Electoral Competition, Voter Bias and Women in Politics [†]

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Abstract

We quantify the implications of voter bias and electoral competition for politicians' gender composition. Unfavorable voters' attitudes towards women and local gender earnings gap correlate negatively with the share of female candidates in Parliamentary elections. Using within-candidate variation across the different polling stations of an electoral district in a given election year, we find that female candidates obtain fewer votes in municipalities with higher gender earnings gaps. We show theoretically that when voters are biased against women, parties facing gender quotas select male candidates in the most contestable districts. We find empirical support for such a strategic party response to voter gender bias. Simulating our calibrated model confirms that competition significantly hinders the effectiveness of gender quotas.

Keywords: women in politics, electoral competition, gender attitudes, gender quotas.

JEL Codes: D72, D78, J16.

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1 Introduction

Despite significant progress in recent years, women are still largely under-represented among elected politicians, accounting for around 25% of members of Parliament across the world.[1] While recent evidence suggest that the gender composition of politicians has important implications for policy making (e.g. Chattopadhyay and Duflo, 2004),[2] there is no consensus on the key factors that drive the under-representation of women in politics. A large body of work has explored whether political parties favor male candidates (see for example Norris and Lovenduski, 1995), and recent studies have found mixed empirical evidence on the importance of party bias (Esteve-Volart and Bagues, 2012; Casas-Arce and Saiz, 2015; Bagues and Campa, 2017, 2018). The possibility that women access to office might be restricted by voters' preferences is also highly debated. The main reason for this is probably the difficulty of identifying voter bias in the data. Whether or not voter bias could account for the small share of women in politics therefore remains an open question (see the review in Krook, 2018).[3]

In this paper, we quantify the role of voters' preferences in the gender composition of politicians. We first show empirically that unfavorable voters' attitudes towards women, measured either through survey data on gender role in politics or local gender earnings gap, correlate negatively with the share of female candidates in Parliamentary elections, both within France and across countries. Using within-candidate variation, we also find that female candidates obtain fewer votes in French municipalities with higher gender earnings gaps within an electoral district in the same election year. Our main theoretical and empirical contribution is then to show that electoral competition hurts women representation in politics when voters have a preference for male politicians, and when parties face gender quota on candidates. For this, we propose a model of political selection which sheds light on the trade-offs faced by political parties when policies encouraging gender diversity are introduced. We define as *biased* in favor of male politicians a voter who is more likely to vote for a male politician than for a female politician, when both politicians have the same ideology and expertise.[4] We show that parties facing gender quotas on candidates select men rather than

[1] Existing evidence on the under-representation of women in powerful and well-paid positions is not restricted to politicians, and covers a wide range of other occupations, including top management in big corporations (e.g. Bertrand and Hallock, 2001) and academia (Bagues et al., 2017).

[2] See also Lott and Kenny (1999); Miller (2008); Alesina and Giuliano (2011); Clots-Figueras (2011, 2012); Ferreira and Gyourko (2014); Funk and Gathmann (2015); Brollo and Troiano (2016).

[3] Krook (2018) summarizes the state of the literature in her handbook chapter as: "In the case of gender, existing work is ambivalent as to the nature and effects of [voter] bias against female candidates" p.187.

[4] We do not take a stand on the *source* of this bias. It might for instance reflect traditional views on the role of women in society, taste-based discrimination, or statistical discrimination. See e.g. Broockman and Soltas (2018) and Eymeoud and Vertier (2018) for recent studies aiming at identifying taste-based from

women in contestable districts (i.e ex-ante close races), if and only if voters are biased in favor of male candidates. We take this test to the French data and find strong empirical support for a strategic party response to voter bias in favor of male candidates. Finally, we calibrate the model, and show in simulations that electoral competition hinders the effectiveness of gender quotas in boosting women's presence among elected politicians. The effect is quantitatively large: we find that an increase of 10% in the share of contestable districts reduces the increase in the fraction of elected women due to the introduction of gender quotas by around 25%.

A body of work in political science test for the existence of a voter gender bias in survey experiments (e.g. Sanbonmatsu, 2002; Teele et al., 2018; Schwarz et al., 2018).[5] In the first part of the paper, we follow an alternative strategy and measure the relation between voters' attitudes toward gender in the field, and gender gaps in the composition of candidates running for elections and in electoral outcomes.[6] For this, we use both elicited data on gender roles in politics, and administrative data on local gender earnings gaps – which for the latter allows us to proxy for differences in attitudes towards gender within the *same* electoral districts. In doing so, we rely on previous studies showing that (residualized) gender earnings gap reflect traditional or unfavourable views towards women role in society (Altonji and Blank, 1999; Bertrand, 2011).

We find that voters' attitudes towards gender are strongly associated with the gender distribution of candidates across electoral districts within France, after controlling for a rich set of candidates' characteristics, such as age, education, past occupation, and eventually political experience. A 10 percentage points increase in the share of respondents who agree with the statement "*Men are better political leaders than women*" is associated with a 2.3 percentage points decrease in the share of female candidates, a 10% drop from the sample mean. This result is robust to using respondents' answers from the statement *"When jobs are scarce, men should have more right to a job than women"* or gender earnings gaps, as alternative proxies for voters' attitudes. Importantly, we also find the same pattern across countries. We then exploit the granularity of local gender earnings gaps in order to estimate the effect of voters' attitudes on gender gaps in vote shares for the *same* female and male

statistical discrimination in electoral data.

[5]While informative, survey experiments, are often carried out using small samples, and raise bias concerns, such as for instance demand effects (Kane and Macaulay, 1993).

[6]Another approach has been to *infer* the presence of voter gender bias by looking at gender gaps in electoral outcomes. Recent evidence includes Esteve-Volart and Bagues (2012); Hogan (2010); Fréchette et al. (2008); Murray et al. (2012). However, gender electoral gaps are equilibrium objects, which makes it difficult to credibly identify voter bias from other factors, such as for instance the role of parties (which may for instance select women in less winnable positions/districts), or gender differences in other candidates' attributes. Recent studies (Kunovich, 2012; Stegmaier et al., 2014) leverage open-list proportional systems with ordered lists in Central and Eastern Europe to compare voters' and parties' preferences over candidates gender.

candidates, across municipalities of the same electoral districts in the same election.[7] To the best of our knowledge, we provide the first granular analysis filtering out supply factors when estimating the effect of voters' attitudes on electoral outcomes. We find a positive and strong correlation between gender earnings gaps and electoral gaps across municipalities: a one standard deviation increase in gender earnings gap leads to an increase by 0.8 percentage points in vote shares between male and female candidates. Overall, we find converging evidence that female candidates obtain lower votes in areas with less favorable attitudes towards women, and are less likely to run for elections in these areas.

We hypothesize that these two facts are linked and that parties refrain from selecting female candidates in districts with less favorable attitudes towards women because they anticipate a lower probability of winning elections when female candidates run in these districts. In the second part of the paper, we assess whether this strategic party response to the presence of voter bias accounts quantitatively for the low fraction of elected women, even after the introduction of gender quota on candidates. For this, we build a model of electoral competition (in majoritarian single-member constituencies elections) in which political parties select candidates across districts taking into account that voters care about the gender of candidates in their districts. We first show that in the absence of gender quotas, parties always select the best candidate in each district – i.e., the one that maximizes the probability of winning the election whatever the degree of political contestability. However, electoral competition shapes the selection of male versus female candidates in the presence of gender quotas on candidates. In that case, we show that parties strategically select men in contestable districts (i.e. ex-ante close races) and women in non-contestable districts when voters are biased in favor of male candidates.

We take this prediction to the data and exploit the introduction in 2000 of gender quotas in French Parliamentary elections (referred to as the Parity Law), in which parties face fines when they deviate from a 50% national gender parity rule on candidates.[8] We find strong empirical support for a strategic party behavior and the existence of a voter bias in favor of male candidates in French elections: while electoral competition has no effect on the gender allocation of candidates before 2000, we find that parties are more likely to select male candidates in contestable districts after the introduction of gender quotas.

Finally, we quantify the importance of voter bias and electoral competition in restricting women representation in politics. In our calibrated model, the fraction of female candidates pre-quota is 8%, in line with the data. When we introduce the parity rule in the model, we

[7]Note that the within-candidate design does not rely on time variation across election years. Instead, it relies on variations across municipalities within an electoral district in a given election year.

[8]This prediction also applies to situations in which parties face strict quotas on the share of female and male candidates.

find that the electoral cost of selecting women when there is a voter bias in favor of male candidates outweighs the cost of the fine in the most contestable districts. This force is large enough for explaining why the main two parties select post-quota only 35% of female candidates, significantly below the objective of the Parity Law. We then conduct counterfactual simulations and confirm that an increase in competition would further significantly reduce the share of women elected in the Parliament.

Importantly, our results do *not* imply that *intrinsic* party bias – whereby political parties prefer male politicians per se – does not explain part of the low fraction of female politicians. Instead, we argue that voter gender bias generates a *strategic* party bias which also matters quantitatively for understanding the under-representation of women in politics. To fix ideas, we propose an extension of our model which features both voter gender bias and an intrinsic party bias in favor of male politicians. We show that parties with intrinsic preferences about politicians' gender still refrain from selecting female candidates in the most contestable districts when facing gender quotas and voter gender bias. Simulations of this extension of the model confirms that electoral competition dampens significantly the effectiveness of gender quotas even in the presence of an intrinsic party bias.

This paper contributes to several strands of the literature. It first relates to a growing body of work on political competition and political selection. Prior empirical studies highlight the effect of political competition on accountability (Ferraz and Finan, 2011), on the quality of politicians (De Paola and Scoppa, 2011; Galasso and Nannicini, 2011), on policy choices (Besley and Preston, 2007; Stromberg, 2008; Besley et al., 2010), and on the transmission of political power within dynasties (Dal Bó et al., 2009). Folke and Rickne (2016) and Esteve-Volart and Bagues (2012) provide empirical evidence that electoral competition improves women position on the ballots of closed-list elections. We build on Galasso and Nannicini (2011)'s framework and provide the first formal model of electoral competition which incorporates voters' preferences for politicians gender. We use the model to show that electoral competition harms women representation in French Parliamentary single-member district majority rule elections.[9]

We also contribute to the literature on the effect of gender quotas in politics,[10] which is based on reduced-form evidence from several reforms. Gender quotas have been shown to affect the quality of politicians running for office (Baltrunaite et al., 2014; Besley et al., 2017; O'Brien and Rickne, 2016), the type of policies implemented (Chattopadhyay and Duflo,

[9]Single-member constituencies are pervasive across the world, and also include for instance the United States, the United Kingdom, Canada, Japan, India, Australia, and Pakistan.

[10]A growing literature in economics and finance study the implications of gender quotas in other contexts, such as e.g. board of directors (Bertrand et al., Forthcoming; Ahern and Dittmar, 2012), academia (Antecol et al., Forthcoming), and evaluation committees (Bagues and Esteve-Volart, 2010).

2004; Baltrunaite et al., 2016), and beliefs about female leader effectiveness (Beaman et al., 2009; Paola et al., 2010). Another strand of the literature studies politicians' incentives for voting in favor of the adoption of gender quotas. In that vein, Fréchette et al. (2008) propose as an explanation for the vote in favor of the 2000 Parity Law by the French Parliament, a theory in which (male) incumbent politicians find it in their best interests to support the introduction of gender quotas when there is a voter bias in favor of male candidates: in doing so, they increase the probability of running against a woman and being reelected in the following election. Murray et al. (2012) offers an alternative view emphasizing the role of party pragmatism in passing the French Parity Law. Our study shifts the focus on the role of voter gender bias for understanding the *consequences* of gender quotas for parties' political selection. Moreover, beyond reduced-form studies, our model allows us to conduct counterfactuals on the effect of gender quotas in boosting women representation among elected politicians depending on the degree of political competition.

More broadly, we also relate to the literature on the influence of social norms on economic and political outcomes. A few papers (Fernández et al., 2004; Fortin, 2005; Fernández and Fogli, 2009; Alesina et al., 2013) show how gender role attitudes influence gender gaps in labor market outcomes. In politics, Gagliarducci and Paserman (2012) find that the probability of early termination for elected female mayors in Italy is higher in regions with less favorable attitudes towards working women. Our findings that voters' attitudes toward gender affect gender gaps in politics – both for differences in electoral scores and in the gender composition of candidates – have important consequences, and overall suggest that slow-moving voters' attitudes might be an important factor that limits convergence towards a gender parity among politicians.

The remainder of the paper is organized as follows. In Section 2, we present French institutions and our data. In Section 3, we show how local differences in voters' attitudes towards gender relate to the gender distribution of candidates across districts, and to gender gaps in electoral outcomes. We present our model of political selection with voter gender bias in Section 4, and take it to the data in Section 5. In Section 6, we run counterfactual simulations on the effect of gender quotas depending on the degree of political competition. Section 7 concludes.

2 Institutions and data

2.1 French institutions and parliamentary elections

The lower house of the French Parliament, the *Assemblée Nationale*, is composed of 577 members elected for 5 years (single-member constituencies), according to a two-round plurality voting rule.[11] In every district, candidates compete in a first round. If no candidate obtain more than 50% of votes (and 25% of registered citizens), a runoff is set with candidates selected by more than 12.5% of registered citizens in round 1 (Pons and Tricaud, Forthcoming). The candidate with the most votes in the runoff wins the election. In practice, a vast majority of runoffs occurs between two candidates, often with one candidate from the Right, and one candidate from the Left.

We gather data for the last seven Parliamentary elections: 1988, 1993, 1997, 2002, 2007, 2012 and 2017.[12] Our main empirical analysis focuses on candidates from the two main party coalitions: the Left coalition and the Right coalition.[13] These two coalitions account for around 80% of elected Members of Parliament (MPs) over the sample period.[14] Their candidates have on average an ex-ante probability of being elected equal to 43%. By contrast, candidates from other parties have on average very low chances of winning a seat in the Parliament (that is, around 1.5% in our sample).[15] Given our focus on parties' selection of candidates in a context of electoral competition, we exclude the other parties from our

[11] In practice, members of the Parliament might hold their office for less than 5 years in case of dissolution of the *Assemblée Nationale*: in our sample period, the 1997 election was called in advance by president Jacques Chirac. An exception to the two-round majoritarian system was the 1986 Parliamentary election for which the voting system combines a majoritarian and proportional rule and took place in one round only.

[12] Data on candidates and electoral outcomes are not available before 1988 in digitalized format.

[13] Over the elections in our sample, the left coalition is mainly composed of candidates from the Parti Socialiste (PS, 84%), and Parti Radical de Gauche (PRG, 12%). The Right coalition is mainly composed of candidates from the Rassemblement pour la République (RPR, 79%), and the Union pour la Démocratie Francaise (UDF, 20%) until 1997, Union pour la Majorité Présidentielle (UMP) in 2002, 2007 and 2012, and Les Républicains (LR) in 2017.

[14] We exclude from our sample La République en Marche (LaREM) and the Mouvement Démocrate (MoDem) from the 2017 election even though this centrist coalition has obtained the majority of seats in the Parliament in 2017. For the sake of simplicity, we abstract in the model presented below from the complications of strategic voting with more than two parties (which would be appropriate in the case of the 2017 election). Note however that we find virtually the same empirical results when including the candidates of LaREM and MoDem in the sample, or alternatively excluding the 2017 Parliamentary election from the sample.

[15] As an illustration, even though the Front National (FN) has obtained vote shares between 10% and 20% in first rounds of Presidential elections over the sample period, the majoritarian voting rule makes it almost impossible for their candidates to win seats in the Assemblée Nationale. Note that the Front National - unlike the two main Left and Right coalitions – presented around 50% of female candidates in the 2002 (and following) elections, as required by the Parity Law voted in France in 2000 (described below), very much in line with the idea explored in this paper that electoral competition is an important factor restricting the probability of running for elections for female politicians.

sample.

Figure 1 presents the share of female candidates in French Parliamentary elections over the last three decades. The share of female candidates hovers around 10% in the 1980s and 1990s, then almost doubles between the 1990s and the 2000s elections, and ranges between 35% and 40% in the last two elections in 2012 and 2017. This increase (at least partially) follows the introduction of gender quotas on candidates in French Parliamentary elections with the vote of the Parity Law in 2000, that we describe below.

The 2000 Parity Law. The parity law voted in 2000 stipulates that each party should have an equal fraction of male and female candidates across electoral districts in Parliamentary elections. When the difference between female and male candidates exceeds 4% (below 48% or above 52%), non-compliance with the 50% parity rule results in a financial penalty computed as follows: public funding provided to political parties based on the number of votes they receive in the first round of elections is reduced "by a percentage equivalent to one half of the difference between the total number of candidates of each sex, out of the total number of candidates".[16] As discussed in more details below, the 2000 Parity Law in French Parliamentary elections provides us with a unique laboratory for testing the presence of voter gender bias.

2.2 Data sources and variables

We use data from several sources: (i) administrative and web data on candidates and electoral outcomes; (ii) survey data on voters' attitude towards gender; as well as (iii) administrative and census data on earnings and voters' demographics across municipalities and electoral districts.

It is crucial for the analysis presented below to (at least) observe the gender of candidates, their party affiliation, as well as granular information on their electoral scores. We also gather data on other candidates' characteristics that we use as control variables in the regressions presented below, such as age, education, occupation, and past political experience.

Candidates and electoral outcomes. The French Ministry of Interior publishes vote shares for each candidate, along with their gender and party affiliation, for Parliamentary (and Presidential) elections (at the electoral district level) since 1988.[17] Vote shares are also

[16]For example, if there are only 35% of female candidates running for election in a given party, the difference between the number of female and male candidates is 30 percentage points, in which case the fine amounts to a 15 percentage points cut on the amount of public funding received by the party.

[17]Gender is missing in 1993 and 1997. We then retrieve gender either from other elections in the case of candidates running several times for elections (and from the *Assemblée Nationale* website for elected politicians), or from candidates' first names. There is almost no uncertainty in the mapping between first names and gender in the case of French candidates.

available at the municipality level (within electoral districts) starting in 1993. The Ministry of Interior also provides information on candidates' date of birth and occupation since 2012. We fill in missing information on date of birth and occupation in elections prior to 2012 using information from other sources.[18] We then construct a dummy for high-skill occupations, such as managers, engineers, physicians, lawyers, and university professors.[19] We also match candidates with the list of all members of government (from the fifth Republic starting in 1958), and we code whether candidates are alumni of an elite university, defined as graduates from the following list of French elite institutions: *Ecole Polytechnique* and *Ecole Centrale Paris* (for engineers), *Ecole Nationale d'Administration* (ENA, for public administration), *Ecole des Hautes Études Commerciales* (HEC, for business), and *SciencesPo* (for politicians).[20] Finally, starting from the 2002 election, we construct a dummy for candidates with a local mandate, which equals one if the candidate has been elected as mayor or in the municipality council in the same electoral district where she/he runs for Parliamentary election.

