimates are consistently in agreement, columns (II)–(IV) show that they become less precise as the flexibility of the B-splines increases (in degree or number of basis functions). We consider column (I) a good compromise between precision and flexibility. For columns (I)–(IV), we use our full sample wherein we follow incumbents if they switch constituencies. This includes cases (less than 3%) of strategic evasion of reservations that our model ignores—i.e., male incumbents who would not have been able to run for reelection due to their original ward being reserved. In column (V), we use an alternative sample wherein, if an incumbent switches constituency (for any reason), we treat them as not having been renominated and drop their subsequent history. Results are virtually identical though less precise.[23]

Using our preferred specification in column (I), we now examine equilibrium behavior by incumbents and voters. Figure 1 plots $\sigma^g(b^0_{nt}; \hat{\theta})$, a low-type gender-$g$ incumbent's equilibrium effort strategy as a function of the voter's initial belief about their type. For both male and female incumbents, effort rates are extremely low—lower than 2.6% for men and 0.5% for women. This is due to the scant likelihood of being renominated, which hinders a low-type incumbent's ability to reap the reelection benefits of effort. According to Table 6, a low-type female councilor faces a 2.7% = (50%)(1.4%) + (50%)(3.9%) expected probability of being renominated. By contrast, a low-type male councilor has an 8.3% = (50%)(16.5%) + (50%)(0%) expected probability of being renominated. Thus, conditional on the same voter belief, male councilors exert more effort in equilibrium.

[23] In Appendix F, we conduct a number of additional checks, including robustness to alternative measures of incumbent performance, to accounting for ethnic reservations, and to the choice of discount factor.

Figure 1: Equilibrium Incumbent Effort Strategies

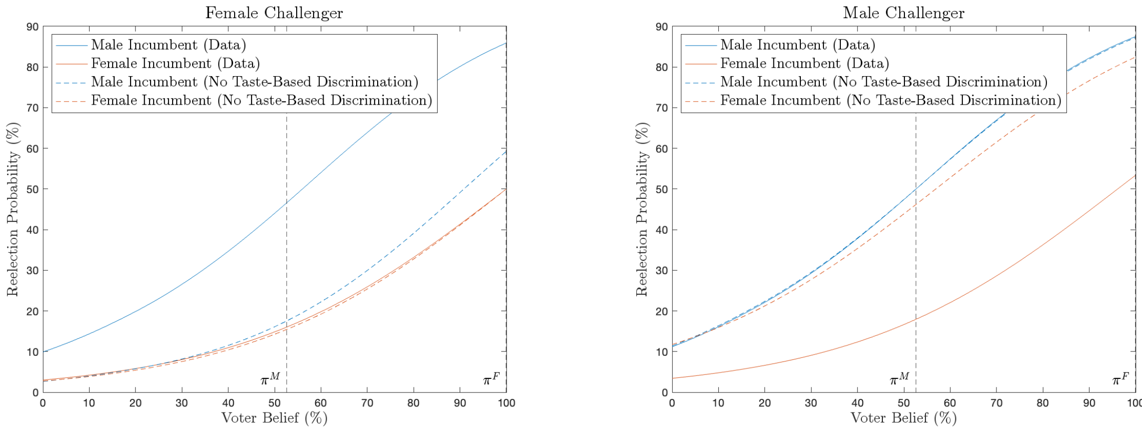


Notes. Probabilities are computed using incumbent's equilibrium strategy defined by (10) and parameter estimates from column (I) of Table 5. Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type.

Figure 2 plots $\sigma^w(b^1_{nt}, g^1_{nt}, g'_{nt}; \hat{\theta})$, the voter's reelection strategy as a function of candidates' gender and the voter's belief at the time of the election that the incumbent-party candidate is a high type. The left (right) panel corresponds to the case where the challenger is female (male). Reelection probabilities for female (male) incumbent-party candidates are shown in solid orange (solid blue). There are two main takeaways. First, incumbent-party candidates, of both genders, fare worse against female challengers. This is unsurprising given that the voter values good policy outcomes, and female challengers are twice as likely as males to be high types. Yet, all else equal, the voter is considerably more likely to reelect a male incumbent-party candidate than a woman.

The unfavorable treatment of female incumbents by the voter is due to both statistical and taste factors. Although women are almost-surely high types, Table 6 implies that they have only a $33\% = (50\%)(44.1\%) + (50\%)(21.8\%)$ expected probability of being renominated. A high-type man, on the other hand, has a $39.7\% = (50\%)(79.4\%) + (50\%)(0\%)$ expected probability of being renominated. Thus, all else equal, a male incumbent-party candidate is a better bet for the voter given parties' renomination behavior. Moreover, Table 5 uncovers an expressive distaste for female candidates. To quantify the relative importance of statistical versus taste factors, we conduct the following exercise: we hold the incumbent's and parties'

Figure 2: Equilibrium Reelection Strategies



Notes. Solid-line probabilities are computed using voter's equilibrium strategy defined by (8) and parameter estimates from column (I) of Table 5. Dashed-line probabilities are computed setting $\xi_g = 0$ and letting the voter best respond to the incumbent's and parties' equilibrium strategies in Figure 1 and Table 6. Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type.

equilibrium strategies fixed and then compute the voter's best response in a setting with no expressive discrimination ($\xi_g = 0$).[24] Figure 2 shows the resulting reelection rates in dashed orange (dashed blue) for female (male) incumbents. Absent expressive discrimination, although male incumbents would still be reelected at higher rates, all else equal, than women, the gender gap would almost disappear, and the advantage of female challengers (left panel) relative to male challengers (right panel) would increase sharply. This reveals that taste-based gender discrimination looms large in Indian local elections.

5 Counterfactual Gender Quota Systems

Our results in the previous section show that the superior performance of female municipal councilors in Mumbai is due to the selection channel of electoral accountability: there is little scope for the discipline channel—as both female and male low-type incumbents exert virtually no effort due to parties' renomination screening—and female politicians are twice as likely as males to be high types who always work hard for their constituents. This may seem to suggest

[24]Best responses are computed by minimizing squared violations of Bellman conditions (6) and (7), as in (11), using B-spline approximations analogous to those underlying column (I) of Table 5.

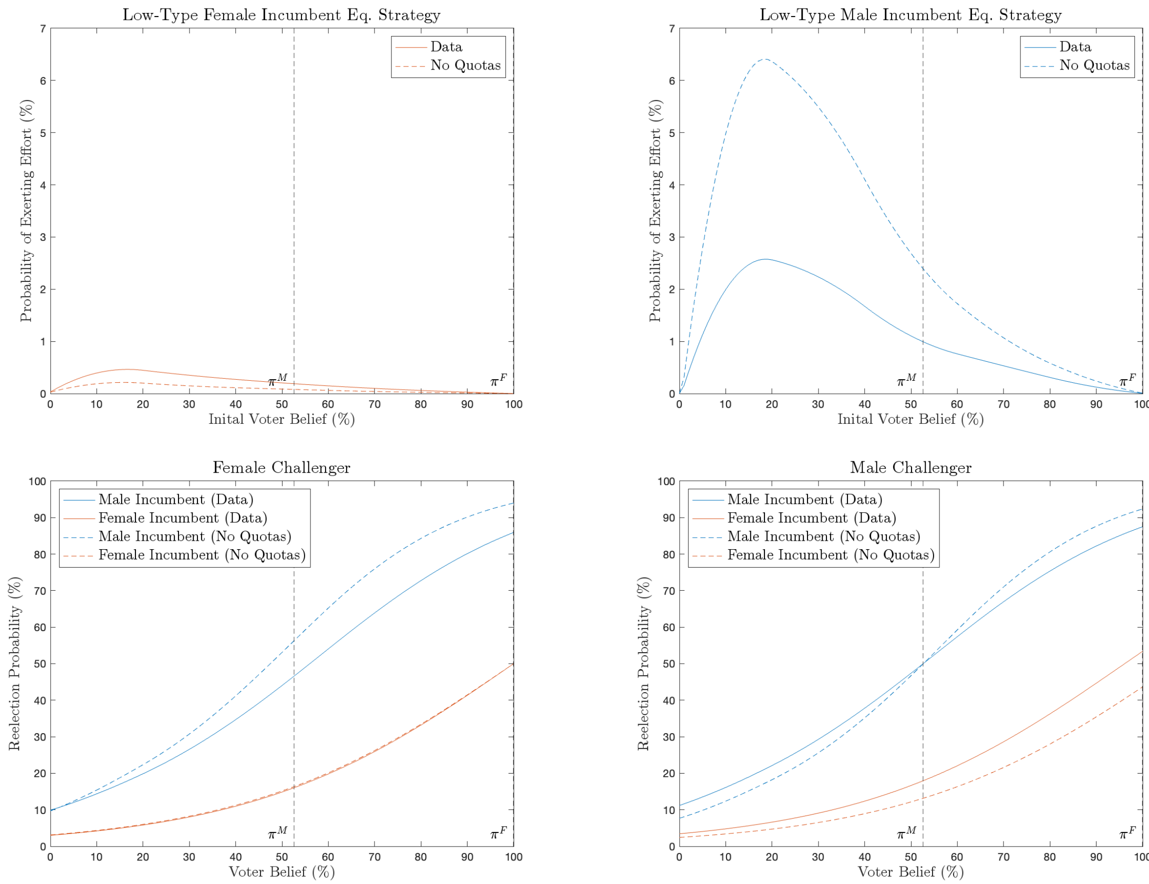
that Mumbai's random reservations system improves voter welfare by ensuring more women get elected. However, a full accounting of the system's net impact must take into consideration strategic adjustments in the absence of quotas as well as voters' expressive gender preferences.

Net impact of random reservations. To that end, in our first counterfactual experiment, we compute incumbent and voter equilibrium strategies in a setting with no gender quotas, *keeping parties' nomination and renomination behavior fixed*. That is, using our parameter estimates from column (I) of Table 5—in particular, keeping α and γ fixed—we compute an equilibrium of the game played by incumbents and voters wherein $q_{nt} = 0$ (wards are unreserved) with probability one. See Appendix E for computational details.

Figure 3 presents the resulting equilibrium strategies. The top panels show low-type incumbents' effort strategies, and the bottom panels plot reelection rates. For comparison, solid lines reproduce the equilibrium strategies in Figures 1 and 2—with 50% random reservations in place—and dashed lines correspond to the counterfactual strategies with no quotas. Consistent with previous work on the perverse incentives of term limits (e.g., Aruoba, Drazen and Vlaicu, 2019), we find that low-type male incumbents would almost triple their likelihood of exerting effort in the absence of the probabilistic term limit imposed by random reserved-seat quotas. By contrast, low-type women's effort would be cut in half since their renomination rates are lower when wards are unreserved. Yet reelection rates of female incumbent-party candidates against a female challenger would remain unchanged. Male incumbent-party candidates, on the other hand, would fare better against a female challenger in the absence of quotas given their increased effort expenditure. Against a male challenger, female incumbent-party candidates would correspondingly fare worse, and male incumbent-party candidates would face stricter screening by the voter: above-average men ($b^1_{nt} > \pi^M$) would be reelected at higher rates, whereas below-average men ($b^1_{nt} < \pi^M$) would be reelected at lower rates.

Overall, conditioning on parties' observed discrimination against women, we find that random reservations have countervailing selection and discipline effects on policy outcomes: they ensure more women get elected—who are of higher quality—but they degrade discipline

Figure 3: Counterfactual Equilibrium Strategies: No Quotas, Party Behavior Fixed

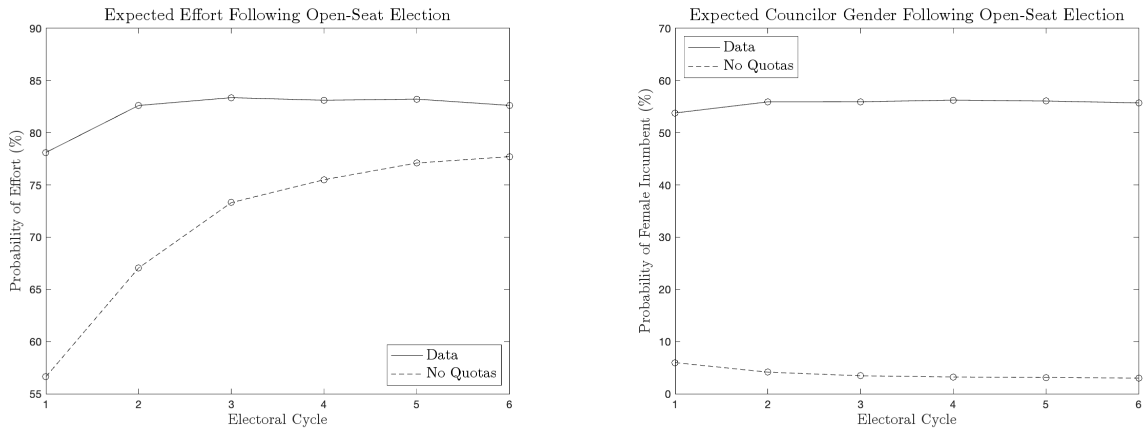


Notes. The top and bottom panels, respectively, are analogous to Figures 1 and 2. Solid-line probabilities reproduce equilibrium strategies in the data, with 50% random reservations in place. Dashed-line probabilities correspond to counterfactual strategies with no gender quotas. Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type. All panels use parameter estimates from column (I) of Table 5, keeping parties' nomination (γ) and renomination (α) behavior fixed in the absence of quotas.

by sharply discouraging low-type men from exerting effort. To quantify the net effect on policy outcomes, we conduct the following exercise. Using observed and counterfactual equilibrium strategies, we simulate six electoral cycles (30 years) following an initial open-seat election between two inexperienced candidates. The left panel of Figure 4 plots expected (given 10,000 simulated histories) effort over time, and the right panel plots expected councilor gender. Solid lines correspond to the equilibrium strategies in the data, with 50% random reservations in place. Dashed lines are computed using counterfactual strategies in the absence of quotas.

Under 50% random reservations, we obtain a first-period expected probability of effort of 78%. Screening by the incumbent party and the voter then ensures expected effort quickly

Figure 4: Counterfactual Effort and Councilor Gender: No Quotas, Party Behavior Fixed



Notes. The left (right) panel plots expected effort (councilor gender) over six electoral cycles following an initial open-seat election. Solid lines correspond to equilibrium strategies in the data, with 50% random reservations in place. Dashed lines correspond to counterfactual strategies with no gender quotas. We plot means from 10,000 simulated histories. Both panels use parameter estimates from column (I) of Table 5, keeping parties' nomination (γ) and renomination (α) behavior fixed in the absence of quotas.

rises—by the second cycle—to 83%. With no gender quotas, the first-period expected probability of effort would be 57%, and effort rates would gradually increase to a long-run average of 78%.[25] Thus, we find that the selection benefit of quotas dominates, and expected policy outcomes are higher with random reservations in place.

The net impact of the random reservations system on voter welfare, however, must also account for expressive gender considerations. Figure 4 shows that, with random reservations, the likelihood of a female incumbent in the first period is 54%, and this slightly increases to 56% by the second cycle. With no quotas, on the other hand, the first-period probability of a female incumbent would be 6%, and the long-run share of female councilors would be 3%. The latter is in fact consistent with the historical share of women in the BMC prior to the introduction of quotas in 1992, which stood at 2% (Barry, Honour and Palnitkar, 2004, p. 153). Given (2), we can calculate long-run, per-cycle expected voter welfare as follows. Under random reservations, we have $\big[0.83(\hat{\mu}_y + \hat{\lambda}) + (1 - 0.83)\hat{\mu}_y\big]\hat{\xi}_y + 0.56\hat{\xi}_g = -0.794$. In the absence of quotas, $\big[0.78(\hat{\mu}_y + \hat{\lambda}) + (1 - 0.78)\hat{\mu}_y\big]\hat{\xi}_y + 0.03\hat{\xi}_g = -0.288$. Thus, despite policy benefits, taste-based considerations dominate—echoing Figure 2—and per-cycle voter welfare

[25] Expected effort and gender rates stabilize from the sixth cycle thereafter.

