Endogenous Affirmative Action: Gender Bias Leads to Gender Quotas[*]

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Abstract

The adoption of gender quotas in electoral lists, like the recent "parity law" in France, can be fully rationalized on the basis of the self interest of male incumbent politicians. This paper explains why the parity law was approved in its form and, at the same time, why it has not been very effective. The existence of a voters' bias in favor of male candidates is sufficient to convince the incumbents to advocate for equal gender representation in party lists, because it *raises* the incumbents' chances of being reelected. The existence of male bias in the French electorate is empirically confirmed in this paper. We also show that parity law may have assembly composition effects and policy effects that vary with the electoral system.

1 Introduction

In 2001 the French Parliament passed a law – the so called "parity law" – that forces parties to choose roughly equal numbers of men and women as candidates in their lists. What can motivate this type of gender quotas in party lists? Can the choice of a parity law be consistent with the self interest of the incumbent (men) politicians who passed the law? Why were deputies almost unanimously in favor of the reform while the senators were mostly opposed? Why did the reform take the form it took? Why was it so little effective at the national level? This paper aims to provide a consistent set of answers to all these questions, by means of a simple formal model of constitutional reform incentives as well as an empirical analysis of the main assumptions and conclusions of the model. We view this also as an important first step towards understanding more generally the conditions under which the self interest of a majority can suffice to explain the introduction of laws that prima facie protect or foster minority interests.

We shall provide a number of insights on the role of electoral systems in terms of the *ex-ante* incentives to pass the law as well as in terms of the *ex-post* differences in gender representation effects and policy effects. The *ex-ante* reasoning of incumbent legislators that we uncover can also be extended to a broader set of contexts, and could help to explain the emergence of many types of affirmative action laws. The *ex-post* effects that we discuss clarify some important externalities between electoral reforms and gender representation reforms, and in particular suggest that the advocates of a more equal gender representation in politics face a trade-off when evaluating an electoral system: the more effective parity is likely to be with an electoral system, the more unlikely it is that a parity law is approved (given that electoral system) or that such an electoral system is approved given a parity law.

Let us begin by relating the main facts that make the French experience a really rich "natural laboratory." For each of the most important elective bodies – namely the Assembly, the Senate, and the Municipalities – there is a radically different electoral system, and the parity law has determined drastically different effects in those three types of elections.[1] The two chambers, the Assembly of deputies and

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[1] The Assembly is formed using single-member-district majority rule. The Senate is elected using plurality rule in small districts and proportional representation in large ones. Finally, municipal

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the Senate, are called by the Constitution to vote together on constitutional reforms like the one discussed here. Since the Assembly is the larger chamber, the almost unanimous support of the reform in the Assembly is the main fact to explain, being almost necessary and sufficient to explain the approval of the reform. The parity reform takes different forms in the different types of elections, and in the case of the Assembly it means that each party should have between 48% and 52% of candidates of each gender across districts. The other two types of elections use "closed party lists" (except the senatorial elections in small districts where it is a two-round plurality rule but where parity does not apply), and the parity reform requires the parties to alternate men and women in the lists. A peculiar feature of the French Parity Law, as approved in 2001, is that if a party does not satisfy the law it must pay some *fees* per violation (or suffer proportional reductions in government funding). The main right wing party (UMP) presented in 2002 only 19.93% of women and paid EUR 4M, representing 15.8% of its government funding, while the main left wing party (a coalition led by the Socialist Party) presented 36.13% of women and lost 9.1% of its funding (see Jourdain [8]).[2]

The common explanation of the approval of the parity law, in newspapers and among parity observers, is that parity law was passed because parties realized that "the French people wanted it." On the other hand, the common explanation for the possibility to violate the law by paying fees relates to the pressure of male incumbents within the parties to remain candidates in favorable districts. In other words, the common view is that the electorate demanded some kind of parity reform, but the male conspiracy within the party hierarchies made the reform ineffective.[3]

Here we propose a completely different explanation. In contrast with the statement that "the French people wanted parity," we postulate that, ceteris paribus, voters prefer male candidates; given the presence of such a male bias in the voters' population, which we shall empirically verify, it is rational for male incumbent

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elections employ a two-round proportional representation system with a fifty percent majority bonus for the plurality winner of the second round.

[2]Note that in France campaign financing is very restricted, so that these reductions in party funds have non trivial consequences.

[3]This is the view developed, for instance, by the official "Observatoire de la parité entre les femmes et les hommes" in their report to the Prime Minister following the elections (see Zimmerman [13]).

deputies to pass a parity law: In fact, a parity law weakens the pool of challengers, since it becomes likely for an incumbent to face a woman challenger in the next election and women are perceived to have, on average, a weaker electoral support.

As far as the rationalization of per violation fees is concerned, we will show that parity law with the possibility to violate it by paying fees can dominate *ex-ante*, under some reasonable conditions, both the status quo and the "pure" parity without that flexibility. The argument goes as follows: Given the voters' bias in favor of men candidates, parties are in favor of a gender quota because it increases the probability for incumbents (conditional on running) to run against a woman and be reelected. On the other hand, pure parity (with no violations allowed) decreases the probability for the male incumbents of a large party to run again. Therefore, fees are rationalizable as they constitute a direct way to make more incumbents run than the strict application of parity would allow. The *ex-ante* drawback of parity with fees is that if one party pays fees, this decreases the chances for the candidates of the other party to run against a woman. Therefore it is not always true that parity with fees *ex-ante* dominates both strict parity and no-parity. One sufficient condition for this to be true is if there exists a (realistic) preference by party leaders for incumbents over new candidates. Given this party preference for reelecting incumbents over electing new candidates, if fees are sufficiently large, parties are willing to pay them only in order to allow incumbents to run. Parity with fees, then, has the two attractive properties (for the incumbents) that (1) it increases the probability for incumbents to run against women, and (2) it does not prevent incumbents from large parties to run.

The intuition for the opposition of the senators is more straightforward than the above intuition for the support given to the reform by the deputies, and it is a direct consequence of the electoral formula. To see this, assume for simplicity (and almost realistically) that all the incumbent senators are men. Senatorial elections are conducted using Closed List Proportional Representation (CPR henceforth), and parity law requires each party to alternate men and women in the candidate list. Given that voters can only choose among parties and the k seats assigned to a party go to the top k candidates in the party list, parity law determines an automatic substitution of incumbents with female candidates.[4] In summary, single

[4]In contrast, in an Open List system like the Belgian one, the assignment of seats within a party

member district (henceforth SMD) majority rule, given the presence of some degree of male bias, allows the incumbent deputies to gain from the parity law; whereas the opposite is true for the senators given CPR.

In terms of *ex-post* effects, the first question concerns the gender representation outcome: The 2002 Assembly elections resulted in only a moderate increase in the percentage of women elected, from 10.9% to 12.3%, and the result was not much better than this in the 2001 and 2004 Senate elections. The reason for the low effectiveness in Assembly elections is related once again to the presence of male bias among voters. Given the evidence provided in this paper about such a male bias in the French voters' population, passing parity law only helped strengthen *ex-post* the incumbency advantage of the already elected deputies. This, in conjunction with the extensive recourse to paying fees, explains the low effectiveness. On the other hand, the low effectiveness in Senate elections is due to "party proliferation" strategies: incumbent senators managed to keep their seats by becoming leaders of new lists.

As a side *ex-post* phenomenon, it is also interesting to note that parity law can affect the party composition of the Assembly. In particular, parity law should be expected to favor the party with the largest number of incumbents when policy preferences alone would make it lose many seats. The intuition for this result is simply that, as parity helps incumbents, some of them are reelected in spite of a sharp decrease in the voters' preference towards the platform they defend. Under CPR the party composition effects may be more difficult to predict, because of integer problems related to the D'Hondt formula and because of the heterogeneity of incumbency advantage across list members.

Given that the theoretical results of the paper rest on the crucial assumption that in the electorate there is a net bias in favor of men, we will validate this assumption empirically. We show that a male bias did exist in France in the relevant period. That is, controlling for observables, when a new (or incumbent) male candidate runs against a woman, he does better than male and female new (or incumbent) candidates running against an opponent of the same sex. Similarly, females running against males do worst than females running against females. We will also show

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depends on the relative number of votes received by the candidates, and with this system PR would not automatically imply a one-to-one mapping between parity in the list and parity in the outcome.

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that this male bias is not the result of new male candidates running in districts more favorable to their party than new female candidates. In other words, the empirical analysis confirms that the most relevant form of bias is among voters, and is not an artifact of a strategic male conspiracy among party leaders. The gender of the new candidates is not correlated to the party's performance in their district at the last election.

There are many reasons for considering the French case as much more than just a case study. First of all, it constitutes a unique natural laboratory, given the three very different electoral systems for the three main elective bodies. The low effectiveness of parity law for the two national elective bodies contrasts with the municipal level, where women obtained 47.5% of the seats. With a two-round PR system neither could male bias play a role nor was it possible to make use of the same party proliferation strategies used in the Senate elections. More generally, our analysis hints which electoral reforms could make parity more effective. Consistent with the observation that French deputies were in favor of the law whereas senators opposed it, an electoral reform that makes a parity law more likely to be effective is, on the other hand, likely to generate opposition by the incumbents. In other words, the message here is that if such an electoral reform is made in a country before parity laws are discussed, such an electoral reform may make it impossible to pass the parity law. As more countries will start debating reforms like the parity law, the empirical links between electoral systems and gender representation laws will become more transparent in the future. At the theoretical level, the externalities across different dimensions of a constitutional reforms are definitely an understudied and important problem, of which we are providing a clear example.