We also rely on the timing of French elections – where Parliamentary elections are in the wake of presidential elections –, and compute as a control for ideology/party popularity in each district, the vote share that each party obtains in the previous Presidential election in the same electoral district. This also provides us with a measure of electoral contestability for each district. Specifically, we define as contestable (close-race), districts for which the vote margin between the Left and the Right party in the previous Presidential election was between +/- 3 percentage points. We provide in Section 5 evidence of the predictive power of this measure.

Proxies for voters' attitudes. Our empirical analysis exploits the sizeable geographical

[18]We retrieve date of birth and occupation for elected candidates from the *Assemblée Nationale* website. We complement missing information with data from the *Centre de Données Socio Politiques* (CDSP) maintained at Sciences Po. Data on the occupations of candidates for the 1997 Parliamentary elections were digitalized within the ANR project *La coordination stratégique et le scrutin à deux tours : Electeurs, partis et règles électorales en France*, supervised by Annie Laurent. We thank Fréchette et al. (2008) for providing us with data on candidates' age for the Parliamentary elections in 2002 and 2007, and Clémence Tricaud for sharing with us the *Répertoire National des Elus* from which we can recover date of birth and occupation for politicians who also get elected in municipal elections in 2001, 2008 or 2014. We scrapped Wikipedia pages for the remaining cases. When we cannot retrieve date of birth or occupation for a given candidate, we include a dummy for missing date of birth or missing occupation in the regressions presented below. Date of birth (respectively occupation) is missing for 10% (respectively 15%) of candidates in our sample. All regression results are virtually unchanged when we restrict our attention to candidates with non-missing information on age and occupation.

[19]This corresponds to the third group of the French occupation classification *Cadres et professions intellectuelles supérieures*.

[20]We retrieve the data from alumni directories of these schools. These institutions fill in a large fraction of the most prestigious jobs in the public administration, in politics, and in the top management of large private and state-owned companies (see e.g. Kramarz and Thesmar, 2013).

differences in attitudes towards women across areas in France. Specifically, the analysis presented below relies on the *Generation Gender Surveys* (GGS) that compile individual-level surveys on a variety of topics, including attitudes and preferences on gender roles in politics and in labor markets. The French wave of the GGS surveyed around 10,000 households in 2006. The survey is designed to be well-distributed geographically.

We follow Alesina et al. (2013) and examine two questions that quantify individuals' attitudes about gender roles. Using the GGS, we construct the share of respondents at the *département* level (the finest geographical unit available in the GGS)[21] who agree with separately the following two statements: "*On the whole, men are better political leaders than women*", and "*When jobs are scarce, men should have more right to a job than women*". The respondents are asked to choose among "strongly agree", "agree", "disagree", "strongly disagree", "neither agree nor disagree". As in Alesina et al. (2013), we omit observations for which the respondents answered "neither agree nor disagree", and compute for each *département* the average of respondents that answered "agree" or "strongly agree".[22]

Unfortunately, this measure does not provide us with cross-sectional variation in voters' attitudes towards gender *within* electoral districts, which would allow us to estimate the effect of voters' attitudes on electoral scores of male versus female candidates keeping constant the supply of candidates. For this, we compute local gender earnings gap from the French employment registers (Déclarations Annuelles des Données Sociales, DADS) as an alternative - and more granular - proxy for voters' attitudes. In doing so, we rely on a large body of literature showing that gender earnings gap reflect attitudes towards gender in labor markets (Bertrand, 2011; Altonji and Blank, 1999), and more generally on the role of women in society. The data are based on a mandatory employer report of the gross yearly earnings of each employee subject to French payroll taxes, and includes all employed individuals. We compute residualized local earnings gaps in order to absorb differences across municipalities related to local distributions of workers' age, occupation, and of employers' industry. We average gender earnings gaps either at the municipality level or at the broader electoral district level, in the year preceding each Parliamentary election.[23]

Summary statistics. Table 1 presents summary statistics of our main sample which consists of 7,038 candidate × election observations spanning seven Parliamentary elections

[21] There are 96 *départements* in Mainland France, and around 6 electoral districts per *département*.

[22] The last three waves of the *World Value Survey* (WVS) comprise the exact same two questions.

[23] We first regress yearly earnings on workers' age, 4-digit occupation and employers' industry. We then take the local average of residuals of either male or female workers and compute the difference. In line with prior work, we find that age, occupation and industry absorb around two thirds of the raw earnings gaps, see Blau and Kahn (2017). French employment registers (DADS) are available starting in 1996. We thus use local earnings gaps measured in 1996 for the Parliamentary elections in 1988 and 1993.

in France from 1988 to 2017. We also present in Appendix Table A.1 the mean and standard deviation of the variables separately for male and female candidates.

There are 24% of female candidates, and the average age of candidates is 52 years old. 13% are alumni from elite universities, and 53% worked in high-skill occupations. In terms of political experience, 37% of candidates run for the first-time, 31% are incumbents in the same district, 8% of candidates were members of a former government (at the time of the election), and 62% hold a local mandate in the same district as where they run for Parliamentary election. We also check that candidates tend to run in the same district across elections: 96% of repeat candidates run in the same district.

Panel B presents electoral outcomes. While there are on average 11 candidates (from all parties) running for election in a given district, left and right candidates of the two main parties in our sample capture a disproportionally large fraction of the votes: their (individual) vote share is on average 30% in the first round of the election, and their overall probability of being elected is 43%. Using candidates' parties' vote shares in the previous presidential election, we end up with 29% of electoral districts being classified as (ex-ante) contestable. As shown in Appendix Table A.1, female candidates obtain on average lower vote shares and are less likely to be elected in Parliamentary elections.

Panel C presents summary statistics for our measures of voters' attitudes at the geographical level. We show in Appendix Table A.2 that these measures are strongly correlated between them, both within survey respondents and across geographical areas. Namely, a one standard-deviation increase in local earnings gap accounts for 46% of the standard deviation in the local share of individuals who agree with the statement "*On the whole, men are better political leaders than women*".

3 Voters' attitudes and gender electoral gaps: reduced-form evidence

In this Section, we provide reduced-form evidence on the importance of voters' attitudes for: i) the share of women running for office in French Parliamentary elections, and across countries; and for ii) gender electoral gaps – defined as the difference in vote shares between male and female candidates. We measure geographical differences in voters' attitudes using both survey data aggregated at the département level, and local gender earnings gaps, either at the district or municipal level. These measures are increasing with the degree of unfavorable attitudes towards women.

3.1 Voters' attitudes and selection of male/female candidates

We first ask the question: are women less likely to run in districts with voters' attitudes that tilt more towards male politicians? For this, we estimate the following linear probability model at the candidate i of party p × election t × district d level:

$$F_{i,p,d,t} = \alpha_{p,t} + \beta \cdot VoterAttitudes_{d,t} + \gamma \cdot X_{i,t} + \mu \cdot Z_{p,d,t} + \nu_d + \epsilon_{i,d,t} \tag{3.1}$$

where $F_{i,p,d,t}$ is a dummy indicating whether candidate i of party p is a female candidate in district d, and $VoterAttitudes_{d,t}$ is either the département-level share of agreement with the statement *"Men are better political leaders than women"* (respectively "*When jobs are scarce, men should have more right to a job than women*"), or the gender (adjusted) earnings gap in electoral district d in the year before election t. All regressions control for party affiliation × election fixed effects, $\alpha_{p,t}$. In some specifications, we also control for other candidates' characteristics $X_{i,t}$, such as age, education, occupation, and political experience. We also control for electoral competition $Z_{p,d,t}$, the score obtained by candidates' party in the first round of the previous presidential election in the same district. When using gender earnings gaps as a proxy for voters' attitudes, we also add district fixed effects ν_d, in which case we identify the effect of within-district changes in voters' attitudes over time on the selection of female versus male candidates. Standard errors are clustered at both the candidate and district × election levels (and at the département level when we use survey measures of voters' attitudes). This accounts for both serial correlation of the error term within candidates running multiple times for election, and across candidates running in the same district in a given election.

Table 2 reports the estimates of our parameter of interest β separately for our three proxies for voters' attitudes.[24] In Panel A, we proxy for unfavorable attitudes towards women with the share of agreement with the statement *"Men are better political leaders than women"*. The coefficient is negative, statistically significant, and stable across specifications. The effect is also economically significant: a 10 percentage points increase in the share of respondents considering that *"Men are better political leaders than women"* is associated with at least a 2.3 percentage points decrease in the probability that a woman runs for election in that district, a 10% decrease compared to the 24% sample mean of female candidates. The estimate hardly

[24] One potential concern from using *"Do you agree with the statement: men are better political leaders than women"* is that this statement might also reflect reverse causality, if for instance voters' exposure to female politicians improves their perceptions about female leader effectiveness (Beaman et al., 2009; Baskaran and Hessami, 2018). While we cannot formally rule out this possibility, finding robust results when using either survey data on attitudes towards women on labor markets, or local gender earnings gaps, mitigate the reverse causality issue.

changes when we further control for candidates' age, education, and previous occupation, in Column (2), and for political experience in Column (3). We control for political experience using dummies for incumbents, for candidates running for a Parliamentary election for the first time, for former members of government and for holding a local mandate. Although these controls are potentially endogenous - e.g., being the incumbent is a past outcome -, we find robust results. Finally, we further control in Column (4) for the vote shares of candidates' affiliated party obtained in the same electoral district during the previous presidential election. The coefficient remains large and statistically significant.[25]

In Panel B, we use the statement "*When jobs are scarce, men should have more right to a job than women*", and find very similar results. If anything, the economic and statistical significance of the estimates are stronger.

Panel C reports the estimates of β when using gender earnings gaps as a proxy for voters' attitudes, which varies both across electoral districts and over time.[26] As for Panels A and B, the coefficients are negative, statistically significant at conventional levels, and stable across specifications. The estimates are also economically large: a one standard deviation increase in the gender earnings gaps is associated with at least a 2 percentage points decrease in the probability that a female candidate runs for office in that district. Note that we introduce district fixed effects in Column (5), so that the coefficient is now identified through within-district variations in the gender earnings gap over time. We still obtain a large and negative coefficient.

Cross country analysis. Is this pattern restricted to France? Figure 2 shows that the correlation between voters' unfavourable attitudes towards women and the selection of women in politics is also negative across countries. This holds both for the share of female candidates in Panel A and the share of female elected politicians in Panel B. Appendix B provides further details on the data and the sample used in Figure 2 and also shows that the negative correlation survives when we control for countries political systems (including gender quotas) and population characteristics.[27]

[25]Including this control addresses for instance the concern that districts in which individuals share the views that *"Men are better political leaders than women"* might be arguably easier to win for Right candidates, and the Right party tend to allocate male candidates to the most winnable districts. However, if anything, the size of the coefficient increases once we control for candidates' affiliated party scores in the Presidential election.

[26]One potential concern might be that gender earnings gaps reflect women wages in the private sector, and therefore affect the local supply of politicians, not through beliefs, but through equilibrium effects on labor markets. For instance, a Roy model of sector selection could predict that more women would select into politics when local private-sector wages are lower (and gender earnings gap therefore larger). However, if this is the case, this would lead us to underestimate the negative effect of (unfavorable) voters' attitudes towards women on women participation into politics when using gender earnings gaps, given that we would have obtained an even more negative coefficient in the absence of sector-selection effects.

[27]Valdini (2013) also finds a negative correlation between unfavourable voters attitudes towards women

Overall, we find converging evidence that female candidates are less likely to run for elections in areas with (relatively) unfavorable attitudes towards women, both within France and across countries. One explanation for this pattern – formalized in the model presented in Section 4 – is that parties anticipate a lower probability of winning elections when female candidates run in districts with unfavorable attitudes towards women. However, one might think of alternative explanations, such as for instance the possibility that the local supply of female versus male candidates vary across districts with more or less favorable attitudes towards women.[28] We thus directly test below whether female candidates indeed obtain lower votes in areas with less favorable attitudes towards women.

3.2 Voters' attitudes and gender gaps in vote shares

We estimate below the correlation between voters' attitudes and actual gender gaps in vote shares. As it should be clear from the previous section, we can expect voters' attitudes to affect simultaneously the selection of candidates running for office, in a way that could bias (upward or downward) the relationship between voters' attitudes and gender gaps in vote shares.[29] To address this concern, we consider within-candidate variation only, and look at the correlation between local measures of voters' attitudes and differences in vote shares for the same female and male candidates running for the same election across the different municipalities of the same electoral district.

Unfortunately, GGS survey answers are not available at this level of granularity. We therefore rely in this section on gender earnings gaps computed at the municipality level (i.e. within electoral district). Specifically, we consider the following regression at the candidate $i \times$ election $t \times$ municipality m level:

$$VoteShare_{i,m,t} = \alpha_{i,t} + \nu_{m,t} + \beta \cdot GenderEarningsGap_{m,t} \times F_i + \gamma \cdot GenderEarningsGap_{m,t} \times X_{i,t} + \epsilon_{i,m,t} \quad (3.2)$$

where $VoteShare_{i,m,t}$ is the candidate score in the first round of election t in municipality

and the share of female politicians in a sample of 23 countries. We analyze 88 countries and provide evidence on the share of both female candidates and female politicians.

[28] Relatedly, that female candidates in districts with less favorable attitudes towards women might not want to run in these districts because they think it is not appropriate for women to do so.

[29] Suppose for instance that the expertise of female politicians is lower in districts in which voters tend to favor male politicians. In this scenario, we would then wrongly attribute differences in vote shares to voters' attitudes, while they would simply reflect unobserved differences in the expertise of male versus female politicians. Suppose instead - as it is the case in the model of political selection presented below - that parties refrain from selecting female candidates in districts in which voters tend to favor male politicians. In this scenario, the selection introduces a downward bias in the relationship between voters' attitudes and gender gaps in vote shares.

m and $GenderEarningsGap_{m,t}$ is the gender earnings gap (adjusted for age, industry and occupation) in municipality m in the year before election t. The gender earnings gap is interacted with a gender dummy F_i for female candidates. We also control for the interaction of the gender earnings gap with other candidates' characteristics $X_{i,t}$, such as education, occupation, political experience, and party affiliation. We include candidate $\times$ election fixed effects $\alpha_{i,t}$ and municipality $\times$ election fixed effects $\nu_{m,t}$. The first fixed effect $\alpha_{i,t}$ allows for candidate-specific election shocks, so that the specification absorbs the within-candidate time-variation across election years. Put differently, the empirical design relies only on variations across municipalities of the same district in a given election year, where the same candidates compete for the same seat in the Parliament. The last fixed effect $\nu_{m,t}$ identifies our parameter of interest β from the comparison between female and male candidate scores when they compete in the same municipality. We cluster standard errors at both the candidate level and municipality $\times$ election level and weight municipalities by their total population.

Table 3 reports estimates for our main parameter of interest β in the sample of municipalities with more than 2,000 inhabitants.[30] The coefficient β on the interaction between gender earnings gaps and the dummy for female candidates is negative and statistically significant (at 1 percent confidence level) in all specifications: female candidates obtain on average lower vote shares compared to male candidates in municipalities in which the male-female earnings gap is larger. We gradually introduce candidate $\times$ election fixed effects and controls for candidates' characteristics (dummies for elite education, and for high-skill occupations, and previous political experience) in interaction with earnings gaps. Importantly, we introduce the party affiliation of the candidate interacted with earnings gaps in Column (5). This controls for the concern that high gender earnings gap municipalities are more likely to vote for the Right party, of which women are less likely to be member. Reassuringly, the β coefficient is still negative and statistically significant at the 1 percent confidence level. In Column (6), we find that the coefficient β is similar for female candidates from the Left and the Right party. This suggests that gender attitudes translate into the same gender electoral gaps whatever the ideology of voters.

Taking Column (5) as our preferred specification, we obtain that a one-standard deviation in gender earnings gap (7.2 percentage points at the municipality level) is associated with a decrease by 0.8 percentage points (0.072*0.104) in the vote share of female candidates

[30] Focusing on relatively large municipalities ensures that local gender earnings gaps are precisely estimated. There are around 5,200 municipalities (out of 36,500 in total) above 2,000 inhabitants (the administrative cutoff for a town in France). Results are robust to choosing alternative cutoffs. We present as robustness the results for municipalities above 5,000 inhabitants in Appendix Table A.3, where estimates are around 50% larger.

(relative to male candidates).[31] For means of comparison, note that in our sample, there are around 12% of tight outcomes in the second round of the Parliamentary elections with vote margins between the two candidates within +/-1 percent (in which case a difference of 1 percentage points would change the outcome of the election). This confirms that voters' attitudes matter quantitatively for electoral outcomes between male and female candidates.

Robustness. In Robustness checks presented in Appendix Table A.4, we take our specification in Column (5) of Table 3 and add the gender dummy interacted with other municipality characteristics (that could arguably confound the effect of voters' attitudes on gender electoral gaps documented in Table 3). For example, one potential concern is that male voters could tend to prefer male candidates while female voters tend to prefer female candidates. If gender earnings gaps are correlated with sex ratios across municipalities, this could confound the interpretation of our coefficient of interest. Instead, we find in Column (1) of Appendix Table A.4 that the estimate on the interaction term between earnings gap and the female candidate dummy is unchanged when we control for the interaction of the sex ratio and the female candidate dummy. More generally, Appendix Table A.4 shows that our coefficient of interest is unaffected when we further interact the female candidate dummy with total population in the municipality, the overall employment rate or the share of men among employed workers.

One remaining concern which is not fully addressed by our within-candidate framework is that women running for elections would be more likely to live or come from municipalities with more favorable gender attitudes, and could obtain more votes in these municipalities because of their local roots. To tackle this concern, we run the same regression as above in which we add a dummy for whether candidate i has been either council member or the mayor in municipality j. If the larger fraction of votes obtained by female candidates in municipalities with low gender earnings gap simply reflects a "home bias", including this control would arguably absorb part of the main coefficient of interest *Female* $\times$ *Gender Earnings Gaps*. We present the results in Appendix Table A.5. First, we do find strong evidence that candidates with a local mandate in a given municipality obtain larger vote shares when running for Parliamentary election. However, including the control for local mandate has virtually no effect on the coefficient of interest *Female* $\times$ *Gender Earnings Gaps*. This largely mitigates the residual concern that selection into politics *within* districts could explain our findings.

[31] Similarly, using the cross-département correlation between gender earnings gaps and beliefs obtained in Table A.2, we can estimate that a 10 percentage points increase in the belief that *"Men are better political leaders than women"* is associated with a 1.7 (0.104*10/0.613) percentage points decrease in vote shares for female candidates.

Overall, we interpret the results presented in Tables 2 to 3 as evidence that voters' attitudes towards women matter quantitatively for understanding gender differences in both selection into politics and electoral outcomes. We use these stylized facts as a motivation for building a model of electoral competition in which parties select candidates taking into account that voters might have a systematic preference for either male or female candidates, referred to as "gender voter bias" in what follows.

