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Gender bias and women's political performance ☆

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ABSTRACT

We model voters' gender bias as a prejudice on women's competence coming from a distorted prior. We analyse the effect of this bias in a two-period two-party election model in which voters care about both policy preference and competence. We find that, if voters (wrongly) believe that women are drawn from a distribution of competences with higher weights on lower values, female politicians are less likely to win office but, when elected, they are on average more competent than male elected officials. As a consequence, female incumbents seek re-election more often.

1. Introduction

Under-representation of women in parliaments worldwide is an issue that has been puzzling political scientists and political economists for a long time. While gender gaps in many areas have been reduced or have completely disappeared, women are still a minority in elected legislatures. They account for 24.9% of the members of parliaments worldwide, in spite of being roughly 50% of the population.

This is clearly a failure of descriptive representation but this deficit is of even greater concern because women's policy preferences receive more attention when a larger percentage of women are elected. It is therefore a question of substantive, not just formal, representation,[1] as recent studies have shown that female politicians are more effective at addressing women's policy needs (Chattopadhyay and Duflo, 2004; Svaleryd, 2009; Clots-Figueras, 2011; Funk and Gathmann, 2015; Braga and Scervini, 2016).

The puzzle comes from the fact that elected women tend to be more qualified than men and while in office they seem to be better representatives for their district (Volden et al., 2012). If, given this superiority, women are still such a minority among legislators, it must be that voters hold some kind of gender bias when evaluating candidates (Pearson and McGhee, 2013). Studies have shown that voters hold women to a higher standard, and vote them only if they are both capable and likeable (Anzia and Berry, 2011), and that they believe that women are more suitable for dealing with some issues like healthcare and education and less with others like homeland security (Lawless, 2004; Falk and Kenski, 2004).

This paper proposes a belief-based theoretical model of gender bias without assuming explicit voters' preference for male politicians and we study its implications on politicians' quality and behaviour, and on their probability of winning an election.

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[1] For a review of the literature on substantive effects of female representation on policies see Hessami and da Fonseca (2020).

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Explanations of female under-representation. Female under-representation in politics is due both to a shortage of candidates (supply side) and to a lower appeal of women politicians in elections (demand side). As for the supply story, according to the Inter Parliamentary Union, the top five motivations that globally keep women from entering politics are: domestic responsibilities, prevailing cultural attitudes regarding the role of women in society, lack of support from family, lack of confidence and lack of finance. Females are typically the primary caregivers both for children and the elderly and therefore tend to have a higher opportunity cost of running for elections (Fox et al., 2001). On top of that, they tend to be less numerous in the professions which constitute the pipeline of the political career (Welch, 1977; Clark, 1994). But other explanations have been proposed for the low level of female entry in politics: women tend to be under-confident and do not think they possess the characteristics for being successful candidates (Fox and Lawless, 2011), women are willing to represent their group but are election averse (Kanthak and Woon, 2015), women have lower political ambition due to reduced political socialisation within the family (Fox and Lawless, 2014), and there is a scarcity of political role models for women (Campbell and Wolbrecht, 2006).

On the demand side, instead, a large survey evidence gathered by psychologists and political scientists suggests that voters largely think that "men are better suited emotionally", "men make better leaders" and that there are circumstances in which being "tough" is really important (Huddy and Terkildsen, 1993; Dolan, 2004). In fact, when elections focus on terrorism, defence and homeland security, the willingness to vote for female politicians is lower (Lawless, 2004; Falk and Kenski, 2004).

Yet, information (or the lack of it) may play a relevant role in determining gender bias. Sanbonmatsu (2002) shows how voters may use gender as a low-information short-cut to make decisions at the poll station, as a way of simplifying the assessment of complex probability judgements (as in (Kahneman and Tverski, 1972)). As a matter of fact, voters who pay little attention to politics and do not gather enough information may vote according to heuristics, the first being party affiliation, and the second one being the candidate's gender. This suggests that gender stereotypes affect voting behaviour because they influence, more or less consciously, the way in which candidates are evaluated. This influence is weaker for informed voters, as the effect of gender attitudes can be attenuated by providing more information on the candidates' qualifications and past experiences (see Mo, 2015).

Recently Bordalo et al. (2016) have formalised the formation of stereotypes building on the work of Tverski and Kahneman (1983). In their work, a stereotype is a probability distribution that over-(under-)estimates the likelihood of an event and it is built on a *kernel of truth*, i.e., it is originated by a true (possibly small) difference between groups. When dealing with gender stereotypes in politics though, this element of truth cannot be found. Findings of the empirical literature indeed confirm the fact that women in office are on average better than the men in the same elected body. More precisely, there is evidence that women tend to have greater prior political experience (Pearson and McGhee, 2013), that they deliver more federal funds for their district (Anzia and Berry, 2011), that they put more bills through the legislative process (Volden et al., 2012) and that they deliver more speeches on the house floor (Pearson and Dancey, 2011). Intuitively, if voters hold a bias unfavourable to female candidates, only the most talented and hard working women will succeed in the electoral process.