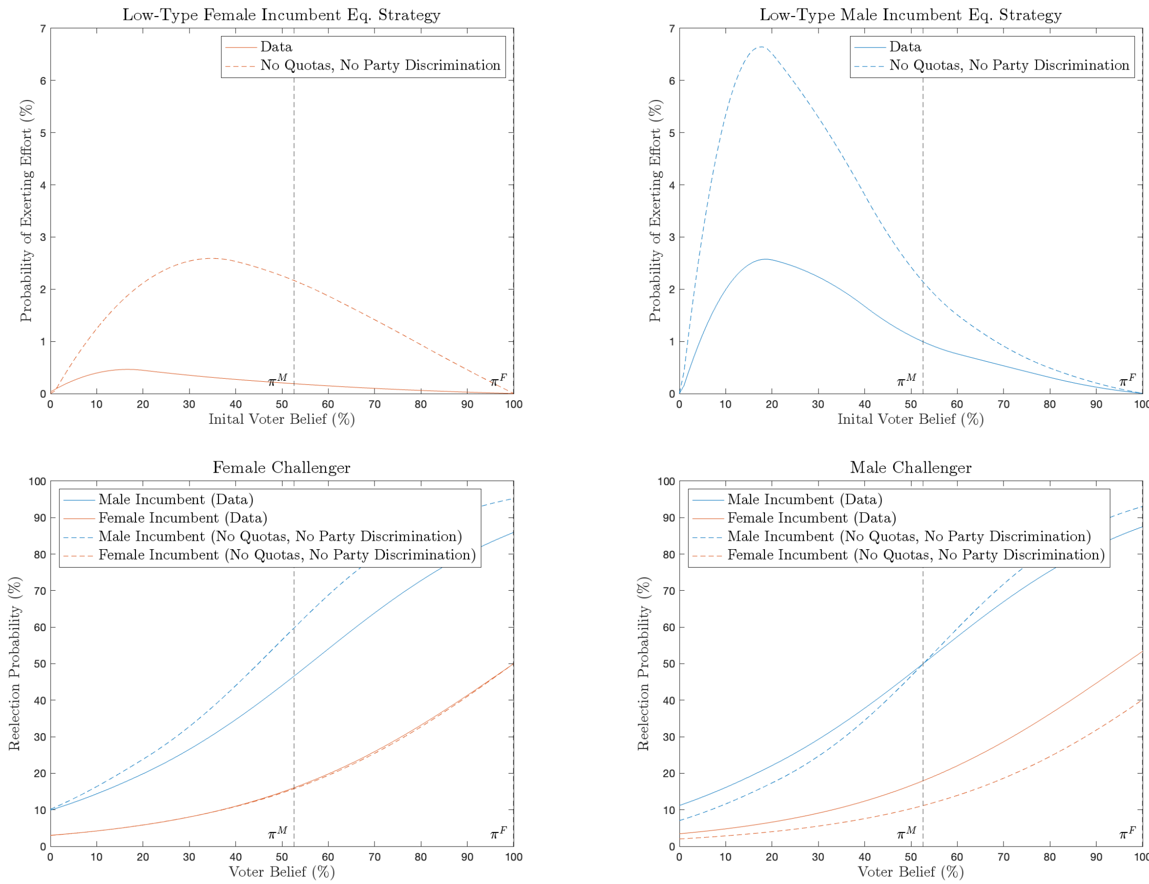
would be 64% higher without gender quotas in place.

The analysis so far conditions on parties' observed nomination and renomination behavior. But what are Indian parties doing, and how might they respond in the absence of quotas? Even though, as noted, the counterfactual share of female councilors in Figure 3 is consistent with the pre-quotas historical average, party attitudes may have changed in the last three decades. Rather than attempting to characterize parties' constraints and objectives, for which we do not have adequate data, we consider next a polar version of our no-quotas counterfactual. Since Mumbai's 50% reserved-seat quotas ensure *at least* half of the BMC is composed of women, it is possible that parties' observed behavior reflects a desire to ensure ex-post gender parity in the council. After all, 56% of incumbents in our sample elected under this system are women. Accordingly, Figure 5 presents an alternative version of our no-quotas counterfactual wherein we set $\gamma = 0.5$ and $\alpha_g^0 = 0$. In other words, we compute incumbent and voter equilibrium strategies in the absence of quotas assuming parties would nominate and renominate politicians of each gender at equal rates.

With regard to effort choices, we find low-type men would similarly triple their likelihood of exerting effort, and low-type women would considerably increase their effort rates as well in light of their improved renomination prospects. Reelection rates, however, would be virtually identical to those in Figure 3. This again reflects the importance of expressive gender considerations for the voter.

As before, we simulate six electoral cycles following an initial open-seat election between two inexperienced candidates. Figure 6 presents expected effort rates and councilor gender analogous to those in Figure 4. If parties were to treat men and women equally in the absence of quotas, the policy benefit of random reservations would disappear: first-period expected effort would be only slightly lower—75% versus 78%—and long-run expected effort would in fact be higher—85% versus 83%. This would result from both higher effort expenditure by low-type incumbents (improved discipline) and mitigation by parties of voter discrimination against high-quality women. Indeed, although the share of female councilors would still de-

Figure 5: Counterfactual Equilibrium: No Quotas, No Party Discrimination

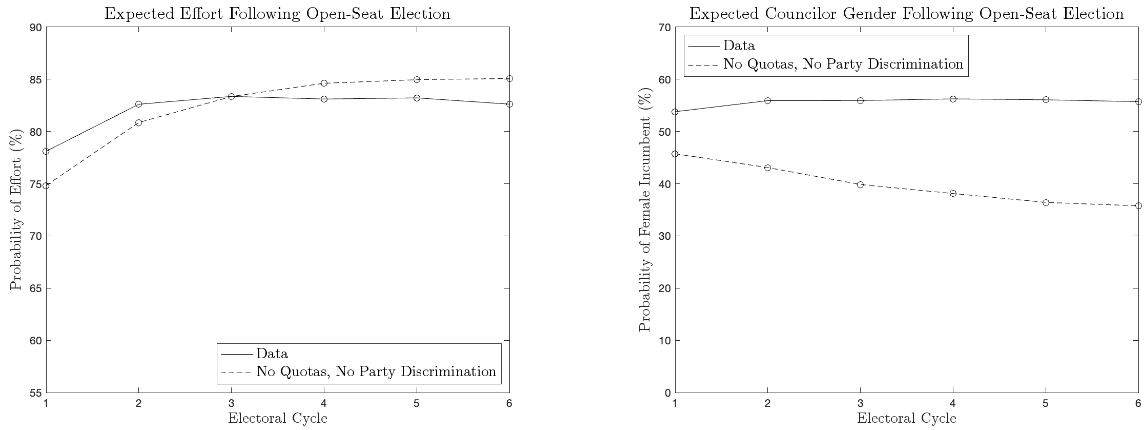


Notes. The top and bottom panels, respectively, are analogous to Figures 1 and 2. Solid-line probabilities reproduce equilibrium strategies in the data, with 50% random reservations in place. Dashed-line probabilities correspond to counterfactual strategies with no gender quotas. Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type. All panels use parameter estimates from column (I) of Table 5, but dashed lines impose equal nomination ($\gamma = 0.5$) and renomination ($\alpha_g^0 = 0$) of men and women in the absence of quotas.

crease without quotas, the long-run share would only drop from 56% to 35%. Expected voter welfare would be $\left[0.78(\hat{\mu}_y + \hat{\lambda}) + (1 - 0.78)\hat{\mu}_y\right]\hat{\xi}_y + 0.03\hat{\xi}_g = -0.288$ per cycle. Thus, in the absence of gender quotas and party discrimination, policy outcomes would marginally improve, and voter welfare would be 43% higher, again due to taste-based considerations.

Rotating reservations. Taking expressive gender preferences at face value, it appears voters in Mumbai would be better off in the absence of gender quotas. We refrain from taking a normative stance on the merits of such an intervention. But we can ask a different in-

Figure 6: Counterfactual Effort and Councilor Gender: No Quotas, No Party Discrimination

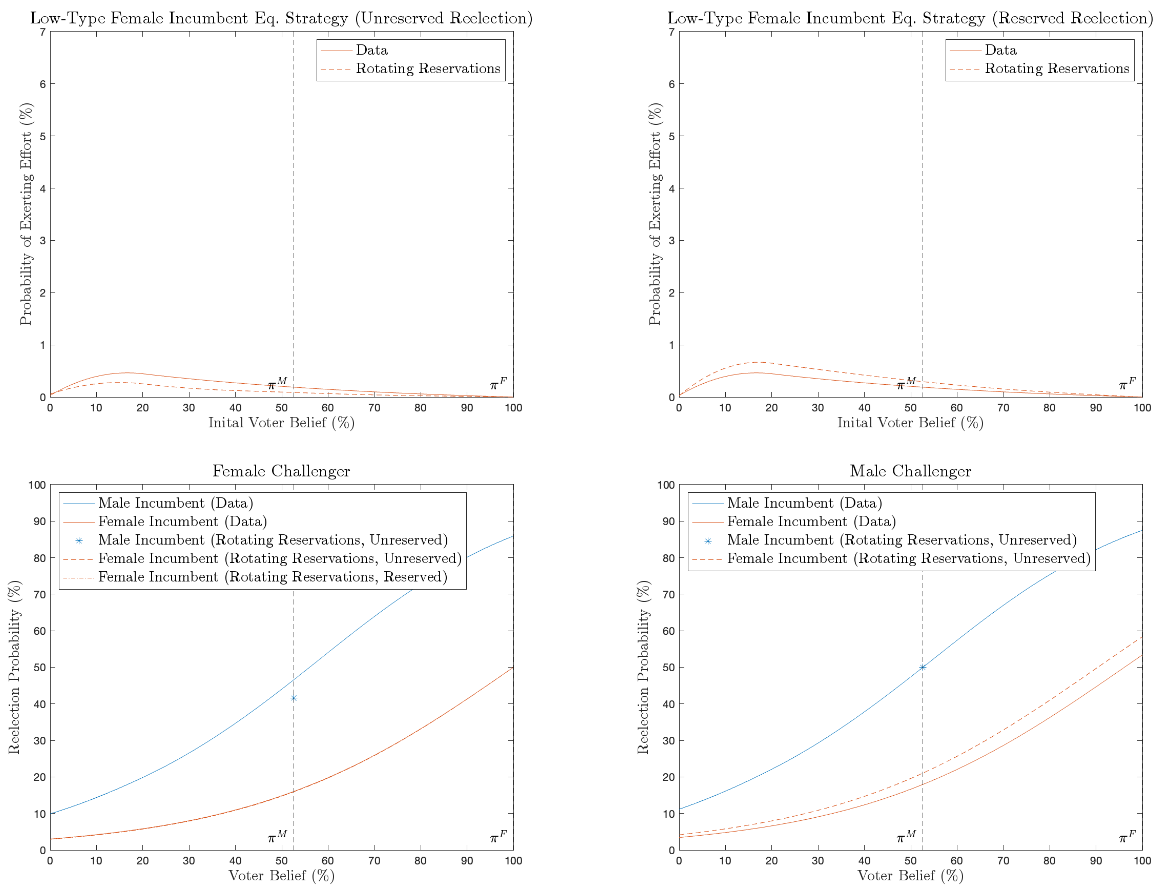


Notes. The left (right) panel plots expected effort (councilor gender) over six electoral cycles following an initial open-seat election. Solid lines correspond to equilibrium strategies in the data, with 50% random reservations in place. Dashed lines correspond to counterfactual strategies with no gender quotas. We plot means from 10,000 simulated histories. Both panels use parameter estimates from column (I) of Table 5, but dashed lines impose equal nomination ($\gamma = 0.5$) and renomination ($\alpha_g^0 = 0$) of men and women in the absence of quotas.

stitutional design question: is there an alternative gender quotas system that could achieve the same descriptive goal but deliver better policy outcomes for voters? First, we compare Mumbai's system with a popular alternative—rotating reservations—wherein a constituency's reservation status would alternate every cycle. In this case, both the incumbent and the voter would condition their choices on q_{nt}, with $q_{n,t+1} = 1 - q_{nt}$. Moreover, low-type male incumbents would exert *no* effort in response to the hard one-term limit imposed by rotating reservations. In this counterfactual, we keep parties' behavior fixed as observed in the data given the descriptive equivalence between random and rotating reservations. See Appendix E for a detailed characterization of the counterfactual equilibrium.

Figure 7 presents the counterfactual strategies. Relative to the equilibrium in the data, a low-type female incumbent facing an unreserved ward at the end of her term would reduce her effort expenditure, echoing Figure 3 in the absence of quotas with party behavior fixed. On the other hand, a low-type woman facing a reserved ward at the end of her term would slightly increase effort given her improved renomination prospects. Against a female challenger, a male incumbent-party candidate would fare worse relative to the data due to being term-limited in the following cycle (note that the voter can no longer update on a man's type under a one-term limit), whereas a female incumbent's reelection prospects would be identical. Against a male challenger, a female incumbent would fare better relative to the data, and a man-versus-man election would simply be a toss-up.

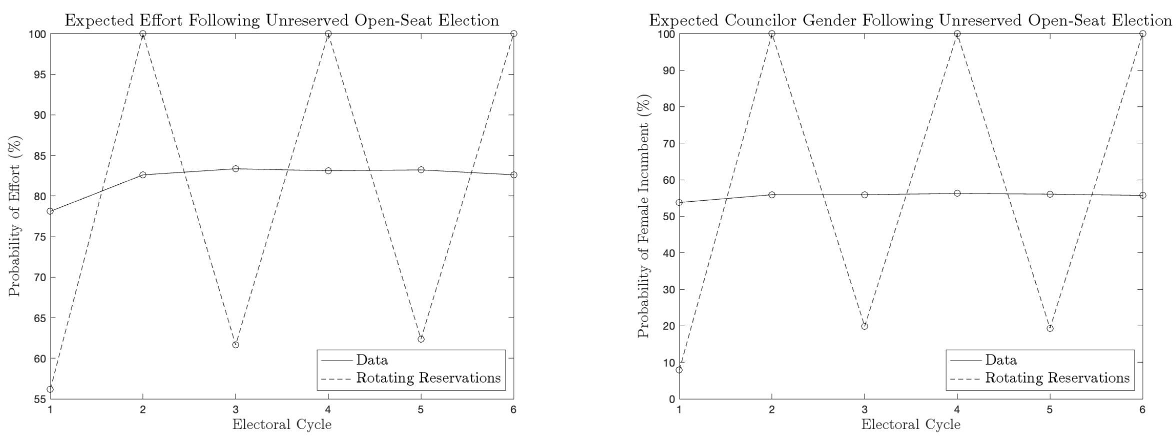
Figure 7: Counterfactual Equilibrium: Rotating Reservations



Notes. The top and bottom panels, respectively, are analogous to Figures 1 and 2. Solid-line probabilities reproduce equilibrium strategies in the data. Dashed-line probabilities correspond to counterfactual strategies under rotating reservations. Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type. All panels use parameter estimates from column (I) of Table 5.

Figure 8 shows expected effort rates and councilor gender analogous to those in Figures 4 and 6. We again simulate six electoral cycles, starting from an *unreserved* open-election prior to the first period. Even-numbered cycles follow reserved elections, so both effort and female rates would stand at 100%. In the first cycle, the likelihood of effort would be 56%, and the share of female councilors would be 8%. These rates would rise to 62% and 20%, respectively, in odd-numbered cycles starting with the third cycle. Note that, under rotating reservations, voter beliefs would be effectively static as male incumbents can't stand for reelection and low-type women are virtually nonexistent. The rise in effort and female rates from the first cycle to the third would simply be due to an increase in the share of female candidates. In the election preceding the first cycle, conditional on an open-seat, the likelihood of a female incumbent-party candidate would be just $\hat{\gamma} = 0.068$. However, unreserved elections at the end of even-numbered cycles would all feature reservation-elected female incumbents with a 22% chance of being renominated according to Table 6. This accounts for the increase in female—and effort—rates in subsequent odd cycles relative to the first.

Figure 8: Counterfactual Effort and Councilor Gender: Rotating Reservations



Notes. The left (right) panel plots expected effort (councilor gender) over six electoral cycles following an initial, unreserved, open-seat election. Solid lines correspond to equilibrium strategies in the data. Dashed lines correspond to counterfactual strategies under rotating reservations. We plot means from 10,000 simulated histories. Both panels use parameter estimates from column (I) of Table 5.

Averaging even and odd cycles, we obtain long-run expected effort and female rates of 81% and 60%, respectively, under rotating reservations. Per-cycle expected voter welfare would be $\left[0.81(\hat{\mu}_y + \hat{\lambda}) + (1 - 0.81)\hat{\mu}_y\right]\hat{\xi}_y + 0.60\hat{\xi}_g = -0.918$. Thus, although rotating reservations would also ensure women are not underrepresented in the BMC—they would in fact be overrepresented—there would be a marginal deterioration in policy outcomes relative to those under random reservations, and voter welfare would decrease by 16%.

Two-term random reservations. The second alternative system we consider has been supported by the largest party in Mumbai in our sample period, Shiv Sena.[26] The proposal involves maintaining 50% reserved-seat quotas, randomly assigned, but keeping them in place for two electoral cycles (ten years) instead of rerandomizing every cycle. Let $\ell_{nt} = -1$ indicate a reservation lottery takes place in ward n at time t. Otherwise, let $\ell_{nt} = q_{n,t-1}$, in which case we also have $q_{nt} = q_{n,t-1}$. Under two-term reservations, we allow parties to adjust their renomination strategy as follows:

$$\mathbb{P}(\eta_{nt} = 1 \mid g^0_{nt}, \omega^0_{nt}, \ell_{nt}, q_{nt}; \alpha) = \begin{cases} \frac{\exp\left\{\alpha_0 + \left(\mathbb{1}_{\ell_{nt}<0}\right)\alpha_\ell + \left(\mathbb{1}_{g^0_{nt}=F}\right)\left[(1-q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right] + \left(\mathbb{1}_{\omega^0_{nt}=H}\right)\alpha_\omega\right\}}{1+\exp\left\{\alpha_0 + \left(\mathbb{1}_{\ell_{nt}<0}\right)\alpha_\ell + \left(\mathbb{1}_{g^0_{nt}=F}\right)\left[(1-q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right] + \left(\mathbb{1}_{\omega^0_{nt}=H}\right)\alpha_\omega\right\}} & \text{if } (g^0_{nt}, q_{nt}) \neq (M, 1), \\ 0 & \text{otherwise.} \end{cases} \tag{12}$$

Setting $\alpha_\ell = 0$ and all other coefficients of parties' strategy to their values from column (I) of Table 5 yields the renomination strategy in Table 6. However, Shiv Sena has advocated for two-term reservations on the grounds that they would reduce uncertainty for incumbents and encourage effort. Accordingly, we allow parties' renomination choices to condition on whether the incumbent faces certainty over next period's reservation status, which is the case when a lottery has taken place prior to renomination ($\ell_{nt} < 0$). Setting $\alpha_\ell = 1$, e.g., roughly doubles expected renomination rates for men and women when a lottery has just taken place.