4 Model of electoral competition

We aim at modeling electoral competition in single-member district majoritarian elections with two main parties.[32] We build on Galasso and Nannicini (2011) and propose a model of political selection in which parties choose between candidates that differ in terms of valence and gender in order to win elections. Our theoretical contribution is to add gender as an additional source of heterogeneity across candidates along with a potential voter gender bias (which then makes gender an important attribute of candidates in the model). The model provides new insights on how voter gender bias and gender quotas affect political selection, and ultimately the gender composition of elected politicians. We show that the presence of voter gender bias endogenously generates a strategic party bias in the presence of gender quotas, that is parties refrain from selecting female (respectively male) candidates in the most-contestable districts when voters have a preference for male (respectively female) candidates. This insight serves as a model-based test for the presence (and sign) of voter bias that we bring to the data in Section 5. We present an extension of the model with intrinsic party bias in Appendix D that highlights the robustness of our model-based test for the presence of voter gender bias.

4.1 Setup

We consider two main parties: Left and Right (denoted L and R below), and $k = 1, \ldots, N$ electoral districts. The two parties occupy fixed positions in the ideology profile: $I_L = -1$ and $I_R = 1$. They compete under single-member district majority rule. The elected candidate provides support for her/his ideology and constituency services for her/his district. Each potential candidate has a personal valence that can be understood as a combination of her/his education, oral ability, political experience, and effort at work. Districts vary by

[32] For the sake of simplicity, we abstract from the two-round majority voting rule of French Parliamentary elections, and start directly with a model of electoral competition in which two parties compete for winning seats in the Parliament in one-round elections.

their local ideology, so that some are contestable, while in others the candidate of one party (either L or R) is ex-ante likely to win the seat.

Parties and districts. Parties L and R select candidates in order to maximize the number of seats they obtain in the Parliament, while taking into account the cost (if any) to circumvent the parity rule that there needs to be 50% of candidates of each gender across all electoral districts. Any deviation from that gender distribution entails a marginal cost of $c \geq 0$, so that the objective of party R (the same applies to L) at the national level is to maximize:

$$U_R = \mathbb{E}\left(\sum_{k=1}^{N} V_{R,k}\right) - \left|\sum_{k=1}^{N} M_{R,k} - 0.5 \times N\right| \times c \tag{4.1}$$

where $V_{R,k}$ is the indicator of victory for party R in district k, and $M_{R,k}$ (respectively $F_{R,k} = 1 - M_{R,k}$) is a dummy indicating whether party R candidate in district k is a male (respectively female) candidate.[33] Equation 4.1 embeds the case of single-member district elections without gender quotas when $c = 0$, as well as strict gender quotas in which parties can participate in the election only if they endorse 50% of respectively male and female candidates when $c = \infty$.

Candidates. In each district, party R (respectively L) chooses between two local candidates – a female candidate and a male candidate – with valence $\theta^F_{R,k}$ and $\theta^M_{R,k}$ (respectively $\theta^F_{L,k}$ and $\theta^M_{L,k}$).[34] The assumption that parties select candidates among a pool of local candidates, as opposed to allocating a national pool of candidates across electoral districts, is consistent with the data. We find that 80% of candidates either hold (or used to hold) a local mandate in the council of one municipality of the same district and/or run in the same district for parliamentary election in one of the previous elections.[35] We assume that female and male candidates' valence are drawn from the same uniform distribution $\mathcal{U}[-\bar{\theta}, \bar{\theta}]$.[36] The valence of each candidate is common knowledge.

[33] One implicit assumption in the objective function 4.1 is that parties equally care for every seat they obtain. Obtaining the majority of seats in the Parliament allows the winning coalition to form the government, which is arguably an additional source of utility introducing theoretically a discontinuity in the party objective around 50% of the seats. However, it is reasonable to abstract from this discontinuity in the case of French Parliamentary elections given that in reality, there is generally no uncertainty on the fact that the party winning the previous Presidential election will also win the majority of seats in the following Parliamentary election.

[34] Restricting the choice to two local candidates in each district is without loss of generality. Alternatively, one may consider local pools of female and male candidates with heterogeneous valence, in which case the party would then simply choose between the male and female candidates with the highest valence.

[35] Note that this is a lower bound on the true fraction of local candidates to the extent that some local candidates might run for the first time in politics or might hold other types of local political mandate that we do not observe in our data. Moreover, a vast majority of (repeat) candidates run in the same district: 96% of candidates running in several elections run in the same electoral district.

[36] We test implications of this assumption in Section 5.4.

Voters and electoral competition. In each district, there is a continuum of voters that care about the ideology, the valence and the gender of (local) candidates. Specifically, voter i in district k - with personal ideology I^i - gets the following utility from voting for the candidate of party R, of valence $\theta_{R,k}$ and gender $F_{R,k}$:

$$U^i_{R,k} = -|I^i - I_R| + \theta_{R,k} - b.F_{R,k} - \delta_k$$

where b corresponds to a gender voter bias, assumed to be observed by political parties. b can be interpreted as either a social norm, a discrimination, or a wrong perception of candidates' abilities based on gender.[37] If $b > 0$, voters are biased in favor of male candidates: they prefer to vote for a male rather than for a female candidate, holding constant ideology and valence. Otherwise voters are biased in favor of female candidates. For the sake of the exposition, we assume that b is homogeneous in the population,[38] and $|b| < 2\overline{\theta}$.[39]

δ_k is a relative popularity shock for the candidate of party L which happens during the electoral campaign, and which is assumed to be normally and independently distributed across districts: $\delta_k \sim \mathcal{N}(0, \sigma^2)$, with Φ denoting the associated cumulative distribution function.[40] Similarly, the same voter derives the following utility from voting for the candidate of party L:

$$U^i_{L,k} = -|I^i - I_L| + \theta_{L,k} - b.F_{L,k}$$

The ideology of voters in each district – observed by parties – is assumed to be uniformly distributed around the ideology of the median voter, denoted I_k, in district k: $I^i \sim \mathcal{U}[-1 + I_k, 1 + I_k]$. Given that the party R wins the election in district k if the median voter I_k gets a higher utility when voting for party R than for party L, party R expected probability of winning the election in district k writes:

$$\mathbb{E}\left(V_{R,k}\right) = \Phi\left(|I_k - I_L| - |I_k - I_R| + \theta_{R,k} - \theta_{L,k} - b.F_{R,k} + b.F_{R,k}\right) \tag{4.2}$$

$|I_k - I_L| - |I_k - I_R| + \theta_{R,k} - \theta_{L,k} - b.F_{R,k} + b.F_{L,k}$ can be interpreted as an ex-ante score

[37] We implicitly assume that the degree of voter bias does not depend on the ideology of voters. This is consistent with the evidence in Table 3, Column (5), where we find that our empirical proxy for voter bias has the same effect on the vote shares of female candidates from the Left and Right party.

[38] We derive below a test for identifying the sign of b in the data. As it will be clear, assuming that b is homogeneous across districts is without loss of generality when solving for the equilibrium of the game. When b is heterogeneous across districts, the test presented in Section 5 then identifies the *average* voter bias b (under the assumption that there is no correlation between the cross-district distributions of b_k's, and the distribution of ideology I_k's).

[39] When $|b| > 2\overline{\theta}$, the selection of candidates is trivial and boils down to selecting only male candidates when $b > 2\overline{\theta}$, and only female candidates when $b < -2\overline{\theta}$, i.e. whatever the relative values of θ^L and θ^M.

[40] This can be interpreted as the voters' reaction during the campaign to candidates' profile and attitude, such as her/his oral ability.

of party R in district k (that is, before the realization of the campaign electoral shock δ_k). $\Phi(.)$ maps ex-ante score into expected probability of winning the election in a given district.

Timing. We adopt the following timing for the electoral game that the two parties play in each district k: (stage 1) Nature draws the local ideology I_k, the potential candidates' valences $\{\theta^F_{R,k}, \theta^M_{R,k}, \theta^F_{L,k}, \theta^M_{L,k}\}$, and which party chooses its local candidate first (say L in what follows); (stage 2) Party L chooses its candidate in $\{F_{L,k}, M_{L,k}\}$; (stage 3) Party R chooses its candidate in $\{F_{R,k}, M_{R,k}\}$; (stage 4) Nature draws the campaign popularity shock δ_k, voters vote and one candidate is elected.

We assume that the probability of moving first is the same for both parties.[41] All nature draws are common knowledge.

Equilibrium. We solve for a subgame perfect equilibrium. The equilibrium in each district k is the gender pair of the left and right candidates $(F_{L,k}, F_{R,k})$ (either $(0,0)$, $(1,1)$, $(0,1)$, or $(1,0)$) and it depends on the parameters $\{c, b, I_k, \theta^F_{R,k}, \theta^M_{R,k}, \theta^F_{L,k}, \theta^M_{R,k}\}$. We formally solve for the equilibrium of the game for all parameter values in Appendix B. In the next Section, we give the main intuition for political parties' best responses in the selection of female or male candidates in each district.

4.2 Parties' selection of candidates

The main intuition, described in this Section, is that the decision of selecting a female versus a male candidate depends in particular on the difference in valence between the two candidates, the degree of voter bias, and on the degree of political competition in the district when there is a cost ($c > 0$) of deviating from the gender parity rule on candidates. To begin with, we describe parties' selection of male or female candidates across electoral districts for the case $c = 0$ (without costs for deviating from the parity rule on candidates).

Pre-quota environment benchmark ($c = 0$). In the absence of gender quotas ($c = 0$), parties' objective (see Equation 4.1) boils down to maximizing $V_{R,k}$, the probability of winning the election in each district. It follows that in each district, each party selects between the male and female candidate the one with the best chance of winning. That is, party R (the same applies to L) chooses the female candidate if and only if $\theta^F_{R,k} - b > \theta^M_{R,k}$, and

[41] Assuming that parties choose their candidates sequentially is not necessary, but allows to obtain a unique equilibrium for all parameter values. Alternatively, when parties choose simultaneously their candidates, there are multiple equilibria for some parameter values (including equilibria in which parties play mixed strategies). Note that we find virtually the same results for the aggregate share of female candidates in the calibration and in simulations presented below when parties choose their candidates simultaneously, and we assign equal weights to each equilibrium in cases with multiple equilibria.

the male candidate otherwise. The following lemma summarizes the selection of candidates and characterizes the aggregate gender composition of candidates when $c = 0$. The proof is in Appendix B.

Lemma 1. *In the absence of gender quotas ($c = 0$), in each district k, party R (the same applies to L) selects the female candidate if $\theta^F_{R,k} - \theta^M_{R,k} \geq b$, and the male candidate otherwise.*

The voter gender bias, b, affects the aggregate fraction of male versus female candidates. When voters have a preference for male politicians ($b > 0$), parties select female candidates only when their valence is large enough to compensate for the degree of voter bias. Aggregating over the (uniform) distribution of valence, the share of female candidates is $\frac{1}{2} - \frac{b}{2\bar{\theta}}$. That is, the share of female candidates running for election is exactly 50% in the absence of voter bias, and below 50% (respectively above 50%) when voters have a preference for male politicians $b > 0$ (respectively for female politicians $b < 0$).

Post-quota environment ($c > 0$). We now discuss the case when there is a cost for deviating from the parity rule on candidates ($c > 0$). We give the intuition of the model solution in an environment with voter bias in favor of male candidates – that is, $b > 0$. This is without loss of generality: as the model is symmetric, the case with $b < 0$ can be described as below after switching notations for male and female candidates.[42]

Suppose that $\theta^F_{R,k} < \theta^M_{R,k} + b$, in which case Party R would choose a male candidate in the absence of quota (see Lemma 1). When $c > 0$, party R might instead consider choosing a female candidate even if the probability of winning would be strictly greater when choosing the male candidate: the presence of the quota introduces a trade-off between the cost of the parity rule and the electoral cost of choosing a female candidate over a male candidate.

To see this formally, observe that in the empirically-relevant case in which parameter values are such that the fraction of female candidates is strictly below 50%, the objective of party R boils down (see Equation 4.1) to maximizing in each district:

$$\max_{F_{R,k}} U_{R,k} = F_{R,k}\mathbb{E}(V_{R,k}|F_{R,k}) + (1 - F_{R,k})(\mathbb{E}(V_{R,k}|M_{R,k}) - c) \tag{4.3}$$

Defining $\Delta\mathbb{E}(V_{R,k}) = \mathbb{E}(V_{R,k}|M_{R,k}) - \mathbb{E}(V_{R,k}|F_{R,k})$ the gender electoral gap in district k – that is, the difference in winning probabilities between the male and female candidate –, the objective function (4.3) implies that party R finds it optimal to select a female candidate in district k if and only if $c > \Delta\mathbb{E}(V_{R,k})$.

[42] When $b = 0$, the equilibrium fraction of female and male candidates is $\frac{1}{2}$.

To further build intuition, we study the behavior of party R in stage 3 of the game, when party L has already chosen a male candidate.[43] We denote $S_{R,k} = |I_k - I_L| - |I_k - I_R| + \theta^M_{R,k} - \theta^M_{L,k}$, party R ex-ante score in district k when both parties R and L select male candidates, and $b_{R,k} = b + \theta^M_{R,k} - \theta^F_{R,k}$, the change in score if party R chooses instead the female candidate. We can then rewrite Equation (4.2) as:

$$\mathbb{E}\left(V_{R,k}\right) = \Phi\left(S_{R,k} - b_{R,k}.F_{R,k}\right) \tag{4.4}$$

and the gender electoral gap rewrites:

$$\Delta\mathbb{E}(V^R_k) = \mathbb{E}(V_{R,k}|M_{R,k}) - \mathbb{E}(V_{R,k}|F_{R,k}) = \Phi(S_{R,k}) - \Phi(S_{R,k} - b_{R,k})$$

Party R finds it optimal to select a female candidate in district k if and only if $c > \Phi\left(S_{R,k}\right) - \Phi\left(S_{R,k} - b_{R,k}\right)$. Figure 3 shows the "electoral cost" of choosing a female candidate over a male candidate with equal valence, for different levels of pre-campaign popularity (or ex-ante score $S_{R,k}$). The vertical arrows represent the electoral cost - formally equal to $\Phi\left(S_{R,k}\right) - \Phi\left(S_{R,k} - b\right)$. The electoral cost is large in districts in which electoral contestability is high: $S_{R,k}$ close to 0 ($\Phi(S_{R,k})$ close to 1/2). As a result, everything else equal, gender quotas push parties to choose female candidates over male candidates in districts in which electoral competition is low - that is, either in districts where party R is very likely to win ($S_{R,k}$ gets closer to 1), or very likely to lose ($S_{R,k}$ gets closer to -1). By contrast, when electoral competition is high, parties would tend to stick to the candidate that maximizes the probability of winning the election: choosing instead a female candidate when $\theta^F_{R,k} < \theta^M_{R,k} + b$ would often generate an electoral cost that outweighs the reduction in the cost c from gender quotas.

To further describe the optimal selection rule of party R in stage 3 of the game, we define the change in score from the initial score $S_{R,k}$ ("the score gap", denoted SG below) such that the probability of winning the election in a given district decreases by c. Lemma 2 then characterizes the selection rule. The proof is in Appendix B.

Lemma 2. *Define $SG_{R,k}$ such that $\Phi(S_{R,k}) - \Phi(S_{R,k} - SG_{R,k}) = c$. In each district k, party R selects the female candidate if $\theta^F_{R,k} - \theta^M_{R,k} \geq b - SG_{R,k}$, and the male candidate otherwise. The score gap $SG_{R,k}$ - and therefore the probability of selecting a female candidate - decreases with electoral competition, and is minimized at $S^*_R = c\sigma\sqrt{\frac{\pi}{2}}$ for c arbitrarily small, where σ is the standard deviation of the campaign electoral shock.*

The score gap $SG_{R,k}$ represents a threshold in the selection rule of party R. Party R will

[43] We discuss the optimal strategy of L in stage 2 and characterize the equilibrium in the Appendix.

select a female candidate in a given district if $\theta^F_{R,k} - b > \theta^M_{R,k} - SG_{R,k}$, and the male candidate otherwise. We can then interpret $SG_{R,k}$ as the distortion in the selection rule due to the costs of gender quotas. That is, for $\theta^M_{R,k} + b - SG_{R,k} < \theta^F_{R,k} < \theta^M_{R,k} + b$, the party internalizes gender quotas and selects a female candidate, even though the probability of winning the local election would have been larger with the male candidate.

Figure 4 illustrates the distortion induced by the gender quota and how it varies with electoral competition (ex-ante score in the x-axis). The y-axis represents the difference in valence between the female and male candidates ($\theta^F_{R,k} - \theta^M_{R,k}$). The solid curve plots $b - SG_{R,k}$. When the valence draws are above the solid curve, party R selects the female candidate. In the absence of quota, party R select female candidates above the dashed line. The area between the dashed line and the solid curve represents the increase in female candidates due to the gender quota. It is thinner in contestable districts, when the score gap is minimal. The second part of lemma 2 shows formally that the minimum is obtained when $S_{R,k} \to 0$ (for low values of c), that is when the ex-ante probability of winning the election $\Phi(S_{R,k})$ is close to 1/2.

Up to now, we gave the intuition considering the party that plays second (in stage 3). We now show that this result extends for the average share of female candidates in equilibrium across both parties. For this, we simulate the equilibrium gender pairs characterized in the Appendix drawing in each district the valence of candidates. We compute from these simulations the aggregate fraction of female candidates running for election, for different levels of pre-campaign popularity and initial voter gender bias $b > 0$. Figure 5 plots the aggregate fraction of female candidates for both the case without (Panel A) and with (Panel B) a cost for deviating from the parity rule. As shown in Panel A, the aggregate fraction of female candidates selected by each party is decreasing in voter gender bias b, but independent on the degree of contestability in the absence of gender quotas (equal to $P(\theta^F_{R,k} - \theta^M_{R,k} \geq b) = \frac{1}{2} - \frac{b}{2\theta}$). As shown in Panel B, political parties react strategically to the introduction of the parity rule by selecting disproportionately more female candidates in non-contestable districts.

Identifying the sign of voter bias. Intuitively, observing the allocation of male and female candidates across contestable and non-contestable districts is informative on the sign of the voter bias. We formalize this intuition in the following Proposition (see proof in Appendix B):

Proposition 1. *When there are gender quotas on candidates ($c > 0$):*

the share of female candidates is lower in contestable than in non-contestable districts when $b > 0$ (voter bias in favor of male politicians);

the share of female candidates is higher in contestable than in non-contestable districts when $b < 0$ (voter bias in favor of female politicians);

the share of female candidates is the same in contestable than in non-contestable districts when $b = 0$ (no voter gender bias).

In Appendix D, we introduce intrinsic party bias in our model: parties have a direct utility cost when women sit in Parliament. We show that this affects the distribution of female candidates across safe and the least winnable districts in the absence of gender quotas. After the gender quota introduction, we find a pattern similar to Proposition 1 where the share of female candidates in contestable districts is lower than in non-contestable districts (both safe and least winnable districts) when voters are biased against women.

In the next Section, we take Proposition 1 to the data and test for the sign of the voter bias in French Parliamentary elections.