A model more in line with our interpretation of the bias can be found in Bohren et al. (2019). Their work shows how the dynamics of discrimination may be different depending on whether discrimination itself is preferences-based or belief-based (with either correct of incorrect beliefs). In the second case, over time, we might even observe reverse discrimination. The source of the bias we model is similar to their belief-based approach but our "evaluation" is much coarser since it is the result of a political election. We believe ours is the first voting model that incorporates belief-based gender discrimination.

Modelling gender bias as an information bias. In our model we will study the implications of voters' gender bias on the probability of females being elected, on politicians' quality, implemented policies and chances of re-election without assuming explicit preferences for male politicians. In order to achieve this, we build a multi-period model where political candidates have private information on two of their own characteristics: policy preference and competence (see ideology and valence in Bernhardt et al., 2011). Voters have heterogeneous policy preferences, while they are homogeneous in their preference for higher competence. Candidates instead are heterogeneous both in their policy preference and in their level of competence. In our model, the competence of male and female politicians is drawn from the same distribution but voters believe that women are drawn from a distribution where lower competences have higher probability than for men. Voters observe a signal on the candidates' competences before they run for the first time, while competences are observed during the first period in office (following Bernhardt et al., 2011).

Note that we model the source of the bias against females as a misperception of the characteristics of the group. This prejudice, however, implies that if the voters observe the same signal on candidates' competences they are going to expect that female candidates are of a worse type than male ones. The fact that competences are observed when in office, instead, implies that the bias against women can be reduced since voters update their prior on female competences.

The assumption that voters have a distorted prior may be grounded in history. Indeed, in the not so distant past, it was true that women had a different distribution of political competence due to gaps in education and labour market participation. Nowadays, the gap in education has disappeared in most countries, and the gap in labour market participation is steadily shrinking. Yet, the gap in political performance and participation suffers from an additional information aspect. Women may be elected only if they manage to convince voters of their competence. However, voters, due to their distorted belief, elect them less often than men. Hence, the bias in politics is more persistent than elsewhere.

Our results on the implication of such an informative gender bias are consistent with the evidence discussed above. We find that women win elections less often, but elected female politicians have higher competence (on average) than male ones. This implies also that female incumbents are re-elected more often than male ones, a result which is also consistent with empirical evidence (Ferreira and Gyourko, 2014; Bhalotra et al., 2018).

The structure of the paper is as follows: Section 2 introduces the model, Section 3 characterises the equilibrium and discusses its dynamics and implications, and Section 4 concludes. An Appendix contains the proofs.

2. The model

We consider a two-period model: in each period there is an election in which two candidates, one from party L and one from party R, face each other, and a policy period, in which the elected politician implements a policy. Politicians are characterised by their policy preference x^k, and their competence v^k, $k = L, R$. Voters are heterogeneous in their policy preference, but they all prefer higher competence. We model the potential trade-off between competence and policy preference, as in Bernhardt et al. (2011), and we adopt their utility function.

Politicians. Politicians are characterised by policy preference and competence and they are policy oriented. In every period, they receive utility from the implemented policy, $y_t \in \mathbb{R}$ and the competence of the elected politician, v_t^P, where $P = L, R$ is the identity of the elected politician in period t. The utility of a politician from party k in period t is:

$$u_t^k\left(y_t, v_t^P\right) = -\left(x^k - y_t\right)^2 + v_t^P.$$

A politician from party L has policy preference $x^L \sim U[-1, 0]$, and a politician from party R has policy preference $x^R \sim U[0, 1]$. The competence $v^k \sim U[0, 1]$ for $k = L, R$, and it is private information of each candidate before the election. Note that while policy preference and competence of a politician are constant across periods, the identity of each party's candidate may vary. Therefore, we let x_t^k and v_t^k denote the policy preference and competence of party k's candidate in period t. When a politician is elected his/her competence and policy preference are observed.[2]

Voters. Each voter i has policy preferences characterised by a bliss point x^i. Bliss points $x^i \sim U[-1, +1]$, so that the median voter has bliss point $x^m = 0$. Period t utility of each voter depends on the implemented policy y_t and on the competence of the elected politician v_t^P as follows:

$$u_t^i\left(y_t, v_t^P\right) = -\left(x^i - y_t\right)^2 + v_t^P.$$

Note that voters and politicians have the same utility function.

Gender and gender bias. The first time they run for office, candidates are randomly selected from a gender-balanced population (male/female with equal probability). The gender of the candidate matters, in that there is a distortion in the voters' perception of female candidates.[3] Even though the competence of the candidates is $v_t^k \sim U[0, 1]$ regardless of the candidate's gender, voters' prior belief on female candidates is that there is a probability ϕ_t that they come from a worse distribution, specifically $v_t^k | F \sim U[0, V]$ where $V \in \left(\frac{1}{3}, 1\right)$, and from the true one $v_t^k | F \sim U[0, 1]$ with the complementary probability $(1 - \phi_t)$.[4] Therefore, the higher is ϕ_t the higher is the gender bias. Period 1 belief ϕ_1 is taken as given, while period 2 belief ϕ_2 may be updated if a female politician is elected in period 1 and her competence is observed.