Under two-term reservations, given parties' adjusted strategy, the incumbent would condition their effort choice on ℓ_{nt}, and the voter would be able to condition incumbent-party reelection on both ℓ_{nt} and q_{nt}. We characterize the counterfactual equilibrium in Appendix E. For $\alpha_\ell \in \{0, 0.5, 1\}$, Figures 9 and 10 present counterfactual incumbent and voter strategies, respectively. Relative to the equilibrium in the data, a low-type female incumbent facing an unreserved (reserved) reelection contest at the end of her term would reduce (increase) effort expenditure, echoing Figure 7. The value of α_ℓ would have no effect on effort in either case. Facing a reservation lottery at the end of the cycle, however, a low-type woman's effort would

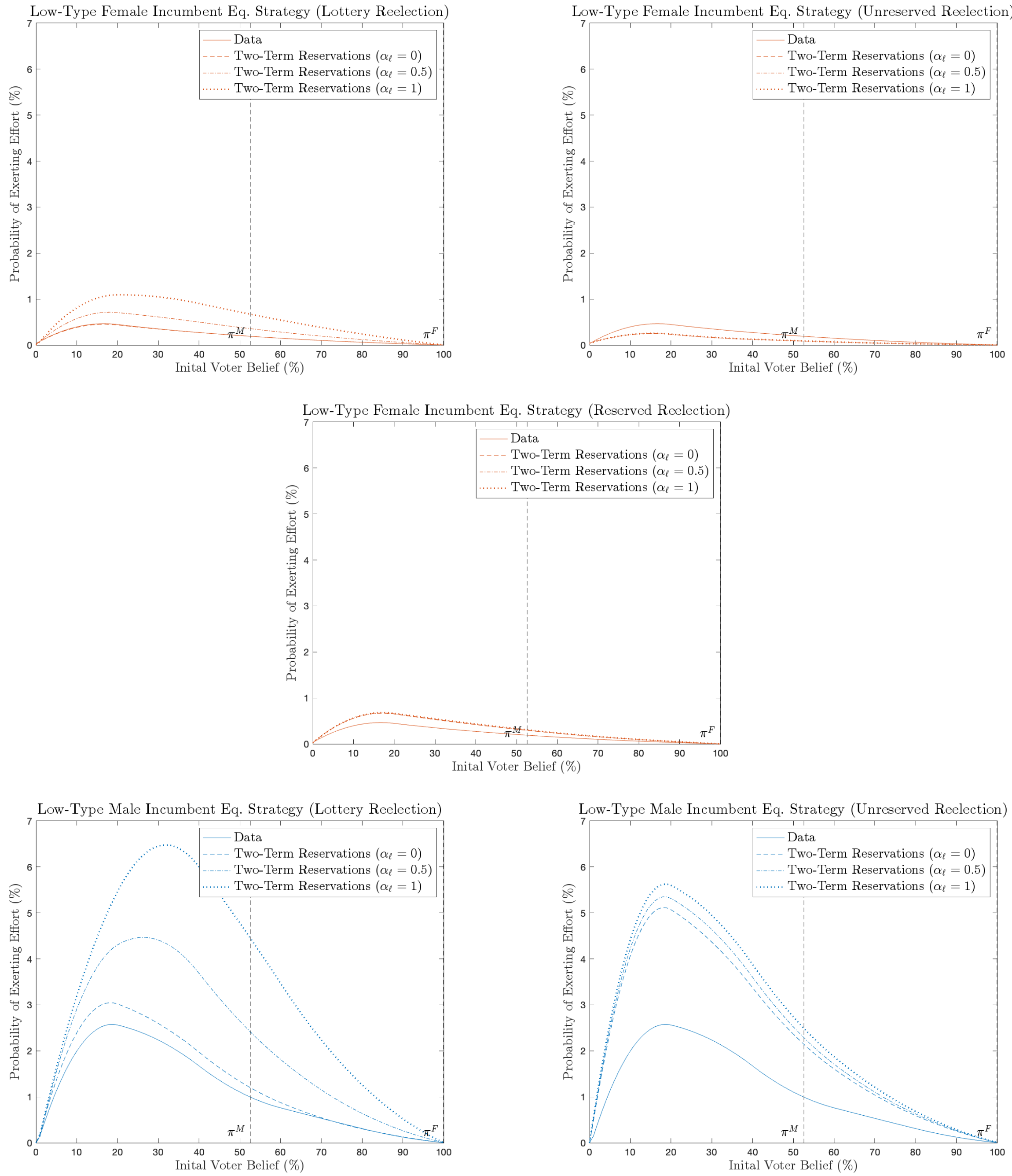
[26] https://indianexpress.com/article/cities/mumbai/shiv-sena-electoral-ward-reservation-mumbai-7138781/.

increase with α_ℓ as renomination prospects improve: effort would match that in the data with $\alpha_\ell = 0$, and it would triple with $\alpha_\ell = 1$.

Consistent with Shiv Sena's view, a low-type male incumbent facing, with certainty, an unreserved reelection contest at the end of his term would exert considerably more effort relative to the data. Higher values of α_ℓ would lead to a greater increase in effort, though marginally so. With $\alpha_\ell = 1$, low-type male effort would be almost as high as in the absence of gender quotas (Figures 3 and 5). Facing a reservation lottery, a low-type male councilor would also exert more effort relative to the data, but the effect of α_ℓ would be much greater in this case. With $\alpha_\ell = 0$, although renomination prospects would be the same as in the data, a male incumbent's chances of staying in office for more than one period would improve conditional on his ward being unreserved for two periods. Thus, low-type male effort would be slightly higher relative to the data. With $\alpha_\ell = 1$, the reelection benefits of effort for a low-type man would be even greater given that his likelihood of renomination would double conditional on his ward being unreserved following the lottery. In fact, with $\alpha_\ell = 1$ and voter belief $b^0_{nt} > 0.2$, low-type male effort would be higher when facing a lottery than when facing an unreserved reelection contest. With $b^0_{nt} \leq 0.2$, on the other hand, the returns to effort would be lower when facing a lottery because $\alpha_\ell > 0$ weakens how informative renomination is about councilor type.

For voter equilibrium behavior, α_ℓ would be effectively irrelevant. The left panels of Figure 10 show that, in an unreserved ward following a lottery, incumbent-party reelection rates would look similar to those in Figure 3 without gender quotas. Relative to the data, however, changes in reelection rates would not be as stark as those in Figure 3 given that certainty about the ward being unreserved would last only one period rather than indefinitely. The right panels of Figure 10, which correspond to the case of an unreserved ward where no lottery has taken place, feature reelection rates that would deviate from those in the data in qualitatively similar ways. However, counterfactual reelection rates would be quantitatively almost identical to those in the data, in anticipation of a reservation lottery in the following

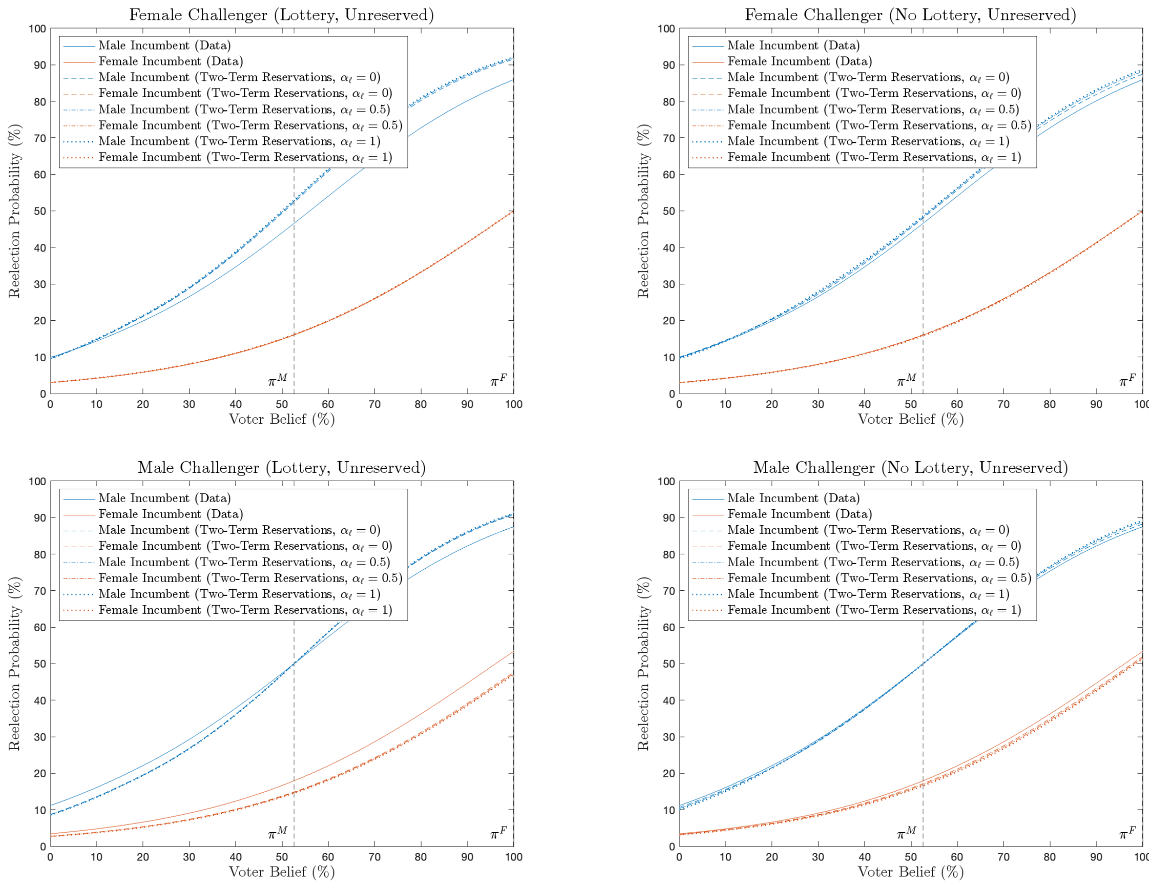
Figure 9: Counterfactual Incumbent Equilibrium Strategies: Two-Term Reservations



Notes. This figure is analogous to Figure 1. Solid-line probabilities reproduce incumbent equilibrium strategies in the data. Nonsolid lines correspond to counterfactual strategies under two-term random reservations for different values of α_ℓ, which modifies parties' renomination strategy according to (12). Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type. All panels use parameter estimates from column (I) of Table 5. Panels differ by incumbent gender and ward lottery status at the end of the cycle.

cycle. Lastly, not shown in Figure 10, woman-versus-woman elections in reserved wards, regardless of lottery status, would be toss-ups as in the data.

Figure 10: Counterfactual Voter Equilibrium Strategy: Two-Term Reservations

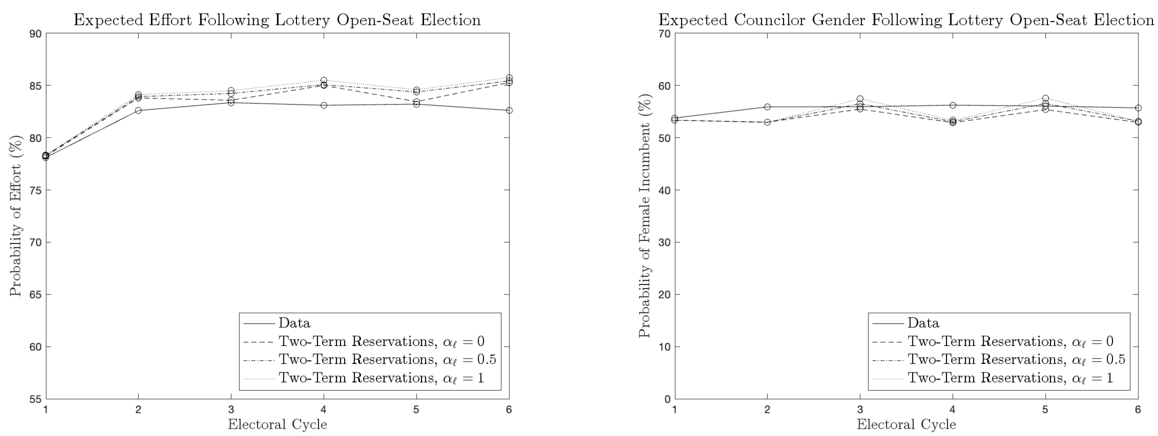


Notes. This figure is analogous to Figure 2. Solid-line probabilities reproduce the voter's equilibrium strategy in the data. Nonsolid lines correspond to counterfactual strategies under two-term random reservations for different values of α_ℓ, which modifies parties' renomination strategy according to (12). Vertical dashed lines highlight voter priors, (π^F, π^M), over inexperienced councilors' type. All panels use parameter estimates from column (I) of Table 5. Panels differ by challenger gender and the ward's lottery and reservation status.

Under two-term random reservations, we simulate six electoral cycles following an initial lottery and open-seat election. Figure 11 presents expected effort rates and councilor gender as before. Incumbents in odd-numbered cycles would have certainty about their ward's reservation status at the end of their term, whereas even-numbered cycles would end with a reservation lottery. Initially, effort and female rates would closely match those in the data. But, by the second cycle, both effort and female rates would stabilize into an oscillating pattern: they would roughly match the data in odd-numbered cycles, and effort (female) rates would be higher (lower) than their counterparts in the data in even-numbered cycles. Interestingly, effort (gender) oscillation would be highest (lowest) with $\alpha_\ell = 0$ and lowest (highest) with $\alpha_\ell = 1$.

Averaging even and odd cycles under two-term reservations, we obtain long-run effort and female rates, respectively, of 84.4% and 54.2% with $\alpha_\ell = 0$, 84.9% and 54.7% with $\alpha_\ell = 0.5$, and 85.2% and 55.4% with $\alpha_\ell = 1$. Relative to the data, for all values of α_ℓ, there would be a decrease in the share of female councilors, who are of high quality, but improved discipline among low-type incumbents would more than compensate, leading to an increase in expected effort. Per-cycle expected voter welfare would be -0.720 with $\alpha_\ell = 0$, -0.710 with $\alpha_\ell = 0.5$, and -0.715 with $\alpha_\ell = 1$. Thus, relative to the gender quota system currently in place in Mumbai, a two-term random reservations system would increase voter welfare by about 9%–11%. This alternative system would therefore ensure women are not underrepresented in the BMC while mitigating the perverse incentives of the probabilistic one-term limit imposed by Mumbai's reserved-seat gender quotas.

Figure 11: Counterfactual Effort and Councilor Gender: Two-Term Reservations



Notes. The left (right) panel plots expected effort (councilor gender) over six electoral cycles following an initial lottery and open-seat election. Solid lines correspond to equilibrium strategies in the data. Nonsolid lines correspond to counterfactual strategies under two-term random reservations for different values of α_ℓ, which modifies parties' renomination strategy according to (12). We plot means from 10,000 simulated histories. Both panels use parameter estimates from column (I) of Table 5.

6 Conclusion

We develop and estimate an electoral accountability model in which male incumbents face probabilistic term limits due to randomly assigned, reserved-seat gender quotas. Using data on constituent evaluations of municipal councilors in Mumbai, India, our model allows us to quantify taste-based versus statistical discrimination of women by voters, discrimination of women by political parties, and whether gender differences in councilor performance are due to selection (politician quality) or discipline (effort expenditure by low-quality politicians). Furthermore, through counterfactual experiments, we evaluate the net voter-welfare impact of the quota system currently in place in Mumbai and compare it with alternative designs.

We find that reserved-seat quotas can have countervailing selection and discipline effects: they ensure a minimum share of women get elected, whom we estimate to be of higher quality, but they also degrade discipline among low-quality men. The net effect and welfare consequences hinge on voters' expressive gender preferences and on parties' potential responses in the absence of quotas. In Mumbai, our results reveal that taste-based gender discrimination by voters, as well as discrimination by parties, looms large. This is likely to also be the case in other developing contexts with traditional gender attitudes. From a descriptive perspective, therefore, our counterfactual experiments caution that gender quotas are indispensable to prevent women from being politically underrepresented. With regard to politician performance, the selection benefit of quotas dominates—but only if parties continue to discriminate against women in their absence. Further research is needed to better understand the gatekeeping role strong political parties play in political selection. Nevertheless, in settings like Mumbai where voter discrimination is prevalent, discrimination by parties is to be expected.

Given that gender quota systems are necessary to address the political underrepresentation of women, can their design be improved to achieve the same descriptive goal but deliver better politician performance? We find one such alternative for the system currently used in Mumbai. By randomizing reservations but keeping them in place for two electoral cycles (ten years) instead of one, we estimate that both incumbent effort expenditure and voter welfare would increase while ensuring women are not underrepresented. This in line with prior work on the perverse incentives of term limits. We hope our approach provides guidance for future research on the welfare implications and optimal design of related aspects of electoral systems.