5 Empirical evidence on strategic party behavior and voter bias

For testing Proposition 1, we exploit two important institutional features of elections in France. First, gender quotas on candidates were introduced in French Parliamentary elections in 2000. Second, the timing of elections – where Parliamentary elections are in the wake of presidential elections - provides us with precise and exogenous measures of contestability across electoral districts, that we present in Section 5.1. In Section 5.2, we find strong empirical evidence that parties are more likely to select male candidates in contestable districts after the introduction of gender quotas, which indicates that parties strategically react to a voter bias in favor of male candidates. In Section 5.3, we rule out alternative explanations: in particular, the share of female candidates is the same across contestable and non-contestable districts before the introduction of the gender quota. As additional evidence consistent with the voter-bias model, we find in Section 5.4 that elected women have higher activity level in Parliamentary work than men.

5.1 Measuring contestability

As already mentioned in Section 2, our main measure of contestability relies on candidates' parties vote shares in the Presidential election preceding the Parliamentary election.Using the previous Presidential election rather than the previous Parliamentary election takes into account swings or *alternance* occurring in French politics (Murray et al., 2012). The main

Left and Right parties reached the runoff of the presidential elections in all years, except in 2002 and 2017. When both parties reached the runoff of the Presidential election, we define as contestable, districts for which the vote margin between the Left and the Right party in the runoff of the previous Presidential election was between +/- 3 percentage points. For 2002 and 2017, we instead use left and right candidates' scores in the first round of the presidential election (and again define as contestable a district in which vote shares were between +/- 3 percentage points). Using this +/- 3 cutoff in vote shares, we obtain an average fraction of contestable districts of 28% over the post-quota Parliamentary elections.

We first check that our measure of contestability indeed predicts well the actual tightness of the Parliamentary election in the same district. For this, we simply regress either a dummy for ex-post tight elections, or the difference in vote shares between the Left and Right candidates in each district and Parliamentary election, on our dummy indicating ex-ante contestable districts. The upper panel of Table 4 presents the results. The contestable dummy predicts well the tightness of the election. In Columns (1) to (3), we find that when the vote margin between the Left and the Right party in the runoff of the previous Presidential election was between +/- 3 percentage points, the probability of a tight Parliamentary election in the same district increases by around 33-34 percentage points (28 percentage points when including district fixed effects), as compared to a 28% sample average of tight Parliamentary elections. Similarly, in Columns (4) to (5), the vote share margin between the Left and the Right party in the runoff of the Parliamentary election decreases by 8 percentage points (6 percentage points when including district fixed effects), a large effect given the sample vote margin of 12%.

5.2 Female candidates in contestable vs. non-contestable districts

To take Proposition 1 to the data, we first restrict our sample when gender quotas are in place (after 2000). We estimate the following linear probability model of the gender of candidate i of party p in district d and in election t:

$$Female_{i,p,d,t} = \alpha_{p,t} + \beta \cdot ContestableDistrict_{d,t} + \delta \cdot PresidScore_{p,d,t} + \gamma \cdot X_{i,t} + \mu \cdot Z_{d,t} + \nu_d + \epsilon_{i,d,t} \quad (5.1)$$

where $\alpha_{p,t}$ are election $\times$ party fixed effects. $ContestableDistrict_{d,t}$ is a dummy for contestable districts. We control for the district-level score of the candidate party in the first round of the Presidential election ($PresidScore_{p,d,t}$). This variable controls for a potential *intrinsic* party bias allocating the least-winnable seats to female candidates. $X_{i,t}$ are candi-

dates characteristics, and include age, education, past occupation, and political experience. $Z_{d,t}$ are district $\times$ election controls, and include the gender earnings gap. We also introduce district fixed effects ν_d. Standard errors are clustered at candidate and district $\times$ election levels.

The lower Panel of Table 4 reports the estimation results under different specifications. In Column (1), we control for election $\times$ party fixed effects only. In Column (2), we introduce the score of the party in the previous Presidential Election. We include controls for candidates' age, education, and past occupation in Columns (3) to (6), for political experience in Columns (4) to (6), for gender earnings gaps at the district $\times$ election level in Columns (5) and (6), and for district fixed effects in Column (6).

We find that our parameter of interest - the coefficient β - is negative, stable across specifications, and statistically significant at least at the 5 percent confidence level. After the 2000 introduction of gender quotas, the share of female candidates is between 3 and 6 percentage-point lower in contestable districts (than in non-contestable districts). This amounts to a significant 9-18% reduction from the average post-quota share of female candidates (35%). In Column (5), we further control for the district-level gender earnings gap before the Parliamentary election. The coefficient is stable, which further confirms that our result is not driven by confounding factors, where contestable districts are also districts with higher voter bias against women. In Column (6), we further control for permanent unobserved characteristics of districts with the introduction of district fixed effects. Again we find robust results when we leverage within-district changes in contestability only. We view these results as strong support for $b > 0$ – i.e., that voters are biased in favor of male candidates.

We view our results as complementary to those in Folke and Rickne (2016) and Esteve-Volart and Bagues (2012), who find that stronger electoral competition improves women position on the ballots of closed-list elections. These differences might suggest that the implications of electoral competition for women representation in Parliament depend on the electoral system: unlike single-member majoritarian elections, individuals vote over a bundle of candidates in closed-list elections, and it is unclear theoretically how gender-biased voters should react to the presence of, say, a low fraction of female candidates on a given list. We leave this interesting question for future research.[44]

[44] As an illustration in the context of minorities, Adida et al. (2016) provides lab-in-the-field experimental evidence on how anti-muslim prejudice depends on the local share of muslims. Similarly, one could imagine that voters (including those who are gender-biased) in closed-list election might prefer to vote for a list with a positive number of women rather than for a list with men only.

5.3 Alternative explanations and robustness

The main alternative explanation of our empirical test is that parties are constrained in their political selection by the local pool of potential candidates, and that these constraints are stricter when looking for female candidates in contestable districts. The evidence in Table 4 already controls for permanent unobserved differences across districts and thus for stable differences in the local pool of candidates. We now provide two extra pieces of evidence that allow us to further rule out this alternative explanation.

First, we note that the vast majority of candidates for Parliamentary elections holds a local mandate. This allows to characterize the local pool of potential candidates (available after 2000 only). We use the skill-content of the occupations of all mayors and members of the municipality councils in the same districts. For every Parliamentary election and for each party, we compute the share of male local politicians with an high-skill occupation, and the same high-skill share among female local politicians. We then take the corresponding gender gap in high-skill occupation at the district $\times$ election $\times$ party level, and use this gap as our left-hand side variable in a regression similar to Equation 5.1. The upper panel of Table 5 reports the results. We find that contestability is essentially unrelated to the gender gap in high-skill occupation among local politicians, whatever the specification.

Second, we use the pre-quota period as a placebo test. Our theoretical model predicts that in the absence of gender quotas, parties should not take into account the local electoral competition when selecting their candidates. We thus run the same regression as Equation 5.1 on the pre-quota sample (before 2000). Consistent with the prediction of our model, the lower Panel of Table 5 shows that the district contestability is not significantly related to the pre-quota probability that a woman runs for office. These results further confirm that differences in local supply of candidates are unlikely to explain our results. In particular, several studies emphasize that women may systematically under-perform relative to men in competitive environments (Gneezy et al., 2003; Niederle and Vesterlund, 2007), and therefore could refrain from running in contestable districts. We do not find that such effects are large enough to explain the magnitude of the estimates in Table 4.

More broadly, the placebo test in Table 5 allows us to rule out alternative explanations where other time-varying district characteristics would confound the effect of electoral contestability.

Another alternative interpretation is that parties indeed react to the gender quota, but based on biased beliefs about voter preferences. The empirical evidence in Section 3 does not support this alternative interpretation. Indeed, we compare municipalities from the same electoral districts in a given election year, where the same man and woman run for office,

and find that unfavourable voter attitudes towards women proxied by municipal-level gender earnings gap correlate well with actual gender gaps in vote shares.

We show in the Appendix that our results are robust to using alternative measures of contestability. In our main analysis, we use either the first round or the runoff, of the previous Presidential election depending on the election. In Appendix Table A.6, we use the same round for all elections, either the first or the runoff and obtain robust results. In Appendix Table A.7, we consider alternative score cutoffs for separating contestable and non-contestable districts and again find robust results.

5.4 Gender gaps in parliamentary activity

In this section, we report further evidence on the presence of voter bias. Our model shares the standard prediction in discrimination studies that the valence of female candidates selected by political parties should be higher than the valence of male candidates in the presence of voter bias. As a test for this additional prediction of the model, we build on prior empirical work (see for example Murray, 2010) and compute gender gaps in parliamentary activity, as a proxy for politicians' valence (or effort at work). The French Parliament records a large set of indicators (in total 12) for the activity for all elected Members of Parliament (MPs): such as the number of oral interventions in the House of Parliament, the number of participation in committees (*commissions*), the number of formal questions (to the government), the number of written reports, of proposals, and of law amendments. We use a dataset that contains for every MP their monthly activity since 2007, together with their presence in the House.[45] We run the following regression for MP i in calendar year-month m :

$$Activity_{i,m} = \delta \cdot Female_i + \alpha_{p(i),t(m)} + \nu_m + \xi_{r(i)} + \beta \cdot PresidScore_{p(i),d(i),t(m)} + \epsilon_{i,m} \quad (5.2)$$

where we control for election $\times$ party fixed effects $\alpha_{p(i),t(m)}$, for year-month fixed effects ν_m, and for department fixed effects $\xi_{r(i)}$ to account for geographical distance between the MP's district and the location of the French Parliament in Paris.[46] As above, we also control for local popularity of the MP's party with its local score in the previous presidential election. To allow for comparison across the different indicators of Parliamentary activity, we compute the deciles of the distribution of each indicator. For each indicator, we run a separate regression where the dependent variable $Activity_{i,m}$ is the decile of MP i activity in month m. Figure 6

[45] The data is publicly available in digitalized format from the website: www.nosdeputes.fr. We use each indicator of activity recorded by the French Parliament.

[46] There are 96 departments in Metropolitan France. Departments are also the geographical level analyzed in Section 3.1 when we use the Gender Generation Survey.

plots the female dummy coefficients of twelve regressions for each indicator of Parliamentary activity, as well as a regression for a single metric of Parliamentary activity defined as the average of the deciles across all indicators for each MP in a given year-month (the "average index" in the top cell). Overall, we find that female MPs are more active in the Parliament than male MPs. The gender gap in the average index is statistically significant at the five percent level. The average decile of female MPs is 0.07 higher. In other words, the average rank of women is around 1 percentage point higher than men. The same results are presented in regression tables in Appendix Table A.8.

To the extent that the indicators of Parliamentary activity are relevant proxies for politicians' valence (in particular for their effort at work), the results in Figure 6 are consistent with the notion that female elected politicians have higher valence than male elected politicians. This provides further support for the voter bias mechanism of our model.[47]

To sum up, our model-based tests provide strong evidence for the existence of a voter bias in favor of male politicians in French Parliamentary elections. The results highlight that parties strategically internalize voters' preferences, and provide an explanation for why they find it optimal to pay fines instead of selecting an equal number of female and male candidates. This ultimately reduces the presence of women among elected politicians.

The results also highlight the interaction between bias and electoral competition in shaping the selection of women into politics. In the next section, we calibrate the model and quantify in simulations the importance of competition for the effect of gender quotas on women representation among elected politicians.

6 Competition and gender quotas

We first calibrate our model with reasonable parameter values and match the gender distribution of candidates both before and after the introduction of gender quotas in French Parliamentary elections. We then conduct counterfactual simulations, and confirm that electoral competition restricts significantly the quota-induced increase in the share of women among elected politicians.

[47] These results are counterfactual to an alternative model without voter bias (b=0) and heterogeneous support for the valence of female versus male candidates, in which political parties would tend to select male candidates in contestable districts under gender quotas because on average the valence of male candidates is higher than the valence of female candidates. This alternative model predicts instead that the valence of female MPs should be *lower* than the valence of male MPs.

6.1 Calibration

To calibrate our model of electoral competition, we need to choose two core parameters - the voter bias (b) and the cost of deviation from gender parity (c) -, as well as the shape and dispersion of the distributions of initial ideology (I_k), of valences (θ), and of electoral campaign shock (δ_k). Table 6 summarizes our choice of calibration parameters.

We use data on electoral scores to pin down the average voter bias b at 0.06.[48] The empirical counterpart of the distribution of initial ideology is the Left-Right vote share margins, which follows a Normal with standard deviation 0.16. We also choose a normal distribution for the electoral campaign shock. Its empirical counterpart is the distribution of Parliamentary scores residualized by the L-R vote share margins in the presidential election. Its dispersion amounts to 0.06. There remains two free parameters: the support of the uniform distribution of candidates valence (Θ) and the cost of gender quotas. We conduct a grid search to choose them and match the share of women among candidates in the post-quota period. Setting $\Theta = 0.05$ and $c = 0.004$ yields 34% of women among candidates, and 28% of elected women in the model. Given the parsimony of the model, the match with the data is reasonable.

6.2 Simulations

Table 7 shows the share of women among candidates (in Column 1) and among elected Members of Parliament (in Column 2), both in the data and in our simulations. Panel A reports the shares in the data in the pre-quota and post-quota period. Panel B reports the simulation results from the baseline calibration. When we set $c = 0$, the model predicts that the share of women is 8%, both among candidates and elected politicians. This is reasonably close to the pre-quota data.

In Panels C and D of Table 7, we report the results of counterfactual simulations where we vary the intensity of electoral competition. In Panel C, we reduce the dispersion of initial ideology from 0.16 to 0.14, and hold constant the other parameters. Electoral competition intensifies, and the share of contestable electoral districts increases by 10% (3 percentage points). This leaves unchanged the share of women in the pre-quota environment. However, in the presence of gender quota, higher competition decreases the share of women among candidates (and elected politicians) by 5 percentage points (compared to the baseline). As

[48] We showed in the previous Section that b is positive. Conditional on the campaign electoral shock, $b/4$ can be interpreted as the difference in vote share between a male and female candidates. We then use regressions of vote shares on female dummy to inform the calibration of b. We obtain a coefficient around 0.015 once controlling for candidates' characteristics, see the last columns of Appendix Table A.9.

there are now more contestable districts, parties select significantly less women. Overall, while the gender quota increases the share of elected women by 20 percentage points in the baseline simulation, the difference post-pre quota is 15 percentage points in the counterfactual simulation. In other words, the quota-induced increase in women among elected politicians is 25% lower when the share of contestable districts increases by 10%.

In Panel D, we conduct the symmetric counterfactual simulation where the standard deviation of the initial ideology increases to 0.18. Electoral competition is less intense, there are less contestable districts. The quota-induced increase in female MPs is significantly larger than in the baseline simulation.

Finally, in Appendix Section D.3, we present the same simulations for the extension of our model with intrinsic party bias (such that political parties enjoy an additional utility when a male politician is elected as compared to a female politician). As expected, the share of female candidates and politicians is lower in the presence of party bias. However, we still observe in simulations that electoral competition hinders the effectiveness of the parity rule in boosting the presence of women in politics.

7 Conclusion

We study and quantify the implications of voter bias and electoral competition for the gender composition of politicians. We first provide empirical evidence that survey-based measures of unfavorable voters' attitudes towards women and local gender earnings gaps correlate negatively with the share of female candidates in both French Parliamentary elections, and across countries. In addition, we find that within electoral district and election, female candidates obtain lower votes compared to their male competitors in high gender earnings gap municipalities. We then propose a model of political selection with voter bias, and show theoretically that electoral competition pushes political parties to tilt the allocation of the most contestable districts towards either male or female candidates depending on voters' gender preferences in the presence of gender quotas on candidates.

Exploiting the 2000 introduction of gender quotas in France, we find strong empirical support for a strategic party response to a voter bias in favor of male candidates. In the most contestable districts, the electoral cost of selecting women when there is a voter bias in favor of male candidates outweighs the cost of the fine post-quota, and we find that this effect is large enough for explaining why the main two parties select on average post-quota only 35% of female candidates, significantly below the objective of the Parity Law. While our results are based on data from single-district member constituencies, they can plausibly be extended to

other electoral systems. Moreover, we do not see the forces highlighted in our paper as specific to gender per se. They might also generalize to the analysis of minority representation in politics. Finally, we highlight that competition might hurt women representation in politics – and the effectiveness of gender quotas – when voters have a preference for male politicians.

Overall, our findings that voters' attitudes toward gender affect gender gaps in politics – both for differences in electoral scores and in the gender composition of candidates – have important consequences, and suggest that slow-moving voters' attitudes might be an important factor that limits convergence towards a gender parity among politicians over the world.

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8 Figures and Tables

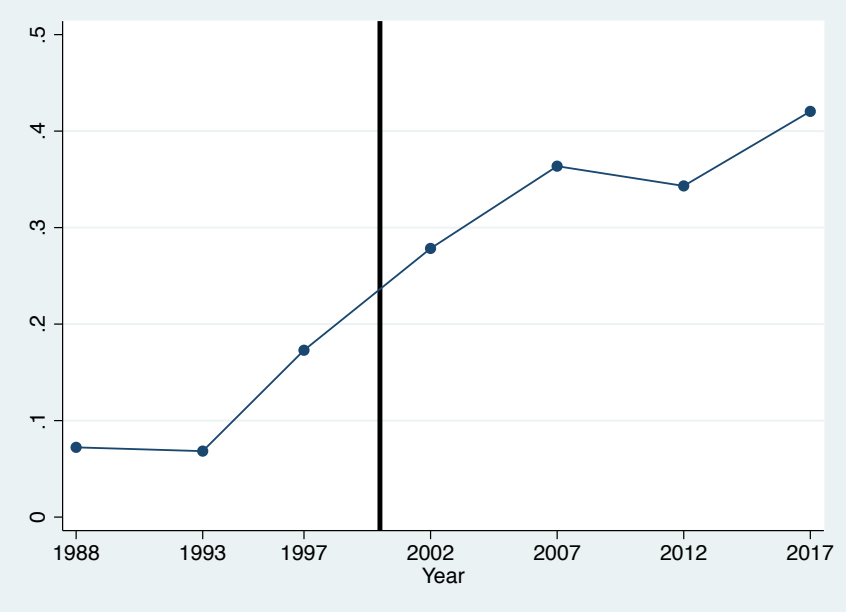
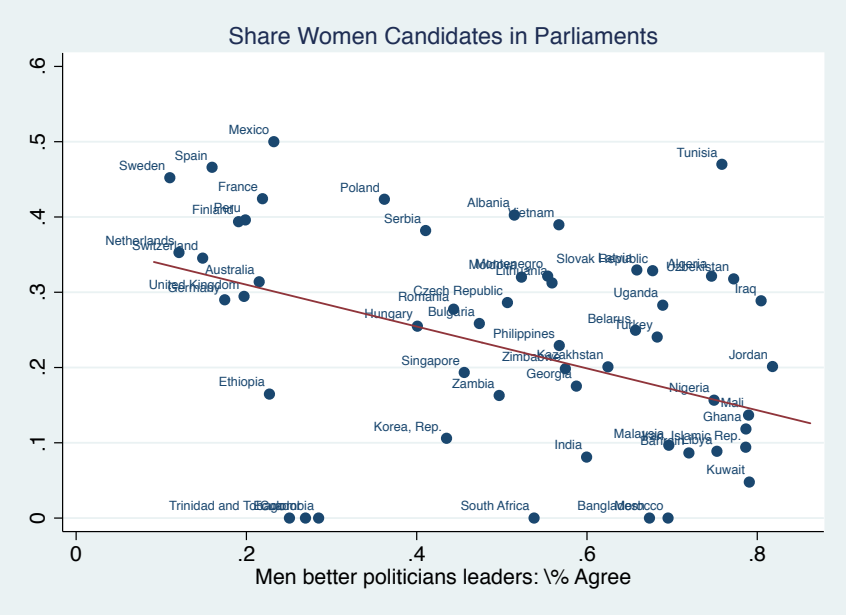


Figure 1
Fraction of women among candidates to French Parliamentary elections

Note: This figure presents the fraction of women among candidates to French Parliamentary elections in 1988, 1993, 1997, 2002, 2007, 2012 and 2017. The sample covers all candidates running for the two main left and right party coalitions.