The French experience analyzed in this paper may also be considered important in terms of comparative politics. As we will report below in a brief comparative section, most scholars now agree that the small number of women in politics in the United States derives from a "supply" problem, and not from a "demand" problem, since no evidence can be found of male bias in the American voters' population, and little in party behavior. We will not extend the comparisons to other countries, leaving a full-blown comparative study for future research, but the comparison between France and the US is at least suggestive of a likely positive correlation between "demand" biases and affirmative action laws.

The paper is organized as follows. We will focus mostly on the theoretical and empirical analysis of SMD assembly elections. We will then highlight the relevant features of the senatorial races and we will elaborate on the electoral design issues mentioned above. We will conclude with some comparative remarks and some hints about the potentially important link between demand biases and affirmative action laws in general.

2   Single Member District Elections

In this section we focus on the Assembly elections, for which the electoral system is two-ballot majority rule. For the sake of simplicity, in our model we assume that there are only two parties, so that the system is equivalent to one-ballot plurality.

Downs [5] defines a political party as "a coalition of men seeking to control the governing apparatus by legal means," where by coalition he means "a group of individuals who have certain ends in common and cooperate with each other to achieve them." A simple way to operationalize this definition in a theoretical framework is to view a party as a "coalition of incumbents seeking reelection." Given the importance of incumbent politicians in any party hierarchy, it is clear that any party leader will have at least two objectives in mind when choosing the composition of the party candidate list: the maximization of the number of seats the party will obtain and the maximization of the chances of reelection of the party's incumbent politicians. The assumption that parties care about the number of seats obtained by their policy platform as well as about the probability of reelecting incumbents will be kept throughout.

The crucial assumption of the theoretical model is that if a man candidate runs against a woman he is elected no matter what the voters of that district think of the candidates' policy platforms. This very strong form of male bias is assumed in order to make computations manageable, but the qualitative results do not change if a weaker form of male bias is considered. The existence of a significant degree of male bias in the French electorate is verified in the second part of this section.

Before turning to the more general model, it is important to illustrate the basic intuition. Suppose that we just needed to explain why men incumbents can prefer a "pure" parity law to the status quo without parity. We could give the explanation

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by means of a simple example: Suppose that the country is divided in two districts, so that the assembly is composed by two incumbents, i.e., the previously elected deputies of those two districts; suppose also that the two incumbents are of the two major parties and that they must run in the district where they were elected (either because it would be illegal or because voters would punish such a switch). If no parity law is passed, the chances of reelection of an incumbent depend on the realization of voters' policy preferences in his district, whereas if a pure parity law is passed, each incumbent is sure to run against a woman (as the men quota will be used by the other incumbent running in his own district), and hence there is an additional advantage, inducing a higher probability of reelection (probability 1 in the case of the extreme gender bias mentioned above). However, explaining why they passed a law that allows parties to pay fees to violate parity is not possible by means of a simple example, and requires a more explicit analysis of all the politicians' incentives.

2.1 Male bias and parity law: the model

There are two parties, L and S. There is a set $[0, 1]$ of districts. The current assembly is composed of the candidates which were elected in the previous elections and are still in office. Districts in $[0, \lambda)$ have an incumbent of party L, whereas districts in $[\lambda, 1]$ have an incumbent of party S. We assume without loss of generality that $\lambda \geq 0.5$ (party L is the large party).

At time 0, members of the assembly vote for a value of $c \in [0, \infty]$, the fee a party needs to pay to circumvent parity in a district. If $c = 0$, there is no limit to the number of men running in the country for the same party, that is, there is no parity requirement (the status quo). If $c = \infty$, it is illegal to have more than fifty percent of men running, the pure parity case. If $0 < c < \infty$, there is some parity requirement but the law allows parties to send more than fifty percent of men, provided they pay c for each additional male candidate. We need to prove that the vote outcome can be a positive and finite c.

At time 1, lists are composed. That is, each party decides, for each district, whether a man or a woman runs for election. Incumbents are assumed to re-run in their district if their party decides to run a man in that district. Also, we assume that

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incumbents cannot shift from their home districts to another one. Consequently, if a man runs in a district where the party did not win the previous election, than this man is a new candidate.[5]

At time 2, voting takes place. In each districts, voters vote for the candidate they prefer. There are only two candidates in each districts, so that no strategic voting takes place.

As mentioned in the introduction, voters differ in their platform preferences, which can change over time, but they also have very strong gender preferences: Being in favor of the platform of one party translates in a vote for that party unless that party's selected candidate is a woman running against a man. In the time elapsing between time 0 and time 2, voters' platform preferences may change. At time 2, districts $[0, z)$ prefer the platform of party L, and $[z, 1]$ are in favor of the platform of S. The implicit assumption here is that in any possible new realization of voters' platform preferences it cannot happen that district i has a majority of S platform supporters and a district $i' > i$ has a majority of L supporters. This order assumption allows us to simplify the treatment of uncertainty at time 0, since in this way the uncertainty is just about the parameter z. The uncertainty about z is greater at time 0 than at time 1. For simplicity, we assume that it is known at time 1, whereas only the probability distribution is known at time 0.[6]

The utility of an incumbent of party p, $p \in \{L, S\}$, depends on the number of seats obtained by his party in the time 2 election, N_p; on whether or not he is reelected; and on the budget of the party, which is affected by the total cost paid by the party to circumvent parity, denoted by C_p. Formally, for all $i \in [0, \lambda)$

$$U_i = U(N_L) + aI_i - \frac{C_L}{\lambda} \tag{1}$$

where a is the utility of being reelected, I_i is the indicator taking value 1 if i is reelected and 0 otherwise, and $U(N)$ denotes the utility that i derives from the fact

[5]The implicit assumption is that incumbency is local, and does not constitutes an advantage if one switches district. The little evidence of incumbents running in different districts from the one where they had been elected confirms that this assumption is realistic, but the qualitative results of our model hold even when we allow incumbents to do this kind of shift, but with useless additional computation complexity.

[6]No result depends on the simplifying assumption that z is completely certain at time 1. Everything would go through in a similar manner if at time 1 there were a less precise update.

that his party obtains N seats. Even though the result could be proved with any $U(N)$ weakly convex for all $N \in [0, 0.5)$ and weakly concave for all $N \in (0.5, 1]$, the following functional form is the simplest to consider:

$$U(N) = \begin{array}{ll} Ns & \text{if } N < 0.5 \\ 0.5 & \text{if } N = 0.5 \\ 1 + Ns & \text{if } N > 0.5. \end{array}$$

For all $i \in [\lambda, 1]$

$$U_i = U(N_S) + aI_i - \frac{C_S}{1 - \lambda}. \tag{2}$$

Consistent with the Downsian view of a party discussed at the beginning of this section, we define a party as the aggregation of its incumbents. Consequently, we assume that the utility of a party is the sum of the utilities of its incumbents:

$$U_L = \lambda U(N_L) + aI_L - C_L, \tag{3}$$

and

$$U_S = (1 - \lambda) U(N_S) + aI_S - C_S \tag{4}$$

where I_p stands for the number of reelected incumbents of party p, $p \in \{L, S\}$.

Parity means that there needs to be fifty percent of candidates of each gender for each party. Any deviation from that gender distribution entails a marginal cost of c, so that

$$C_p = c\,|M_p - 0.5|\,, \;\; p \in \{L, S\}$$

where M_p is the fraction of men candidates of party p selected at time 1.

Given all the assumptions above, we prove the following result:

Proposition 1: *If s is small and a is large (i.e., reelecting an incumbent is important for a party but the marginal utility of a new seat is small unless it allows the party to obtain the majority), then there exist well behaved probability distributions of voters' platform preferences such that, at the constitutional choice stage (at time 0), a "parity with fees" system is unanimously preferred to the no parity system, and is preferred by a majority to the pure parity system.*

In a nutshell, we have shown that male bias allows the incumbents to obtain a new type of incumbency advantage by passing an affirmative action law with a

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progressive cover. The formal proof is in appendix 1. The intuition is similar to the one given for the two-district case as far as the reason for preferring pure parity to the status quo. The intuition for the additional result that parity with fees can dominate even pure parity is as follows: given that a party is a coalition of incumbents and hence reelecting incumbents has priority over electing new candidates, the larger party wants a parity law in order to protect its incumbents in the states of the world in which platform preferences happen to favor party S, but given that L's incumbents are more than fifty percent, pure parity is dominated by a system where even the other $\lambda - 0.5$ incumbents can be protected (with some probability) by paying fees. A small s and a relatively large a are needed so that there exist values of c for which parties are ready to pay the fee only if it allows an incumbent to run: indeed, if no such value of c exists, parity with fees cannot be optimal as either the party would refuse to pay to allow one more incumbent to run, or, if the party pays, the opponent party also pays and the incumbent runs against a man, thereby loosing his seat anyway. There are restrictions on the class of admissible distribution functions because the uncertainty to be reelected needs to be sufficiently large: if a large fraction of incumbents are sure to be reelected, they may have no incentive to pass the law as it doesn't increase the probability that their party win the election and it is likely to impose a cut in the budget of the party. However, as one can verify in the appendix, the conditions on a, s and on the skewness of the probability distribution to obtain consensus on parity with fees are very reasonable.

