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The Good, the Bad and the Different: Can Gender Quotas Raise the Quality of Politicians?

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The debate over political gender quotas is unduly confined to a supposed trade-off between diversity and competence. We characterize the effects of a political gender quota in a citizen-candidate model, to find that quotas do increase the overall quality of those elected whenever the rewards from public office are high, or the skill premium or political gender discrimination are sufficiently low. In such cases, high-skill women candidates run for office in sufficiently high numbers, driving off low-skill male and female candidates. Our model compares quotas with other policies in terms of their impact on the number and quality of those elected.

INTRODUCTION

Quotas are mechanisms for ascribing to a specific group preferential access to a resource. The resource can vary, from entry in higher education institutions to a position in political lists or parliament. The group benefiting from preferential access can be defined on the basis of ethnicity, gender or other observable characteristic. Though ethnically-based quotas in access to higher education have been common in the USA for decades, affirmative action programmes are increasingly under scrutiny. In contrast, gender-based quotas in politics are becoming increasingly popular, triggering a rising body of important studies (e.g. Fréchette *et al*. 2008; Beaman *et al*. 2009; De Paola *et al*. 2010; Galasso and Nannicini 2011; Besley *et al*. 2013; Esteve-Volart and Bagues 2012).

Between 1997 and 2014, the number of countries applying gender quotas in the political arena has increased from 8 to 69, a nearly ninefold increase in 17 years.[1] This came in the wake of the United Nations' fourth world conference in 1995 and the Beijing Declaration, which called for gender quotas and encouraged signatory countries to push their implementation in the following years. Though the share of female elected officials is well below 50% for most countries, Figure 1 makes evident that countries applying gender quotas in politics present larger shares, about 7 percentage points higher than no-quota countries in the recent period. Figure 2 plots the share of female members in parliament for subsamples of the available countries, defined according to the presence or absence of quotas in the years 1997 and 2014. The share of elected women politicians rises by about 10 percentage points in the whole sample, and around 15 percentage points for countries using quotas in both years or that adopted quotas in the intervening period. In sum, the presence of women in elected political bodies has increased everywhere, but more so where quotas are in place or were introduced.

In spite of the facts documented above, gender quotas remain a hotly debated issue. One of the most important controversies revolves around the idea of a potential sacrifice in the overall 'quality' of politicians in exchange for greater female representativeness. The basic intuition is that gender preferences necessarily sacrifice average 'quality' since the exogenous quota restriction alters the initial political equilibrium and 'artificially' increases the presence of women in politics, independent of merit.

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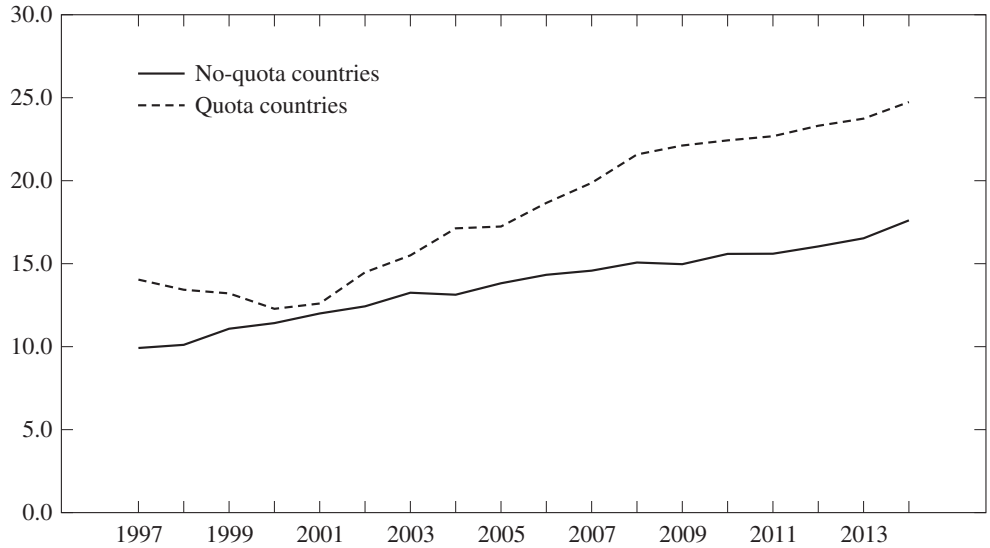

FIGURE 1. Women in parliament (Lower House).
Source: IDEA (2014) and authors' own calculations.