Panel A. Candidates



Panel B. Elected politicians

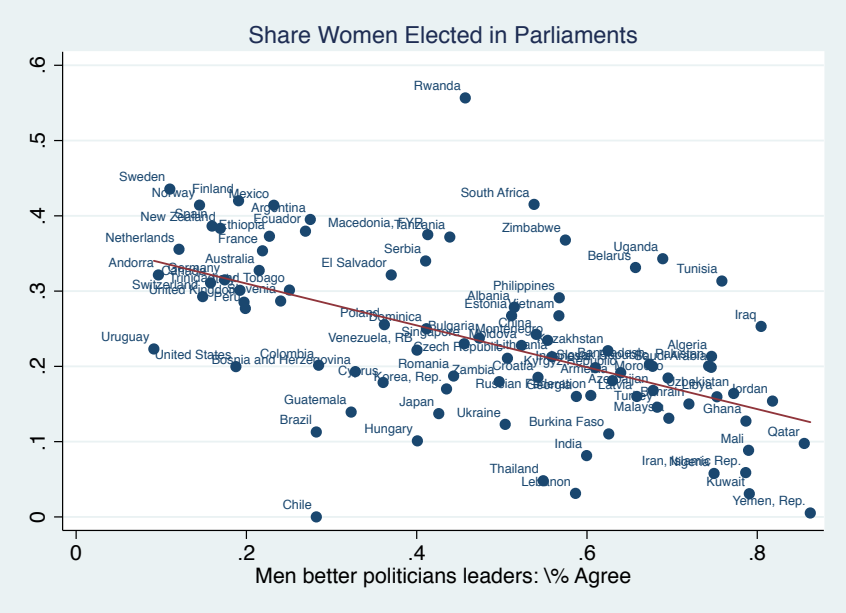


Figure 2

"Men better political leaders": % Agree and fraction of women among candidates and among elected members of Parliament - Cross Country

Note: This figure presents the cross-country correlation between either the fraction of women among candidates (Panel A) or the fraction of women among elected members of Parliament (Panel B), and the share of respondents in the World Value Survey who agree with the statement *"Men are better political leaders than women"*. The sample includes 59 countries in Panel A, and 88 countries in Panel B.

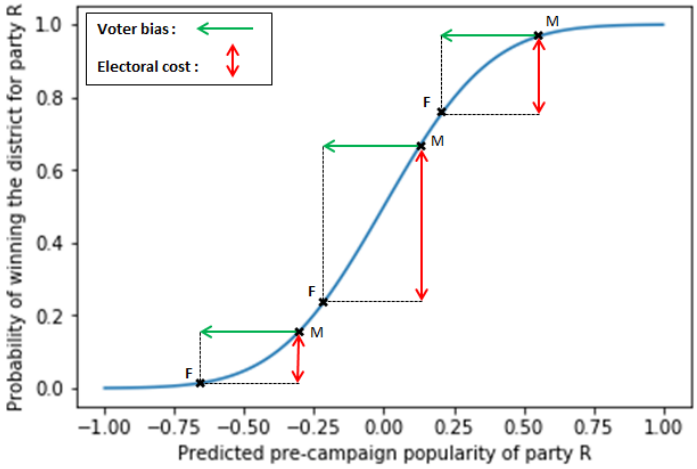


Figure 3

Voter bias and electoral cost when selecting female versus male candidates.

Note: The (blue) curve is the cdf of the campaign shock. This Figure illustrates the change in the probability of winning the election when selecting a female instead of a male candidate of the same valence: $\theta^F = \theta^M$ for different expected scores (pre-campaign popularity).

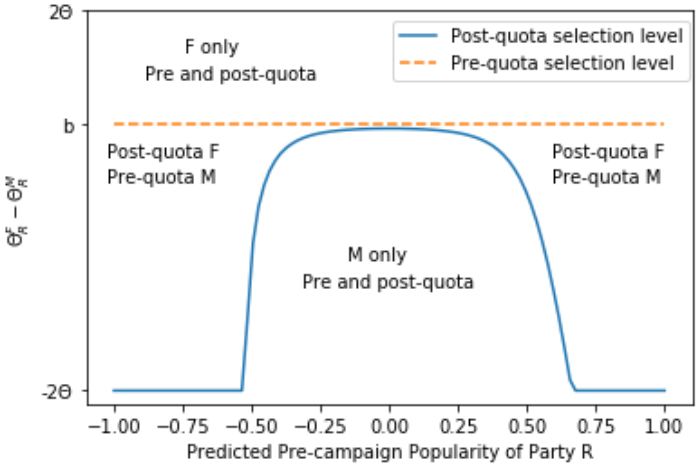
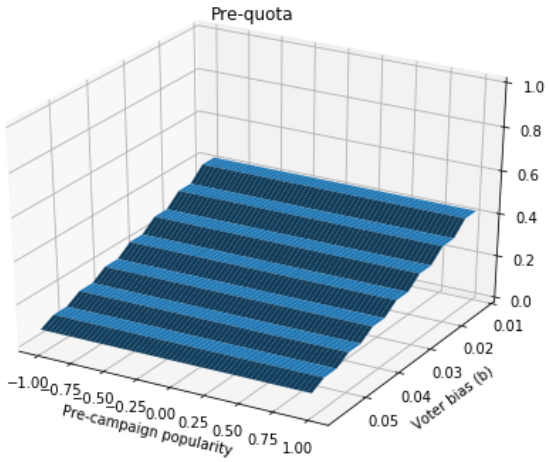


Figure 4

Candidates' valence and party selection rule

Note: X-axis: pre-campaign popularity of party R (S_R varies from -1 to 1). Y-axis: Difference between the valence of the female and male candidates, $\theta_F - \theta_M$ (varies from $-2\overline{\theta}$ to $2\overline{\theta}$). The dashed line presents the selection rule for $c = 0$, that is party R selects the female candidate if $\theta^F_{R,k} - \theta^M_{R,k} \geq b$, and the male candidate otherwise. The solid line presents the selection rule for $c > 0$, that is party R selects the female candidate if $\theta^F_{R,k} - \theta^M_{R,k} \geq b - SG_{R,k}$, and the male candidate otherwise.

A. Without gender quota



B. With gender quota

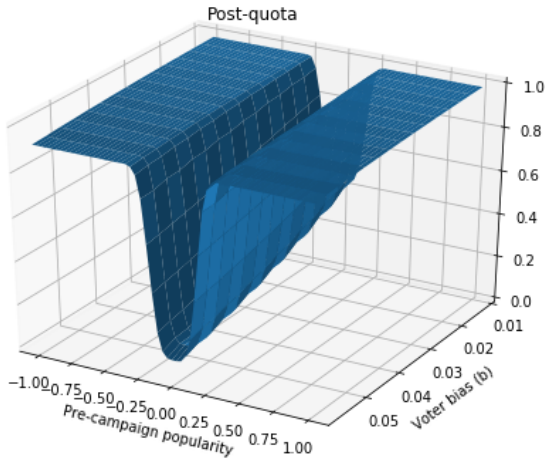


Figure 5

Share of women candidates, competition and voter gender bias

Note: Front axis: pre-campaign popularity of party R (S_R varies from -1 to 1). Y-axis: voter gender bias (b varies from 0.02 to 0.08). Z-axis: share of female candidates.

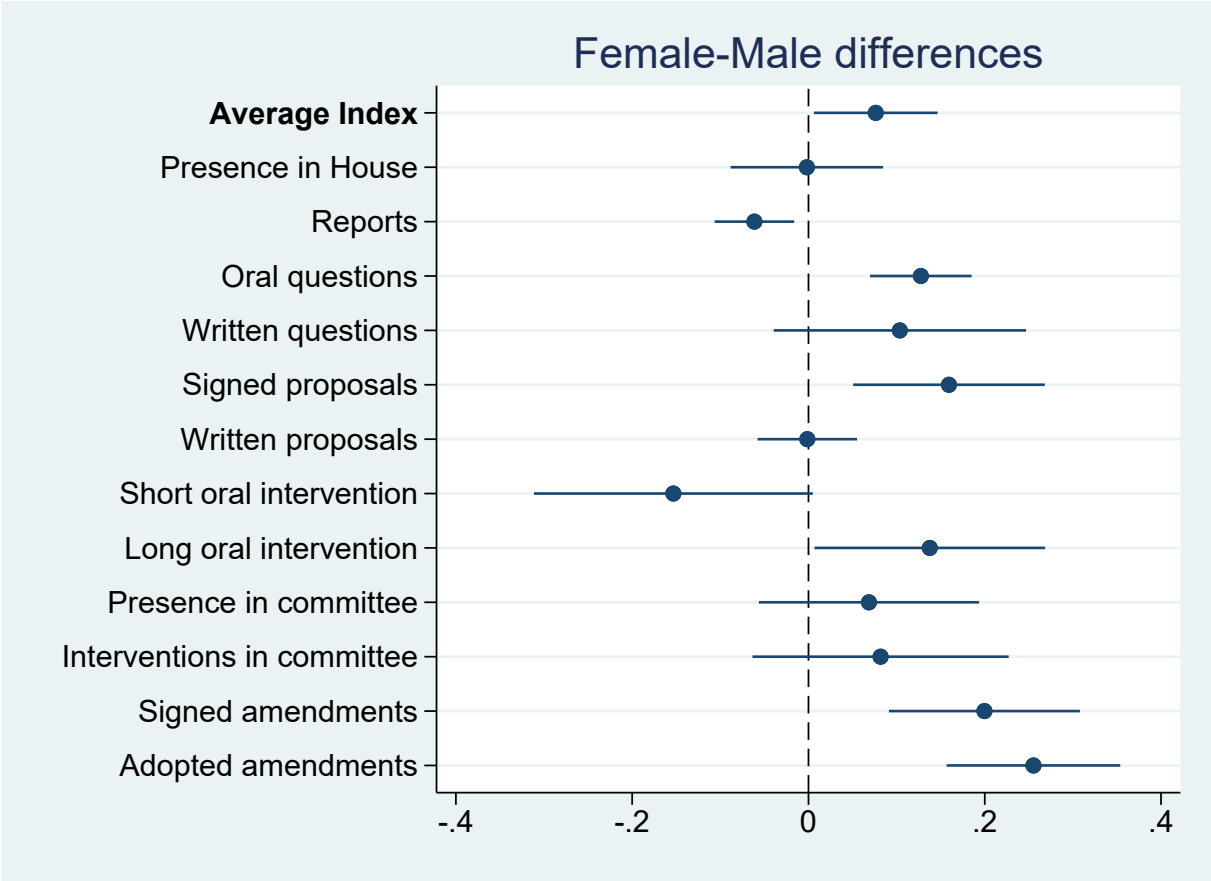


Figure 6

Parliamentary activity of female vs male elected politicians

This Figure plots the coefficient on a female dummy in regressions of parliamentary activity. Intervals centered around the dot correspond to 95% confidence intervals. Each row is a different indicator of parliamentary activity, while the top dot corresponds to the gender gap in the average index of the 12 individual components. Each activity indicator ranges from 1 to 10, and the gender gap should be interpreted as changes in average rank position of women compared to men in the distribution of activity. We add as regression controls, election × party fixed effects, year-month fixed effects, and geographical department fixed effects. Standard errors are clustered at the individual politician level. Total sample size amounts to 52,828 observations. Appendix Table A.8 reports detailed estimation results.

Table 1
Summary statistics - French Parliamentary elections

This Table presents the summary statistics for our sample, which consists of 7,038 candidate-district observations over seven Parliamentary elections between 1988 and 2017. There are 3,890 unique candidates in this sample. A candidate is included in the sample if she/he is running for the left or right coalition in a given election. Female is a dummy if the candidate is a woman. Age is the age of the candidate at the time of the election. Elite university education is a dummy for graduates of the following list of French elite institutions: *Ecole Polytechnique*, *Ecole Centrale Paris*, *Ecole Nationale d'Administration*, *Ecole des Hautes Études Commerciales*, and *SciencesPo*. High-skill occupation is a dummy indicating whether the candidate was either a manager, engineer, physician, lawyer, or university professor. First-time candidate is a dummy indicating whether the candidate is running in a Parliamentary election for the first time. Incumbent is a dummy if the candidate has been elected in the previous Parliamentary election in the same district. Former govt. member is a dummy indicating whether the candidate has been a member of a former government. Local mandate is a dummy indicating whether the candidate has been elected either as mayor or in the council of a municipality in the same Parliamentary district (only available from 2002). Vote share is the number of votes obtained by the candidate in the first round of a given Parliamentary election over the total number of votes in the same district and election. Candidate elected is a dummy for the candidate winning the election in the district. Presidential party vote share is the vote share obtained by the candidate's party in the previous Presidential election. Contestable district is a dummy which equals one if the vote margin between the Left and the Right party in the runoff of the previous Presidential election was between +/- 3 percentage points (respectively in the first round of the previous Presidential election for the 2002 and 2017 Presidential elections). *Men better political leaders: % Agree* and *Men more right to a job: % Agree* are drawn from the 2006 GGS survey, and are computed at the département level. Gender gap in earnings is the average residualized gender gap (between men and women) in the district in the year preceding the election.

	Obs.	Mean	SD	p1	p50	p99
Panel A: Candidates Characteristics						
Female	7038	0.240	0.427	0.000	0.000	1.000
Age	6376	51.508	9.937	28.000	52.000	73.000
Elite university education	7038	0.134	0.341	0.000	0.000	1.000
High-skill occupation	6084	0.530	0.499	0.000	1.000	1.000
First-time candidate	7038	0.366	0.482	0.000	0.000	1.000
Incumbent	7038	0.314	0.464	0.000	0.000	1.000
Former govt. member	7038	0.080	0.272	0.000	0.000	1.000
Local mandate (from 2002 election)	3880	0.623	0.485	0.000	1.000	1.000
Panel B: Elections Characteristics						
Vote share (round 1)	7038	0.301	0.125	0.032	0.302	0.587
Candidate elected	7038	0.429	0.495	0.000	0.000	1.000
Presidential party vote share	7038	0.237	0.084	0.048	0.229	0.436
Contestable district	7038	0.290	0.454	0.000	0.000	1.000
Panel C: Voters' Attitudes						
Men better political leaders: % Agree	6989	0.167	0.058	0.000	0.172	0.312
Men more right to a job: % Agree	6989	0.278	0.088	0.123	0.278	0.481
Gender earnings gap (residualized)	7038	0.125	0.043	0.016	0.128	0.224

Table 2
Voters' attitudes and selection of male/female candidates

This Table presents estimates from regressions of candidates' gender on the fraction of respondents in each *département* in the 2006 GGS who agree with the statement "*Men are better political leaders than women*" in Panel A, and with "*When jobs are scarce, men should have more right to a job than women*" in Panel B, and on (residualized) gender earnings gaps in Panel C. Regressions include election × party fixed effects. Columns (2) to (5) include dummies for candidates' age, elite university education, and high-skill occupations. Columns (3) to (5) include dummies for Incumbent, First-time candidate, and Former government members, as additional controls. Columns (4) and (5) also control for the vote share obtained by the candidate's party in the previous Presidential election. Column (5) includes district fixed effects (Panel C only). The sample is restricted to candidates from the main Left and Right party coalitions. Regressions are at the candidate-district level over the Parliamentary elections between 1988 and 2017. Standard errors presented in parentheses are clustered at both the candidate and département levels in Panels A and B, and at the candidate and district × election levels in Panel C. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A:	Female Candidate?				
Men better political leaders: % Agree	-0.228*	-0.269**	-0.267**	-0.301***	
	(0.120)	(0.119)	(0.115)	(0.115)	
Election × Party FE	Yes	Yes	Yes	Yes	
Age, education, occupation	No	Yes	Yes	Yes	
Incumbent, 1^{st} run, govt exp.	No	No	Yes	Yes	
Presid. party vote share	No	No	No	Yes	
District FE	No	No	No	No	
Observations	6989	6989	6989	6989	
R^2	0.127	0.163	0.208	0.211	
Panel B:	Female Candidate?				
Men more right to a job: % Agree	-0.268***	-0.290***	-0.299***	-0.332***	
	(0.076)	(0.076)	(0.072)	(0.071)	
Election × Party FE	Yes	Yes	Yes	Yes	
Age, education, occupation	No	Yes	Yes	Yes	
Incumbent, 1^{st} run, govt exp.	No	No	Yes	Yes	
Presid. party vote share	No	No	No	Yes	
District FE	No	No	No	No	
Observations	6989	6989	6989	6989	
R^2	0.129	0.165	0.210	0.214	
Panel C:	Female Candidate?				
Gender earnings gap (District)	-0.473***	-0.481***	-0.494***	-0.525***	-0.647**
	(0.158)	(0.159)	(0.152)	(0.152)	(0.273)
Election × Party FE	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp.	No	No	Yes	Yes	Yes
Presid. party vote share	No	No	No	Yes	Yes
District FE	No	No	No	No	Yes
Observations	7038	7038	7038	7038	7038
R^2	0.128	0.164	0.209	0.212	0.344