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Online Appendix for

Are Women Better Politicians? Discrimination, Gender Quotas, and Electoral Accountability

Contents

A Additional Tables

Table A1: Ward Reservation Status

	(I)	(II)	(III)	(IV)
Constant	0.522***	0.517***	0.517***	0.473***
	(0.075)	(0.089)	(0.089)	(0.103)
2007	-0.165***	-0.175***	-0.157***	
	(0.044)	(0.046)	(0.046)	
2012	-0.028	-0.035	-0.029	0.013
	(0.047)	(0.049)	(0.047)	(0.047)
A	0.094	0.083	0.126	-0.006
	(0.166)	(0.164)	(0.156)	(0.200)
B	0.051	0.019	0.115	-0.060
	(0.184)	(0.187)	(0.186)	(0.236)
C	0.003	0.018	0.004	0.298*
	(0.169)	(0.170)	(0.166)	(0.178)
D	0.046	0.048	0.113	-0.291**
	(0.134)	(0.137)	(0.139)	(0.137)
E	-0.020	-0.024	0.010	0.094
	(0.128)	(0.128)	(0.123)	(0.152)
FN	0.009	0.006	0.040	0.011
	(0.116)	(0.116)	(0.112)	(0.144)
FS	0.019	0.017	0.014	0.059
	(0.128)	(0.129)	(0.127)	(0.162)
GN	-0.033	-0.032	0.006	-0.037
	(0.111)	(0.112)	(0.109)	(0.136)
GS	-0.212*	-0.202*	-0.168	0.087
	(0.110)	(0.113)	(0.113)	(0.153)
HE	-0.080	-0.080	-0.076	-0.052
	(0.110)	(0.110)	(0.109)	(0.136)
HW	-0.069	-0.075	-0.045	0.099
	(0.132)	(0.132)	(0.129)	(0.172)
KE	-0.080	-0.081	-0.057	0.096
	(0.100)	(0.100)	(0.099)	(0.128)
KW	0.004	0.002	0.026	0.020
	(0.107)	(0.107)	(0.105)	(0.132)
L	-0.024	-0.016	0.049	-0.070
	(0.101)	(0.104)	(0.105)	(0.133)
ME	0.076	0.079	0.096	0.053
	(0.105)	(0.107)	(0.105)	(0.133)
MW	-0.107	-0.106	-0.087	0.030
	(0.123)	(0.122)	(0.122)	(0.155)
N	-0.027	-0.017	0.036	0.041
	(0.108)	(0.110)	(0.107)	(0.138)
PS	-0.020	-0.014	-0.018	0.098
	(0.118)	(0.118)	(0.115)	(0.155)
RC	-0.091	-0.079	-0.035	-0.076
	(0.112)	(0.113)	(0.113)	(0.142)
RN	-0.006	-0.002	0.038	0.014
	(0.129)	(0.130)	(0.137)	(0.163)
RS	-0.033	-0.032	0.004	0.114
	(0.107)	(0.108)	(0.109)	(0.138)
S	0.066	0.069	0.093	0.005
	(0.106)	(0.107)	(0.104)	(0.134)
T	-0.013	0.003	0.048	-0.047
	(0.140)	(0.141)	(0.137)	(0.171)
Bharatiya Janata Party		-0.011	0.010	-0.039
		(0.066)	(0.065)	(0.085)
Indian National Congress		0.043	0.059	-0.006
		(0.062)	(0.061)	(0.071)
Shiv Sena		0.002	0.040	-0.061
		(0.055)	(0.054)	(0.067)
Elected-Councilor Term > 1			-0.193***	
			(0.040)	
Sitting-Councilor Term > 1				0.104*
				(0.056)
Observations	681	681	681	454

Notes. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Column (I) regresses via OLS a binary indicator of ward reservation status (1 = reserved for women) on year and administrative-ward fixed effects. The omitted year is 2017, and the omitted administrative ward is PN (the largest). Column (II) additionally controls for the party of the councilor *elected* under the reservation status, omitting parties other than the three largest. Column (III) further controls for whether the *elected* councilor is *not* a first-time incumbent. Column (IV) is analogous to column (III) but explores whether the *sitting* councilor (in cycles 2007–2012 and 2012–2017) is *not* a first-time incumbent.

Table A2: Perceived Incumbent Performance by Issue (Part 1 of 2)

	Roads		Traffic		Public Gardens		Public Transport		Hospitals		Schools & Colleges	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Constant	-0.493**	-0.534**	-0.274	-0.286	-0.564***	-0.553***	-0.732***	-0.756***	-0.270	-0.280	-0.358*	-0.359*
	(0.215)	(0.218)	(0.213)	(0.217)	(0.209)	(0.213)	(0.181)	(0.181)	(0.216)	(0.215)	(0.191)	(0.189)
Female	0.076	0.145	-0.002	0.017	0.013	-0.005	0.117	0.156*	0.108	0.124	0.150*	0.151
	(0.091)	(0.102)	(0.091)	(0.102)	(0.089)	(0.101)	(0.081)	(0.090)	(0.083)	(0.094)	(0.083)	(0.093)
Bharatiya Janata Party	0.131	0.134	0.184	0.185	0.316**	0.315**	0.071	0.073	0.091	0.092	0.026	0.026
	(0.160)	(0.160)	(0.161)	(0.162)	(0.151)	(0.151)	(0.139)	(0.139)	(0.160)	(0.160)	(0.145)	(0.145)
Indian National Congress	0.274**	0.270**	0.451***	0.450***	0.534***	0.535***	0.349***	0.347***	0.186	0.185	0.199	0.199
	(0.129)	(0.129)	(0.133)	(0.133)	(0.134)	(0.134)	(0.121)	(0.121)	(0.135)	(0.135)	(0.126)	(0.126)
Shiv Sena	0.069	0.069	0.133	0.133	0.294**	0.294**	0.170	0.170	-0.015	-0.015	0.102	0.102
	(0.128)	(0.129)	(0.135)	(0.136)	(0.139)	(0.139)	(0.118)	(0.118)	(0.139)	(0.139)	(0.120)	(0.120)
2011	0.186	0.200	-0.006	-0.002	0.200*	0.196*	-0.172	-0.164	-0.611***	-0.608***	-0.519***	-0.519***
	(0.125)	(0.126)	(0.116)	(0.117)	(0.110)	(0.111)	(0.111)	(0.112)	(0.117)	(0.117)	(0.120)	(0.120)
2016	0.521***	0.522***	-0.126	-0.126	0.134	0.133	0.789***	0.790***	0.045	0.046	0.457***	0.457***
	(0.125)	(0.125)	(0.122)	(0.122)	(0.123)	(0.123)	(0.112)	(0.112)	(0.121)	(0.121)	(0.115)	(0.115)
Administrative-Ward F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	472	472	472	472	472	472	472	472	472	472	472	472

	Power Supply		Water Supply		Flooding		Pollution		Crime		Law & Order	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Constant	-0.230	-0.250	-0.353*	-0.351*	-0.551***	-0.536***	-0.577***	-0.573***	-0.688***	-0.694***	-0.664***	-0.665***
	(0.191)	(0.190)	(0.206)	(0.207)	(0.206)	(0.208)	(0.206)	(0.207)	(0.207)	(0.207)	(0.190)	(0.190)
Female	0.181**	0.213**	0.158*	0.154	0.075	0.050	0.044	0.038	0.042	0.052	0.101	0.103
	(0.083)	(0.092)	(0.085)	(0.096)	(0.094)	(0.104)	(0.093)	(0.103)	(0.092)	(0.103)	(0.085)	(0.095)
Bharatiya Janata Party	-0.112	-0.110	-0.074	-0.074	0.240	0.238	0.260*	0.260*	0.241	0.242	0.221	0.221
	(0.141)	(0.141)	(0.156)	(0.156)	(0.162)	(0.162)	(0.154)	(0.154)	(0.153)	(0.153)	(0.149)	(0.149)
Indian National Congress	0.016	0.014	0.044	0.045	0.448***	0.449***	0.392***	0.392***	0.439***	0.439***	0.420***	0.420***
	(0.121)	(0.121)	(0.125)	(0.125)	(0.138)	(0.138)	(0.135)	(0.135)	(0.134)	(0.134)	(0.127)	(0.127)
Shiv Sena	-0.143	-0.143	-0.098	-0.098	0.093	0.093	0.137	0.137	0.145	0.144	0.175	0.175
	(0.113)	(0.113)	(0.119)	(0.119)	(0.132)	(0.132)	(0.131)	(0.131)	(0.129)	(0.129)	(0.123)	(0.123)
2011	-0.397***	-0.391***	-0.347***	-0.348***	0.200*	0.195	0.156	0.155	-0.013	-0.011	-0.155	-0.155
	(0.118)	(0.118)	(0.119)	(0.119)	(0.120)	(0.120)	(0.121)	(0.121)	(0.126)	(0.125)	(0.124)	(0.124)
2016	0.538***	0.539***	0.496***	0.495***	0.478***	0.478***	0.393***	0.392***	0.501***	0.501***	0.576***	0.576***
	(0.105)	(0.105)	(0.118)	(0.118)	(0.121)	(0.121)	(0.122)	(0.122)	(0.121)	(0.121)	(0.119)	(0.119)
Administrative-Ward F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	472	472	472	472	472	472	472	472	472	472	472	472

Notes. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. For the subsample of first-time councilors, this table regresses, via ordinary (OLS) or two-stage least squares (2SLS), various measures of perceived incumbent performance (standardized) on gender. All columns control for the party of the incumbent (omitting parties other than the three largest) as well as year (omitting 2019) and administrative-ward fixed effects.

Table A2: Perceived Incumbent Performance by Issue (Part 2 of 2)

	Sanitation		Accessibility		Satisfaction		Corruption		Improv't in Lifestyle	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Constant	-0.954***	-0.941***	0.244	0.200	-0.970***	-0.972***	0.500***	0.465**	-0.336	-0.361
	(0.193)	(0.195)	(0.160)	(0.158)	(0.144)	(0.144)	(0.184)	(0.185)	(0.226)	(0.226)
Female	0.112	0.090	0.013	0.085	0.012	0.015	0.073	0.131	0.279***	0.320***
	(0.086)	(0.096)	(0.081)	(0.090)	(0.064)	(0.069)	(0.083)	(0.093)	(0.094)	(0.104)
Bharatiya Janata Party	0.279*	0.278*	0.082	0.086	-0.079	-0.079	-0.045	-0.042	-0.046	-0.044
	(0.152)	(0.152)	(0.146)	(0.147)	(0.108)	(0.108)	(0.136)	(0.137)	(0.168)	(0.168)
Indian National Congress	0.433***	0.434***	0.174	0.171	0.077	0.076	0.014	0.012	0.067	0.065
	(0.128)	(0.128)	(0.126)	(0.126)	(0.094)	(0.094)	(0.127)	(0.127)	(0.131)	(0.131)
Shiv Sena	0.186	0.186	0.212*	0.212*	0.120	0.120	-0.097	-0.097	0.090	0.090
	(0.132)	(0.132)	(0.117)	(0.117)	(0.088)	(0.088)	(0.119)	(0.119)	(0.119)	(0.119)
2011	0.314***	0.309***	-0.163	-0.148	1.142***	1.143***	-1.099***	-1.088***	-0.074	-0.065
	(0.117)	(0.118)	(0.113)	(0.113)	(0.089)	(0.088)	(0.106)	(0.107)	(0.121)	(0.121)
2016	0.862***	0.862***	-0.821***	-0.819***	1.632***	1.632***	-0.626***	-0.625***	-0.145	-0.144
	(0.119)	(0.119)	(0.105)	(0.105)	(0.080)	(0.080)	(0.092)	(0.093)	(0.116)	(0.116)
Administrative-Ward F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	472	472	472	472	472	472	472	472	472	472

Notes. See Part 1.

B Data

We rely on three data sources:

Praja's "Councillor Report Card" project. Table A2 lists the 17 questions that appear in all constituent surveys in our sample. As discussed in the paper, Praja fielded its first survey in 2011, and annual surveys (in nonelection years) followed thereafter until 2019. Since the COVID-19 pandemic, surveys have been discontinued. For each category in Table A2, respondents were asked to rate their sitting councilor on a 0–100 scale, where 100 corresponds to the most favorable evaluation. (In the case of corruption, a score of 100 corresponds to a complete lack of perceived corruption.) In addition to the six years of data (2011, 2013, 2014, 2015, 2016, 2018) used by Karekurve-Ramachandra and Lee (2023), we obtained by request from Praja data from their 2019 survey. Due to privacy concerns and data protection laws, respondent demographics and their individual responses are unavailable, but Praja shared with us constituency-level average performance scores for every question in each survey.

As noted in Karekurve-Ramachandra and Lee (2023), the surveys sampled between 100–107 respondents in each of the 227 constituencies in Mumbai, totaling 22,700–24,500 respondents per survey. Sample demographics were compared with and matched to values for Mumbai from the Indian Readership Survey, which has an annual sample size of more than 200,000 respondents across India (Praja Foundation, 2011, p.157). The complete survey research design and weighting criteria are described in the annual "Councillor Report Cards" on Praja's website (https://www.praja.org/report-card).

In the paper, we use data from the 2011 survey for incumbents serving in the 2007–2012 electoral cycle, data from the 2016 survey for 2012–2017 incumbents, and data from the 2019 survey for 2017–2022 incumbents. In Appendix F, we show that our results are robust to an alternative coding of overall performance wherein we average data from the 2013–2016 surveys for incumbents serving in the 2012–2017 cycle, and we average data from the 2018 and 2019 surveys for 2017–2022 incumbents.

Maharashtra State Election Commission. We digitized and translated electoral results handbooks obtained from the Maharashtra State Election Commission for 2007, 2012, and 2017. We compiled from the handbooks the reservation status of each constituency as well as the name and party affiliation of candidates. Additionally, Rikhil Bhavnani graciously shared with us data from the 1997 and 2002 elections. By matching names to winners going back to 1997, we identified incumbent-party candidates and challengers with previous experience as a BMC municipal councilor (other than sitting incumbents).

Prior to the 2017 election, Mumbai underwent a redistricting process to ensure equal-population apportionment of wards. To match 2012–2017 incumbents to successor wards, we obtained from the BMC website detailed ward maps before and after redistricting.[1] Maps were drawn by the Maharashtra State Election Commission. For about 50% of wards, matching is virtually exact as there were little to no changes in boundaries. In ambiguous cases, we coded incumbent renomination and incumbent-party reelection for the results in the left-hand panels of Tables 3 and 4 as follows. If the sitting councilor was renominated in an unmatched ward within the same administrative ward, then the incumbent was considered renominated, and the destination ward was taken as the successor. Importantly, administrative-ward boundaries did not change during redistricting. We finally matched remaining wards as closely as possible based on spatial overlap. Concerns about potential measurement error due to redistricting are mostly relevant for the descriptive results in Tables 3 and 4. In our main analysis, recall that we abstract from party affiliation, and we follow incumbents wherever they go if they are renominated in a different ward (even outside their original administrative ward), so accurately matching wards is not critical.

Finally, as noted in the paper, gender quotas in India are overlaid on top of ethnic reservations. Historically underprivileged castes and tribes, officially recognized as Scheduled Castes (SCs) and Scheduled Tribes (STs), are constitutionally guaranteed reserved seats at all levels of government proportional to their population shares. In addition, many states, including Maharashtra, have reserved seats in local and state governments for "Other Backward

[1] https://electiondata.mcgm.gov.in/MCGM_GENERAL_ELECTION_2017_WARD_BOUNDARY_MAP_INFORMATION/.

Classes" (OBCs), a collection of groups that are considered socially more marginalized than the "upper castes" but generally better off than SC/ST groups. Based on our correspondence with researchers who collaborate with election officials and on official gazette notifications, ethnic reservations in Mumbai are assigned as follows. Wards with at least a 5% SC (ST) population share are eligible to receive SC (ST) reservation. The total number of SC (ST) reserved seats in an electoral cycle is determined by—and proportional to—the Mumbai-wide SC (ST) population share, and wards eligible to receive SC (ST) reservation are ranked according to their within-ward SC (ST) population shares. Reservations are then assigned in descending order, rotating over the remainder across electoral cycles. (Population shares are based on the decennial census). In contrast, OBC reservations are based on a combination of population thresholds and a lottery. We were able to obtain SC/ST population figures for every ward before and after the 2017 redistricting process, but we were unable to acquire OBC population shares. We were also unable to systematically ascertain the ethnic background of candidates. Overall, about 34% of wards in Mumbai are reserved for protected ethnic groups. Our model ignores the additional term-limiting role of ethnic reservations. However, we show in Appendix F that our results are robust to excluding from our sample wards with SC or ST population shares above 5%.

News reports, social media profiles, and political parties' websites As noted in the paper, we identified the gender of candidates based on their names, verifying this with news reports, social media profiles, and political parties' websites.