Signal. When a candidate runs for the first time, voters observe a signal $\sigma_t^k \in \left\{\underline{v}, \overline{v}\right\}$ on his/her competence. The signal reveals whether the competence of the candidate is below ($\underline{v}$) or above ($\overline{v}$) the median of its group. Hence the perceived expected competence given the signal σ_t^k differs for male and female candidates as follows:

$$\mathbb{E}\left[v_t^k | \sigma_t^k, M\right] = \begin{cases} \frac{3}{4} & if\ \sigma_t^k = \overline{v} \\ \frac{1}{4} & if\ \sigma_t^k = \underline{v} \end{cases} \quad ; \quad \mathbb{E}\left[v_t^k | \sigma_t^k, F\right] = \begin{cases} \frac{3}{4}\left(1 - \phi_t(1 - V)\right) & if\ \sigma_t^k = \overline{v} \\ \frac{1}{4}\left(1 - \phi_t(1 - V)\right) & if\ \sigma_t^k = \underline{v} \end{cases}.$$

As a consequence, the expected competence of a female candidate is lower than the one of a male candidate for any possible signal. Moreover $\mathbb{E}\left[v_t^k | \sigma_t^k, F\right]$ is decreasing in the bias ϕ_t. Given the assumption $V > \frac{1}{3}$, it is always the case that a woman with a high signal has a higher expected competence than a man with a low signal for any possible ϕ_t.

Timing. The sequence of events at period 1 is:

- Two randomly drawn untried candidates (one per party) run for election.
- Signals on candidates' competences are observed.
- Given the information about candidates (party affiliation, gender and σ) citizens vote for their preferred candidate.
- The winning politician, P, with policy preference x_1^P and competence v_1^P, implements the policy choice $y_t = p\left(x_1^P, v_1^P\right)$.
- The incumbent optimally decides whether to run for re-election or not.

The sequence of events at period 2 is

- Two candidates (one per party) run for election. One of them may be the incumbent.

[2] We depart from the standard assumption of Bernhardt et al. (2011) by assuming that also policy preference is observed.

[3] We assume that politicians are not biased. This assumption is relevant only in determining their re-candidacy decision, when the incumbent takes into account also his/her utility when a different candidate is elected. The analysis is robust to the alternative assumption that politicians are gender biased as well. A discussion of the consequences of this alternative assumption on the re-candidacy decision can be found in the proof of Proposition 1 in Appendix.

[4] The assumption $V > \frac{1}{3}$ prevents the trivial case in which each male candidate is perceived as more competent than any female one. See the proof of Proposition 1 in the Appendix for a discussion of this.

- Signals on candidates' competences are observed.
- Given the information about candidates (party affiliation, gender and σ for the untried candidates; party affiliation, gender, x_1^P, v_1^P and y_1 for the incumbent) citizens vote for their preferred candidate.
- The winning politician, P, with policy preference x_2^P and competence v_2^P, implements the policy choice $y_2 = p\left(x_2^P, v_2^P\right)$.

3. Equilibrium analysis

An equilibrium of this political game is composed by policy choices and voting decisions that may involve incumbents, for which policy preference x^I and competence v^I have already been observed, or untried candidates for which only party affiliation is known. Proposition 1 characterises a Perfect Bayesian Equilibrium with weakly undominated voting strategies.[5]

Proposition 1. *The following pure strategies constitute a political equilibrium in which the electoral outcome is decided by the median voter* ($x^m = 0$).

Policy choice. *In every period $t = 1, 2$ the elected politician, P, implements $y_t = x_t^P$.*

Voting on untried candidates. *When candidates are both untried the median voter votes according to the following ranking of gender-signal pairs*

$$\left(M, \overline{v}\right) \succ \left(F, \overline{v}\right) \succ \left(M, \underline{v}\right) \succ \left(F, \underline{v}\right),$$

randomising with equal probability when indifferent.

Voting for the incumbent. *The median voter votes for the incumbent:*

1. *for any type of challenger when $v^I \geq \left(x^I\right)^2 + \frac{5}{12}$;*
2. *if the challenger's gender-signal pair is in $\left\{\left(F, \overline{v}\right), \left(M, \underline{v}\right), \left(F, \underline{v}\right)\right\}$ when $v^I \geq \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi_2\left(1 - V\right)$;*
3. *if the challenger's gender-signal pair is in $\left\{\left(M, \underline{v}\right), \left(F, \underline{v}\right)\right\}$ when $v^I \geq \left(x^I\right)^2 - \frac{1}{12}$;*
4. *if the challenger's gender-signal pair is $\left(F, \underline{v}\right)$ when $v^I \geq \left(x^I\right)^2 - \frac{1}{12} - \frac{1}{4}\phi_2\left(1 - V\right)$.*

Re-candidacy decision. *The incumbent of $t = 1$ runs for re-election in $t = 2$ if one of the following conditions holds:*

1. $v^I \geq \max\left\{-\left(x^I\right)^2 + \frac{1}{3}x^I + \frac{1}{4}, \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi(1 - V)\right\}$;
2. $v^I \in \left[\max\left\{\left(x^I\right)^2 - \frac{1}{12}, -\left(x^I\right)^2 + x^I + \frac{1}{6}\right\}, \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi(1 - V)\right]$.