Table 3
Voters' attitudes and gender gaps in vote shares – Municipality level

This Table presents estimates from regressions of candidates' vote shares in the first round of the Parliamentary elections on a female candidate dummy interacted with residualized gender earnings gap at the municipality level, and control variables. All regressions include Municipality × Election fixed effects. Columns (2) to (5) include Candidate × Election fixed effects. Some specifications include controls for the interaction between residualized gender earnings gap and other characteristics of candidates (age, elite university education, high-skill occupation, political experience, and party affiliation). The sample is restricted to candidates from the two main party coalitions, and to municipalities above 2,000 inhabitants. Regressions are at the candidate-municipality level over the Parliamentary elections from 1993 to 2017. Standard errors presented in parentheses are clustered at both the candidate and municipality-election levels, and regressions are weighted by total population in each municipality. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Vote Share - Round 1					
Female × Gender earnings gap	-0.338***	-0.356***	-0.270***	-0.208***	-0.104***	
	(0.056)	(0.042)	(0.038)	(0.037)	(0.035)	
Female × Right party × Gender earnings gap						-0.097**
						(0.048)
Female × Left party × Gender earnings gap						-0.109**
						(0.044)
Female	-0.014**					
	(0.006)					
Municipalities × Election FE	Yes	Yes	Yes	Yes	Yes	Yes
Candidate × Election FE	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation × Earnings gap	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., × Earnings gap	No	No	No	Yes	Yes	Yes
Right party × Earnings gap	No	No	No	No	Yes	Yes
Observations	46393	46393	46393	46393	46393	46393
R^2	0.709	0.916	0.917	0.918	0.920	0.920

Table 4
Electoral contestability and selection of male/female candidates

This Table presents estimates from regressions of electoral outcomes (in panel A) and of candidates' gender (in panel B) on a proxy for contestable districts, and control variables. When both the right and left parties reached the runoff of the previous Presidential election, we define as contestable, districts for which the vote margin between both parties in the runoff of the Presidential election was between +/- 3 percentage points. For 2002 and 2017 we instead use left and right candidates' scores in the first round of the presidential election (and again define as contestable a district in which vote shares were between +/- 3 percentage points). Panel A shows how contestability predicts tight elections. In Columns (1) to (3), the dependent variable is whether the candidate's vote share in the runoff of the parliamentary election is between 47% and 53%. In Columns (4) to (6), the dependent variable is the absolute difference in vote shares between the candidate and her/his opponent in the runoff. In Panel B, the dependent variable indicates whether the candidate is a woman. Regressions include Election × Party fixed effects. Columns (2) to (6) include the vote share obtained by the candidate's party in the previous Presidential election. Columns (3) to (6) include candidates' age, and dummies for elite university education and high-skill occupations. Columns (4) to (6) include dummies for Incumbent, First-time candidate, Former government members, and local mandate as additional controls. Columns (5) to (6) also control for residualized gender earnings gaps in the same district in the year before the election. Column (6) also includes District fixed effects. The sample is restricted to candidates from the main Left and Right party coalitions. Regressions are at the candidate-electoral district level over the Parliamentary elections between 2002 and 2017. Standard errors presented in parentheses are clustered at both the candidate and district-election levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Predicting tight elections	Round 2 Parliamentary Election					
	Tight Election Dummy			Abs Vote Share Margin		
Contestable	0.340***	0.329***	0.280***	-0.083***	-0.084***	-0.060***
	(0.013)	(0.023)	(0.024)	(0.004)	(0.005)	(0.005)
Election × Party FE	No	Yes	Yes	No	Yes	Yes
District FE	No	No	Yes	No	No	Yes
Observations	3880	3880	3880	2154	2154	2154
R^2	0.148	0.154	0.388	0.199	0.207	0.657
Panel B: Candidates' selection	Female Candidate?					
Contestable	-0.053***	-0.066***	-0.050***	-0.042**	-0.040**	-0.033**
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.013)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	3880	3880	3880	3880	3880	3880
R^2	0.047	0.073	0.130	0.175	0.178	0.377

Table 5
Electoral contestability and selection of male/female candidates
Alternative explanations?

This Table presents estimates from regressions of the gender skill gaps among local politicians (in Panel A) and of candidates' gender (in Panel B) on a proxy for contestable districts, and control variables. As in Table 4, we define as contestable, districts for which the vote margin between both parties in the runoff of the previous Presidential election was between +/- 3 percentage points. For 2002 and 2017 we instead use left and right candidates' scores in the first round of the presidential election. In Panel A, the dependent variable is the gender gap in the share of municipal council members with high-skill occupation (over all municipalities in the district). In Panel B, the dependent variable indicates whether the candidate is a woman, but the sample is restricted to the pre-quota period. Regressions include Election × Party fixed effects. Columns (2) to (6) include the vote share obtained by the candidate's party in the previous Presidential election. Columns (3) to (6) include candidates' age, and dummies for elite university education and high-skill occupations. Columns (4) to (6) include dummies for Incumbent, First-time candidate, Former government members, and local mandate as additional controls. Columns (5) to (6) also control for residualized gender earnings gaps in the same district in the year before the election. Column (6) also includes District fixed effects. The sample is restricted to candidates from the main Left and Right party coalitions. Regressions are at the candidate-electoral district level over the Parliamentary elections between 2002 and 2017 in Panel A and between 1988 and 1997 in Panel B. Standard errors presented in parentheses are clustered at both the candidate and district-election levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Local pool of candidates	Gender gap high-skill occupation - local politicians					
Contestable	-0.006	-0.005	-0.003	-0.002	-0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	3880	3880	3880	3880	3880	3880
R^2	0.051	0.056	0.071	0.075	0.093	0.502
Panel B: Pre-Quota	Female Candidate?					
Contestable	-0.016	-0.016	-0.015	-0.016	-0.015	-0.010
	(0.012)	(0.012)	(0.013)	(0.012)	(0.013)	(0.010)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	3158	3158	3158	3158	3158	3158
R^2	0.057	0.062	0.082	0.106	0.108	0.396

Table 6
Calibration parameters

This Table presents values of the parameters for our model. We also report whether the parameters are obtained from our own estimates or calibrated to match specific moments of the data.

Parameter	Symbol	Value	Source of Calibration
Voter bias	b	0.06	Gender gap in electoral scores
Dispersion initial popularity	s.d. I_k's	0.16	Left-Right vote share margins in Presidential elections
Dispersion campaign shocks	s.d. δ_k's	0.06	Parliamentary residualized scores
Support candidates' types	Θ	0.05	Match post-quota % of Women among Candidates and Elected MPs
Cost from gender quotas	c	0.004	Match post-quota % of Women among Candidates and Elected MPs

Table 7
Model simulations

This Table presents the share of women among both candidates and elected politicians in the data (Panel A), in our calibrated model (Panel B), and in counterfactual simulations of our model with more (Panel C) and less (Panel D) electoral competition among the two main parties.

	(1)	(2)
	% F Candidates	% F Elected
	Panel A. Data	
Pre quota	10	7.5
Post quota	35	20
Δ quota	+25	+12.5
	Panel B. Baseline Simulation	
Pre quota	8	8
Post quota	34	28
Δ quota	+26	+20
	Panel C. Counterfactual: more contestable	
Pre quota	8	8
Post quota	29	23
Δ quota	+21	+15
	Panel D. Counterfactual: less contestable	
Pre quota	8	8
Post quota	39	32
Δ quota	+31	+24

Online Appendix

Voter Bias and Women in Politics

This Online Appendix includes a series of additional Tables (Appendix A), details on the cross-country analysis (Appendix B), the full derivation and proofs of our model (Appendix C), and an extension of the voter-bias model with intrinsic party bias (Appendix D).

A Appendix Tables

Table A.1
Candidates' characteristics by gender

This Table presents candidates' characteristics separately for male and female candidates. Age is the age of the candidate at the time of the election. Elite university education is a dummy for graduates of the following list of French elite institutions: *Ecole Polytechnique*, *Ecole Centrale Paris*, *Ecole Nationale d'Administration*, *Ecole des Hautes Études Commerciales*, and *SciencesPo*. High-skill occupation is a dummy indicating whether the candidate was either a manager, engineer, physician, lawyer, or university professor. First-time candidate is a dummy indicating whether the candidate is running in a Parliamentary election for the first time. Incumbent is a dummy if the candidate has been elected in the previous Parliamentary election in the same district. Former govt. member is a dummy indicating whether the candidate has been a member of a former government. Local mandate is a dummy indicating whether the candidate has been elected either as mayor or in the council of a municipality in the same Parliamentary district (only available from 2002). Vote share is the number of votes obtained by the candidate in the first round of a given Parliamentary election over the total number of votes in the same district and election. Candidate elected is a dummy for the candidate winning the election in the district. Presidential party vote share is the vote share obtained by the candidate's party in the previous Presidential election. Contestable district is a dummy which equals one if the vote margin between the Left and the Right party in the runoff of the previous Presidential election was between +/- 3 percentage points (respectively in the first round of the previous Presidential election for the 2002 and 2017 Presidential elections).

	Female Candidates			Male Candidates			Equality Test
	Obs.	Mean	SD	Obs.	Mean	SD	P-value
Age	1522	50.270	9.890	4854	51.900	9.920	0.000
Elite university education	1691	0.060	0.240	5347	0.160	0.360	0.000
High-skill occupation	1496	0.480	0.500	4587	0.550	0.500	0.000
First-time candidate	1691	0.600	0.490	5347	0.290	0.450	0.000
Incumbent	1691	0.180	0.380	5347	0.360	0.480	0.000
Former govt. member	1691	0.050	0.220	5347	0.090	0.290	0.000
Local mandate (from 2002 election)	1361	0.530	0.500	2519	0.670	0.470	0.000
Vote share (round 1)	1691	0.250	0.110	5347	0.320	0.120	0.000
Elected	1691	0.250	0.430	5347	0.490	0.500	0.000
Presidential party vote share	1691	0.220	0.080	5347	0.240	0.080	0.000
Contestable	1691	0.240	0.430	5347	0.310	0.460	0.000

Table A.2
Correlation between proxies for voters' attitudes

This Table presents estimates from regressions of GGS respondents' answer to the statement "*Men are better political leaders than women*" on either the statement "*When jobs are scarce, men should have more right to a job than women*", or (residualized) gender earnings gaps, and control variables. Regressions are run at the individual level in Columns (1) and (2) and at the *département* level in Columns (3) to (4). Standard errors presented in parentheses are clustered at the *département* level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
	Men Better Political Leaders			
	Agree? Individual level		% Agree Département level	
Men More Right to Jobs: Agree?	0.188***	0.187***		
	(0.009)	(0.009)		
Female respondent		-0.007		
		(0.007)		
Men More Right to Jobs: % Agree			0.419***	
			(0.047)	
Gender earnings gap				0.613**
				(0.284)
Observations	10046	10046	92	92
R^2	0.058	0.058	0.336	0.051

Table A.3
Voters' attitudes and gender gaps in vote shares – Municipality level
Robustness – Large municipalities

This Table presents estimates from the same regressions as in Table 3, except that the sample is restricted to municipalities above 5,000 inhabitants. Regressions are at the candidate × municipality level over the Parliamentary elections from 1993 to 2017. Standard errors presented in parentheses are clustered at both the candidate and municipality × election levels, and regressions are weighted by total population in each municipality.

	(1)	(2)	(3)	(4)	(5)	(6)
	Vote Share - Round 1					
Female × Gender earnings gap	-0.342***	-0.541***	-0.404***	-0.321***	-0.157***	
	(0.076)	(0.071)	(0.065)	(0.063)	(0.058)	
Female × Right party × Gender earnings gap						-0.168**
						(0.085)
Female × Left party × Gender earnings gap						-0.150**
						(0.072)
Female	-0.014**					
	(0.006)					
Municipalities × Election FE	Yes	Yes	Yes	Yes	Yes	Yes
Candidate × Election FE	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation × Earnings gap	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., × Earnings gap	No	No	No	Yes	Yes	Yes
Right party × Earnings gap	No	No	No	No	Yes	Yes
Observations	18996	18996	18996	18996	18996	18996
R^2	0.720	0.931	0.932	0.932	0.934	0.934

Table A.4
Voters' attitudes and gender gaps in vote shares – Municipality level
Controlling for interaction with other municipality characteristics

This Table presents estimates from regressions of candidates' vote shares in the first round of the Parliamentary elections on a female candidate dummy interacted with residualized gender earnings gap at the municipality level, and control variables. All regressions include Municipality × Election fixed effects, Candidate × Election fixed effects, the interaction between residualized gender earnings gap and other characteristics of candidates (age, elite university education, high-skill occupation, political experience, and party affiliation). We then add in each Column the interactions of the female candidate dummy (and other candidates' characteristics) with the following municipalities' characteristics: the gender ratio in Column (1), the logarithm of total population in Column (2), the employment rate in Column (3), and the employment rate of men in Column (4). The sample is restricted to candidates from the two main party coalitions, and to municipalities above 2,000 inhabitants. Regressions are at the candidate × municipality level over the Parliamentary elections from 1993 to 2017. Standard errors presented in parentheses are clustered at both the candidate and municipality × election levels, and regressions are weighted by total population in each municipality. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
	Vote Share - Round 1			
Female × Gender earnings gap	-0.119***	-0.121***	-0.095***	-0.094***
	(0.037)	(0.035)	(0.035)	(0.034)
Female ×	gender ratio	total pop.	emp. rate	male emp. rate
Candidate × Election FE	Yes	Yes	Yes	Yes
Municipality × Election FE	Yes	Yes	Yes	Yes
Right party, age, educ, occ × Earnings gap	Yes	Yes	Yes	Yes
Right party, age, educ, occ × Municip. charac.	Yes	Yes	Yes	Yes
Incumb., 1^{st} run, govt exp., × Earnings gap	Yes	Yes	Yes	Yes
Incumb., 1^{st} run, govt exp., × Municip. charac.	Yes	Yes	Yes	Yes
Observations	46393	46393	46393	46393
R^2	0.923	0.920	0.922	0.922

Table A.5
Voters' attitudes and gender gaps in vote shares – Municipality level
Controlling for local mandates

This Table presents estimates from regressions of candidates' vote shares in the first round of the Parliamentary elections on a female candidate dummy interacted with residualized gender earnings gap at the municipality level, and control variables. All regressions include Municipality × Election fixed effects, and Candidate × Election fixed effects. We then add in Column (2) and (4) a dummy indicating whether the candidate has been elected as mayor or council member in the same municipality. The sample is restricted to municipalities above 2,000 inhabitants in Columns (1) and (2), and to municipalities above 5,000 inhabitants in Columns (3) and (4). Regressions are at the candidate × municipality level over the Parliamentary elections from 2002 to 2017. Standard errors presented in parentheses are clustered at both the candidate and municipality × election levels, and regressions are weighted by total population in each municipality. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
From 2002 election	Vote Share - Round 1			
	Above 2,000 inhabitants		Above 5,000 inhabitants	
Female × Gender earnings gap	-0.353***	-0.319***	-0.566***	-0.502***
	(0.044)	(0.041)	(0.076)	(0.070)
Local mandate		0.084***		0.082***
		(0.004)		(0.005)
Municipalities × Election FE	Yes	Yes	Yes	Yes
Candidate × Election FE	Yes	Yes	Yes	Yes
Observations	31423	31423	12347	12347
R^2	0.920	0.931	0.933	0.944

Table A.6
Electoral contestability and selection of male/female candidates
Robustness–Round 1 or Round 2

This Table presents estimates from the same regressions as in Panel B of Table 4 for different definitions of contestable (versus non-contestable) districts. In Panel A, we define as contestable, districts for which the vote margin between the right and the left party coalitions in the *first* round of the previous Presidential election is between +/-3 percentage points. In Panel B, we define as contestable, districts for which the vote margin between the right and the left party coalitions in the *second* round of the previous Presidential election is between +/-3 percentage points. Thus Panel B excludes the 2002 and 2017 elections. The sample is restricted to candidates from the main Left and Right party coalitions. Regressions are at the candidate-electoral district level over the Parliamentary elections between 2002 and 2017. Standard errors presented in parentheses are clustered at both the candidate and district × election levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: (-3/+3) Round 1 Only	Female Candidate?					
Contestable (Round 1 Only)	-0.059***	-0.073***	-0.059***	-0.050***	-0.049***	-0.029*
	(0.018)	(0.018)	(0.018)	(0.017)	(0.017)	(0.015)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	3880	3880	3880	3880	3880	3880
R^2	0.047	0.074	0.131	0.175	0.178	0.376
Panel B: (-3,+3) Round 2 Only	Female Candidate?					
Contestable (Round 2 Only)	-0.064***	-0.076***	-0.057***	-0.048**	-0.045**	-0.031**
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.015)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	2537	2537	2537	2537	2537	2537
R^2	0.047	0.074	0.131	0.175	0.178	0.376

Table A.7
Electoral contestability and selection of male/female candidates
Robustness–Different cutoffs

This Table presents estimates from the same regressions as in Panel B of Table 4 for different definitions of contestable (versus non-contestable) districts. We define as contestable, districts for which the vote margin between the right and the left party coalitions in the second round of the previous Presidential election is between +/-1 percentage points in Panel A and +/-2 percentage points in Panel B. As in Table 4, we use the vote margin in the first round for the 2002 and 2017 Presidential elections, when the Left party did not attain the runoff. The sample is restricted to candidates from the main Left and Right party coalitions. Regressions are at the candidate-electoral district level over the Parliamentary elections between 2002 and 2017. Standard errors presented in parentheses are clustered at both the candidate and district × election levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: (-1/+1)	Female Candidate?					
Contestable (-1,+1)	-0.070***	-0.080***	-0.063***	-0.062***	-0.060***	-0.067***
	(0.022)	(0.023)	(0.022)	(0.022)	(0.022)	(0.017)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	3880	3880	3880	3880	3880	3880
R^2	0.046	0.072	0.130	0.175	0.178	0.377
Panel B: (-2,+2)	Female Candidate?					
Contestable (-2,+2)	-0.058***	-0.070***	-0.054***	-0.048***	-0.046**	-0.030**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.014)
Election × Party FE	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	No	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	No	Yes	Yes	Yes
Gender earnings gap	No	No	No	No	Yes	Yes
District FE	No	No	No	No	No	Yes
Observations	3880	3880	3880	3880	3880	3880
R^2	0.047	0.073	0.130	0.175	0.178	0.376

Table A.8
Parliamentary activity of female vs male elected politicians

This Table presents estimates from regressions of parliamentary activities on a female dummy. We add as regression controls, election × party fixed effects, year-month fixed effects, and geographical department fixed effects. Each activity indicator ranges from 1 to 10, and the gender gap should be interpreted as changes in average rank position of women compared to men in the distribution of activity. In Column 1, parliamentary activity is measured with a composite index, which averages each of the twelve different indicators that appear in Columns (2) to (13). The sample is restricted to elected members of the Parliament from the main Left and Right party coalitions. Regressions are at the elected candidate-year-month level since 2017. This corresponds to three houses elected in 2007, in 2012 and in 2017. Standard errors presented in parentheses are clustered at the elected candidate level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	AVERAGE INDEX	Presence in House	Reports	Oral Questions	Written Questions	Signed Proposals	Written Proposals	Short oral Intervention	Long oral Intervention	Presence Committee	Interventions Committee	Signed Amendments	Adopted Amendment
Female	0.076**	-0.002	-0.061***	0.128***	0.104	0.159***	-0.001	-0.153*	0.138**	0.069	0.082	0.200***	0.255***
	(0.036)	(0.044)	(0.023)	(0.029)	(0.073)	(0.055)	(0.029)	(0.081)	(0.067)	(0.064)	(0.074)	(0.055)	(0.050)
Election x Party FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Presid. party vote share	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Département FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	52828	52828	52828	52828	52828	52828	52828	52828	52828	52828	52828	52828	52828
R^2	0.256	0.063	0.080	0.151	0.326	0.060	0.256	0.145	0.135	0.151	0.141	0.286	0.176

Table A.9
Gender gaps in vote shares - District level

This Table presents estimates from regressions of candidates' vote shares in the first round of the Parliamentary elections on a female candidate dummy, and control variables. Regressions include Election × Party fixed effects. Columns (2) to (5) include dummies for candidates' age, elite university education and high-skill occupations. Columns (3) to (5) include dummies for Incumbent, First-time candidate, Former government members, and local mandate, as additional controls. Columns (4) and (5) also control for the vote share obtained by the candidate's party in the previous Presidential election. The sample is restricted to candidates from the main Left and Right party coalitions. Regressions are at the candidate-electoral district level over the Parliamentary elections between 1988 and 2017. Standard errors presented in parentheses are clustered at both the candidate and district × election levels. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
	Vote Share - Round 1				
Female	-0.052***	-0.040***	-0.024***	-0.018***	-0.016***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)
Election × Party FE	Yes	Yes	Yes	Yes	Yes
Age, education, occupation	No	Yes	Yes	Yes	Yes
Incumbent, 1^{st} run, govt exp., local mandate	No	No	Yes	Yes	Yes
Presid. party vote share	No	No	No	Yes	Yes
District FE	No	No	No	No	Yes
Observations	7038	7038	7038	7038	7038
R^2	0.466	0.545	0.647	0.728	0.780

B Voters' attitudes and share of female candidates - International evidence

This Appendix explores in details the relationship between voters' attitudes and the selection of women into politics across countries. For this, we rely on survey answers across countries to the same gender-attitudes questions in the World Value Survey, as well as data from the PARLINE database on the fraction of female candidates and elected politicians across Parliaments in the world.[49] We also retrieve from PARLINE data on electoral rules (Proportional, Mixed or Majoritarian), the number of seats in each Parliament, the share of directly elected politicians in each chamber, whether the Parliament consists of one or two chambers, a dummy indicating the Lower House, as well as a dummy when electoral rules include legal gender quotas (either reserved seats or legislated candidate quotas). Data on gender quotas are retrieved from the Global Database of Gender Quotas.[50] Finally, we use data on GDP per capita, fertility rates, life expectancy, and total population, from the World Bank.