There are a number of remarks and/or corollaries to the main result stated in proposition 1:

1. Combining the effects of the 1995 and 1997 elections, the UMP party had the largest number of incumbent politicians at the time of the parity reform. As one can verify from appendix 1, the larger party is the one that is expected to pay more fees, consistent with the fact that the UMP party indeed violated the law significantly more than PS.

2. As a corollary of proposition 1, one could easily check from its formal proof that the expected number of women elected given parity law (with fees allowed) is zero. The result is thus very sharp: not only the parity law as it passed in France is perfectly consistent with the self interest of the male incumbents, as

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proved by proposition 1, but it is also completely ineffective in terms of the official goals.[7]

3. Parity may affect the party composition of the Assembly (and hence policies) when voters' platform preferences change with respect to the status quo. The number of seats won by the large party that is losing support in terms of platform preferences is (weakly) larger than if parity was not applied. Thus, the introduction of parity reduces the variance of party composition.

Finally, note that in the informal literature the parties are directly blamed for the low effectiveness of the law (male conspiracy within parties). In our model parties are coalitions of strategic incumbents, so they strategically choose their preferred institutional system at time 0, and they play strategically at the list composition stage. A district where a party is almost sure to win is also one where it has an incumbent, and hence, for the values of the parameter we look at, it is rational for the party to have the incumbent running there. However, there is no room in the model for male conspiracy, which would bias the party list composition decisions in favor of men just because of their gender. Only self interest matters. Among other things, the next subsection will establish that indeed from the French elections data there is very little to no evidence of male conspiracy within parties, whereas the evidence of existence of a male bias among voters will be very clear. Let us turn to the empirical analysis.

2.2   Existence of male bias among voters

In this section, we will show empirically that in the 2002 French National Assembly election a male bias existed among voters. We define as male bias the additional percentage of votes a male candidate gets, ceteris paribus, when he runs against a woman. We remark that by male bias we do not refer necessarily to discriminating preferences, but to whatever reasons that make voters have a net preference for men when all the other observable variables are kept constant.[8]

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[7]Of course, with a less extreme type of gender bias, the model could determine a positive (but small) number of expected women elected, especially when there is a significant change in the platform preferences of the electorate with respect to the status quo.

[8]For example, a male bias can arise from a wide-spread belief that men are more corrupt, or bring more pork to the district, whereas women are more concerned about global public goods, and

Beside exhibiting some male bias as defined above, we need to show that this does not derive from party bias. As a party bias would result in a strategic allocation of men in favorable districts, we show below that the data does not exhibit such a party bias. In other words, parties have not preferred men to women in "good" districts.[9]

Our data is constructed based on the information collected from the website of French National Assembly.[10] The website provides, among other things, biographical information on 2002 candidates, their party affiliation and incumbency status, and the district-by-district first- and second-round results in both 1997 and 2002 elections, together with abstention rate of each district. We have complemented this with data on candidate campaign expenditures and party contributions to each candidate's campaign from *Publication Simplifiée des Comptes de Campagnes*.[11] In order to avoid difficulties associated with variable number of parties and the resulting strategic voting behavior, we focus on those districts where election went to the second-round and where the two second-round candidates were from the two main party coalitions of 2002 elections, PS and UMP.

For observation/candidate j, we assume a linear model of the form $y_j = \beta X_j + \varepsilon_j$. Different specifications will be estimated, but in the basic one y_j is candidate j's score in the second round of the 2002 elections. Beside a variable measuring the male advantage, which we describe next, the vector X_j of controls includes the score in the second-round of the 1997 election by the candidate of the same district and same party as candidate j.[12] This party-district-specific variable counts for the aggregate preference toward a specific party within each district. A second control is age difference between opponents in the same district, since a candidate's age is plausibly correlated with his(her) perceived quality or experience. We also control for the difference of the square of their age.[13] Finally, we control for party affiliations,

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the electorate of a district may prefer a focus on the former type of policies.

[9] Clearly, overall men may be in better districts, but only because most incumbents are men.

[10] http://www.assemblee-nationale.fr/elections

[11] Or, *Simplified Publication of Campaign Accounts*, which is published in the *Official Journal of the French Rebublic* in the *Administrative Documents* series.

[12] Thus we also eliminate some observations that have no such correspondence in 1997. (Since the UMP did not exit in 1997 we use the score from the RPR or UDF.) For example, if no PS, RPR or UDF candidates ran in that district in 1997 or if they were eliminated in the first round.

[13] Both are divided by 100 to make results easier to present.

since they could be correlated to the gender bias. This is done by including an indicator variable that takes value 1 if the candidate is from UMP and 0 if he or she is from PS. A constant term is also included, which represents the average score a candidate won in 2002 when all other regressors were zero.[14] Error terms (ε_j) follow standard assumptions imposed by ordinary least squares estimation method.[15]

The key regressor is the male advantage, which measures the male bias. The model assumes that when a male candidate has a female opponent, he does better than when the opponent is male (holding everything else constant). The male advantage can be measured by a variable that takes value 1 if a male has a female opponent, 0 if the two candidates are of the same gender, and -1 if a female has a male opponent. We will also show, although it is not crucial to our argument, that the implicit symmetry assumption – namely that woman vs woman is just like man vs man and that the advantage of a man incumbent (respectively, new man candidate) over a woman is equivalent to the disadvantage of a woman incumbent (respectively, new woman candidate) with respect to a man – is actually supported by the data.

Table 1 reports estimation results. Specifications (1) and (2) only use new candidates while specifications (3) and (4) use incumbents.[16] Specifications (1) and

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[14]We also considered controlling for the difference in expenditures between the candidates in the same district and the square of the difference. Out of the eight specifications reported in Tables 1 and 2, these variables were statistically significant in only two cases. The biggest coefficient estimate (in absolute value) has its first non-zero digit in the fifth position past the decimal. More importantly, adding these regressors had no qualitative impact on the other estimates. The only difference worth noting is that three coefficient estimates lose statistical significance, "Age Difference" in specifications 1 and 2, and the "Difference of Square of Age" in 1. For these reasons these regressors were excluded from the results reported here but are available from the authors on request.

[15]The fact that the dependent variable lies between 0 and 1 could be problematic in an OLS regression if we had regressors with values in a large range. Here it is not a problem because the right hand side is composed mostly of regressors between 0 and 1. Nonetheless, we have also estimated the standard transformed equation $\ln\left(\frac{y_j}{1-y_j}\right) = \beta X_j + \varepsilon_j$. The conclusions are unchanged (in particular the sign and statistical significance of our measure of male bias), thus we prefer to report the more familiar and easier to interpret case where the dependent variable is not transformed.

[16]In specifications (1) and (2), since we limit attention to new candidates, and since in each second round of each district election the race is 90% of the time between an incumbent and a new candidate, only 10% of the new candidates need to be dropped in order to avoid having two candidates

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(3) control for the type of the opponent (either a new candidate, a 1997 loser, or a 1997 winner that was moved district): for (1) the excluded category is an incumbent opponent and for (3) it is a new candidate opponent. These dummies are jointly statistically significant (p-value < 0.1) in specification (1) but not in specification (3) (p-value > 0.1) and thus we also report (2) and (4) where those dummies are excluded. For new candidates, these estimates suggest that it is better to run against any type of candidates than against an incumbent, but that effect is statistically significant only against 1997 losers. Own party score in 1997 and the party position are statistically significant in every specification. Not surprisingly, the effect of own party score in 1997 is positive.[17] Age difference has a positive impact on score for both new candidates and incumbents, but is statistically significant only for new candidates.

The "key result" is the statistically significant male bias, which is observed for both new candidates and incumbents irrespective of the specification. In appendix 2 we show in Table 3 how this effect differs when a woman faces a woman, a woman faces a men, and a men faces a woman, from the baseline where a man faces a man. We show that the hypothesis that woman vs woman is no different from man vs man and that the advantage of a man vs a woman equals the disadvantage of a woman against a man cannot be rejected (this is termed the symmetry hypothesis in the table).

Another way to see if there exists a male bias is to look for the impact of gender on the probability of winning. Table 2 presents logit estimates of the determinants of a win (win equals one and loose equals zero) using the same regressors as for the specifications presented in Table 1. In both specifications (5) and (7) the joint hypothesis that the effect of the type of opponent (new, 1997 loser, or was moved district) is equal to zero cannot be rejected (p-value > 0.1). For both new candidates

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from the same district (which would determine correlation between the error terms). However, the results are basically identical with or without such a restriction of the sample. When more than one new candidate ran in the same district, the selection rule was to select male candidates if they ran against a woman, otherwise to select the loser.

[17]One effect of the male bias could be to affect party allegiance as a function of the gender of the candidates which would suggest to interact own party score in 1997 with gender. In all the regressions reported in the paper, doing so didn't affect overall results and the effect of own party score in 1997 interacted with gender was never statistically significant.