In this political game, every elected politician implements a policy choice equal to his/her bliss point in every period. In the second period, which is the end of the game, this is trivially optimal, as there are no incentives to do otherwise to gain votes for re-election. In the first period, instead, this is due to the fact that both policy preference and competence are observed when a politician is elected. As a consequence, the incumbent has no incentive to mimic a different policy preference, given that voters correctly anticipate his/her second period policy choice (if re-elected).

The median voter, instead, forms expectations on untried candidates on the basis of their gender-signal pairs. These expectations concern both the candidate's policy choice and his/her competence. The median voter's expected utility from the policy component is the same for any untried candidate, given that politicians' policy preferences are uniformly distributed and parties are symmetric around the median voter's position. Therefore, when evaluating an untried candidate, the median voter only focuses on the politician's expected competence. In this respect, politicians are instead different even ex-ante, and information on the expected competence can be inferred from the gender-signal pairs. As discussed in Section 2 the voters' distorted prior (*gender bias*) implies that the median voter expects the highest competence from male candidates with high signals, followed by female candidates with high signals, male candidates with low signals and, at the bottom, female candidates with low signals. Therefore, in elections involving an open seat (*i.e.*, with two untried candidates) the median voter votes for the candidate with the highest expected competence as described by the ranking in Proposition 1, randomising with equal probability when choosing between candidates with the same gender-signal pair.

The case of elections with an incumbent is different. When an incumbent runs for re-election both his/her policy preference and competence matter for the median voter's decision as they are known, and for this reason the incumbent's gender does not affect the voting decision of the electorate. The incumbent is more likely to be re-elected for higher competences and lower policy biases. Re-election is also more likely the lower the expected competence of the challenger.

Finally, the incumbent anticipates this electoral outcome and chooses to run for re-election only when his/her competence is sufficiently high.

[5] We consider a variant of the PBE which incorporates the independence assumption that is characteristic of sequential equilibria, the "no-signaling-what-you-don't-know" condition, as in Fudenberg and Tirole (1991). In our framework, the assumption notably implies that observed deviations from the incumbent do not signal anything on the challenger's type.

3.1. Effects of the gender bias

The presence of a bias in voters' appraisal of candidates has naturally many consequences for the career of politicians conditional on their gender. In what follows we show in detail how women have a lower chance of being elected but, when this happens, they are characterised by higher competences on average and will therefore be stronger incumbents so that they will typically run for re-election more often.

Female probability of winning. The first effect of gender bias is a distortion in the winning probability of women, in that female candidates are less likely to win for any given signal. Women are thought to be drawn from a distribution that gives higher probability to lower competences. This has two implications. First, when running for an open seat, they lose the electoral competition against males with the same signal. The winning probabilities given σ_t^k in an open seat election are as follows:

$$\Pr_t\left[\text{win}|\sigma_t^k, M\right] = \begin{cases} \frac{7}{8} & if\, \sigma_t^k = \overline{v} \\ \frac{3}{8} & if\, \sigma_t^k = \underline{v} \end{cases}, \quad \Pr_t\left[\text{win}|\sigma_t^k, F\right] = \begin{cases} \frac{5}{8} & if\, \sigma_t^k = \overline{v} \\ \frac{1}{8} & if\, \sigma_t^k = \underline{v} \end{cases},$$

so that the winning candidate is a woman with probability $\frac{3}{8}$ which is lower than the fraction of female candidates $\left(\frac{1}{2}\right)$.

Second, the bias also affects the probability of winning when running against an incumbent. Note that challengers with low signals, regardless of their gender, always lose competitions against incumbents who optimally seek re-election. Thus, the difference is driven by challengers with high signals. In this group, male challengers win against incumbents with $v^I < \left(x^I\right)^2 + \frac{5}{12}$, while female challengers only win against a subset of them, i.e., those with $v^I < \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi_2(1-V)$. Hence, challengers with high signals win or lose against incumbents with intermediate competences $\left(v^I \in \left[\left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi_2(1-V), \left(x^I\right)^2 + \frac{5}{12}\right)\right)$ only because of their gender, even though their (true) expected competence is the same across genders.

Expected competence of elected politicians. A second effect of the bias is that the expected competence of an elected politician depends on his/her gender. Indeed, the expected competence of elected politicians is higher for women, and this phenomenon is driven by the electoral competitions for open seats. Male politicians who win an open seat election are above the median ($\sigma_t^P | M = \overline{v}$) with a lower probability than elected females. As the true median is the same for both groups the result follows:

$$\mathbb{E}\left[v_t^P|M\right] = \Pr\left(\sigma_t^P = \overline{v}|M\right)\mathbb{E}\left[v_t^P|\overline{v}, M\right] + \Pr\left(\sigma_t^P = \underline{v}|M\right)\mathbb{E}\left[v_t^P|\underline{v}, M\right] = \frac{3}{5},$$
$$\mathbb{E}\left[v_t^P|F\right] = \Pr\left(\sigma_t^P = \overline{v}|F\right)\mathbb{E}\left[v_t^P|\overline{v}, F\right] + \Pr\left(\sigma_t^P = \underline{v}|F\right)\mathbb{E}\left[v_t^P|\underline{v}, F\right] = \frac{2}{3}.$$

Voting for the incumbent. Gender bias has no effect on voters' perception of the incumbent, since both his/her competence and policy preference are observed once in office. What affects the incumbent's chances of re-election, instead, is the challenger's gender-signal pair. Note that in an election between an incumbent of type $\left(x^I, v^I\right)$ and an untried challenger, as the quality of the challenger (predicted by the gender-signal pair) falls, the set of incumbent's characteristics $\left(x^I, v^I\right)$ that allows him/her to gain re-election grows larger.