Table B.1 presents summary statistics on our cross-country sample, which includes 129 chambers over 88 countries.[51] Data on the share of female candidates running for elections are available only for 51 chambers in 49 countries. As of 2017, women account for 23% of members of Parliaments in our sample, and 28% of candidates running for elections. Gender quotas apply to 24% chambers. The electoral system is Majoritarian in 32% of the elections, and each chamber includes on average 233 seats. Note that attitudes towards women in politics and on labor markets display large heterogeneity across countries, and are strongly correlated: the cross-country correlation between the two statements in the WVS is 0.9.[52]

We next present the results of the cross-country relationship between voters' attitudes toward women in politics and respectively the share of women running for elections (in Panel A) and the share of women elected in Parliaments (in Panel B), without controls in Figure

[49]PARLINE ("PARliaments onLINE") is a publicly-available database maintained by the Inter-Parliamentary Union, an international organization of the Parliaments of sovereign States, and contains information on 272 parliamentary chambers in all of the 193 countries where a national legislature exists.

[50]The Global Database of Gender Quotas is publicly available and jointly provided by IDEA, the Inter-Parliamentary Union and Stockholm University.

[51]The list of 88 countries in the sample includes Albania, Algeria, Argentina, Armenia, Australia, Azerbaijan, Bahrain, Bangladesh, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Canada, Chile,China, Colombia, Croatia, Cyprus, Czech Republic, Ecuador, El Salvador, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Guatemala, Hungary, India, Indonesia, Iran, Iraq, Italy, Japan, Jordan, Kazakhstan, Korea, Kuwait, Kyrgyz Republic, Latvia, Lebanon, Lithuania, Macedonia, Malaysia, Mali, Mexico, Moldova, Montenegro, Morocco, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, United States, Uruguay, Uzbekistan, Vietnam, Yemen, Zambia, and Zimbabwe.

[52]In the WVS (Wave 5, 2005-2009), the share of French respondents who agree with *"Men are better political leaders than women"* and "*When jobs are scarce, men should have more right to a job than women*" is respectively 22% and 20%, which is very similar to the aggregate share in the GGS 2006 survey to the same questions, respectively 17% and 28%. We cannot directly use survey answers from the WVS for France in Table 2, because the WVS does not provide disaggregated information on the location of respondents within countries.

2, and with controls in Appendix Table B.2.

The coefficients on *"Men are better political leaders than women: % Agree"* are negative, statistically significant (at the 1 percent confidence level), and stable across specifications in both Panels of Table B.2. The effects are also economically large: for example in Column (5), a 10 percentage points increase in the fraction of respondents sharing the view that *"Men are better political leaders than women"* is associated with a 2.8 percentage points decrease in the share of female candidates (respectively 3.5 percentage points decrease in the share of women elected in Parliaments), a 10% decrease compared to the 28% mean of female candidates across countries in our sample (respectively a 15% decrease compared to the 23% sample mean of women in Parliaments across countries). As robustness, we present in Appendix Table B.3 the same regressions when using "*When jobs are scarce, men should have more right to a job than women*" as an alternative proxy for voters' attitudes, and find virtually identical results.

Table B.1
Summary statistics - Cross-country sample

This Table presents the summary statistics for our cross-country sample, which consists of 129 country-chambers observations. There are 88 unique countries in this sample (representing around 94% of the world GDP). % Women elected is the fraction of women among elected politicians in a given chamber as of December 2017. Women candidates is the fraction of women among candidates running in the last election in a given chamber as of December 2017 (available for only 51 observations). Gender quota dummy equals one if gender quota (reserved seats or candidates gender quotas) applies to a given chamber. Majoritarian system is a dummy for elections with a majoritarian voting rule. Bicameral is a dummy for countries with two (Upper and Lower) chambers. % Directly elected is the fraction of directly elected candidates in a given chamber. Number of seats is the number of members in the chamber. *Men better political leaders: % Agree* and *Men more right to a job: % Agree* are averaged over respondents from the most recent wave available in the WVS for each country (1999-2004, 2005-2009, or 2010-2014). GDP per capita, fertility rates, life expectancy and total population are drawn from the World Bank as of 2015.

	Obs.	Mean	SD	p1	p50	p99
Parliaments' Characteristics						
% Women elected	129	0.233	0.120	0.000	0.220	0.481
% Women candidates	51	0.278	0.122	0.048	0.289	0.505
Gender quota dummy	129	0.240	0.429	0.000	0.000	1.000
Majoritarian system	129	0.318	0.467	0.000	0.000	1.000
Bicameral	129	0.636	0.483	0.000	1.000	1.000
% Directly elected	129	0.771	0.403	0.000	1.000	1.000
Number of seats	129	233	292	24	150	805
Attitudes						
Men better political leaders: % Agree	129	0.465	0.223	0.091	0.497	0.862
Men more right to a job: % Agree	129	0.437	0.245	0.065	0.395	0.886
Country-Level Controls						
Log(GDPperCapita)	129	8.998	1.293	6.470	9.103	11.315
Fertility rate	129	2.302	1.088	1.240	1.874	5.682
Life expectancy	129	74.462	6.757	52.978	75.497	83.844
Log(Population)	129	16.924	1.563	13.965	17.108	20.993

Table B.2
Voters' attitudes and share of female candidates - International evidence

This Table presents estimates from cross-country regressions of the share of female candidates (Panel A) and of female elected politicians (Panel B) in Parliaments on the fraction of WVS respondents in each country who agree with the statement "*men are better political leaders than women*", and control variables. Columns (2) to (5) include a dummy for majoritarian system, the number of seats in each Parliament, the share of directly elected politicians in each chamber, whether the Parliament consists of one or two chambers, a dummy indicating the Lower House. Columns (3) to (6) include a dummy when electoral rules include legal gender quotas. Columns (4) to (5) also control for country characteristics and include the logarithm of GDP per capita, the fertility rate, life expectancy, and the logarithm of total population. Column (5) also include fixed effects for the different waves of the WVS (either 1999-2004, 2005-2009, or 2010-2014). There is either one or two observations per country, depending on whether there is one or two chambers. Standard errors presented in parentheses are clustered at the country level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A:	% Female Candidates				
Men better political leaders: % Agree	-0.283***	-0.203***	-0.265***	-0.223***	-0.276***
	(0.062)	(0.053)	(0.047)	(0.069)	(0.075)
Gender quota dummy			0.102***	0.082***	0.099***
			(0.025)	(0.033)	(0.034)
Parliaments' Controls	No	Yes	Yes	Yes	Yes
Country-Level Controls	No	No	No	Yes	Yes
WVS Wave FE	No	No	No	No	Yes
Observations	51	51	51	51	51
R^2	0.271	0.484	0.587	0.613	0.638
Panel B:	% Female Elected Politicians				
Men better political leaders: % Agree	-0.268***	-0.269***	-0.299***	-0.347***	-0.353***
	(0.042)	(0.043)	(0.040)	(0.045)	(0.050)
Gender quota dummy			0.084***	0.079***	0.077***
			(0.027)	(0.025)	(0.027)
Parliaments' Controls	No	Yes	Yes	Yes	Yes
Country-Level Controls	No	No	No	Yes	Yes
WVS Wave FE	No	No	No	No	Yes
Observations	129	129	129	129	129
R^2	0.250	0.270	0.355	0.397	0.398

Table B.3
Voters' attitudes and share of female candidates - International evidence
Robustness

This Table presents estimates from cross-country regressions of the share of female candidates (Panel A) and of female elected politicians (Panel B) in Parliaments on the fraction of WVS respondents in each country who agree with the statement "*When jobs are scarce, men should have more right to a job than women*", and control variables. Columns (2) to (5) include a dummy for majoritarian system, the number of seats in each Parliament, the share of directly elected politicians in each chamber, whether the Parliament consists of one or two chambers, a dummy indicating the Lower House. Columns (3) to (6) include a dummy when electoral rules include legal gender quotas. Columns (4) to (5) also control for country characteristics and include the logarithm of GDP per capita, the fertility rate, life expectancy, and the logarithm of total population. Column (5) also include fixed effects for the different waves of the WVS (either 1999-2004, 2005-2009, or 2010-2014). There is either one or two observations per country, depending on whether there is one or two chambers. Standard errors presented in parentheses are clustered at the country level. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A:	% Female Candidates				
Men more right to a job: % Agree	-0.247***	-0.192***	-0.223***	-0.196***	-0.240***
	(0.065)	(0.050)	(0.045)	(0.054)	(0.056)
Gender quota dummy			0.089***	0.084**	0.103***
			(0.026)	(0.032)	(0.033)
Parliaments' Controls	No	Yes	Yes	Yes	Yes
Country-Level Controls	No	No	No	Yes	Yes
WVS Wave FE	No	No	No	No	Yes
Observations	51	51	51	51	51
R^2	0.247	0.511	0.595	0.633	0.664
Panel B:	% Female Elected Politicians				
Men more right to a job: % Agree	-0.250***	-0.240***	-0.264***	-0.269***	-0.268***
	(0.040)	(0.040)	(0.037)	(0.040)	(0.043)
Gender quota dummy			0.083***	0.078***	0.075***
			(0.026)	(0.025)	(0.028)
Parliaments' Controls	No	Yes	Yes	Yes	Yes
Country-Level Controls	No	No	No	Yes	Yes
WVS Wave FE	No	No	No	No	Yes
Observations	129	129	129	129	129
R^2	0.261	0.285	0.370	0.386	0.389

C Derivation of the Model and Proofs

In this Appendix, we characterize the equilibrium candidates' gender pairs and provide proofs for our model.

It is clear from the Party objective Equation (4.1) that for c large enough, there will be 50% of female and male candidates irrespective of the value (or the sign) of the voter bias, b. We abstract from this "corner case" in what follows, and describe how to solve for the game when c is such that the aggregate fraction of female candidates at equilibrium is strictly below 50% when $b > 0$ (and by symmetry, when the aggregate fraction of male candidates at equilibrium is strictly below 50% when $b < 0$).

Away from the "corner case", the aggregate objective of party R (or L) boils down to maximizing the party utility in each district independently. We then suppress the k district subscript from all notations below. Party R objective (the same applies to L) is then to maximize in each district:

$$U_R = F_R \mathbb{E}(V_R|F_R) + M_R(\mathbb{E}(V_R|M_R) - c) \tag{C.1}$$

Recall party R expected probability of winning the district election given in Equation (4.2):

$$\mathbb{E}(V_R) = \Phi\left(|I - I_L| - |I - I_R| + \theta_R - \theta_L - b.F_R + b.F_L\right)$$

where I is the ideology of the median voter. To ease the presentation, let us denote $S_R = |I - I_L| - |I - I_R| + \theta_R^M - \theta_L^M$, party R ex-ante score under the assumption that both R and L select male candidates, and $b_R = b + \theta_R^M - \theta_R^F$ (respectively $b_L = b + \theta_L^M - \theta_L^F$), the change in score if party R (respectively party L) chooses the female candidate instead. We can then rewrite Equation (4.2) as:

$$\mathbb{E}(V_R) = \Phi\left(S_R - b_R.F_R + b_L.F_L\right) \tag{C.2}$$

Observe that the expected probability that party R wins the election in a given district is equal to:

$\Phi(S_R)$ if $M_L = 1$ and $M_R = 1$,

$\Phi(S_R - b_R + b_L)$ if $F_L = 1$ and $F_R = 1$,

$\Phi(S_R - b_R)$ if $M_L = 1$ and $F_R = 1$,

$\Phi(S_R + b_L)$ if $F_L = 1$ and $M_R = 1$.

Absence of gender quota. Let us first solve the game when $c = 0$. Recall Lemma 1 in the paper:

Lemma 1 *In the absence of gender quotas ($c = 0$), in each district k, party R (the same applies to L) selects the female candidate if $\theta_{R,k}^F - \theta_{R,k}^M \geq b$, and the male candidate otherwise.*

Proof of Lemma 1. When $c = 0$, parties' objective is to maximize C.2 the probability of winning the election in each district. It follows that party R (the same applies to L) chooses $M_R = 1$ if $b_R > 0$, and $F_R = 1$ otherwise – that is, $M_R = 1$ if $\theta_R^F - \theta_R^M \geq b$, and $F_R = 1$ otherwise.

The aggregate fraction of female candidates selected by each party equals $P(\theta^F - \theta^M \geq b)$. Given that θ^F and θ^M follow $\mathcal{U}[-\Theta, \Theta]$, we obtain $\frac{1}{2} - \frac{b}{2\bar{\theta}}$.

Presence of gender quota. Let us now solve the case $c > 0$. In the proof below, we assume that $b > 0$. Solving the case with $b < 0$ is obtained by symmetry, switching the notations for male and female candidates. Finally, note that when $b = 0$, the aggregate share of female and male candidates is 50% for all $c \geq 0$.

Using the notations above, party R payoffs in function of L and R strategies write:

$\Phi(S_R)$ if $M_L = 1$ and $M_R = 1$,

$\Phi(S_R - b_R + b_L) + c$ if $F_L = 1$ and $F_R = 1$,

$\Phi(S_R - b_R) + c$ if $M_L = 1$ and $F_R = 1$,

$\Phi(S_R + b_L)$ if $F_L = 1$ and $M_R = 1$.

Similarly, Party L payoffs in function of L and R strategies write:

$1 - \Phi(S_R)$ if $M_L = 1$ and $M_R = 1$,

$1 - \Phi(S_R - b_R + b_L) + c$ if $F_L = 1$ and $F_R = 1$,

$1 - \Phi(S_R - b_R)$ if $M_L = 1$ and $F_R = 1$,

$1 - \Phi(S_R + b_L) + c$ if $F_L = 1$ and $M_R = 1$.

For the sake of exposition, we assume that party L moves first. It is convenient to solve the game backward. We present the sequential choices of candidates by party L and R in extensive form, as well as expected payoff pairs, in Figure C.1. Let us then first characterize party R best response in stage 3 (in function of party L decision in stage 2):[53]

If $M_L = 1$ (L selects the male candidate), R selects $M_R = 1$ if $\Phi(S_R) - \Phi(S_R - b_R) \geq c$, and $F_R = 1$ otherwise.

If $F_L = 1$, R selects $M_R = 1$ if $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$, and $F_R = 1$ otherwise.

[53] Observe that the probability that party R is indifferent between selecting a male or a female candidate in a given district is zero given that valences are drawn from continuous distribution functions with no mass over their support.

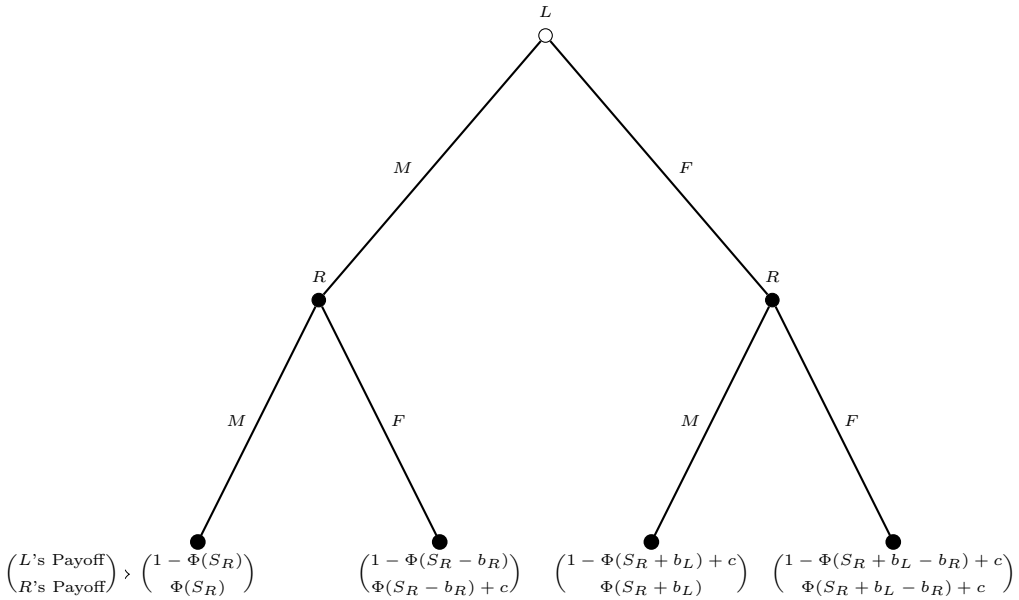


Figure C.1
Expected payoffs in the game

Recall Lemma 2 in the paper:

Lemma 2. *Define $SG_{R,k}$ such that $\Phi(S_{R,k}) - \Phi(S_{R,k} - SG_{R,k}) = c$. In each district k, party R selects the female candidate if $\theta^F_{R,k} - \theta^M_{R,k} \geq b - SG_{R,k}$, and the male candidate otherwise.*
The score gap $SG_{R,k}$ - and therefore the probability of selecting a female candidate - decreases with electoral competition, and is minimized at $S^*_R = c\sigma\sqrt{\frac{\pi}{2}}$ for c arbitrarily small, where σ is the standard deviation of the campaign electoral shock.