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Candidates:	New		Incumbent	
	(1)	(2)	(3)	(4)
Own Party Score in 1997	0.545***	0.610***	0.504***	0.512***
	(0.054)	(0.049)	(0.043)	(0.043)
Male Advantage	0.014***	0.017***	0.013***	0.014***
	(0.005)	(0.005)	(0.004)	(0.004)
Age Difference /100	0.421**	0.464**	0.064	0.107
	(0.179)	(0.181)	(0.164)	(0.162)
Difference of Square of Age /100	-0.005**	-0.005**	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Party Right of Center	0.081***	0.079***	0.084***	0.083***
	(0.006)	(0.006)	(0.006)	(0.006)
Opponent is a New Candidate	0.015			
	(0.010)			
Opponent is a 1997 Loser	0.034***		-0.008	
	(0.012)		(0.005)	
Opponent was Moved	0.002		-0.027	
	(0.013)		(0.029)	
Constant	0.172***	0.150***	0.235***	0.227***
	(0.025)	(0.024)	(0.024)	(0.024)
Observations	248	248	290	290

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 1: The Effect of Male Bias on Scores

and incumbents, all other regressors have the expected sign and are statistically significant. For a male, having an opponent of opposite gender increases the probability of winning – and for a woman it decreases it. The popularity of a candidate's party in 1997 has a significant positive effect. The older the candidate with respect to (her)his opponent, the more likely (s)he is to win, but this effect is decreasing as the age difference increases. Finally, everything else being equal, the UMP candidates were more likely to win in 2002.

One potential criticism is that experience in politics is historically correlated with being male. At the same age, males are likely to have more experience in politics than female candidates do. To address this, we interact the difference in age and the difference in the square of age with the male advantage variable.[18] Those estimates for specifications similar to those reported in Table 1 can be found in the Appendix (Table 4). For none of the specifications (1c-4c) are either the age difference interacted with the male advantage or the square of the difference interacted with the male advantage statistically significant, nor are they jointly statistically significant (p-value > 0.1).

This is not simply a result of the particular structure of the male advantage variable: if instead we interact the age difference and its square with one indicator variable for male candidate with female opponents, and separately interact it with an indicator for female candidate with male opponents, the results are the same: none of the interactions are individually nor jointly statistically significant.

Furthermore, one would expect this to be less of an issue for incumbents: female incumbents should be expected to have similar office holding experience as men, and we have shown the male advantage to be important for incumbents as well.

A third fact confirming that the male advantage is not simply an artifact of unobserved experience differences is the following: If we estimate specifications 1 and 2 on a subsample of young candidates (more specifically, using the subsample of candidates who are younger than the youngest incumbent in our sample), Estimates of the male advantage are still statistically significant (and the coefficient estimate is actually larger at about 0.024 in both specifications), in spite of the fact that in that subsample the office holding experience does not exist for any gender. In

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[18]If at a given age men tend to have more (relevant) experience, and this matters to voters, then the interaction variable should be statistically significant.

Candidate:	New		Incumbent	
	(5)	(6)	(7)	(8)
Own Party Score in 1997	15.955***	18.265***	24.373***	24.486***
	(3.641)	(3.448)	(4.112)	(4.069)
Male Advantage	1.007***	0.992***	0.810**	0.893***
	(0.336)	(0.306)	(0.323)	(0.316)
Age Difference /100	25.635*	24.902*	27.072*	30.707**
	(14.087)	(13.737)	(15.083)	(14.951)
Difference of Square of Age /100	-0.265*	-0.258*	-0.285**	-0.317**
	(0.138)	(0.135)	(0.145)	(0.144)
Party Right of Center	3.779***	3.493***	5.389***	5.287***
	(0.698)	(0.581)	(0.892)	(0.885)
Opponent is a New Candidate	-0.145			
	(0.688)			
Opponent is a 1997 Loser	1.516*		-0.600	
	(0.879)		(0.373)	
Opponent was Moved	-0.747		-0.245	
	(0.882)		(1.486)	
Constant	-10.905***	-11.636***	-13.074***	-13.359***
	(1.922)	(1.845)	(2.240)	(2.218)
Observations	248	248	290	290

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2: The Effect of Male Bias on Winning (Logit)

other words, the male advantage exists among young new candidates and incumbent candidates, and in both cases there should be a relatively homogeneous experience across genders. This being said, our story is in no way tied to this observation. Even if the male bias was the product of perceived experience differences, our model would still apply, since it relies on the existence of a male advantage, not on a specific source of it.

To summarize, men have a statistically higher score when they face a female candidate. A man facing a woman gets about a one and a half percentage points boost in his score compared to a case where he faces a man. Although this advantage may seem small in magnitude, it has huge implications for the candidates probability of winning. Using specification (6) we compute the probability of winning for a new male candidate who runs against a female to be 22 percentage points higher than against a male (this is computed setting all other regressors at their sample mean values). Similar computations using specification (8) reveal that the equivalent gain for incumbent males is 10 percentage points.

We will now argue that the male advantage just displayed illustrates the existence of some voters' bias rather than a party bias. Indeed, a party bias would take the form of a correlation between gender and the expected score of candidates: men would be sent to districts where the last score is higher. The regressions indicate that even controlling for observables (the 1997 scores, age differences, and party position), there exists a male bias on the voters part. Nonetheless, we will further directly show that women were not victim of a party bias. In Figure 1, we divide the range of 1997 scores into intervals of 2.5% and present the ratio of new men candidates in districts falling in each interval. It turns out that women are sent to districts where the average 1997 score is equal to 44.72% while men average is 45.57%. Both a t-test (p-value = 0.30) and a Wilcoxon/Mann-Whitney test (p-value = 0.16) cannot reject that the two are equal.

It is useful to distinguish party bias intended as a pure male conspiracy within parties against women candidates from a rational party behavior that takes into account the existence of a male bias in the voters' population. We can now discuss the evidence about both party bias and party strategic behavior.[19] What we mean

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[19]Note that although we argue that the driving force behind the passing of the parity law and its performance is a male bias amongst voters, parties behaving strategically in the face of this bias is
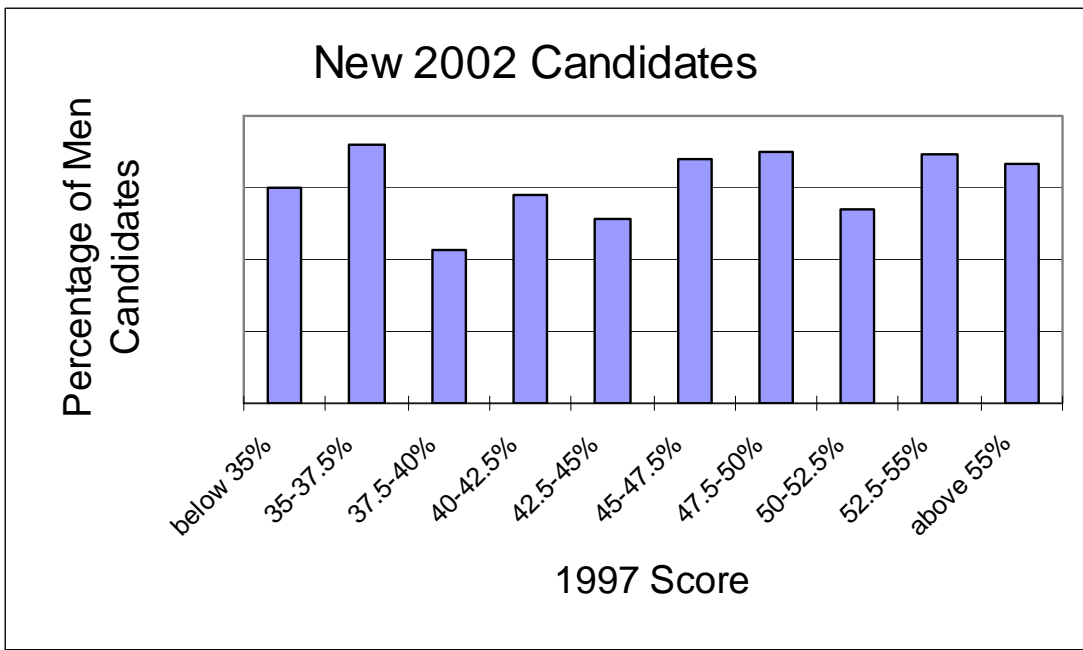
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Figure 1: Ratio of Men Candidates

by parties behaving strategically is that they could send women to sure losers, or sure winners and men to the tight races. In the sure losers and winners, sending a woman has little impact on the probability of winning, but in the tight races, sending a man greatly improves the odds. Using the estimates from specification (6), we find the 1997 score that implies a 50-50 chance of winning (setting all other regressors to their sample mean values). That number is 51%. For 1997 scores below 51%, women were sent to districts with 1997 scores of 43% while men's districts averaged 44%. For 1997 scores above 51%, women were assigned districts which averaged 57% while men's districts averaged 56%. Although these numbers are in the direction suggested by parties behaving strategically in the face of a male bias in voting, none of these differences are statistically significant at the 10% level using either a t-test or Wilcoxon/Mann-Whitney test.