Running for re-election. Voters' evaluation of an incumbent does not depend on his/her gender.[6] Therefore, re-election incentives are the same for male and female politicians in office. Specifically, incumbents that are so good that they win against any type of challenger always run for re-election. Candidates who win at most against a female challenger with a low signal, instead, never choose to do so, as running implies that the opposing party wins too often, thus implementing a policy that belongs to the opposite side of the policy spectrum. Candidates with intermediate types, who win against candidates with low signals, and possibly also against female candidates with high signals, only run for re-election if their competence is high enough given their policy preference. These results hold whatever the gender of the incumbent, nonetheless there is an indirect effect of gender on the re-candidacy decision. As a matter of fact, as discussed before, elected women have higher competences and will be harder-to-defeat incumbents, which is consistent with empirical findings in the literature (Fulton, 2012; Ferreira and Gyourko, 2014). Hence, elected women are more likely to be in those parametric regions in which re-candidacy is optimal, so that on average they run for re-election more often (Bhalotra et al., 2018).

4. Policy implications and conclusions

This paper proposes an explanation for the presence of gender bias in politics as a demand effect driven by a prejudice of voters on the distribution of competences in the female population. In a simple two-period model we have shown how modelling gender bias as an informational bias of voters in the evaluation of candidates generates results that are consistent with the empirical evidence of the existing political science and political economy literature. For example, we found that women win less often than men but those who are elected are on average more competent than the elected male politicians.

If information is the key explanation, being exposed to very talented and qualified female politicians may actually reduce the bias with which voters evaluate candidates when making their voting decision. In this respect, quotas and other affirmative action policies may speed up the process as institutional changes are useful to modify cultural and social norms that otherwise evolve

[6] This is consistent with Shair-Rosenthal and Hinojosa (2014), who find evidence in Chilean data that incumbency eliminates voters' bias.

extremely slowly. Our model suggests a mechanism through which affirmative action policies such as quotas are likely to be effective in increasing female representation because observing the performance in office of elected women provides additional information on their distribution of origin and therefore reduce the distortion on the prior and in turn the bias. Moreover, the beneficial effect of quotas should be persistent over time even if the affirmative action measures are temporary, given that the update of the prior has permanent effects. This is consistent with the evidence that temporary measures in support of female candidacies have a persistent effect on the presence of women in politics (Beaman et al., 2009; Bhavnani, 2009; De Paola et al., 2010). Moreover, it is worth noting that these policies in our model should improve the general quality of politicians consistently with Baltrunaite et al. (2014) and may even cause an increase in the quality of elected males through some sort of competition effect (Besley et al., 2017).[7]

Interestingly, our model provides an explanation also for the fact that a soft policy approach like double gender preference in open list systems seems to be working (Baltrunaite et al., 2019). The authors explain their finding with a moderate voter's bias against women that is overcome with the possibility of a double choice that allows voters to select a woman that is ranked close enough to their favourite male candidate. We show one type of bias which has the required characteristics. For example, suppose that a voter has expressed a preference for a male politician and has to decide whether to express also a preference for a female politician. In doing so, he/she will compare the expected utility from the best female in the list with the expected utility from the candidate that on the margin may not be elected due to this expression of preferences. Such marginal candidate is worse that the most preferred male, i.e., associated to a lower expected utility. Therefore, it is more likely that, despite the gender bias, the voter will prefer the best female to the marginal candidate.

The model can be extended to consider the strategic candidacy choice made by parties.[8] When we allow parties to choose their candidates strategically, we observe that they choose women candidates only when they are sufficiently strong, even if parties are not gender biased, because they anticipate the gender bias of the electorate. Therefore, the bias operates twice, first at the candidate selection stage, and then at the election one. As a consequence, the probability of having a female candidate decreases, and the probability of electing a woman falls even further, while on the other hand the expected competence of elected women increases more than the expected competence of the elected men. This is consistent with the evidence that parties behave as gatekeepers and do not select women as candidates (Kunovich and Paxton, 2005 and Le Barbanchon and Sauvagnat, 2022).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Appendix. Proof of Proposition 1

Policy choice. In the last period of the game, the policy choice of the elected politician affects only his/her second period utility, as the game ends afterwards. Therefore he/she implements his/her most preferred policy to maximise his/her utility. In the first period of the game, the elected politician P in period t knows that his/her policy preference x_t^P and his/her competence v_t^P are both observed by voters when he/she is in office. Moreover, voters know that in the last period every elected politician implements a policy equal to his/her policy preference. As a consequence, the policy choice of the politician who is in office in period $t = 1$ does not affect his/her probability of winning the election in $t = 2$ (nor his/her re-candidacy choice). Therefore, also in period 1 $y_1 = x_1^P$.