C Model Details

C.1 Voter's Conditional Value Functions

Recall from (6) that the voter's value from reelecting the incumbent party satisfies

$$W^{1,g^1_{nt}}(b^1_{nt};\theta) = (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\left\{\mu_Y + \left[b^1_{nt} + (1-b^1_{nt})\sigma^{g^1_{nt}}(b^1_{nt};\theta)\right]\lambda\right\}\xi_y$$
$$+\,\delta\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\} + \exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\,\middle|\, b^1_{nt}, g^1_{nt}, r_{nt}=1;\theta\right].$$

Similarly, given (7), the value from electing the challenger satisfies

$$W^{0,g'_{nt}}(\theta) = (\mathbb{1}_{g'_{nt}=F})\xi_g + \delta\left\{\mu_Y + \left[\pi^{g'_{nt}} + (1-\pi^{g'_{nt}})\sigma^{g'_{nt}}(\pi^{g'_{nt}};\theta)\right]\lambda\right\}\xi_y$$
$$+\,\delta\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\} + \exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\,\middle|\, g'_{nt}, r_{nt}=0;\theta\right].$$

By iterating expectations and letting $\tilde{g}^r_{nt} = rg^1_{nt} + (1-r)g'_{nt}$ and $\tilde{b}^r_{nt} = rb^1_{nt} + (1-r)\pi^{g'_{nt}}$, the voter's continuation value given reelection choice $r_{nt} = r \in \{0,1\}$ can be written as

$$\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\} + \exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\,\middle|\, \tilde{b}^r_{nt}, \tilde{g}^r_{nt}, r_{nt}=r;\theta\right] =$$
$$\sum_{q_{n,t+1}\in\{0,1\}} \frac{1}{2} \sum_{g'_{n,t+1}\in\{F,M\}} \left[(q_{n,t+1} + (1-q_{n,t+1})\gamma)\,\mathbb{1}_{g'_{n,t+1}=F} + (1-q_{n,t+1})(1-\gamma)\mathbb{1}_{g'_{n,t+1}=M}\right]\cdots$$
$$\sum_{\eta_{n,t+1}\in\{0,1\}} \Bigg\{(1-\eta_{n,t+1})q_{n,t+1}\mathbb{1}_{\tilde{g}^r_{nt}=M}$$
$$+\,(1-q_{n,t+1}+q_{n,t+1}\mathbb{1}_{\tilde{g}^r_{nt}=F})\left[\frac{\tilde{b}^r_{nt}\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g] + \alpha_\omega\right\}^{\eta_{n,t+1}}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g] + \alpha_\omega\right\}}\right.$$
$$\left.+\,\frac{(1-\tilde{b}^r_{nt})\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g]\right\}^{\eta_{n,t+1}}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g]\right\}}\right]\Bigg\}\cdots$$
$$\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\} + \exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\,\middle|\, \tilde{b}^r_{nt}, \tilde{g}^r_{nt}, r_{nt}=r, q_{n,t+1}, g'_{n,t+1}, \eta_{n,t+1};\theta\right].$$

In period $t+1$, given $\eta_{n,t+1} = 0$, the voter will face a choice between two inexperienced candidates. Otherwise, the voter will observe policy outcome $y_{n,t+1}$, update their belief accordingly, and decide whether to reelect the incumbent councilor. We thus have

$$\mathbb{E}\left[\log\left(\exp\left\{W^{1,g^1_{n,t+1}}(b^1_{n,t+1};\theta)\right\}+\exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\,\middle|\,\tilde{b}^r_{nt},\tilde{g}^r_{nt},r_{nt}=r,q_{n,t+1},g'_{n,t+1},\eta_{n,t+1};\theta\right]=$$

$$(1-\eta_{n,t+1})\Bigg[(q_{n,t+1}+(1-q_{n,t+1})\gamma)\log\left(\exp\left\{W^{1,F}(\pi^F;\theta)\right\}+\exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)$$

$$+(1-q_{n,t+1})(1-\gamma)\log\left(\exp\left\{W^{1,M}(\pi^M;\theta)\right\}+\exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\Bigg]$$

$$+\eta_{n,t+1}\int_{-\infty}^{\infty}\log\left(\exp\left\{W^{1,\tilde{g}^r_{nt}}\left(\rho^{y,\eta}(\tilde{b}^r_{nt},y_{n,t+1},q_{n,t+1},\eta_{n,t+1},\tilde{g}^r_{nt};\theta);\theta\right)\right\}+\exp\left\{W^{0,g'_{n,t+1}}(\theta)\right\}\right)\cdots$$

$$\left[\tilde{b}^r_{nt}\phi\left(y_{n,t+1};\mu_y+\lambda,\varsigma^2_y\right)+(1-\tilde{b}^r_{nt})d^{\tilde{g}^r_{nt}}(y_{n,t+1}|\tilde{b}^r_{nt};\theta)\right]\mathrm{d}y_{n,t+1}.$$

As noted in the paper, we compute all integrals using sparse-grid integration as implemented by Heiss and Winschel (2008).

C.2 Incumbent's Conditional Value Functions

Given (1), (8), and (9), the value for a low-type incumbent from effort choice $e\in\{0,1\}$ satisfies

$$V^{e,g^0_{nt}}(b^0_{nt};\theta)$$

$$=\beta+\delta\int_{-\infty}^{\infty}\phi\left(y_{nt};\mu_y+e\lambda,\varsigma^2_y\right)\sum_{q_{nt}\in\{0,1\}}\frac{\mathbb{1}_{(g^0_{nt},q_{nt})\neq(M,1)}\exp\left\{\alpha_0+\mathbb{1}_{g^0_{nt}=F}[(1-q_{nt})\alpha^0_g+q_{nt}\alpha^1_g]\right\}}{2\left[1+\exp\left\{\alpha_0+\mathbb{1}_{g^0_{nt}=F}[(1-q_{nt})\alpha^0_g+q_{nt}\alpha^1_g]\right\}\right]}\cdots$$

$$\sum_{g'_{nt}\in\{F,M\}}\left[(q_{nt}+(1-q_{nt})\gamma)\,\mathbb{1}_{g'_{nt}=F}+(1-q_{nt})(1-\gamma)\mathbb{1}_{g'_{nt}=M}\right]\cdots$$

$$\frac{\exp\left\{W^{1,g^0_{nt}}\left(\rho^{y,\eta}(b^0_{nt},y_{nt},q_{nt},\eta_{nt}=1,g^0_{nt};\theta);\theta\right)\right\}}{\exp\left\{W^{0,g'_{nt}}(\theta)\right\}+\exp\left\{W^{1,g^0_{nt}}\left(\rho^{y,\eta}(b^0_{nt},y_{nt},q_{nt},\eta_{nt}=1,g^0_{nt};\theta);\theta\right)\right\}}\cdots$$

$$\mathbb{E}\left[\max_{\tilde{e}\in\{0,1\}}V^{\tilde{e},g^0_{nt}}(b^0_{n,t+1};\theta)-\tilde{e}c_{n,t+1}\,\middle|\,b^0_{nt},g^0_{nt},y_{nt},q_{nt},\eta_{nt}=1,g'_{nt},r_{nt}=1;\theta\right]\mathrm{d}y_{nt}.$$

To simplify notation, let $v^{\tilde{e},g^0_{nt}}(b^0_{nt},y_{nt},q_{nt};\theta)=V^{\tilde{e},g^0_{nt}}\left(\rho^{y,\eta}(b^0_{nt},y_{nt},q_{nt},\eta_{nt}=1,g^0_{nt};\theta);\theta\right)$. Since effort costs are uniformly distributed, the incumbent's expected payoff from making an optimal effort choice in period $t+1$, conditional on remaining in office, is given by

$$\mathbb{E}\left[\max_{\tilde{e}\in\{0,1\}} V^{\tilde{e},g^0_{nt}}(b^0_{n,t+1};\theta) - \tilde{e}c_{n,t+1} \,\middle|\, b^0_{nt}, g^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}=1, g'_{nt}, r_{nt}=1;\theta\right]$$
$$= \begin{cases} v^{1,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) - \frac{1}{2} & \text{if } \Delta v^{g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) > 1, \\ \frac{1}{2}\left[v^{1,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) - v^{0,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta)\right]^2 + v^{0,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) & \text{if } \Delta v^{g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) \in [0,1], \\ v^{0,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) & \text{if } \Delta v^{g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) < 0, \end{cases}$$

where $\Delta v^{g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) = v^{1,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta) - v^{0,g^0_{nt}}(b^0_{nt}, y_{nt}, q_{nt};\theta)$.

D Estimation Details

To simplify notation, let $\Psi^{W^{0,g}}(\theta, W^0, \zeta) = W^{0,g} - \Phi^{W^{0,g}}(\theta, W^0, \zeta)$, $\Psi^{W^{1,g}}(b;\theta, W^0, \zeta) = W^{1,g}(b;\zeta^g_W) - \Phi^{W^{1,g}}(b;\theta, W^0, \zeta)$, and $\Psi^{V^{e,g}}(b;\theta, W^0, \zeta) = V^{e,g}(b;\zeta^{e,g}_V) - \Phi^{V^{e,g}}(b;\theta, W^0, \zeta)$. We can then rewrite (11) as

$$\max_{\theta, W^0, \zeta} \log \mathcal{L}\big(\{Z^{T_n}_n\}^N_{n=1} \,\big|\, \{Z^0_n\}^N_{n=1};\theta, W^0, \zeta\big) \quad \text{subject to}$$
$$(W^0, \zeta) \in \arg\min_{\tilde{W}^0, \tilde{\zeta}} \sum_{g\in F,M} \int_0^1 \left\{\Psi^{W^{0,g}}(\theta, \tilde{W}^0, \tilde{\zeta})^2 + \Psi^{W^{1,g}}(b;\theta, \tilde{W}^0, \tilde{\zeta})^2 + \sum_{e\in\{0,1\}} \Psi^{V^{e,g}}(b;\theta, \tilde{W}^0, \tilde{\zeta})^2\right\} \mathrm{d}Q(b).$$

As noted in the paper, we implement the equilibrium constraint above using the corresponding first-order conditions. Specifically, given $Q \sim U[0,1]$, we estimate the model parameters, θ, by solving

$$\max_{\theta, \tilde{W}^0, \tilde{\zeta}} \log \mathcal{L}\big(\{Z^{T_n}_n\}^N_{n=1} \,\big|\, \{Z^0_n\}^N_{n=1};\theta, \tilde{W}^0, \tilde{\zeta}\big) \quad \text{subject to}$$
$$\sum_{g\in F,M} \int_0^1 \left\{D_{W^0}\left[\Psi^{W^{0,g}}(\theta, \tilde{W}^0, \tilde{\zeta})^2\right] + D_{W^0}\left[\Psi^{W^{1,g}}(b;\theta, \tilde{W}^0, \tilde{\zeta})^2\right] + \sum_{e\in\{0,1\}} D_{W^0}\left[\Psi^{V^{e,g}}(b;\theta, \tilde{W}^0, \tilde{\zeta})^2\right]\right\} \mathrm{d}b = 0,$$
$$\sum_{g\in F,M} \int_0^1 \left\{D_{\zeta}\left[\Psi^{W^{0,g}}(\theta, \tilde{W}^0, \tilde{\zeta})^2\right] + D_{\zeta}\left[\Psi^{W^{1,g}}(b;\theta, \tilde{W}^0, \tilde{\zeta})^2\right] + \sum_{e\in\{0,1\}} D_{\zeta}\left[\Psi^{V^{e,g}}(b;\theta, \tilde{W}^0, \tilde{\zeta})^2\right]\right\} \mathrm{d}b = 0.$$

Thus, the augmented log-likelihood of the data is maximized subject to a square system of nonlinear equations involving the auxiliary parameters of the incumbent's and voter's conditional value functions.

We implement our estimator in the AMPL modeling language to take advantage of built-in automatic differentiation.[2] We then use Knitro's Interior/Direct optimization algorithm.[3] To mitigate concerns about potential local maxima, we randomly draw 100 parameter starting values and select the constrained-optimization solution that achieves the highest log-likelihood value. Finally, to verify the second-order conditions of the equilibrium constraint, we subsequently run the Bellman least-squares problem at our parameter estimates.

For inference, we use a nonparametric bootstrap procedure in N, the number of individual incumbents in our data. Each bootstrap sample consists of a random drawing with replacement of N incumbents, taking their entire histories in office. All reported standard errors in Table 5 and Appendix F are based on 100 such bootstrap samples.

B-splines are implemented using the Cox-de Boor recursion (de Boor, 2001). To ensure smoothness (twice continuous differentiability), interior knots are augmented with end knots of multiplicity equal to the order of the spline. For example, for a quadratic spline (order 3) with m interior uniform knots, $0 < \frac{1}{m+1} < \frac{2}{m+1} < \cdots < \frac{m}{m+1} < 1$, the final knot sequence is $\left(0, 0, 0, \frac{1}{m+1}, \frac{2}{m+1}, \cdots, \frac{m}{m+1}, 1, 1, 1\right)$. The number of spline coefficients to be estimated is then equal to the number of knots minus the order. For a spline of order k with m interior knots, the number of coefficients is $(m + 2k) - k = m + k$.

E Counterfactuals

We compute counterfactual equilibria by minimizing squared violations of the corresponding Bellman conditions, which we characterize below for each of the three alternative quota systems we consider: no quotas, rotating reservations, and two-term random reservations.

[2]https://ampl.com. The first-order conditions that define the constraints are calculated analytically and verified against finite-difference approximations.

[3]https://www.artelys.com/solvers/knitro/.

E.1 No Quotas

As noted in the paper, we account for potential party responses in the absence of gender quotas by considering alternative values of α_g^0 and γ. Specifically, we consider two cases. First, we keep party nomination behavior fixed using the estimated values of α_g^0 and γ from column (I) of Table 5. Second, we consider a no-party-discrimination scenario wherein parties nominate and renominate men and women at equal rates by setting $\alpha_g^0 = 0$ and $\gamma = 0.5$.

In the absence of quotas, letting $\tilde{\theta} = (\theta, W^0, \zeta)$ as in the baseline model, the $\Psi^{W^{0,g}}(\tilde{\theta})$, $\Psi^{W^{1,g}}(b; \tilde{\theta})$, and $\Psi^{V^{e,g}}(b; \tilde{\theta})$ mappings described in Appendix D are modified as follows. First, we have

$$
\begin{aligned}
\Psi^{W^{0,g}}(\tilde{\theta}) = W^{0,g} &- (\mathbb{1}_{g=F})\xi_g - \delta \left\{\mu_Y + [\pi^g + (1-\pi^g)\sigma^g(\pi^g; \zeta_V^g)]\,\lambda\right\}\xi_y \\
&- \delta \sum_{g'_{n,t+1} \in \{F,M\}} \left[\gamma \mathbb{1}_{g'_{n,t+1}=F} + (1-\gamma)\mathbb{1}_{g'_{n,t+1}=M}\right] \cdots \\
&\left\{ \left[\frac{\pi^g}{1 + \exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0 + \alpha_\omega\right\}} + \frac{1-\pi^g}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}} \right] \cdots \right. \\
&\quad \left[\gamma \log\left(\exp\left\{W^{1,F}(\pi^F; \zeta_W^F)\right\} + \exp\left\{W^{0,g'_{n,t+1}}\right\} \right) \right. \\
&\quad \left. + (1-\gamma)\log\left(\exp\left\{W^{1,M}(\pi^M; \zeta_W^M)\right\} + \exp\left\{W^{0,g'_{n,t+1}}\right\} \right) \right] \\
&+ \left[\frac{\pi^g \exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0 + \alpha_\omega\right\}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0 + \alpha_\omega\right\}} + \frac{(1-\pi^g)\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}} \right] \cdots \\
&\quad \int_{-\infty}^{\infty} \log\left(\exp\left\{ W^{1,g}\left(\rho^{y,\eta}(\pi^g, y_{n,t+1}, 0, 1, g; \tilde{\theta}); \zeta_W^g\right)\right\} + \exp\left\{W^{0,g'_{n,t+1}}\right\} \right) \cdots \\
&\quad \left. \left[\pi^g \phi\left(y_{n,t+1}; \mu_y + \lambda, \varsigma_y^2\right) + (1-\pi^g)\tilde{d}^g(y_{n,t+1}|\pi^g; \tilde{\theta})\right] \mathrm{d}y_{n,t+1} \right\}
\end{aligned}
$$

and

$$\Psi^{W^{1,g}}(b;\tilde{\theta}) = W^{1,g}(b;\zeta_W^g) - (\mathbb{1}_{g=F})\xi_g - \delta\left\{\mu_Y + \left[b + (1-b)\sigma^g(b;\zeta_V^g)\right]\lambda\right\}\xi_y$$
$$- \delta \sum_{g'_{n,t+1}\in\{F,M\}} \left[\gamma \mathbb{1}_{g'_{n,t+1}=F} + (1-\gamma)\mathbb{1}_{g'_{n,t+1}=M}\right]\cdots$$
$$\Bigg\{\left[\frac{b}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0 + \alpha_\omega\right\}} + \frac{1-b}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}}\right]\cdots$$
$$\Bigg[\gamma \log\left(\exp\left\{W^{1,F}(\pi^F;\zeta_W^F)\right\} + \exp\left\{W^{0,g'_{n,t+1}}\right\}\right)$$
$$+ (1-\gamma)\log\left(\exp\left\{W^{1,M}(\pi^M;\zeta_W^M)\right\} + \exp\left\{W^{0,g'_{n,t+1}}\right\}\right)\Bigg]$$
$$+ \left[\frac{b\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0 + \alpha_\omega\right\}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0 + \alpha_\omega\right\}} + \frac{(1-b)\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}}\right]\cdots$$
$$\int_{-\infty}^{\infty} \log\left(\exp\left\{W^{1,g}\left(\rho^{y,\eta}(b, y_{n,t+1}, 0, 1, g;\tilde{\theta});\zeta_W^g\right)\right\} + \exp\left\{W^{0,g'_{n,t+1}}\right\}\right)\cdots$$
$$\left[b\phi\left(y_{n,t+1};\mu_y + \lambda, \varsigma_y^2\right) + (1-b)\tilde{d}^g(y_{n,t+1}|b;\tilde{\theta})\right] \mathrm{d}y_{n,t+1}\Bigg\},$$

where $\zeta_V^g = (\zeta_V^{0,g}, \zeta_V^{1,g})$ and $b \in [0,1]$. Similarly,

$$\Psi^{V^{e,g}}(b;\tilde{\theta}) = V^{e,g}(b;\zeta_V^{e,g}) - \beta - \delta\int_{-\infty}^{\infty} \phi\left(y_{nt};\mu_y + e\lambda, \varsigma_y^2\right)\left(\frac{\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{g=F}\alpha_g^0\right\}}\right)\cdots$$
$$\sum_{g'_{nt}\in\{F,M\}} \left[\gamma \mathbb{1}_{g'_{nt}=F} + (1-\gamma)\mathbb{1}_{g'_{nt}=M}\right]\cdots$$
$$\frac{\exp\left\{W^{1,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_W^g\right)\right\}}{\exp\left\{W^{0,g'_{nt}}\right\} + \exp\left\{W^{1,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_W^g\right)\right\}}\cdots$$
$$\Bigg\{\frac{1}{2}\left[V^{1,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_V^{1,g}\right) - V^{0,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_V^{0,g}\right)\right]^2$$
$$+ V^{0,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_V^{0,g}\right)\Bigg\}\mathrm{d}y_{nt},$$

assuming $V^{1,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_V^{1,g}\right) - V^{0,g}\left(\rho^{y,\eta}(b, y_{nt}, 0, 1, g;\tilde{\theta});\zeta_V^{0,g}\right) \in [0,1]$ for all y_{nt} in the support of the numerical-integration nodes (which we verify).