Proof of Lemma 2. Lemma 2 defines the score gap SG_R such that $\Phi(S_R) - \Phi(S_R - SG_R) = c$. As the function $x \to \Phi(S_R) - \Phi(S_R - x)$ is strictly increasing, the condition $\Phi(S_R) - \Phi(S_R - b_R) \geq c$ is equivalent to $b_R \geq SG_R$. It follows that the condition - R selects $M_R = 1$ if $\Phi(S_R) - \Phi(S_R - b_R) \geq c$ - is equivalent to R selects the female candidate if $\theta^F_{R,k} - \theta^M_{R,k} \geq b - SG_{R,k}$, and the male candidate otherwise. This proves the first part of Lemma 2.

Let us now turn to the second part of Lemma 2. The relation $\Phi(S_R) - \Phi(S_R - SG) = c$ defines an implicit function $SG(S_R)$. According to the implicit function theorem, the derivative of SG wrt to S_R writes: $\frac{dSG}{dS_R} = -\frac{\Phi'(S_R) - \Phi'(S_R - SG)}{\Phi'(S_R - SG)}$. Let us define S^*_R such that $S^*_R = -(S^*_R - SG(S^*_R))$. We have $\frac{dSG}{dS_R}(S^*_R) = 0$. Moreover, for any S_R, we have $SG(S_R) > 0$. As a consequence, the properties of the normal density imply that $\Phi'(S_R) - \Phi'(S_R - SG) > 0$ when $S_R < S^*_R$ and $\Phi'(S_R) - \Phi'(S_R - SG) < 0$ when $S_R > S^*_R$. This shows that the score gap generally decreases with competition. It decreases when $S_R < S^*_R$ increases, and it increases when $S_R > S^*_R$ increases. Furthermore we show that S^*_R is close to 0.

The score gap is minimized when $\Phi(S^*_R) - \Phi(-S^*_R) = c$. Using a linear approximation

(relevant when c is small),

$$\Phi(S_R) - \Phi(-S_R) = \Phi(S_R) - \Phi(0) - (\Phi(-S_R) - \Phi(0)) \tag{C.3}$$
$$= S_R.\Phi'(0) - (-S_R.\Phi'(0)) \tag{C.4}$$
$$= 2.S_R.\Phi'(0) \tag{C.5}$$

We then obtain $S_R^* = \frac{c}{2\Phi'(0)} = \frac{c\sigma\sqrt{2\pi}}{2}$. This ends the proof of Lemma 2.

Resuming to the derivation of the equilibrium, it follows that party L optimal strategy in stage 2 is such that:

If $\Phi(S_R) - \Phi(S_R - b_R) \geq c$ and $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$ (R chooses $M_R = 1$ in both nodes), L selects $M_L = 1$ if $\Phi(S_R + b_L) - \Phi(S_R) \geq c$, and $F_L = 1$ otherwise.

If $\Phi(S_R) - \Phi(S_R - b_R) \geq c$ and $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) < c$, L selects $M_L = 1$ if $\Phi(S_R + b_L - b_R) - \Phi(S_R) \geq c$, and $F_L = 1$ otherwise.

If $\Phi(S_R) - \Phi(S_R - b_R) < c$ and $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$, L selects $M_L = 1$ if $\Phi(S_R + b_L) - \Phi(S_R - b_R) \geq c$, and $F_L = 1$ otherwise.

If $\Phi(S_R) - \Phi(S_R - b_R) < c$ and $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) < c$, L selects $M_L = 1$ if $\Phi(S_R + b_L - b_R) - \Phi(S_R - b_R) \geq c$, and $F_L = 1$ otherwise.

Equilibrium. It is then straightforward to characterize the (unique) equilibrium gender pair for each parameters' value $\{c, b, I, \theta_R^F, \theta_R^M, \theta_L^F, \theta_L^M\}$:

(M_L, M_R) if $\Phi(S_R) - \Phi(S_R - b_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$, and $\Phi(S_R + b_L) - \Phi(S_R) \geq c$, or if $\Phi(S_R) - \Phi(S_R - b_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) < c$ and $\Phi(S_R + b_L - b_R) - \Phi(S_R) \geq c$;

(F_L, F_R) if $\Phi(S_R) - \Phi(S_R - b_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) < c$, and $\Phi(S_R + b_L - b_R) - \Phi(S_R - b_R) < c$, or if $\Phi(S_R) - \Phi(S_R - b_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) < c$ and $\Phi(S_R + b_L - b_R) - \Phi(S_R) < c$;

(M_L, F_R) if $\Phi(S_R) - \Phi(S_R - b_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) < c$, and $\Phi(S_R + b_L - b_R) - \Phi(S_R - b_R) \geq c$, or if $\Phi(S_R) - \Phi(S_R - b_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$ and $\Phi(S_R + b_L) - \Phi(S_R - b_R) \geq c$;

(F_L, M_R) if $\Phi(S_R) - \Phi(S_R - b_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$, and $\Phi(S_R + b_L) - \Phi(S_R) < c$, or if $\Phi(S_R) - \Phi(S_R - b_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) \geq c$ and $\Phi(S_R + b_L) - \Phi(S_R - b_R) < c$.

Recall Proposition 1 allowing to identify the sign of the voter bias from data on female candidates in contestable and non-contestable district.

Proposition 1 *When there are gender quotas on candidates ($c > 0$):*
the share of female candidates is lower in contestable than in non-contestable districts when $b > 0$ (voter bias in favor of male politicians);

the share of female candidates is higher in contestable than in non-contestable districts when $b < 0$ (voter bias in favor of female politicians);
the share of female candidates is the same in contestable than in non-contestable districts when $b = 0$ (no voter gender bias).

Proof of Proposition 1. District are contestable when local ideology I is close to 0, and non-contestable when I is close to -1 or 1. Formally, we want to show that there exists a cutoff $\overline{I}$ – separating between relatively more contestable ($|I_k| < \overline{I}$) and relatively less contestable districts ($|I_k| > \overline{I}$) – such that:
If $b > 0$, then $\mathbb{E}\left[F|\,|I_k| < \overline{I}\right] < \mathbb{E}\left[F|\,|I_k| > \overline{I}\right]$;
If $b < 0$, then $\mathbb{E}\left[F|\,|I_k| < \overline{I}\right] > \mathbb{E}\left[F|\,|I_k| > \overline{I}\right]$.

Furthermore, given that the model is symmetric across gender, it is sufficient to prove the case when $b > 0$. The proof of the case when $b < 0$ follows the same lines, replacing female index by male index, and taking the opposite sign of b. We focus below on $b > 0$.

We first consider the case without heterogeneity in valence $\{\theta_F^R, \theta_M^R, \theta_F^L, \theta_M^L\} = \{0, 0, 0, 0\}$. This implies that $b_L = b_R = b > 0$, and that $S_R = |I - I_L| - |I - I_R| = 2.I$ when $I \in (I_L, I_R)$ and $I_L = -I_R = -1$. For convenience, we also assume below that b is small enough.

Define $I_0 < 0$ and $I_1 > 0$ the two solutions of the equation $\Phi(2I) - \Phi(2I - b) = c$. Using a linear approximation when b is small, the equation simplifies into $\Phi'(2I).b = c$. This also implies that the approximation is valid when c is also small ($c = \mathcal{O}(b)$). As the density of the normal distribution writes $\frac{1}{\sigma\sqrt{2\pi}} \exp \frac{-(2I)^2}{2\sigma^2}$, the two solutions write: $I_0 = -\frac{\sigma\sqrt{2}}{2}\sqrt{\log\left(b/\left(c\sigma\sqrt{2\pi}\right)\right)}$ and $I_1 = -I_0$, where we assume that $b \geq \left(c\sigma\sqrt{2\pi}\right)$. I_0 and I_1 are symmetric around 0.

As $\Phi(2I + b) - \Phi(2I) \geq c$ implies $\Phi(2I + b) - \Phi(2I - b) \geq c$, the equilibrium pairs are:

(M_L, M_R) if $\Phi(2I) - \Phi(2I - b) > c$ and $\Phi(2I + b) - \Phi(2I) > c$.

(F_L, F_R) if $\Phi(2I + b) - \Phi(2I) < c$.

(M_L, F_R) if $\Phi(2I) - \Phi(2I - b) < c$ and $\Phi(2I + b) - \Phi(2I) > c$.

Given that $I_0 < 0$ and $I_1 > 0$ are the two solutions of the equation $\Phi(2I) - \Phi(2I - b) = c$, it follows that the two solutions of the equation $\Phi(2I + b) - \Phi(2I) = c$ are $I_0 + b/2$ and $I_1 + b/2$. Given that $I_0 = -I_1$ (with $I_1 > 0$), we can rewrite the condition above as:

$\Phi(2I) - \Phi(2I - b) < c \Leftrightarrow I \in (-\infty, -I_1) \cup (I_1, \infty)$.

$\Phi(2I + b) - \Phi(2I) < c \Leftrightarrow I \in (-\infty, -I_1 + b/2) \cup (I_1 + b/2, \infty)$.

To sum up, we just showed that there exist cutoff values for I_k's such that:

(F_L, F_R) if $I_k < -I_1 + b/2$

(M_L, M_R) if $I_k \in (-I_1 + b/2, I_1)$

(M_L, F_R) if $I_k \in (I_1, I_1 + b/2)$

(F_L, F_R) if $I_k > I_1 + b/2$

where the condition $-I_1 + b/2 < I_1$ is verified when b is small. It follows that $\mathbb{E}[F||I_k| < I_1] < \mathbb{E}[F||I_k| > I_1]$ when we aggregate over both parties. This completes the proof. We confirm the same pattern with heterogeneity in valence in simulations.

D Model with intrinsic party bias

In this appendix, we add intrinsic party bias to our voter-bias model. In the first section, we describe the setup and provide the main intuition of the impact of party bias on the distribution of female candidates across districts. In the second section, we provide the derivation of the equilibrium for all parameter values of the game. In the third section, we present simulations for the aggregate share of female candidates and elected politicians, under different electoral competition regimes.

D.1 Setup

We incorporate an intrinsic party bias, denoted B, in favor of one gender in party R (the same applies to L) objective function as follows:

$$U_R = \mathbb{E}\left(\sum_{k=1}^{N} V_{R,k}\right) - \left|\sum_{k=1}^{N} M_{R,k} - 0.5 \times N\right| \times c + \sum_{k=1}^{N} B.\mathbb{E}(V_{R,k}).M_{R,k} \tag{D.1}$$

Party R has an intrinsic bias in favor of male (elected) candidates if $B > 0$, and in favor of female (elected) candidates if $B < 0$. Equation $D.1$ embeds the model without party bias presented in the paper for $B = 0$. $B > 0$ can be interpreted as an intrinsic preference of doing politics between men (in line with the notion of employee discrimination à la Becker (1971)), or alternatively as a belief that male elected politicians have higher ability at serving parties' interest while in office.

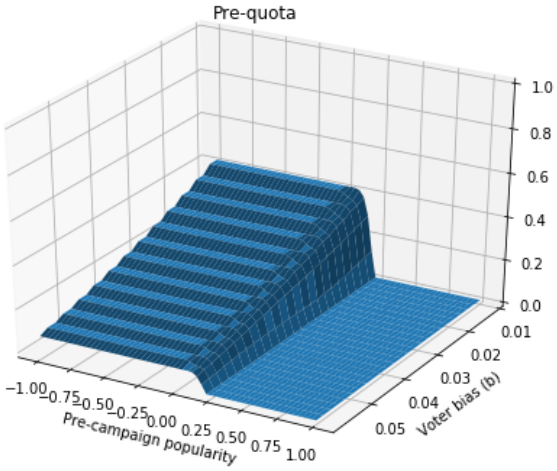
Note that in the empirically-relevant case in which the fraction of female candidates is strictly below 50%, the objective of party R boils down to maximize in each district:

$$U_{R,k} = F_{R,k}\mathbb{E}(V_{R,k}|F_{R,k}) + M_{R,k}(\mathbb{E}(V_{R,k}|M_{R,k})(1+B) - c) \tag{D.2}$$

Intuitively, an intrinsic party bias $B > 0$ pushes political parties not to select female candidates in the most-winnable districts. Figure D.2 presents the proportion of women selected by the party R for moderate values of $B > 0$ both before – that is, $c = 0$ – and after the implementation of gender quotas – that is, $c > 0$.[54] In the absence of quotas, female candidates tend to be selected only in the least-winnable districts. This mechanism still operates in the presence of quotas, but it does not smooth out the drop in female candidates in contestable districts. Consequently, we find that the test from Proposition 1 signs voter bias and is robust to the presence of intrinsic party bias.

[54] Moderate values of the intrinsic party bias means $0 < B < c$. When $B > c$, the most winnable districts are always allocated to male candidates both pre- and post- quota, and the share of female candidates increases following the passage of gender quotas only in the least-winnable districts.

A. Without gender quota



B. With gender quota

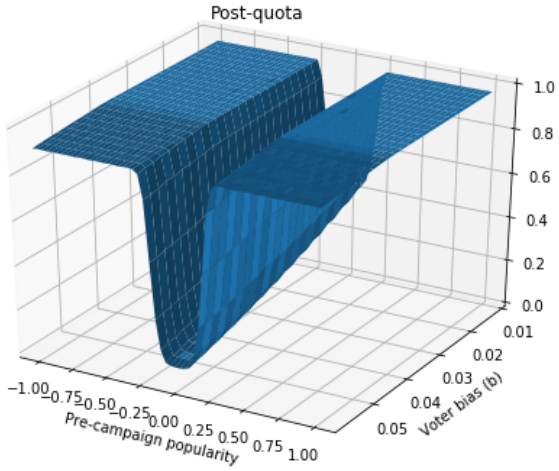


Figure D.2

Share of female candidates depending on the pre-campaign popularity of party R and voter gender bias, in the model with intrinsic party bias.

Note: This figure presents the share of female candidates simulated from the model with both voter bias and intrinsic party bias. The calibration follows Table 6, and we set the party bias $B = 0.0035$. For each value of the voter bias b from 0.01 to 0.06 (Y axis), we report the distribution of female candidates across district popularity index (S_R from -1 to 1; front axis).

D.2 Solving for the equilibrium

We follow the same logic as in Appendix Section C for characterizing the equilibrium gender paris for each parameters' value $\{c, b, I, \theta_F^R, \theta_M^R, \theta_F^L, \theta_M^L, B\}$. With intrinsic party bias B, party R maximizes:

$$U_R = F^R(1-B)\mathbb{E}(V_k^R|F_k^R) + M_k^R(\mathbb{E}(V_k^R|M_k^R) - c) \tag{D.3}$$

Using the notations above, party R payoffs in function of L and R candidate selection rewrites:

$\Phi(S_R)$ if $M_L = 1$ and $M_R = 1$,

$\Phi(S_R - b_R + b_F)(1-B) + c$ if $F_L = 1$ and $F_R = 1$,

$\Phi(S_R - b_R)(1-B) + c$ if $M_L = 1$ and $F_R = 1$,

$\Phi(S_R + b_F)$ if $F_L = 1$ and $M_R = 1$.

Omitting the description of respectively party L and party R optimal strategy, we obtain the (unique) equilibrium gender pair for each parameters' value:

(M_L, M_R) if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) \geq c$, and $\Phi(S_R + b_L) - \Phi(S_R) + B(1 - \Phi(S_R)) \geq c$, or if $\Phi(S_R) -$

$\Phi(S_R - b_R) + B\Phi(S_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) < c$ and $\Phi(S_R + b_L - b_R) - \Phi(S_R) + B(1 - \Phi(S_R)) \geq c$.

(F_L, F_R) if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) < c$, and $\Phi(S_R + b_L - b_R) - \Phi(S_R - b_R) + B(1 - \Phi(S_R - b_R)) < c$, or if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) < c$ and $\Phi(S_R + b_L - b_R) - \Phi(S_R) + B(1 - \Phi(S_R - b_R)) < c$.

(M_L, F_R) if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) < c$, and $\Phi(S_R + b_L - b_R) - \Phi(S_R - b_R) + B(1 - \Phi(S_R - b_R)) \geq c$, or if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) \geq c$ and $\Phi(S_R + b_L) - \Phi(S_R - b_R) + B(1 - \Phi(S_R)) \geq c$.

(F_L, M_R) if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) \geq c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) \geq c$, and $\Phi(S_R + b_L) - \Phi(S_R) + B(1 - \Phi(S_R)) \geq c$, or if $\Phi(S_R) - \Phi(S_R - b_R) + B\Phi(S_R) < c$, $\Phi(S_R + b_L) - \Phi(S_R + b_L - b_R) + B\Phi(S_R + b_L) \geq c$ and $\Phi(S_R + b_L) - \Phi(S_R - b_R) + B(1 - \Phi(S_R)) \geq c$.

D.3 Calibration and counterfactuals

As an illustration for the role of an intrinsic party bias in affecting the fraction of both selected and elected female candidates, we use the same parameter values as in the calibration presented in Section 6 and include a moderate party bias $B = 0.0035$.

In this calibration (see Table D.1), the model predicts 32% of women among candidates and 23% of women among elected politicians under gender quotas, slightly below what we find in Table 6. Moreover, in the pre-quota period (i.e. when setting $c = 0$ and keeping constant all other parameters), the model predicts 7% of female candidates and 5% of women among MPs. Table D.1 shows that electoral competition reduces the quota-induced increase in female representation, when party bias is also present. Comparing Panel B and C, electoral competition reduces by 32% the share of female among elected politicians.

Table D.1
Model simulations with both voter bias and party intrinsic bias

This table presents the share of women among both candidates and elected politicians for a calibrated version of our model with intrinsic party bias $B = 0.0035$. The values of the other parameters are the same as in Table 6. As for Table 6, we present the share of women among both candidates and elected politicians in the data (Panel A), in our calibrated model (Panel B), and in counterfactual simulations of our model with more (Panel C) and less (Panel D) electoral competition among the two main parties.

	(1)	(2)
	% F Candidates	% F Elected
	Panel A. Data	
Pre quota	10	7.5
Post quota	35	20
Δ quota	+25	+12.5
	Panel B. Baseline Simulation (with $B = 0.0035$)	
Pre quota	7	5
Post quota	32	24
Δ quota	+25	+19
	Panel C. Counterfactual: more contestable	
Pre quota	7	6
Post quota	27	19
Δ quota	+20	+13
	Panel D. Counterfactual: less contestable	
Pre quota	7	5
Post quota	36	28
Δ quota	+29	+23