Voting on untried candidates. Voters anticipate the politicians' behaviour. At the time of the election, the median voter cannot distinguish two untried candidates according to their policy position, as candidates are ex-ante symmetric in this dimension. Therefore the election is decided on the basis of the information available on candidates' competence. The median voter's utility is linear in v_t^P therefore he will prefer the candidate with the highest expected competence. The expected competence given the candidate's gender and his/her σ_t^k is:

$$\mathbb{E}\left[v_t^k|\sigma_t^k, M\right] = \begin{cases} \frac{3}{4} & if\ \sigma_t^k = \overline{v} \\ \frac{1}{4} & if\ \sigma_t^k = \underline{v} \end{cases} \quad ; \quad \mathbb{E}\left[v_t^k|\sigma_t^k, F\right] = \begin{cases} \frac{3}{4}\left(1-\phi_t(1-V)\right) & if\ \sigma_t^k = \overline{v} \\ \frac{1}{4}\left(1-\phi_t(1-V)\right) & if\ \sigma_t^k = \underline{v} \end{cases} .$$

To see why this is the case, let us consider male candidates first. The median competence of the male group is $\frac{1}{2}$. Therefore, a male candidate with a high signal is randomly drawn from a uniform distribution on $\left[\frac{1}{2}, 1\right]$, so his expected competence is $\frac{3}{4}$. Similarly, we can derive that the expected competence of a male candidate with a low signal is $\frac{1}{4}$. For what concerns females,

[7] The evidence on the effect of quotas on the quality of elected males is mixed, and the effect may depend on the specifics of the affirmative action policy. For example, for the Italian case, Baltrunaite et al. (2014) find a positive effect of the 1993 introduction of quotas on the quality of elected males, while Andreoli et al. (2021) find a negative effect of the introduction of quotas and double gendered preferences in 2012 on the education of elected males.

[8] The derivation of the model with strategic party choices is available from the authors upon request.

the voter believes that with probability $(1-\phi_t)$ they are randomly drawn from a uniform distribution over $[0,1]$, with median $\frac{1}{2}$, while with probability ϕ_t they are randomly drawn from a uniform distribution over $[0,V]$ with median $\frac{V}{2}$. As a consequence, the expected median is $\frac{1-\phi_t(1-V)}{2}$, and the expected competences given the high and low signals are the ones above. Note that $V > \frac{1}{3}$ implies that $\mathbb{E}[v_t|\overline{v},F] > \mathbb{E}[v_t|\underline{v},M]$. Therefore, the median voter ranks the candidates according to their gender-signal pair as follows $(M,\overline{v}) \succ (F,\overline{v}) \succ (M,\underline{v}) \succ (F,\underline{v})$.

Voting for the incumbent. Consider now a period 2 election in which the incumbent from period 1 runs for re-election. In period 2 voters know both competence v^I and policy preference x^I of the incumbent. Given that the competence is observed, the incumbent's gender does not affect his/her probability of re-election. Moreover, voters know that any politician winning in period 2 will implement a policy equal to his/her bliss point.

Consider therefore the voting incentives of the median voter when comparing an incumbent (x^I,v^I) with an untried challenger characterised by his/her gender-signal pair. As the median voter is located at $x^m=0$, it does not matter whether the incumbent is from party R and the challenger from party L or viceversa.

The median voter's expected policy disutility in period 2 from an untried challenger from party k, given the equilibrium policy choice, is:

$$-\mathbb{E}(0-y_2)^2 = -\mathbb{E}(x_2^k)^2 = -Var[x_2^k] - (\mathbb{E}[x_2^k])^2 = -\frac{1}{12} - \frac{1}{4} = -\frac{1}{3}.$$

Therefore, the median voter's expected utility in period 2 when facing a challenger, depending on his/her gender-signal pair, is:

- $\mathbb{E}u_2^m\left(M,\overline{v}\right) = \mathbb{E}\left(0-y_2\right)^2 + \mathbb{E}\left[v_2^k|\overline{v},M\right] = -\frac{1}{3}+\frac{3}{4} = \frac{5}{12}$;
- $\mathbb{E}u_2^m\left(F,\overline{v}\right) = -\frac{1}{3}+\frac{3}{4}\left(1-\phi_2\left(1-V\right)\right) = \frac{5}{12}-\frac{3}{4}\phi_2\left(1-V\right)$;
- $\mathbb{E}u_2^m\left(M,\underline{v}\right) = -\frac{1}{3}+\frac{1}{4} = -\frac{1}{12}$;
- $\mathbb{E}u_2^m\left(F,\underline{v}\right) = -\frac{1}{3}+\frac{1}{4}\left(1-\phi_2\left(1-V\right)\right) = -\frac{1}{12}-\frac{1}{4}\phi_2\left(1-V\right)$.