However, between 1997 and 2002 things might have changed a lot and parties may have information about districts which we do not have, and thus it may be that the bad districts for a given party in 2002 were different from the bad ones in 1997. To address this possibility we again use estimates from specification (6) to construct counterfactual probabilities of winning if parties always presented a candidate of the same gender as the incumbent in every district. This way, we can infer which were the close districts in 2002. We will refer to this counterfactual probability as the "same sex 2002 probability." Table 5 available in the appendix summarizes the results of multiple tests to establish the presence of either party bias or party strategy using both the 1997 and 2002 measures. To test for strategic behavior we define a closeness variable for each year, which is $0.51 - |\text{score in } 1997 - 0.51|$ for the 1997 measure and $0.5 - |\text{same sex } 2002 \text{ probability} - 0.5|$ for 2002. Every test is performed separately for each party as well as jointly. Beside the t-tests, logits are also performed controlling for age, age squared as well as party when the two are combined (the dependent variable is the gender dummy). One set of logits is done separately with score or closeness, whereas the final set includes both regressors in the same specifications (if score is positive and statistically significant, that would be evidence of party bias, if closeness is, that would be evidence of strategic behavior). An M means that the point (coefficient) estimates suggest a male bias or a party

not inconsistent with our story.

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strategy exploiting a male bias in voting, and F is the same but for females. Overall, there is almost no statistical significance of either (out of the 36 tests reported, only 7 are statistically significant). Strategy is statistically significant more often than party bias. Finally, when both are included, none is ever statistically significant and the party bias is reversed in favor of women in two cases. We conclude from this that there is little to no evidence of party bias or of strategic behavior, but that if they are present, strategic behavior is slightly more likely.

Another way parties could treat woman differently is by giving them less funding for the campaign. There doesn't seem to be any evidence of this. In fact, one party gave on average more to its female candidates. There is, however, a big difference across parties. The UMP gave 10000 Euros to many of its candidate (the median of what it gave is 10000) while the PS gave nothing to a majority of them (its median is 0). The UMP gave on average 9539.424 to its female and 9371.369 to its male candidates. The PS gave 1446.088 and 1673.339 to its female and male candidates respectively. For neither party are these numbers statistically different (using either a t-test or a Wilcoxon/Mann-Withney test).

Hence, it seems that females were not assigned to districts that were either more difficult to win or easier to win than man were. They also did not receive less financial support from their parties. However, there is evidence that controlling for observables, voters preferred men to women in the 2002 election.

3   Proportional representation

Let us now describe the rules of the senatorial elections. These rules changed slightly in 2003. The senator office term was nine years and went down to six years, and a fraction of the Senate is recomposed every three years. The country is divided in a few large districts, and, depending on the population of the district, a number of senators, ranging from 1 to 12, are elected in each district. If the number of seats to be allocated is equal or below a threshold, then a two-round plurality system is in order and parity does not apply. If the number is above the threshold, then the system is CPR. In this case, parity means that in a party list there cannot be two consecutive candidates of the same gender. The threshold was equal to two in 2001 and to three in 2004.

An essential feature of the senatorial elections is that the set of voters is composed of grands electeurs only, and about 95% of them are municipality deputies. They had no say in the passing of the parity law, but they tried to influence it through their senators.

Municipal elections are two round list elections. A list can run in the second round if it obtains 10% or more in the first round. The seat allocation rule is proportional with a 50% seat bonus to the winner. For instance, if a party wins the second round elections with 40% of the votes and 60 seats are to be allocated, then it will get 30+(0.40*30)=42 seats and the remaining 18 seats are allocated among the other parties proportionally to their second round score. The implementation of the Parity law at the municipal level has this property: out of each set of subsequent six candidates in a party list, three have to be women. The only freedom which is left to the parties is the position of the women within each set of six candidates.

Given the electoral rule and the amounts of seats allocated in each municipality (varying between 29 and 67), parity cannot but have a huge effect on the gender composition of the municipal assemblies, and a lot of incumbents must loose their seat. A fraction of them must even be thrown out of the list. Under the pressure of their grands electeurs, Senators obtained the amendment that parity would not apply in municipalities with less than 3500 inhabitants, whereas Assembly deputies first proposed it to apply to all municipalities with more than 2000 inhabitants. Senators also proposed to remove the three women out of six candidate rule, but it was maintained. The percentage of women elected in the more than 3500 inhabitants municipalities went up from 25,7% to 47.5% (thereby making the fraction of women elected in municipal councils rise from 21,7% to 33%).

Protecting their electorate was not the only concern of the senators: They also had to protect their own seats.[20] Out of the 74 (resp., 72) incumbent senators looking for reelection in 2001 (resp., 2004) in districts where CPR applies, only 5 (resp., 8) were women. Before the law was passed, senators tried to obtain the amendment that no alternating gender rule apply for the senatorial elections, but

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[20]The simple computations contained in this section use the electoral outcomes presented on the website of the French senate, http://www.senat.fr/. The details of the computation is available upon request.

failed.[21] Nevertheless, only 20 seats - 28% - (resp., 26 - 32.9% -) went to female candidates. Given the number of districts where parity does not apply and the low effectiveness where it applies, the percentage of women in the current assembly is 16.6%.

What did senators resort to, in order to circumvent the law? This is illustrated by the Meurthe-et-Moselle district, where 4 seats had to be allocated. Two right-wing incumbents had been elected under the same party flag nine years before.[22] They split the list, created two new parties, ran on the top of their respective list (followed, as required by the law, by a woman) and got reelected. Let us call that strategy *party proliferation*. Out of the 29 districts where proportional elections were held in 2001 or 2004, party proliferation (in the sense of incumbents previously elected under the same flag and running on different ones) took place in 11 of them.[23] In 8 other cases candidates elected on different lists registered as members of the same senatorial group after the election.[24] Finally, in several other districts, candidates previously active in the same party, though new in the senatorial race, ran on different lists, with two examples of such lists obtaining more than 10 percent. Party proliferation has clearly been a wide phenomenon in both elections, which explains the low effectiveness of parity.

Let us now analyze more closely the phenomenon of strategic party proliferation in CPR. We first describe the conditions under which party proliferation is most likely to happen. Then we study its effect on the party composition of the assembly.

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[21]Senators have a weaker role in France relative to many other countries. "The Senate's legislative powers are limited; the National Assembly has the last word in the event of a disagreement between the two houses." (US Department of State (2004)) This is clearly visible in Title V Article 45 of the Constitution "If the joint committee does not succeed in adopting a common text, or if the text is not adopted as provided in the preceding paragraph, the Government may, after a further reading by the National Assembly and by the Senate, ask the National Assembly to make a final decision."

[22]The 2001 senatorial elections were also the first ones where CPR applies. In 1992, candidates ran on an individual basis (the system was a two-round plurality system) but under a party flag, and elected senators formed groups according to their party affiliation after the elections.

[23]In 8 out of those cases, one of the candidates lost his seat. In one case both candidates lost their seats.

[24]Although, by definition, those examples involve new candidates to the senatorial elections, these candidates do typically have incumbent-type advantages, as they are former ministers, deputies, region presidents, etc.

3.1 Party proliferation

The cost of creating a party is relatively low for the senators. Given the grands electeurs system and the size of the districts, the actual number of votes needed to obtain a seat varies between 260 and 892. Moreover, those are councillors themselves and senators have regular opportunities to meet them. Let us consider a party likely to obtain a score of s and an associated number of k seats, with k male incumbents. Let k be an even number. It seems reasonable to assume that the incumbent's advantage is decreasing among candidates from the leader of the list to the kth elected: popularity decreases with rank. Given parity, only $\frac{k}{2}$ incumbents can be given positions among the first k positions, those leading to a seat with some likelihood. Therefore, the $\left(\frac{k}{2}+1\right)$th incumbent is pivotal in the proliferation process. His only chance of being elected is in creating his own list and diverting at least $\frac{s}{k+1}$ voters from the main party. This score is necessary, as the score of the main party, down to $\frac{ks}{k+1}$, is otherwise still superior to k times that of the dissident list. This may not be sufficient, however, since other parties may have a larger d'Hondt score for the last seat and obtain the formerly kth seat of that party. To illustrate this fact, let us consider a district where three parties compete for 8 seats and the distribution of scores is (45,27.5,27.5), so that the allocation of seats is (4,2,2). After the parity reform, incumbent 3 of the first party is ejected from the first positions on the list. By running on his own and obtaining 10 percent of the votes, which corresponds to scores (35,10,27.5,27.5), he would keep his seat. If we compare that result with the situation where there is only one opponent party and the scores are (45,55) before parity and (35,10,55) after proliferation by incumbent 3, we now have a distribution of seats going from (4,4) to (3,0,5). The lower bound in the second situation is now 11 and the scores (33.9,11.1,55) then lead to (3,1,4). Let us also note that any two incumbents ejected from the main party list have no incentive to create a joint list, as, given parity, their joint list would have to win three seats for them both to be elected.