Thus, given model parameter estimates $\hat{\theta}$ from column (I) of Table 5 (with the appropriate values of α_g^0 and γ as explained above), we compute counterfactual equilibria in the absence of gender quotas by solving

$$(\tilde{W}^0, \tilde{\zeta}) \in \arg\min_{W^0,\zeta} \sum_{g\in F,M} \int_0^1 \left\{ \Psi^{W^{0,g}}(\hat{\theta}, W^0, \zeta)^2 + \Psi^{W^{1,g}}(b; \hat{\theta}, W^0, \zeta)^2 + \sum_{e\in\{0,1\}} \Psi^{V^{e,g}}(b; \hat{\theta}, W^0, \zeta)^2 \right\} \mathrm{d}b.$$

E.2 Rotating Reservations

Under rotating reservations, we keep parties' strategy as in the baseline model, but the incumbent now knows their ward's reservation status in advance given that $q_{nt} = 1 - q_{n,t-1}$ with certainty. Thus, both the incumbent and the voter now condition their choices on q_{nt}.

Voter's equilibrium strategy. As in the baseline model, the voter conditions their choice on state $s_{nt} = (q_{nt}, b^1_{nt}, g^1_{nt}, g'_{nt})$, where $b^1_{nt} = \rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt.}, g^1_{nt}; \tilde{\theta})$ denotes the voter's belief at the time of the election that the incumbent party's candidate is a high type. The voter's belief update, $\rho^{y,\eta}$, is defined by (3) as before. Since incumbents now condition their effort choice on their ward's reservation status, we have $W^1(s_{nt}; \zeta) = W^{1,q_{nt},g^1_{nt}}(b^1_{nt}; \zeta_W^{q_{nt},g^1_{nt}})$ and $W^0(s_{nt}) = W^{0,q_{nt},g'_{nt}}$, where

$$\begin{aligned} W^{1,q_{nt},g^1_{nt}}(b^1_{nt}; \zeta_W^{q_{nt},g^1_{nt}}) &= (\mathbb{1}_{g^1_{nt}=F})\xi_g + \delta\left\{\mu_Y + \left[b^1_{nt} + (1-b^1_{nt})\sigma^{q_{n,t+1},g^1_{nt}}(b^1_{nt}; \zeta_V^{q_{n,t+1},g^1_{nt}})\right]\lambda\right\}\xi_y \\ &+ \delta\mathbb{E}\left[\log\left(\exp\left\{W^{1,q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1}; \zeta_W^{q_{n,t+1},g^1_{n,t+1}})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right) \middle| s_{nt}, r_{nt} = 1; \tilde{\theta}\right], \end{aligned} \tag{E1}$$

$$\begin{aligned} W^{0,q_{nt},g'_{nt}} &= (\mathbb{1}_{g'_{nt}=F})\xi_g + \delta\left\{\mu_Y + \left[\pi^{g'_{nt}} + (1-\pi^{g'_{nt}})\sigma^{q_{n,t+1},g'_{nt}}(\pi^{g'_{nt}}; \zeta_V^{q_{n,t+1},g'_{nt}})\right]\lambda\right\}\xi_y \\ &+ \delta\mathbb{E}\left[\log\left(\exp\left\{W^{1,q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1}; \zeta_W^{q_{n,t+1},g^1_{n,t+1}})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right) \middle| s_{nt}, r_{nt} = 0; \tilde{\theta}\right], \end{aligned} \tag{E2}$$

and $q_{n,t+1} = 1 - q_{nt}$ with certainty. We again denote by $\tilde{\theta} = (\theta, W^0, \zeta)$ the model parameters augmented with the auxiliary parameters of the incumbent's and voter's conditional value functions, but we now have $W^0 = (W^{0,q,g})_{q\in\{0,1\},g\in\{F,M\}}$, $\zeta = (\zeta_W^{q,g}, \zeta_V^{q,g})_{q\in\{0,1\},g\in\{F,M\}}$, and

$\zeta_V^{q,g} = (\zeta_V^{0,q,g}, \zeta_V^{1,q,g})$. (**Note:** to simplify exposition, we first define conditional value functions and their auxiliary parameters considering all (q, g) pairs, but we impose below necessary restrictions given that men cannot compete in reserved wards.) By iterating expectations and letting $\tilde{g}_{nt}^r = rg_{nt}^1 + (1-r)g'_{nt}$ and $\tilde{b}_{nt}^r = rb_{nt}^1 + (1-r)\pi^{g'_{nt}}$, the voter's continuation value given $r_{nt} = r \in \{0, 1\}$ can be written as

$$
\begin{aligned}
&\mathbb{E}\left[\log\left(\exp\left\{W^{1,q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{q_{n,t+1},g^1_{n,t+1}})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right) \middle| s_{nt}, r_{nt} = r; \tilde{\theta}\right] \\
&= \sum_{g'_{n,t+1}\in\{F,M\}} \left[(q_{n,t+1} + (1-q_{n,t+1})\gamma)\,\mathbb{1}_{g'_{n,t+1}=F} + (1-q_{n,t+1})(1-\gamma)\,\mathbb{1}_{g'_{n,t+1}=M}\right]\cdots \\
&\quad \sum_{\eta_{n,t+1}\in\{0,1\}} \Bigg\{(1-\eta_{n,t+1})q_{n,t+1}\mathbb{1}_{\tilde{g}^r_{nt}=M} \\
&\quad + (1-q_{n,t+1}+q_{n,t+1}\mathbb{1}_{\tilde{g}^r_{nt}=F})\left[\frac{\tilde{b}^r_{nt}\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha_g^0 + q_{n,t+1}\alpha_g^1\right] + \alpha_\omega\right\}^{\eta_{n,t+1}}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha_g^0 + q_{n,t+1}\alpha_g^1\right] + \alpha_\omega\right\}}\right. \\
&\quad + \left.\frac{(1-\tilde{b}^r_{nt})\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha_g^0 + q_{n,t+1}\alpha_g^1\right]\right\}^{\eta_{n,t+1}}}{1+\exp\left\{\alpha_0 + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha_g^0 + q_{n,t+1}\alpha_g^1\right]\right\}}\right]\Bigg\}\cdots \\
&\quad \mathbb{E}\left[\log\left(\exp\left\{W^{1,q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{q_{n,t+1},g^1_{n,t+1}})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right) \middle| s_{nt}, r_{nt} = r, g'_{n,t+1}, \eta_{n,t+1}; \tilde{\theta}\right],
\end{aligned}
$$

where

$$
\begin{aligned}
&\mathbb{E}\left[\log\left(\exp\left\{W^{1,q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{q_{n,t+1},g^1_{n,t+1}})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right) \middle| s_{nt}, r_{nt} = r, g'_{n,t+1}, \eta_{n,t+1}; \tilde{\theta}\right] \\
&= (1-\eta_{n,t+1})\Big[(q_{n,t+1} + (1-q_{n,t+1})\gamma)\log\left(\exp\left\{W^{1,q_{n,t+1},F}(\pi^F;\zeta_W^{q_{n,t+1},F})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right) \\
&\quad + (1-q_{n,t+1})(1-\gamma)\log\left(\exp\left\{W^{1,q_{n,t+1},M}(\pi^M;\zeta_W^{q_{n,t+1},M})\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right)\Big] \\
&\quad + \eta_{n,t+1}\int_{-\infty}^{\infty}\log\left(\exp\left\{W^{1,q_{n,t+1},\tilde{g}^r_{nt}}\left(\rho^{y,\eta}(\tilde{b}^r_{nt}, y_{n,t+1}, q_{n,t+1}, 1, \tilde{g}^r_{nt};\tilde{\theta});\zeta_W^{q_{n,t+1},\tilde{g}^r_{nt}}\right)\right\} + \exp\left\{W^{0,q_{n,t+1},g'_{n,t+1}}\right\}\right)\cdots \\
&\quad \left[\tilde{b}^r_{nt}\phi\left(y_{n,t+1};\mu_y+\lambda,\varsigma_y^2\right) + (1-\tilde{b}^r_{nt})d^{q_{n,t+1},\tilde{g}^r_{nt}}(y_{n,t+1}|\tilde{b}^r_{nt};\tilde{\theta})\right]\mathrm{d}y_{n,t+1}
\end{aligned}
$$

and

$$
\begin{aligned}
d^{q_{n,t+1},\tilde{g}^r_{nt}}(y_{n,t+1}|\tilde{b}^r_{nt};\tilde{\theta}) &= \sigma^{q_{n,t+1},\tilde{g}^r_{nt}}(\tilde{b}^r_{nt};\zeta_V^{q_{n,t+1},\tilde{g}^r_{nt}})\phi\left(y_{n,t+1};\mu_y+\lambda,\varsigma_y^2\right) \\
&\quad + \left[1-\sigma^{q_{n,t+1},\tilde{g}^r_{nt}}(\tilde{b}^r_{nt};\zeta_V^{q_{n,t+1},\tilde{g}^r_{nt}})\right]\phi\left(y_{n,t+1};\mu_y,\varsigma_y^2\right).
\end{aligned}
$$

The likelihood that the voter reelects the incumbent party is given by

$$\sigma^w(q_{nt}, b_{nt}^1, g_{nt}^1, g_{nt}'; \tilde{\theta}) = \frac{\exp\left\{W^{1,q_{nt},g_{nt}^1}(b_{nt}^1; \zeta_W^{q_{nt},g_{nt}^1})\right\}}{\exp\left\{W^{0,q_{nt},g_{nt}'}\right\} + \exp\left\{W^{1,q_{nt},g_{nt}^1}(b_{nt}^1; \zeta_W^{q_{nt},g_{nt}^1})\right\}}.$$

Incumbent's equilibrium strategy. As in the baseline model, the incumbent knows voters will condition their choice on state $s_{nt} = (q_{nt}, b_{nt}^1, g_{nt}^1, g_{nt}')$, but q_{nt} is now known by the incumbent at the time of their effort choice. Given $(q_{nt}, b_{nt}^0, g_{nt}^0, c_t)$, we have

$$\begin{aligned}
&V^{e,q_{nt},g_{nt}^0}(b_{nt}^0; \zeta_V^{e,q_{nt},g_{nt}^0}) = \beta + \delta \int_{-\infty}^{\infty} \phi\left(y_{nt}; \mu_y + e\lambda, \varsigma_y^2\right) \cdots \\
&\quad \frac{\mathbb{1}_{(g_{nt}^0, q_{nt}) \neq (M,1)} \exp\left\{\alpha_0 + \mathbb{1}_{g_{nt}^0 = F}\left[(1-q_{nt})\alpha_g^0 + q_{nt}\alpha_g^1\right]\right\}}{1 + \exp\left\{\alpha_0 + \mathbb{1}_{g_{nt}^0 = F}\left[(1-q_{nt})\alpha_g^0 + q_{nt}\alpha_g^1\right]\right\}} \cdots \\
&\quad \sum_{g_{nt}' \in \{F,M\}} \left[(q_{nt} + (1-q_{nt})\gamma)\,\mathbb{1}_{g_{nt}'=F} + (1-q_{nt})(1-\gamma)\mathbb{1}_{g_{nt}'=M}\right] \cdots \\
&\quad \frac{\exp\left\{W^{1,q_{nt},g_{nt}^0}\left(\rho^{y,\eta}(b_{nt}^0, y_{nt}, q_{nt}, 1, g_{nt}^0; \tilde{\theta}); \zeta_W^{q_{nt},g_{nt}^0}\right)\right\}}{\exp\left\{W^{0,q_{nt},g_{nt}'}\right\} + \exp\left\{W^{1,q_{nt},g_{nt}^0}\left(\rho^{y,\eta}(b_{nt}^0, y_{nt}, q_{nt}, 1, g_{nt}^0; \tilde{\theta}); \zeta_W^{q_{nt},g_{nt}^0}\right)\right\}} \cdots \\
&\quad \mathbb{E}\left[\max_{\tilde{e} \in \{0,1\}} V^{\tilde{e},q_{n,t+1},g_{nt}^0}(b_{n,t+1}^0; \zeta_V^{\tilde{e},q_{n,t+1},g_{nt}^0}) - \tilde{e}c_{n,t+1} \,\middle|\, b_{nt}^0, g_{nt}^0, y_{nt}, q_{nt}, \eta_{nt} = 1, r_{nt} = 1; \tilde{\theta}\right] \mathrm{d}y_{nt}.
\end{aligned} \tag{E3}$$

The conditional expectation above takes a similar form to that in Appendix C, and a low-type incumbent's equilibrium strategy is given by

$$\sigma^{q_{nt},g_{nt}^0}(b_{nt}^0; \zeta_V^{q_{nt},g_{nt}^0}) = \max\left\{0, \min\left\{V^{1,q_{nt},g_{nt}^0}(b_{nt}^0; \zeta_V^{1,q_{nt},g_{nt}^0}) - V^{0,q_{nt},g_{nt}^0}(b_{nt}^0; \zeta_V^{0,q_{nt},g_{nt}^0}), 1\right\}\right\}.$$

Equilibrium. Under rotating reservations, the Bellman-violation mappings $\Psi^{W^{0,q,g}}(\tilde{\theta})$, $\Psi^{W^{1,q,g}}(b; \tilde{\theta})$, and $\Psi^{V^{e,q,g}}(b; \tilde{\theta})$ are defined by taking the corresponding difference between the left- and right-hand sides of (E1), (E2), and (E3). We make, however, two important observations. First, note from (E3) that a low-type male incumbent whose ward will be reserved at the end of his term cannot be renominated, so

$$\sigma^{1,M}(b_{nt}^0; \zeta_V^{1,M}) = V^{1,1,M}(b_{nt}^0; \zeta_V^{1,1,M}) - V^{0,1,M}(b_{nt}^0; \zeta_V^{0,1,M}) = \beta - \beta = 0.$$

Furthermore, there can be no sitting male incumbent facing an unreserved reelection (as he would have to have been elected in a reserved ward). Thus, low-type male incumbents never exert effort, and we only have $\zeta_V = (\zeta_V^{0,0,F}, \zeta_V^{0,1,F}, \zeta_V^{1,0,F}, \zeta_V^{1,1,F})$ and the corresponding conditional value functions for female incumbents.

Second, since male incumbents can only serve for one term, there is no voter updating about their types. Moreover, men can only compete as incumbent-party candidates by replacing female incumbents in unreserved wards who are not renominated. This implies that $W^{1,0,M}(b_{nt}^1; \zeta_W^{0,M})$ is only defined for $b_{nt}^1 = \pi^M$, so this conditional value function simply becomes $W^{1,0,M}$, a constant, similar to $W^{0,0,M}$. Thus, for the voter, we only have auxiliary parameters $W^0 = (W^{0,0,F}, W^{0,0,M}, W^{0,1,F})$, $W^{1,0,M}$, and $\zeta_W = (\zeta_W^{0,F}, \zeta_W^{1,F})$.

Given model parameter estimates $\hat{\theta}$ from column (I) of Table 5, we compute the counterfactual equilibrium under rotating reservations by solving

$$
\begin{aligned}
(\tilde{W}^0, \tilde{W}^{1,0,M}, \tilde{\zeta}_W, \tilde{\zeta}_V) \in \underset{W^0, W^{1,0,M}, \zeta_W, \zeta_V}{\arg\min} & \Big\{ \Psi^{W^{0,0,F}}(\hat{\theta}, W^0, W^{1,0,M}, \zeta_W, \zeta_V)^2 + \Psi^{W^{0,0,M}}(\hat{\theta}, W^0, W^{1,0,M}, \zeta_W, \zeta_V)^2 \\
& + \Psi^{W^{0,1,F}}(\hat{\theta}, W^0, W^{1,0,M}, \zeta_W, \zeta_V)^2 + \Psi^{W^{1,0,M}}(\hat{\theta}, W^0, W^{1,0,M}, \zeta_W, \zeta_V)^2 \\
& + \sum_{q \in 0,1} \int_0^1 \Big[\Psi^{W^{1,q,F}}(b; \hat{\theta}, W^0, W^{1,0,M}, \zeta_W, \zeta_V)^2 + \sum_{e \in \{0,1\}} \Psi^{V^{e,q,F}}(b; \hat{\theta}, W^0, W^{1,0,M}, \zeta_W, \zeta_V)^2 \Big] \mathrm{d}b \Big\}.
\end{aligned}
$$

E.3 Two-Term Random Reservations

Let $\ell_{nt} = -1$ indicate a reservation lottery takes place in ward n at time t. Otherwise, let $\ell_{nt} = q_{n,t-1}$, in which case we also have $q_{nt} = q_{n,t-1}$. Recall that, under two-term random reservations, we allow parties to adjust their renomination strategy as defined by (12). Given parties' adjusted strategy, the incumbent now conditions their effort choice on ℓ_{nt} (note that q_{nt} is unknown to the incumbent if $\ell_{nt} = -1$). The voter can condition incumbent-party reelection on both ℓ_{nt} and q_{nt}.