The median voter's expected utility in period 2 from an incumbent characterised by (x^I,v^I) is instead: $\mathbb{E}u_2^m\left(x^I,v^I\right) = -(x^I)^2+v^I$. Hence, the median voter votes for the incumbent given the challenger's gender-signal pair, in the following parametric regions:

- if the challenger's gender-signal pair is $\left(M,\overline{v}\right)$, when $v^I \geq (x^I)^2+\frac{5}{12}$, that is, when $x^I \in \left[-\sqrt{v^I-\frac{5}{12}},\sqrt{v^I-\frac{5}{12}}\right]$;
- if the challenger's gender-signal pair is $\left(F,\overline{v}\right)$, when $v^I \geq (x^I)^2+\frac{5}{12}-\frac{3}{4}\phi_2\left(1-V\right)$, that is, when $x^I \in \left[-\sqrt{v^I-\frac{5}{12}+\frac{3}{4}\phi_2\left(1-V\right)},\sqrt{v^I-\frac{5}{12}+\frac{3}{4}\phi_2\left(1-V\right)}\right]$;
- if the challenger's gender-signal pair is $\left(M,\underline{v}\right)$, when $v^I \geq (x^I)^2-\frac{1}{12}$, that is, when if $x^I \in \left[-\sqrt{v^I+\frac{1}{12}},\sqrt{v^I+\frac{1}{12}}\right]$;
- if the challenger's gender-signal pair is $\left(F,\underline{v}\right)$, when $v^I \geq (x^I)^2-\frac{1}{12}-\frac{1}{4}\phi_2\left(1-V\right)$, that is, when $x^I \in \left[-\sqrt{v^I+\frac{1}{12}+\frac{1}{4}\phi_2\left(1-V\right)},\sqrt{v^I+\frac{1}{12}+\frac{1}{4}\phi_2\left(1-V\right)}\right]$.

Remark 2. Note that, in an election between an incumbent $\left(x^I,v^I\right)$ and an untried challenger, as the quality of the challenger falls, the set of x^I by the incumbent that allows him/her to gain re-election grows larger, and also the threshold for v^I decreases.

The incumbent's candidacy decision. Consider an incumbent from party R, characterised by $x^I \geq 0$ and v^I. If he/she does not run, voters have the same ex-ante probability of electing a politician from party L or R. Therefore the incumbent, in period 2, obtains expected utility:

$$\begin{aligned}\mathbb{E}u_2^I &= -\frac{1}{2}\mathbb{E}[(x^I-x_2^L)^2]-\frac{1}{2}\mathbb{E}[(x^I-x_2^R)^2]+\mathbb{E}\left(v_2^P\right) = -\left(x^I\right)^2-\frac{1}{2}\mathbb{E}[\left(x_2^L\right)^2]+x^I\mathbb{E}\left[x_t^L\right]-\frac{1}{2}\mathbb{E}[\left(x_2^L\right)^2]+x^I\mathbb{E}\left[x_t^L\right]+\mathbb{E}\left(v_2^P\right)\\ &= -\left(x^I\right)^2-\frac{1}{3}+\frac{5}{8} = -\left(x^I\right)^2+\frac{7}{24}.\end{aligned}$$

Note that in the model we assume that politicians are not biased and therefore their expected utility is not affected by the gender of the challenger. If we assumed instead that the incumbent suffered from the same gender bias as the voters, his/her utility from not running would have been lower, and therefore he/she would have run for re-election (sub-optimally) more often.

Given the incumbent's expected utility if he/she does not run in the second period, we discuss the optimal re-candidacy choice, which depends on the chances of re-election.

- If elected in period 2, the incumbent implements his/her bliss point and his/her utility is equal to v. Therefore, an incumbent who wins against any type of challenger, i.e., an incumbent with $v^I \geq \left(x^I\right)^2+\frac{5}{12}$, runs for re-election in period 2 for $v^I \geq \frac{7}{24}-\left(x^I\right)^2$. The first condition implies the second one, therefore an incumbent who wins against any type of challenger always runs for re-election.
- An incumbent who wins against everybody but $\left(M,\overline{v}\right)$, *i.e.*, an incumbent such that $v \in \left[\left(x^I\right)^2+\frac{5}{12}-\frac{3}{4}\phi_2(1-V),\left(x^I\right)+\frac{5}{12}\right)$, has an expected utility from running for re-election which is the weighted average of the utility of winning (with probability

3/4) and of the utility of losing against a challenger of the opposite party with a gender-signal pair equal to $(M, \overline{v})$, that is:

$$\frac{3}{4}v^I + \frac{1}{4}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \mathbb{E}\left(v_2^L | M, \overline{v}\right)\right) = \frac{3}{4}v^I + \frac{1}{4}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \frac{3}{4}\right) = \frac{3}{4}v^I - \frac{1}{4}\left(x^I\right)^2 - \frac{1}{4}x^I + \frac{5}{48}.$$

Therefore this incumbent will run for re-election if the following holds:

$$\begin{aligned}\frac{3}{4}v^I - \frac{1}{4}\left(x^I\right)^2 - \frac{1}{4}x^I + \frac{5}{48} &\geq -\left(x^I\right)^2 + \frac{7}{24},\\ v^I &\geq \frac{4}{3}\left(-\frac{3}{4}\left(x^I\right)^2 + \frac{1}{4}x^I + \frac{7}{24} - \frac{5}{48}\right),\\ v^I &\geq -\left(x^I\right)^2 + \frac{1}{3}x^I + \frac{1}{4}.\end{aligned}$$