Let us assume that the $\left(\frac{k}{2}+1\right)$th incumbent is sure to keep his seat if he creates his own list. Then the probability that the $\frac{k}{2}$th incumbent be elected on the main list decreases, as the new score of the main party may no longer be sufficient to obtain $k-2$ seats. Moreover, if the $\left(\frac{k}{2}+1\right)$th incumbent is able to be elected

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by running on his own, then so is the $\frac{k}{2}$th incumbent, given the assumption that individual popularity decreases with the rank. The prudent strategy by candidate $\frac{k}{2}$ is therefore to create his own list too, which, in turn, decreases the probability of the $\left(\frac{k}{2} - 1\right)$th incumbent to be elected.

From this simple argument we can infer that proliferation is the more likely the more popular is the $\left(\frac{k}{2} + 1\right)$th incumbent, but the unravelling may determine a situation in which the incumbents who actually are observed making the split are higher in the rank. If k is large, it may be impossible to have a sufficiently large popularity for the $(k/2 + 1)$-th incumbent and, at the same time, a decreasing order of popularity. This leads to the following:

Remark: Party proliferation is more likely when (1) the incumbency advantage is more equal among candidates and (2) the number of incumbents on the list, and/or the number of seats expected by a list, is lower.

The example and the reasoning above all assume that the scores are perfectly expected. Proliferation is also more likely when the uncertainty of being elected by running on one's own is lower. When the number of seats to be allocated in a district and the number of relevant parties are larger, then the competition for the last seats to allocate is larger, which increases the uncertainty.

This explains why, given that districts have on average a relatively small number of seats, parity had low effect in the senatorial elections.

3.2   Assembly composition effect

Parity may also affect the assembly composition under CPR. There are two different effects. One is the large party effect, playing in a similar way as under SMD: if a party has more incumbents than half the total number of seats, then it has to loose the votes associated with the incumbency advantage of the incumbents it ejects from the list. Clearly, this may affect the score of the party, and, therefore, the number of seats it gets.

The second effect is directly associated to party proliferation. In the example above, proliferation by incumbent 3 led to a change in the assembly composition from (4,4) to (3,0,5) which means a shift of one seat from left to right. The example may look extreme, as the proliferation was a failure. However, other examples may

be given of successful proliferation affecting the assembly composition. Consider a district where two parties compete for 6 seats. The expected scores are (43,57), which would lead to a (3,3) allocation of seats. Assume that, indeed, there are three incumbents out of each platform. Again, we may think that incumbent 3 of the left party can profitably create his own list, thereby preventing incumbent 2 from keeping his own seat. The equilibrium list composition is therefore one where the left party has split into two lists, led by incumbents 1 and 2 respectively. Let us assume that the resulting distribution of votes is (24,19,57), the resulting seat allocation is (1,1,4): proliferation by left incumbent 2 is successful, but increases the number of seats obtained by the right party.

The composition effect arising from the conflicting interests of an incumbent seeking to keep his seat and a party seeking to maximize the number of seats obtained by candidates sharing its platform is likely to affect both large and small parties. It is well known that under the d'Hondt system a party can never gain by splitting, as the d'Hondt coefficients cannot rise as a result of a split. As a consequence, the platform which looses is always the one where proliferation takes place. As it is clear from the example, proliferation is more likely to result in a loss of seats when the d'Hondt coefficient of the party as a whole is the lowest among all parties.

4   Remarks on electoral design

The common criterion used to evaluate election reforms such as the parity law in France is the effectiveness of the reform: did it help increase the percentage of women elected? Another important criterion, however, is the desirability of the increase in the number of women elected. In this section, we point out how electoral systems could be reformed, first if the objective is to increase the number of women only if the voters want it, and second if the objective is to increase the number of women even if the voters do not want it.[25]

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[25]It has been well documented that the percentage of elected women is larger in countries having PR systems (see e.g. Matland [9]). However, such international observational comparisons do not elaborate on the causality and they cannot be used for normative purposes. They ignore the possibility that gender bias can be the primary factor as well as the fact that party proliferation can make effectiveness low under CPR without thresholds.

If an increase in the number of elected women is seen desirable only when the voters want it, then quotas do not, a priori, make much sense. But as we saw above, parity in the candidacy did not prevent the voters from expressing their gender bias at the national Assembly elections. They did not want the number of women to increase, and indeed it did not. That is, introducing quotas in a SMD system is perfectly consistent with this criterion as quotas will only be effective if there is, on average, a rationed demand for elected women among voters.

Introducing quotas into an electoral system different from SMD could, on the contrary, be effective independently of the demand for female candidates, as examplified by the municipal elections in France. But there comes the second criterion. Arguments can be drawn from the debates on positive action to defend the view that the number of female candidates should increase even if the voters do not want it, as, in the long run, it will increase the competence of women candidates, or it will improve voters' perception of the quality of female candidates (in the terms of this paper, it will decrease the male bias), or it will increase the ability of voters to discriminate between good and bad female politicians, etc. In this case, a reform is useless under a SMD system.

Introducing quotas into a PR system may be effective, provided there are barriers to party proliferation. The easiest way to create barriers is by enlarging the districts and, correspondingly, the number of seats to allocate in the districts. First, this reduces the expected incumbent's advantage of the pivotal incumbent. Second, as the number of competing parties is larger in larger districts, the competition for the last seats to allocate is larger, thereby increasing the sensitivity of the total number of seats obtained by a platform to the way the total number of votes is divided between the lists obtained by proliferation from one party.

A second change in the proportional system which would enhance effectiveness of the parity law is the introduction of legal thresholds. First, such thresholds would make successful proliferation more difficult, as the minimal percentage to obtain one seat is increased. Second, even if lists proliferate as a consequence of self-interested behavior by incumbents, if the threshold is put sufficiently high so that once a party obtains seats, the number of seats is at least equal to 2, then the number of women elected cannot but rise.[26]

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[26]Term limits are another institution that on the one hand would increase effectiveness of a parity

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Introducing quotas into a mixed system like the French municipal system is very effective but advocating for a shift towards that system involves forgetting about its important drawback of allowing even small parties to obtain the majority of the seats (in the extreme case, a party with a little bit more than 10% of the votes in the first round can end up obtaining 100% of the seats).[27]

5   Comparative remarks and future research

Gender quotas in elections exist in many other countries, in various forms, but France was the first country where (1) quotas were imposed on parties at the list composition stage, rather than directly to the distribution of seats, and where (2) different elective bodies are elected with different electoral formulas. Legal quotas on candidates (without fees) were first introduced in Belgium in 1994 but at the level of 25% (this figure increased to 33.3% from 1999 onwards).[28] Legal quotas on seats exist, for instance, in India (see Duflo and Chattopadhyay [6]) and quotas on candidates based on voluntary commitments by parties exist, for instance, in Norway and Sweden (see e.g. Dahlerup [4] for a comprehensive list of all the quota systems). In future research we plan to analyze in detail the comparative history and genesis of gender quotas across countries. Here we just note that our empirical results on male bias are in contrast with the results on American voters.

First of all, the parity law can have bite only in countries where parties are very powerful in determining the set of candidates. Countries with a closed list electoral system and strong parties are more likely than countries like the U.S. to consider such laws. Beside this institutional observation, the precondition for the politicians' incentive to pass a parity law is missing, according to our analysis above, when male bias does not exist. In chapter 3 of Darcy, Welch and Clark's [3] survey work, they found that new men candidates did as well as new women candidates for State legislatures (table 3.3). So the fact that the total percentage of women in state legislatures is still 20 percent is mostly due to the power of incumbents and to lack

law but, on the other hand, would make it less likely that the incumbents would pass a parity law.

[27] The sense in which this is a drawback refers to standard ex-ante welfare criteria. See for example Morelli [10] for a suggestive welfare comparison of electoral systems along similar criteria.

[28] The effectiveness has been higher in Belgium, because the electoral system is open list PR with minimum legal thresholds.

of supply. Voters' hostility to women is considered disappeared by the 70's. They also point out (table 3.4) that no voters' hostility exists in primaries. The evidence against slating and the evidence against the hypothesis of significant differences in fund raising should be also considered evidence against the male conspiracy theory (Duverger [7]), which is the basis for the party bias hypothesis. In table 3.5 they show evidence that men are put in more uphill battles, and they consider it evidence of no-slating. In table 3.6 they show that there is a pattern of more women of party x running in states dominated by party y, but within the states the women are placed in good districts, hence again no evidence of slating. Finally in 3.7 they show that if anything women seem to be better at fund-raising.

In summary, they conclude, in our terms, that in the US states there seems to be no evidence of voters' hostility against women, nor any evidence in favor of the male conspiracy theory. So no "demand side" explanation for low number of women in politics. Implicitly this implies a mostly "supply side" story for the U.S.[29] Their conclusion was basically that "in the U.S. if more women run more women will be elected."

This sharp contrast between our study on the French case and the earlier studies on the U.S.[30] suggests an intriguing hypothesis to be tested in future research: Countries where voters' gender bias exists have fewer women than men because of a "demand" bias, and are more likely to endogenously generate affirmative action laws; on the other hand, countries like the U.S. where no voters' demand bias exists, and where therefore the shortage of women in politics is a "supply" issue, are unlikely to have the necessary conditions for the approval of a parity law.