Voter's equilibrium strategy. As noted, the voter conditions their choice on state $s_{nt} = (\ell_{nt}, q_{nt}, b_{nt}^1, g_{nt}^1, g_{nt}')$, where $b_{nt}^1 = \rho^{y,\eta}(b_{nt}^0, y_{nt}, \ell_{nt}, q_{nt}, \eta_{nt.}, g_{nt}^1; \tilde{\theta})$ denotes voters' belief at the time of the election that the incumbent party's candidate is a high type. The voter's belief update takes the same form as in the baseline model after adjusting parties' renomination strategy. Note that, if $\ell_{nt} < 0$, the councilor elected in period t will make their effort choice next period knowing that $\ell_{n,t+1} = q_{n,t+1} = q_{nt}$. On the other hand, if $\ell_{nt} \geq 0$, then the elected councilor will face a lottery in period $t+1$. Thus, we now have $W^1(s_{nt};\zeta) = W^{1,\ell_{nt},q_{nt},g^1_{nt}}(b^1_{nt};\zeta_W^{\ell_{nt},q_{nt},g^1_{nt}})$ and $W^0_n(s_{nt}) = W^{0,\ell_{nt},q_{nt},g'_{nt}}$, where

$$
\begin{aligned}
W^{1,\ell_{nt},q_{nt},g^1_{nt}}(b^1_{nt};\zeta_W^{\ell_{nt},q_{nt},g^1_{nt}}) = {} & (\mathbb{1}_{g^1_{nt}=F})\xi_g \\
& + \delta\Big\{\mu_Y + \Big[b^1_{nt} + (1-b^1_{nt})\Big(\mathbb{1}_{\ell_{nt}<0}\sigma^{q_{nt},g^1_{nt}}(b^1_{nt};\zeta_V^{q_{nt},g^1_{nt}}) \\
& \qquad + \mathbb{1}_{\ell_{nt}\geq 0}\sigma^{-1,g^1_{nt}}(b^1_{nt};\zeta_V^{-1,g^1_{nt}})\Big)\Big]\lambda\Big\}\xi_y \\
& + \delta\mathbb{E}\Big[\log\Big(\exp\Big\{W^{1,\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}})\Big\} \\
& \qquad + \exp\Big\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\Big\}\Big)\Big| s_{nt}, r_{nt}=1;\tilde{\theta}\Big]
\end{aligned} \tag{E4}
$$

and

$$
\begin{aligned}
W^{0,\ell_{nt},q_{nt},g'_{nt}} = {} & (\mathbb{1}_{g'_{nt}=F})\xi_g \\
& + \delta\Big\{\mu_Y + \Big[\pi^{g'_{nt}} + (1-\pi^{g'_{nt}})\Big(\mathbb{1}_{\ell_{nt}<0}\sigma^{q_{nt},g'_{nt}}(\pi^{g'_{nt}};\zeta_V^{q_{nt},g'_{nt}}) \\
& \qquad + \mathbb{1}_{\ell_{nt}\geq 0}\sigma^{-1,g'_{nt}}(\pi^{g'_{nt}};\zeta_V^{-1,g'_{nt}})\Big)\Big]\lambda\Big\}\xi_y \\
& + \delta\mathbb{E}\Big[\log\Big(\exp\Big\{W^{1,\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}})\Big\} \\
& \qquad + \exp\Big\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\Big\}\Big)\Big| s, r_{nt}=0;\tilde{\theta}\Big].
\end{aligned} \tag{E5}
$$

We again denote by $\tilde{\theta} = (\theta, W^0, \zeta)$ the model parameters augmented with the auxiliary parameters of the incumbent's and voter's conditional value functions. In this case, we have $W^0 = (W^{0,\ell,q,g})_{\ell\in\{-1,0,1\},q\in\{0,1\},g\in\{F,M\}}$, $\zeta = (\zeta_W, \zeta_V)$, $\zeta_W = (\zeta_W^{\ell,q,g})_{\ell\in\{-1,0,1\},q\in\{0,1\},g\in\{F,M\}}$, $\zeta_V = (\zeta_V^{\ell,g})_{\ell\in\{-1,0,1\},g\in\{F,M\}}$, and $\zeta_V^{\ell,g} = (\zeta_V^{0,\ell,g}, \zeta_V^{1,\ell,g})$. (**Note:** again, to simplify exposition, we first define conditional value functions and their auxiliary parameters considering all triples (ℓ, q, g) and pairs (ℓ, g), but we impose below necessary restrictions given that men cannot compete in reserved wards.) By iterating expectations and letting $\tilde{g}^r_{nt} = rg^1_{nt} + (1-r)g'_{nt}$ and $\tilde{b}^r_{nt} = rb^1_{nt} + (1-r)\pi^{g'_{nt}}$, the voter's continuation value given $r_{nt} = r \in \{0,1\}$ can be written as

$$
\begin{aligned}
&\mathbb{E}\left[\log\left(\exp\left\{W^{1,\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}})\right\} + \exp\left\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\right\}\right) \middle| s_{nt}, r_{nt} = r; \tilde{\theta}\right] \\
&= \sum_{q_{n,t+1}\in\{0,1\}} \left[\mathbb{1}_{q_{n,t+1}=\ell_{n,t+1}} + \frac{1}{2}\mathbb{1}_{\ell_{n,t+1}<0}\right]\cdots \\
&\quad \sum_{g'_{n,t+1}\in\{F,M\}} \left[(q_{n,t+1} + (1-q_{n,t+1})\gamma)\,\mathbb{1}_{g'_{n,t+1}=F} + (1-q_{n,t+1})(1-\gamma)\mathbb{1}_{g'_{n,t+1}=M}\right]\cdots \\
&\quad \sum_{\eta_{n,t+1}\in\{0,1\}} \Bigg\{(1-\eta_{n,t+1})q_{n,t+1}\mathbb{1}_{\tilde{g}^r_{nt}=M} \\
&\quad + (1 - q_{n,t+1} + q_{n,t+1}\mathbb{1}_{\tilde{g}^r_{nt}=F})\left[\frac{\tilde{b}^r_{nt}\exp\left\{\alpha_0 + \alpha_\ell\mathbb{1}_{\ell_{n,t+1}<0} + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g\right] + \alpha_\omega\right\}^{\eta_{n,t+1}}}{1+\exp\left\{\alpha_0 + \alpha_\ell\mathbb{1}_{\ell_{n,t+1}<0} + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g\right] + \alpha_\omega\right\}}\right. \\
&\quad \left.+ \frac{(1-\tilde{b}^r_{nt})\exp\left\{\alpha_0 + \alpha_\ell\mathbb{1}_{\ell_{n,t+1}<0} + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g\right]\right\}^{\eta_{n,t+1}}}{1+\exp\left\{\alpha_0 + \alpha_\ell\mathbb{1}_{\ell_{n,t+1}<0} + \mathbb{1}_{\tilde{g}^r_{nt}=F}\left[(1-q_{n,t+1})\alpha^0_g + q_{n,t+1}\alpha^1_g\right]\right\}}\right]\Bigg\}\cdots \\
&\quad \mathbb{E}\Bigg[\log\Bigg(\exp\left\{W^{1,\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}})\right\} \\
&\qquad\qquad + \exp\left\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\right\}\Bigg) \Bigg| s_{nt}, r_{nt} = r, q_{n,t+1}, g'_{n,t+1}, \eta_{n,t+1}; \tilde{\theta}\Bigg],
\end{aligned}
$$

where

$$
\begin{aligned}
&\mathbb{E}\Bigg[\log\Bigg(\exp\left\{W^{1,\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}}(b^1_{n,t+1};\zeta_W^{\ell_{n,t+1},q_{n,t+1},g^1_{n,t+1}})\right\} \\
&\qquad\qquad + \exp\left\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\right\}\Bigg) \Bigg| s_{nt}, r_{nt} = r, q_{n,t+1}, g'_{n,t+1}, \eta_{n,t+1}; \tilde{\theta}\Bigg] \\
&= (1-\eta_{n,t+1})\Bigg[(q_{n,t+1} + (1-q_{n,t+1})\gamma)\log\left(\exp\left\{W^{1,\ell_{n,t+1},q_{n,t+1},F}(\pi^F;\zeta_W^{\ell_{n,t+1},q_{n,t+1},F})\right\} + \exp\left\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\right\}\right) \\
&\quad + (1-q_{n,t+1})(1-\gamma)\log\left(\exp\left\{W^{1,\ell_{n,t+1},q_{n,t+1},M}(\pi^M;\zeta_W^{\ell_{n,t+1},q_{n,t+1},M})\right\} + \exp\left\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\right\}\right)\Bigg] \\
&\quad + \eta_{n,t+1}\int_{-\infty}^{\infty}\log\Bigg(\exp\left\{W^{1,\ell_{n,t+1},q_{n,t+1},\tilde{g}^r_{nt}}\left(\rho^{y,\eta}(\tilde{b}^r_{nt}, y_{n,t+1}, \ell_{n,t+1}, q_{n,t+1}, 1, \tilde{g}^r_{nt};\zeta_W^{\ell_{n,t+1},q_{n,t+1},\tilde{g}^r_{nt}})\right)\right\} \\
&\qquad\qquad + \exp\left\{W^{0,\ell_{n,t+1},q_{n,t+1},g'_{n,t+1}}\right\}\Bigg)\cdots \\
&\quad \left[\tilde{b}^r_{nt}\phi\left(y_{n,t+1};\mu_y+\lambda,\varsigma^2_y\right) + (1-\tilde{b}^r_{nt})\left(\mathbb{1}_{\ell_{nt}<0}d^{q_{nt},\tilde{g}^r_{nt}}(y_{n,t+1}|\tilde{b}^r_{nt};\tilde{\theta}) + \mathbb{1}_{\ell_{nt}\geq 0}d^{-1,\tilde{g}^r_{nt}}(y_{n,t+1}|\tilde{b}^r_{nt};\tilde{\theta})\right)\right]\mathrm{d}y_{n,t+1}.
\end{aligned}
$$

and

$$
\begin{aligned}
d^{\ell_{n,t+1},\tilde{g}^r_{nt}}(y_{n,t+1}|\tilde{b}^r_{nt};\tilde{\theta}) &= \sigma^{\ell_{n,t+1},\tilde{g}^r_{nt}}(\tilde{b}^r_{nt};\zeta_V^{\ell_{n,t+1},\tilde{g}^r_{nt}})\phi\left(y_{n,t+1};\mu_y+\lambda,\varsigma^2_y\right) \\
&\quad + \left[1-\sigma^{\ell_{n,t+1},\tilde{g}^r_{nt}}(\tilde{b}^r_{nt};\zeta_V^{\ell_{n,t+1},\tilde{g}^r_{nt}})\right]\phi\left(y_{n,t+1};\mu_y,\varsigma^2_y\right).
\end{aligned}
$$

The likelihood that the voter reelects the incumbent party is given by

$$\sigma^w(\ell_{nt}, q_{nt}, b^1_{nt}, g^1_{nt}, g'_{nt}; \tilde{\theta}) = \frac{\exp\left\{W^{1,\ell_{nt},q_{nt},g^1_{nt}}(b^1_{nt}; \zeta_W^{\ell_{nt},q_{nt},g^1_{nt}})\right\}}{\exp\left\{W^{0,\ell_{nt},q_{nt},g'_{nt}}\right\} + \exp\left\{W^{1,\ell_{nt},q_{nt},g^1_{nt}}(b^1_{nt}; \zeta_W^{\ell_{nt},q_{nt},g^1_{nt}})\right\}}.$$

Incumbent's equilibrium strategy. The incumbent knows voters will condition their choice on state $s_{nt} = (\ell_{nt}, q_{nt}, b^1_{nt}, g^1_{nt}, g'_{nt})$. However, if $\ell_{nt} = -1$, the incumbent doesn't know q_{nt} at the time of their effort choice. Given $(\ell_{nt}, b^0_{nt}, g^0_{nt}, c_t)$, we have

$$\begin{aligned} V^{e,\ell_{nt},g^0_{nt}}(b^0_{nt}; \zeta_V^{e,\ell_{nt},g^0_{nt}}) = \beta + \delta \int_{-\infty}^{\infty} \phi\left(y_{nt}; \mu_y + e\lambda, \varsigma_y^2\right) \sum_{q_{nt}\in\{0,1\}} \left[\mathbb{1}_{q_{nt}=\ell_{nt}} + \frac{1}{2}\mathbb{1}_{\ell_{nt}<0}\right] \cdots \\ \frac{\mathbb{1}_{(g^0_{nt},q_{nt})\neq(M,1)} \exp\left\{\alpha_0 + \alpha_\ell \mathbb{1}_{\ell_{nt}<0} + \mathbb{1}_{g^0_{nt}=F}\left[(1-q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right]\right\}}{1 + \exp\left\{\alpha_0 + \alpha_\ell \mathbb{1}_{\ell_{nt}<0} + \mathbb{1}_{g^0_{nt}=F}\left[(1-q_{nt})\alpha^0_g + q_{nt}\alpha^1_g\right]\right\}} \cdots \\ \sum_{g'_{nt}\in\{F,M\}} \left[(q_{nt} + (1-q_{nt})\gamma)\,\mathbb{1}_{g'_{nt}=F} + (1-q_{nt})(1-\gamma)\mathbb{1}_{g'_{nt}=M}\right] \cdots \\ \frac{\exp\left\{W^{1,\ell_{nt},q_{nt},g^0_{nt}}\left(\rho^{y,\eta}(b^0_{nt}, y_{nt}, \ell_{nt}, q_{nt}, 1, g^0_{nt}; \tilde{\theta}); \zeta_W^{\ell_{nt},q_{nt},g^0_{nt}}\right)\right\}}{\exp\left\{W^{0,\ell_{nt},q_{nt},g'_{nt}}\right\} + \exp\left\{W^{1,\ell_{nt},q_{nt},g^0_{nt}}\left(\rho^{y,\eta}(b^0_{nt}, y_{nt}, \ell_{nt}, q_{nt}, 1, g^0_{nt}; \tilde{\theta}); \zeta_W^{\ell_{nt},q_{nt},g^0_{nt}}\right)\right\}} \cdots \\ \mathbb{E}\left[\max_{\tilde{e}\in\{0,1\}} V^{\tilde{e},\ell_{n,t+1},g^0_{nt}}(b^0_{n,t+1}; \zeta_V^{\tilde{e},\ell_{n,t+1},g^0_{nt}}) - \tilde{e}c_{n,t+1} \,\middle|\, b^0_{nt}, g^0_{nt}, y_{nt}, \ell_{nt}, q_{nt}, \eta_{nt} = 1, r_{nt} = 1; \tilde{\theta}\right] \mathrm{d}y_{nt}. \end{aligned} \tag{E6}$$

The conditional expectation above again takes a similar form to that in Appendix C, and a low-type incumbent's equilibrium strategy is given by

$$\sigma^{\ell_{nt},g^0_{nt}}(b^0_{nt}; \zeta_V^{\ell_{nt},g^0_{nt}}) = \max\left\{0, \min\left\{V^{1,\ell_{nt},g^0_{nt}}(b^0_{nt}; \zeta_V^{1,\ell_{nt},g^0_{nt}}) - V^{0,\ell_{nt},g^0_{nt}}(b^0_{nt}; \zeta_V^{0,\ell_{nt},g^0_{nt}}), 1\right\}\right\}.$$

Equilibrium. Under two-term reservations, the Bellman-violation mappings $\Psi^{W^{0,\ell,q,g}}(\tilde{\theta})$, $\Psi^{W^{1,\ell,q,g}}(b; \tilde{\theta})$, and $\Psi^{V^{e,\ell,g}}(b; \tilde{\theta})$ are defined by taking the corresponding difference between the left- and right-hand sides of (E4), (E5), and (E6). We make, however, two observations. First, if $\ell \geq 0$, we must have $\ell = q$. Second, male candidates cannot compete if $q = 1$. Thus, the only feasible (ℓ, q) pairs are $(-1, 0)$, $(-1, 1)$, $(0, 0)$, and $(1, 1)$; the only feasible (q, g) pairs are $(0, F)$, $(0, M)$, and $(1, F)$; and the only feasible (ℓ, g) pairs are $(-1, F)$, $(-1, M)$, $(0, F)$,

$(0, M)$, and $(1, F)$. Given these restrictions and model parameter estimates $\hat{\theta}$ from column (I) of Table 5, we compute the counterfactual equilibrium under two-term random reservations by solving a Bellman least-squares problem analogous to that in Appendix E.2.