Therefore, an incumbent in this region seeks re-election for:

$$v^I \in \left[\max\left\{\left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi(1-V), -\left(x^I\right)^2 + \frac{1}{3}x^I + \frac{1}{4}\right\}, \left(x^I\right)^2 + \frac{5}{12}\right].$$

- An incumbent who wins only against challengers with low signals (of any gender), *i.e.*, an incumbent such that $v \in \left[\left(x^I\right)^2 - \frac{1}{12}, \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi_2(1-V)\right)$, has an expected utility from running which is the weighted average of the utility of winning (with weight 1/2) and of the utility of losing against a challenger of the opposite party with a high signal. Recall that politicians are not gender biased, so that the expected competence of a candidate with a high signal is $\frac{3}{4}$ regardless of his/her gender. Hence, in this parametric region, the incumbent's utility from running in period 2 is:

$$\frac{1}{2}v^I + \frac{1}{2}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \frac{3}{4}\right) = \frac{1}{2}v^I - \frac{1}{2}\left(x^I\right)^2 - \frac{1}{2}x^I + \frac{5}{24},$$

which is higher than the expected utility of the incumbent who chooses not to run in period 2 if:

$$\begin{aligned}\frac{1}{2}v^I - \frac{1}{2}\left(x^I\right)^2 - \frac{1}{2}x^I + \frac{5}{24} &\geq -\left(x^I\right)^2 + \frac{7}{24},\\ v^I &\geq 2\left(-\frac{1}{2}\left(x^I\right)^2 + \frac{1}{2}x^I + \frac{1}{12}\right),\\ v^I &\geq -\left(x^I\right)^2 + x^I + \frac{1}{6}.\end{aligned}$$

Therefore, an incumbent in this region seeks re-election for:

$$v^I \in \left[\max\left\{\left(x^I\right)^2 - \frac{1}{12}, -\left(x^I\right)^2 + x^I + \frac{1}{6}\right\}, \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi(1-V)\right].$$

- An incumbent that gains re-election only against $(F, \underline{v})$, *i.e.*, an incumbent such that $v \in \left[\left(x^I\right)^2 - \frac{1}{12} - \frac{1}{4}\phi_2(1-V), \left(x^I\right)^2 - \frac{1}{12}\right)$, has an expected utility from running which is the weighted average of the utility of winning (with weight 1/4), of the utility of losing against a challenger of the opposite party with a high signal (with weight 1/2), and of the utility of losing against a challenger of the opposite party with a low signal. Hence, in this parametric region, the incumbent's utility from running in period 2 is:

$$\frac{1}{4}v^I + \frac{1}{2}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \frac{3}{4}\right) + \frac{1}{4}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \frac{1}{4}\right) = \frac{1}{4}v^I - \frac{3}{4}\left(x^I\right)^2 - \frac{3}{4}x^I + \frac{3}{16},$$

which is higher than the expected utility of the incumbent who chooses not to run in period 2 if:

$$\begin{aligned}\frac{1}{4}v^I - \frac{3}{4}\left(x^I\right)^2 - \frac{3}{4}x^I + \frac{3}{16} &\geq -\left(x^I\right)^2 + \frac{7}{24}\\ v^I &\geq 4\left(-\frac{1}{4}\left(x^I\right)^2 + \frac{3}{4}x^I - \frac{3}{16} + \frac{7}{24}\right)\\ v^I &\geq -\left(x^I\right)^2 + 3x^I + \frac{5}{12}.\end{aligned}$$

However, $-\left(x^I\right)^2 + 3x^I + \frac{5}{12} > \left(x^I\right)^2 - \frac{1}{12}$. Hence, there is no pair (x^I, v^I) in this parametric region such that the incumbent finds it optimal to run for re-election.

- Finally, an incumbent who wins against no type of challenger does never find it optimal to seek re-election as by running he ensures that the challenger from the opposite party (which can have a high or low signal with equal probability) wins. His/her expected utility from running is:

$$\frac{1}{2}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \frac{3}{4}\right) + \frac{1}{2}\left(-\left(x^I\right)^2 - \frac{1}{3} - x^I + \frac{1}{4}\right) = -\left(x^I\right)^2 - x^I + \frac{1}{6} < -\left(x^I\right)^2 \leq -\left(x^I\right)^2 + \frac{7}{24}.$$

Combining the conditions above, we conclude that the incumbent characterised by a pair (x^I, v^I) chooses to run for re-election if one of the following conditions hold:

1. $v^I \geq \max\left\{-\left(x^I\right)^2 + \frac{1}{3}x^I + \frac{1}{4}, \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi(1-V)\right\}$;
2. $v^I \in \left[\max\left\{\left(x^I\right)^2 - \frac{1}{12}, -\left(x^I\right)^2 + x^I + \frac{1}{6}\right\}, \left(x^I\right)^2 + \frac{5}{12} - \frac{3}{4}\phi(1-V)\right]$.

Results for an incumbent from party L are derived symmetrically. ■

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