As part of our future research on endogenous affirmative action or, more generally, on endogenous institutional reform due to incumbents' interests, we plan to extend the theoretical as well as the empirical analysis to campaign financing: there is a great variation of campaign financing and party funding laws across democra-

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[29]Even at the congressional level no evidence can be convincingly put forward about voters' hostility (See in particular Welch et al. [12] and Darcy and Schramm [2]). About the existence of party bias, some evidence can be found in the U.S. State legislatures if one uses measures of party strength: in States were parties are stronger there tend to be less women (see Sanbonmatsu [11]).

[30]Note that our empirical analysis is based on field data, whereas the studies just mentioned on the U.S. are based on survey data, and we have no way to say to what extent these sharp differences could be due to this.

cies, and we conjecture that campaign financing restrictions, as much as the gender quotas studied in this paper, may well be motivated by the same objectives of incumbent politicians. Moreover, the politicians of countries with different electoral systems are likely to value different kinds of "institutional complementarities" with campaign financing laws, and it is our goal to continue to uncover these different types of institutional complementarities.

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Appendix 1: Proof of proposition 1

Once z is known, the country is conceptually divided into three regions: $[0, \min\{z, \lambda\})$; $[\min\{z, \lambda\}, \max\{z, \lambda\}]$; and $[\max\{z, \lambda\}, 1]$. Parties L and S play a list composition game, and a strategy is an assignment of a man or a woman in each district. Formally, a strategy is an element of $\{0, 1\}^{[0,1]}$ where 0 (resp. 1) means that a woman (respectively, a man) is sent to that district. Denote by $m_p^j \in [0, 1]$ the fraction of men candidates running for party p, $p \in \{L, S\}$, in region j, $j \in \{[0, \min\{z, \lambda\}), [\min\{z, \lambda\}, \max\{z, \lambda\}), [\max\{z, \lambda\}, 1]\}$.

Given our assumptions on voters' platform preferences and gender preferences, each party wants to send men where the other party sends men if the platform preference of the voters is favorable, or send men where the opponent sends women if the opposite is true. This leads to the following lemma:

Lemma 1 *In any Nash equilibrium of the list composition game played at time 1 by the two parties, each party uses the same mixed strategy in every district of the same region, and hence an equilibrium strategy of party p can be summarized by the triplet (m_p^j).*

Proof. Suppose instead that party S puts a man running in district i with probability $m_S(i) < m_S(i')$, where i and i' are in the same region j.

Then if j is a region in which L wins the man-man races the best response is to have $m_L(i') > m_L(i)$; but this could not be compatible in equilibrium with the hypothesis, since the best response to the latter inequality for party S must have the feature $m_S(i) > m_S(i')$.

A similar contradiction arises if j is a region in which S wins the man-to-man races: In this case the best response by L would have to satisfy $m_L(i) > m_L(i')$, but this in turn cannot be compatible in equilibrium with the hypothesis, since the best response to the latter inequality by party S would be $m_S(i) > m_S(i')$.   **QED.**

The list composition game is, therefore, equivalent to a game where parties have to decide on proportions of men in each of the three regions. Suppose for example that $z < \lambda$ (the voters' support of the L platform has decreased since the last election). Then parties have to decide on $m_p^{0z}, m_p^{z\lambda}, m_p^{\lambda 1}$. The result is that a fraction $m_L^{0z} + \left(1 - m_L^{0z}\right)\left(1 - m_S^{0z}\right)$ of L candidates are elected in region $[0, z)$, as all

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the men are elected, and, among the women who run (in proportion $\left(1 - m_L^{0z}\right)$), all those who end up running against a woman also win the election, and the probability of running against a woman is $\left(1 - m_S^{0z}\right)$.

Having explained the strategies for any probability distribution over z, let us now choose a specific probability distribution that will allow us to prove the result. Assume that z can take values in $\{0, 1 - \lambda, \lambda, 1\}$, with corresponding probabilities equal to $0.5 - f, f, f, 0.5 - f$, for some $f \in (0.25, 0.5)$. (Thus f measures the skewness of the distribution.)

Assume that s is infinitesimally small, so that it justifies a seat maximizing behavior ceteris paribus but it can be ignored in the computations. Given this assumption, the utility of party L is

$$U_L = \int_{i \leq \lambda} U_i di = \begin{array}{ll} \lambda + aI_L - C_L & \text{if } N_L > 0.5 \\ 0.5\lambda + aI_L - C_L & \text{if } N_L = 0.5 \\ aI_L - C_L & \text{if } N_L < 0.5 \end{array}$$

and

$$U_S = \int_{i \geq \lambda} U_i di = \begin{array}{ll} (1 - \lambda) + aI_S - C_S & \text{if } N_S > 0.5 \\ 0.5(1 - \lambda) + aI_S - C_S & \text{if } N_S = 0.5 \\ aI_S - C_S & \text{if } N_S < 0.5. \end{array}$$

Consider first the status quo $(c = 0)$. At time 1, it is a dominant strategy for both parties to have only male candidates. the expected utility is then:

$$\begin{aligned} \forall i \quad &\in [0, 1 - \lambda): \quad U_i^e = af + (1 + a)f + (0.5 - f)(1 + a) \\ &= (0.5 + f)a + 0.5; \\ \forall i \quad &\in [1 - \lambda, \lambda): \quad U_i^e = (1 + a)f + (0.5 - f)(1 + a) \\ &= 0.5(1 + a); \\ \forall i \quad &\in [\lambda, 1]: \quad U_i^e = (0.5 + f)a + 0.5. \end{aligned}$$

Consider next the pure parity case $(c = \infty)$. We first analyse the equilibrium of the list composition subgames in the four possible cases, and then we deduce the expected utility of each incumbent.

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Case 1: $z = 0$; the 0.5 men candidates sent by S will be elected, and necessarily at least some women will be elected too, so that S will win the election. It is optimal for S to have all its incumbents running. Therefore, in region $[0, \lambda]$,, by lemma 1, the equilibrium strategies are $m_L^{0\lambda} = \frac{0.5}{\lambda}$ and $m_S^{0\lambda} = \frac{\lambda - 0.5}{\lambda}$ in every district of that region. Consequently, each L incumbent has a probability $\frac{0.5}{\lambda}$ of running, and, if he runs, a probability $\frac{0.5}{\lambda}$ of being elected. All S incumbents are sure to be reelected.

Case 2: $z = 1 - \lambda$. Sending all its 0.5 men to districts in $[1 - \lambda, 1]$ guarantees 0.5 seats, and S is sure to have more than that, so, again, S is sure to win the election. The equilibrium strategies are $m_L^{0z} = 1, m_L^{z\lambda} = \frac{1}{2}, m_L^{\lambda 1} = 0$ and $m_S^{0z} = 0, m_S^{z\lambda} = \frac{1}{2}, m_S^{\lambda 1} = 1$. Incumbents in $[0, z)$ and $[\lambda, 1]$ are sure to be reelected, whereas incumbents in $[z, \lambda)$ run with probability $\frac{1}{2}$ and, if they run, are elected with probability $\frac{1}{2}$.

Cases 3 and 4: $z = \lambda$ or $z = 1$. L wins the election. In this case party L tries to send men where S sends men, and S tries to send men where L sends women. Equilibrium strategies are $m_L^{0\lambda} = \frac{0.5}{\lambda}, m_L^{\lambda 1} = 0$ and $m_S^{0\lambda} = \frac{\lambda - 0.5}{\lambda}, m_S^{\lambda 1} = 1$. Incumbents from region $[0, \lambda)$ run with probability $\frac{0.5}{\lambda}$ and are sure to be reelected if they run.

The expected utilities computed at time 0 are as follows.

$$
\begin{aligned}
\forall i \quad \in [0, 1 - \lambda): \quad U_i^e &= (0.5 - f)\frac{0.5^2}{\lambda^2}a + af + 0.5\left(1 + \frac{0.5}{\lambda}a\right) \\
&= \left(\frac{0.5^2}{\lambda^2}(\lambda + 0.5 - f) + f\right)a + 0.5; \\
\forall i \quad \in [1 - \lambda, \lambda): \quad U_i^e &= (0.5 - f)\frac{0.5^2}{\lambda^2}a + 0.5^2 af + 0.5\left(1 + \frac{0.5}{\lambda}a\right) \\
&= \frac{0.5^2}{\lambda^2}\left(\lambda + 0.5 - \left(1 - \lambda^2\right)f\right)a + 0.5; \\
\forall i \quad \in [\lambda, 1]: \quad U_i^e &= 0.5(1 + a) + 0.5a \\
&= a + 0.5.
\end{aligned}
$$

It is easy to see that S incumbents strictly prefer pure parity to no parity, as it guarantees their reelection.

Let us now consider the case of parity with fees ($c = c^* \in (0, \infty)$). Take in particular any value of c^* such that

Assumption a: $a/2 > c^* > s \approx 0$.