F Model Fit, Validation, and Alternative Specifications

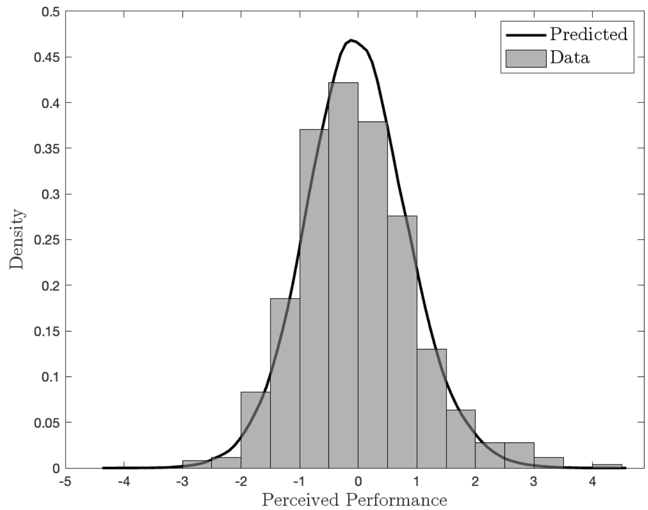
F.1 Model Fit and Validation

We assess the goodness of fit of our model by evaluating how well it predicts (i) policy outcomes, (ii) renomination decisions, and (iii) election outcomes. Let $\tilde{\theta}$ denote the model parameter estimates from column (I) of Table 5, augmented with the corresponding estimates of the auxiliary parameters of incumbents' and voters' conditional value functions. Model predictions are generated as follows. First, for each incumbent n and period t they are in office, we compute the voter's belief at the beginning of the period that the councilor is a high-type, $b_{nt}^0 = b_{nt}^0(Z_n^{t-1}; \tilde{\theta})$, where Z_n^{t-1} denotes the councilor's observed history in office up to period $t-1$, as explained in the paper. Recall that this belief is obtained by recursive application of Bayesian update (3). We then simulate 500 draws of policy outcome $\hat{y}_{nt}$ from the mixture distribution

$$\hat{y}_{nt} \sim \left[b_{nt}^0 + (1 - b_{nt}^0)\sigma^{g_{nt}^0}(b_{nt}^0; \tilde{\theta})\right] \mathcal{N}(\hat{\mu}_y + \hat{\lambda}, \hat{\varsigma}_y^2) + (1 - b_{nt}^0)\left[1 - \sigma^{g_{nt}^0}(b_{nt}^0; \tilde{\theta})\right] \mathcal{N}(\hat{\mu}_y, \hat{\varsigma}_y^2),$$

where $\sigma^g(b_{nt}^0; \tilde{\theta})$ denotes a low-type gender-g incumbent's equilibrium probability of exerting effort given b_{nt}^0, which is defined by (10). Figure F1 plots the histogram of observed policy outcomes in the data, y_{nt}, along with the density of model predictions, $\hat{y}_{nt}$. The predicted distribution matches the data remarkably well, including its left-of-zero mode. Our model only slightly underpredicts the right tail of the observed policy-outcomes distribution.

Figure F1: Model Fit: Policy Outcomes



Notes. This figure plots the histogram of observed policy outcomes (perceived performance scores) along with the density of corresponding model predictions using parameter estimates from column (I) of Table 5.

Second, predicted probabilities of renomination are computed as

$$\hat{\eta}_{nt} = (1 - q_{nt} + q_{nt}\mathbb{1}_{g^0_{nt}=F}) \left[\frac{\rho^y(g^0_{nt}, b^0_{nt}, y_{nt}; \tilde{\theta}) \exp\left\{\hat{\alpha}_0 + \mathbb{1}_{g^0_{nt}=F}\left[(1-q_{nt})\hat{\alpha}^0_g + q_{nt}\hat{\alpha}^1_g\right] + \hat{\alpha}_\omega\right\}}{1 + \exp\left\{\hat{\alpha}_0 + \mathbb{1}_{g^0_{nt}=F}\left[(1-q_{nt})\hat{\alpha}^0_g + q_{nt}\hat{\alpha}^1_g\right] + \hat{\alpha}_\omega\right\}} \right.$$
$$\left. + \frac{\left[1 - \rho^y(g^0_{nt}, b^0_{nt}, y_{nt}; \tilde{\theta})\right] \exp\left\{\hat{\alpha}_0 + \mathbb{1}_{g^0_{nt}=F}\left[(1-q_{nt})\hat{\alpha}^0_g + q_{nt}\hat{\alpha}^1_g\right]\right\}}{1 + \exp\left\{\hat{\alpha}_0 + \mathbb{1}_{g^0_{nt}=F}\left[(1-q_{nt})\hat{\alpha}^0_g + q_{nt}\hat{\alpha}^1_g\right]\right\}} \right],$$

where $\rho^y(g^0_{nt}, b^0_{nt}, y_{nt}; \tilde{\theta})$ denotes the updated likelihood that the councilor is a high type after observing policy outcome y_{nt}. Recall that this update is defined by (5). Notably, our model correctly predicts 75% of observed renomination decisions, where a correct prediction corresponds to $\eta_{nt} = \mathbb{1}_{\hat{\eta}_{nt}>0.5}$. To further validate our model, column (I) of Table F1 reproduces column (VIII) of Table 3 using the final sample with which we estimate our model. Column (II) of Table F1 then adds $\hat{\eta}_{nt}$ as a predictor. Notice that the specification in column (I) includes most of the variables used to compute $\hat{\eta}_{nt}$ (namely, q_{nt}, g^0_{nt}, and y_{nt}), as well as data on challenger gender, incumbent party, and year and administrative-ward fixed effects that our model ignores. Nevertheless, (with the exception of the BJP coefficient) the only significant predictor in column (II) is $\hat{\eta}_{nt}$, which provides strong evidence that our model, while parsimonious, captures the key considerations underlying renomination decisions in the data. In particular, our model accounts for inferences about councilors' unobserved types given their histories in office, $b^0_{nt} = b^0_{nt}(Z^{t-1}_n; \tilde{\theta})$, and corresponding updates $\rho^y(g^0_{nt}, b^0_{nt}, y_{nt}; \tilde{\theta})$. Note also an increase in the adjusted R^2 from column (I) to column (II).

Table F1: Model Validation: Incumbent Renomination

	(I)	(II)
Constant	0.579***	0.039
	(0.101)	(0.328)
Reserved	-0.365**	0.223
	(0.183)	(0.387)
Female	-0.325***	-0.013
	(0.072)	(0.197)
Reserved × Female	0.451*	-0.369
	(0.253)	(0.548)
Perceived Performance	0.019	-0.006
	(0.027)	(0.023)
Female × Perceived Performance	0.026	0.051
	(0.043)	(0.041)
Female Challenger	-0.162	-0.217
	(0.193)	(0.165)
Female × Female Challenger	0.274	0.332
	(0.257)	(0.238)
Bharatiya Janata Party (BJP)	0.156*	0.147*
	(0.085)	(0.085)
Indian National Congress (INC)	0.031	0.030
	(0.064)	(0.064)
Shiv Sena (SS)	0.043	0.042
	(0.062)	(0.061)
Model Prediction ($\hat{\eta}_{nt}$)		1.038*
		(0.605)
Year F.E.	Yes	Yes
Administrative-Ward F.E.	Yes	Yes
Observations	320	320
Adjusted R^2	0.209	0.215

Notes. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Column (I) reproduces column (VIII) of Table 3 using the final sample with which we estimate our model. Column (II) adds as a regressor $\hat{\eta}_{nt}$, our model's predicted probability of renomination. Model predictions are computed using parameter estimates from column (I) of Table 5.

Finally, we compute predicted probabilities of incumbent-party reelection as

$$\hat{r}_{nt} = \sigma^w(b^1_{nt}, g^1_{nt}, g'_{nt}; \tilde{\theta}),$$

where the voter's equilibrium reelection strategy, σ^w, is defined by (8), and the voter's belief about the incumbent-party candidate's type, $b^1_{nt} = \rho^{y,\eta}(b^0_{nt}, y_{nt}, q_{nt}, \eta_{nt}, g^1_{nt}; \tilde{\theta})$, is defined by (3). Our model correctly predicts 63% of observed election outcomes (i.e., $r_{nt} = \mathbb{1}_{\hat{r}_{nt}>0.5}$). Again, to further validate our model, column (I) of Table F2 reproduces column (VI) of Table 4 using the final sample with which we estimate our model. Column (II) of Table F2 then adds $\hat{r}_{nt}$ as a predictor. Only two incumbent-party coefficients (BJP and SS) remain statistically significant in column (II). Moreover, the coefficient on $\hat{r}_{nt}$ is the largest in magnitude and only marginally insignificant (p-value = 0.104), and the adjusted R^2 again increases from column (I) to column (II). This indicates that our model, while parsimonious, captures well the key considerations underlying voters' observed choices—in particular, their inferences about candidates' unobserved types.

F.2 Alternative Specifications

We conclude by evaluating the robustness of our results to alternative sample and model specifications. For easy reference, column (I) of Table F3 reproduces parameter estimates from column (I) of Table 5. Column (II) of Table F3 presents results using an alternative measure of observed policy outcomes: instead of using data from the last available Praja survey for each electoral cycle, we average all available surveys within a cycle. That is, we use the 2011 survey for 2007–2012 incumbents, we average the 2013–2016 surveys for 2012–2017 incumbents, and we average the 2018–2019 surveys for 2017–2022 incumbents. Results are nearly identical.

Column (III) of Table F3 uses our original measure of incumbent performance but drops from the sample wards with an SC *or* ST population share above 5%. As discussed in Appendix B, only the latter are eligible to receive SC/ST reservation status, and ethnic reservations impose an additional layer of term-limiting risk for incumbents that our model ignores. However, column (III) shows that our parameter estimates are robust to focusing on the subsample of wards that are not subject to SC/ST reservations. The only notable difference is that, in column (III), parties' renomination strategy conditions more sharply on incumbent gender and type, which is consistent with our baseline estimates treating renomination risk due to ethnic reservations as noise.

Finally, as noted in the paper, we set the incumbent's and voter's discount factor $\delta = 0.95$ for all results in Tables 5 and F3. Table F4 shows that our estimates are robust to alternative values of the discount factor, ranging from $\delta = 0.8$ to $\delta = 0.99$.

Table F2: Model Validation: Incumbent-Party Reelection

	(I)	(II)
Constant	0.116	-1.516
	(0.143)	(1.009)
Female	0.151	0.033
	(0.138)	(0.158)
Renominated	0.321***	-0.652
	(0.086)	(0.613)
Female × Renominated	-0.320**	0.657
	(0.130)	(0.628)
Perceived Performance	-0.022	-0.023
	(0.036)	(0.036)
Renominated × Perceived Performance	0.194**	0.129
	(0.080)	(0.087)
Female × Renom'd × Perc'd Performance	-0.232**	-0.165
	(0.115)	(0.121)
Female Challenger	-0.028	0.029
	(0.153)	(0.140)
Female × Female Challenger	-0.147	-0.087
	(0.206)	(0.194)
Bharatiya Janata Party (BJP)	0.328***	0.329***
	(0.108)	(0.108)
Indian National Congress (INC)	-0.063	-0.063
	(0.078)	(0.078)
Shiv Sena (SS)	0.190**	0.189**
	(0.083)	(0.083)
BJP Challenger	-0.016	-0.010
	(0.093)	(0.093)
INC Challenger	-0.115	-0.110
	(0.088)	(0.086)
SS Challenger	-0.086	-0.086
	(0.089)	(0.088)
Model Prediction ($\hat{r}_{nt}$)		3.260
		(2.004)
Year F.E.	Yes	Yes
Administrative-Ward F.E.	Yes	Yes
Observations	264	264
Adjusted R^2	0.167	0.169

Notes. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Column (I) reproduces column (VI) of Table 4 using the final sample with which we estimate our model. Column (II) adds as a regressor $\hat{r}_{nt}$, our model's predicted probability of incumbent-party reelection. Model predictions are computed using parameter estimates from column (I) of Table 5.

Table F3: Parameter Estimates with Alternative Samples

	(I)	(II)	(III)
π^F (Voter Prior: Female)	1.000***	1.000***	0.996***
	(0.146)	(0.224)	(0.294)
π^M (Voter Prior: Male)	0.526***	0.622***	0.391**
	(0.133)	(0.128)	(0.171)
α_0 (Renomination: Low-Type Male)	-1.623*	-2.490	-1.228*
	(0.907)	(1.975)	(0.627)
α_g^0 (Renom'n: Female, Unreserved Ward)	-2.626***	-2.388**	-10.304***
	(0.840)	(0.967)	(3.416)
α_g^1 (Renom'n: Female, Reserved Ward)	-1.586*	-1.335	-9.354**
	(0.869)	(0.987)	(3.674)
α_ω (Renomination: High Type)	2.970**	3.587	10.211***
	(1.338)	(2.577)	(2.882)
β (Office Benefit)	9.299	2.163	12.891
	(7.615)	(3.662)	(8.009)
γ (Female Nomination, Unreserved Ward)	0.068***	0.068***	0.052**
	(0.020)	(0.022)	(0.023)
λ (Effect of Effort)	0.369*	0.465	0.352
	(0.198)	(0.370)	(0.399)
μ_y (Policy-Outcome Mean, No Effort)	-0.313**	-0.424**	-0.280
	(0.150)	(0.190)	(0.187)
ς_y (Policy-Outcome St. Dev.)	0.989***	0.988***	1.015***
	(0.040)	(0.041)	(0.088)
ξ_y (Voter: Value of Policy)	9.831***	8.416***	7.365**
	(2.841)	(2.300)	(3.068)
ξ_g (Voter: Expressive Gender Preference)	-1.296**	-1.085*	-1.147*
	(0.577)	(0.602)	(0.643)
Observations	1,091	1,095	600
Log-Likelihood	-1,090	-1,096	-593.4
Total Sq. Bellman Violation	2.4×10^{-6}	1.3×10^{-7}	3.2×10^{-6}

Notes. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Bootstrapped standard errors are shown in parentheses. For all specifications, we use quadratic B-splines with four interior (uniform) knots to approximate conditional value functions. For easy reference, column (I) reproduces results from column (I) of Table 5. Column (II) uses an alternative measure of policy outcomes that averages incumbent performance scores across all available Praja surveys in an electoral cycle. Column (III) uses our original measure of incumbent performance but drops from the sample wards with an SC or ST population share above 5%. The total number of observations includes observed policy outcomes, y_{nt}; observed renomination decisions, η_{nt}; and observed election outcomes, r_{nt}. There are $N = 472$ individual councilors in the sample used in column (I), $N = 475$ in column (II), and $N = 257$ in column (III).

Table F4: Parameter Estimates with Alternative Discount Factors

	$\delta = 0.8$	$\delta = 0.85$	$\delta = 0.9$	$\delta = 0.95$	$\delta = 0.99$
π^F (Voter Prior: Female)	1.000***	1.000***	1.000***	1.000***	1.000***
	(0.180)	(0.220)	(0.108)	(0.146)	(0.251)
π^M (Voter Prior: Male)	0.530***	0.531***	0.529***	0.526***	0.532***
	(0.161)	(0.140)	(0.129)	(0.133)	(0.179)
α_0 (Renomination: Low-Type Male)	-1.634	-1.640	-1.637	-1.623*	-1.651
	(1.244)	(1.212)	(1.054)	(0.907)	(1.114)
α_g^0 (Renom'n: Female, Unreserved Ward)	-2.609**	-2.606***	-2.616**	-2.626***	-2.608*
	(1.183)	(0.903)	(1.030)	(0.840)	(1.331)
α_g^1 (Renom'n: Female, Reserved Ward)	-1.569	-1.565	-1.576	-1.586*	-1.568
	(1.252)	(1.006)	(1.007)	(0.869)	(1.369)
α_ω (Renomination: High Type)	2.965**	2.967*	2.974*	2.970**	2.980
	(1.506)	(1.530)	(1.606)	(1.338)	(1.846)
β (Office Benefit)	12.143	11.906**	10.740	9.299	10.931**
	(7.396)	(4.960)	(7.523)	(7.615)	(5.339)
γ (Female Nomination, Unreserved Ward)	0.068***	0.068***	0.068***	0.068***	0.068***
	(0.020)	(0.019)	(0.023)	(0.020)	(0.019)
λ (Effect of Effort)	0.371**	0.372*	0.371*	0.369*	0.372
	(0.182)	(0.202)	(0.220)	(0.198)	(0.257)
μ_y (Policy-Outcome Mean, No Effort)	-0.316**	-0.317***	-0.315*	-0.313**	-0.317**
	(0.129)	(0.119)	(0.178)	(0.150)	(0.130)
ς_y (Policy-Outcome St. Dev.)	0.989***	0.989***	0.989***	0.989***	0.989***
	(0.044)	(0.038)	(0.040)	(0.040)	(0.055)
ξ_y (Voter: Value of Policy)	12.074***	11.231***	10.478***	9.831***	9.350***
	(3.935)	(3.416)	(3.181)	(2.841)	(3.248)
ξ_g (Voter: Expressive Gender Preference)	-1.375**	-1.344**	-1.317**	-1.296**	-1.263**
	(0.568)	(0.605)	(0.596)	(0.577)	(0.491)
Observations	1,091	1,091	1,091	1,091	1,091
Log-Likelihood	-1,090	-1,090	-1,090	-1,090	-1,090
Total Sq. Bellman Violation	2.3×10^{-6}	2.4×10^{-6}	2.3×10^{-6}	2.4×10^{-6}	2.7×10^{-6}

Notes. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Bootstrapped standard errors are shown in parentheses. For all specifications, we use quadratic B-splines with four interior (uniform) knots to approximate conditional value functions. For easy reference, the column with $\delta = 0.95$ reproduces results from column (I) of Table 5. The total number of observations includes observed policy outcomes, y_{nt}; observed renomination decisions, η_{nt}; and observed election outcomes, r_{nt}. There are $N = 472$ individual councilors in the sample.

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