Case 1: $z = 0$. At equilibrium, S must win the election. Indeed, it has at least 0.5 seats (all its men are elected), and, if it is not sufficient to win, then it is worth paying the fee for one male candidate. So we can consider that S wins the election with 0.5 men running. S tries to maximize the number of seats obtained, so that the equilibrium will be mixed, with M_S (the number of men running for S in $[0, \lambda)$) equal to $\lambda - 0.5$. The utility of party L is $U_L = a\frac{0.5}{\lambda}M_L - c^*(M_L - 0.5)$ where M_L stands for the number of men running in $[0, \lambda)$. Rearranging, we get $U_L = \left(\frac{0.5}{\lambda}a - c^*\right)M_L + 0.5c^*$, so that L pays the fees for all its incumbents whenever $\frac{0.5}{\lambda}a - c^* > 0$, that is, $a > 2c^*\lambda$, which holds given assumption a. Therefore, all the incumbents run, and 0.5 of them are elected. The average utility among them is $\frac{0.5}{\lambda}a - \frac{c^*(\lambda - 0.5)}{\lambda}$, whereas the utility of each S incumbent is $1 + a$.

Case 2: $z = 1 - \lambda$. As above, S is sure to win, provided all men run in $[z, 1]$. It has no incentive to take a man from $[\lambda, 1]$ to $[z, \lambda)$, given that $c^* > s$, nor to $[0, z)$, as the probability for a man to be elected in that region is 0. If a man from party L runs in $[z, \lambda]$, then his probability of being elected is 0.5. Utility of party L is $U_L = (1 - \lambda)a + 0.5\left(M_L - (\lambda - 0.5)\right)a - c^*(M_L - 0.5)$. So party L will pay the fees, given assumption a. For each incumbent in $[0, 1 - \lambda)$, $U_i = a - \frac{c^*}{\lambda}(\lambda - 0.5)$, and the average utility of those from $[1 - \lambda, \lambda)$ is $0.5a - \frac{c^*}{\lambda}(\lambda - 0.5)$. The utility of incumbents of S is $1 + a$.

Case 3: $z = \lambda$. For a similar reason as above, L is sure to win. Party S sends all its incumbents, and sends men uniformly in $[0, \lambda)$. We have $U_L = 1 + aM_L - c^*(M_L - 0.5)$, so that $M_L = \lambda$, all to be reelected. The utility of each L incumbent is $1 + a - \frac{c^*}{\lambda}(\lambda - 0.5)$, and that of S incumbents is a.

Case 4: $z = 1$. The fact that L men are sure to be elected even if they run in $[\lambda, 1]$ does not change the strategy from the previous case, as paying the fee for having one more male candidate elected is not profitable if he is not an incumbent. The equilibrium utilities are, therefore, identical to what they are in case 3.

The expected utility of the incumbents can be computed as follows (letting C^*

stand for $\frac{c^*}{\lambda}(\lambda - 0.5)$):

$$\forall i \quad \in [0, 1 - \lambda): \quad U_i^e = (0.5 - f)\left(\frac{0.5}{\lambda}a - C^*\right) + f(a - C^*) + 0.5(1 + a - C^*)$$

$$= \left((0.5 - f)\frac{0.5}{\lambda} + f + 0.5\right)a + 0.5 - C^*;$$

$$\forall i \quad \in [1 - \lambda, \lambda): \quad U_i^e = (0.5 - f)\left(\frac{0.5}{\lambda}a - C^*\right) + f(0.5a - C^*) + 0.5(1 + a - C^*)$$

$$= \left((0.5 - f)\frac{0.5}{\lambda} + 0.5f + 0.5\right)a + 0.5 - C^*;$$

$$\forall i \quad \in [\lambda, 1]: \quad U_i^e = 0.5(1 + a) + 0.5a$$

$$= a + 0.5.$$

At time 0:

Let us now compare the expected utility of each incumbent across the different possible values of c.

1) For incumbents in $[0, 1 - \lambda)$: it is clear that parity with fees is the system which maximizes their probability of being reelected. But the other consequence is that fees have to be paid. We have that parity with fees is better than no parity iff $a \geq 2c^*\frac{\lambda - 0.5}{0.5 - f}$, which can only be satisfied if $0.5 - f$ is not too small. Let us note that a very low $0.5 - f$ means that those incumbents are almost sure to be reelected even without parity, so that it is intuitive that no parity is the best system for them. Given our assumptions, it is sufficient to have $0.5 - f > \lambda - 0.5$, which is reasonable, in order to have the incumbents in this region strictly prefer parity with fees to no parity. Strict parity is better than no parity iff $0.5 - f > 2\lambda(\lambda - 0.5)$, which again means that the probability to be in a bad state is sufficiently large; but observe that the threshold is more difficult to satisfy than in the previous case (it is more likely to have parity with fees better than no parity than strict parity better than no parity). Parity with fees is better than pure parity iff $a \geq \frac{2\lambda c^*(\lambda - 0.5)}{\lambda(\lambda - f) - 0.5(0.5 - f)}$, which is satisfied if the condition above for parity with fees to dominate no parity holds. Thus, parity with fees is the best for those incumbents if $0.5 - f$ is sufficiently large.

2) For incumbents in $[1 - \lambda, \lambda)$: parity with fees is preferred to no parity iff $a > 2c^*\frac{\lambda - 0.5}{0.5 - (1 - \lambda)f}$. But we have already assumed that $a > 2c^*$, and the fraction is always lower than 1. Parity with fees is preferred to strict parity iff $a > 2c^*\frac{\lambda(\lambda - 0.5)}{(1 - \lambda)f + \lambda^2 + 0.5^2}$, and again the fraction is always smaller than 1. Consequently, parity with fees is

always the strictly most preferred solution in this region.

3) The incumbents in $[\lambda, 1]$ all strictly prefer a parity law, with whatever $c > 0$, to the status quo.

Consequently, given assumption a, there are many probability distributions with many possible skewness levels such that parity with fees is strictly preferred by the majority (the L incumbents) to any other system. Given the strict preference by the S incumbents for any type of parity law over the status quo, the parity with fees reform could win against the status quo even if the voting rule was unanimity. **QED**.

Appendix 2:

Candidate:	New		Incumbent	
	(1b)	(2b)	(3b)	(4b)
Own Party Score in 1997	0.541***	0.612***	0.497***	0.504***
	(0.053)	(0.049)	(0.044)	(0.044)
Male candidate with Female Opponent	0.027***	0.029***	0.011**	0.012**
	(0.010)	(0.009)	(0.006)	(0.006)
Female candidate with Male Opponent	-0.007	-0.010	-0.017**	-0.018**
	(0.007)	(0.007)	(0.008)	(0.008)
Female candidate with Female Opponent	-0.011	-0.007	0.012	0.014
	(0.011)	(0.011)	(0.012)	(0.012)
Age Difference /100	0.445**	0.486***	0.075	0.114
	(0.179)	(0.181)	(0.164)	(0.163)
Difference of Square of Age /100	-0.005***	-0.005***	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Party Right of Center	0.080***	0.079***	0.083***	0.083***
	(0.006)	(0.006)	(0.006)	(0.006)
Opponent is a New Candidate	0.013			
	(0.011)			
Opponent is a 1997 Loser	0.037***		-0.007	
	(0.012)		(0.005)	
Opponent was Moved	0.001		-0.026	
	(0.013)		(0.029)	
Constant	0.172***	0.146***	0.239***	0.232***
	(0.025)	(0.024)	(0.025)	(0.024)
Observations	248	248	290	290
F-Test of Symmetry Hypothesis (p-values)	0.121	0.193	0.454	0.392

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: The Effect of Male Bias on Scores

Candidate:	New		Incumbent	
	(1c)	(2c)	(3c)	(4c)
Own Party Score in 1997	0.543***	0.609***	0.504***	0.513***
	(0.054)	(0.049)	(0.043)	(0.043)
Male Advantage	0.015***	0.018***	0.012**	0.012***
	(0.006)	(0.005)	(0.005)	(0.005)
Age Difference /100	0.433**	0.481**	0.129	0.162
	(0.198)	(0.200)	(0.188)	(0.187)
Difference of Square of Age /100	-0.005**	-0.005**	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Age Difference x Male Advantage /100	0.049	0.074	-0.166	-0.137
	(0.295)	(0.297)	(0.270)	(0.270)
Difference of Square of Age x Male Advantage /100	0.000	-0.001	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Party Right of Center	0.081***	0.079***	0.083***	0.082***
	(0.007)	(0.006)	(0.006)	(0.006)
Opponent is a New Candidate	0.014			
	(0.010)			
Opponent is a 1997 Loser	0.034***		-0.008	
	(0.012)		(0.005)	
Opponent was Moved From Another District	0.001		-0.029	
	(0.013)		(0.029)	
Constant	0.173***	0.150***	0.235***	0.227***
	(0.025)	(0.024)	(0.024)	(0.024)
Observations	248	248	290	290

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: The Effect of Male Bias on Scores

		Party Bias in favor of		Strategy using a voting bias in favor of	
		1997	2002	1997	2002
t-test	PS	M*	M	M*	M
	UMP	M	M	M	M
	Overall	M	M*	M	M*
Logit with party bias or strategy, age, age^2 (, party)	PS	M	M	M*	M
	UMP	M	M	M	M
	Overall	M*	M	M*	M
Logit with: party bias and strategy, age, age^2 (, party)	PS	M	F	M	M
	UMP	F	M	M	M
	Overall	M	M	M	M

* significant at 10%; ** significant at 5%; *** significant at 1%

M stands for male and F for female.

Table 5: Party Bias or Strategy?