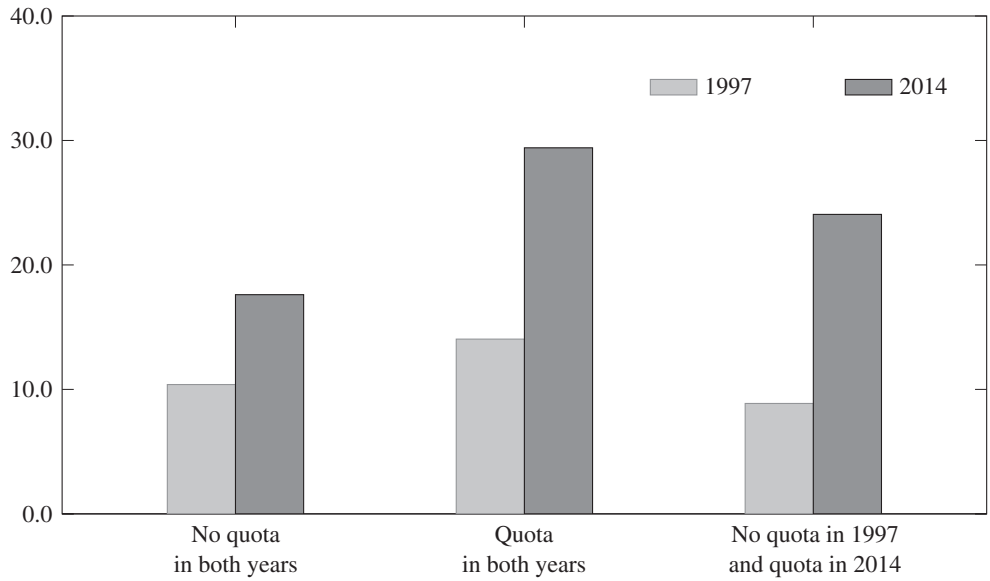

FIGURE 2. Change in women in parliament (Lower House).
Source: IDEA (2014) and authors' own calculations.

We contribute to the literature by modelling the self-selection and election of public officials, and demonstrating that quotas do not necessarily involve a cost in terms of quality.[2] While recognizing the centrality of the 'quality' issue in the public discussion of the merits of quotas, our paper exposes the fragility of the common-sense argument that quotas necessarily imply a decrease in the quality of elected officials in a parsimonious model of political competition.[3]

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Building on Caselli and Morelli (2004), we model political choice as the selection of candidates from four different pools of politicians, divided according to an identifiable characteristic—which we take to be gender but could equally be ethnicity or other—and an imperfectly observed characteristic—in our case individual ability. We hypothesize that women, as the under-represented group, suffer from two types of discrimination —'private labour market' and 'political market' discrimination.[4] The former results in less pay for women relative to men with similar skills, while the latter makes women face a higher cost of entering into politics. In accordance with the almost universal under-representation of women in politics, and in line with the data in Figure 3, we consider that political market discrimination outweighs private labour market discrimination.[5]

We show that the imposition of gender quotas may decrease, increase or have no effect on the quality of elected officials, depending on the relative weight of political discrimination vis-à-vis labour market discrimination and on the quota size.[6] Interestingly, quotas may have a non-linear effect on quality, first decreasing it, and at higher values increasing it. The mechanism is simple: a higher quota increases the probability of election for the discriminated group, regardless of skill, and decreases the probability of election for the other group. The impact of quotas on quality depends on the type of candidates from the discriminated group that are encouraged to run for office —either high- or low-skill—and the type of candidates from the other group that are discouraged—also high- or low-skill. As one might infer, the change in the overall quality of the elected pool depends on the mix of those entering and those abandoning the political arena. A quota may have non-linear effects on quality since it may reduce the probability of election for high-skill men before encouraging high-skill women to enter politics. We also find that active policies decreasing gender discrimination in the political market may have a direct impact on female representation, compounding the effect of quotas alone on the quality of public officials.

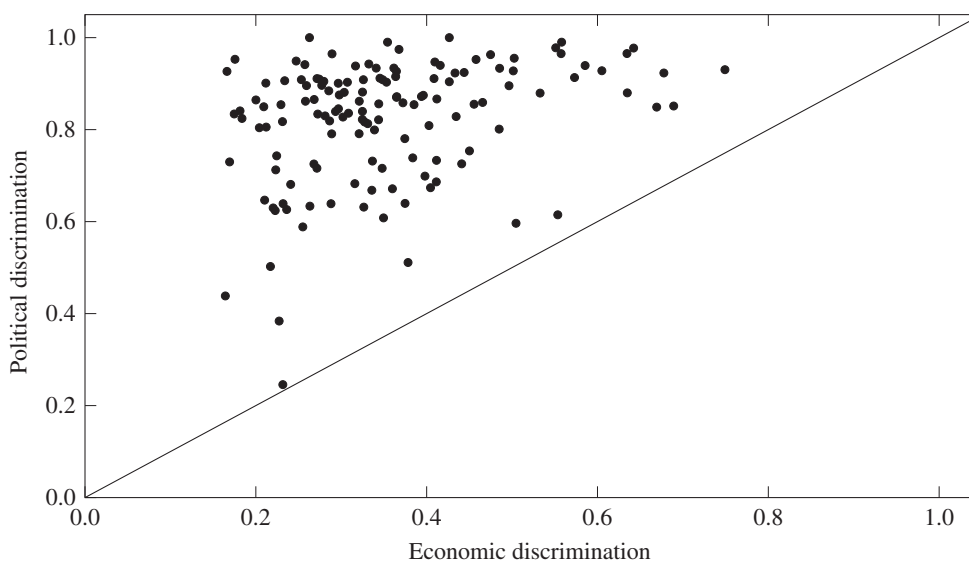

FIGURE 3. Economic and political discrimination.
Notes: Higher values mean greater discrimination. Each data point corresponds to a country. Data are for 2013.
Source: The Global Gender Gap Report 2013 and authors' own calculations.

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A possible way to think of our results is with reference to the propensity of high-skill women to run for office as their probability of being elected raises following a quota. In our setup, a higher quota can, in several instances, effectively override the higher costs of running for office that women face in a way such that high-skilled women enter political life in sufficient numbers to raise the overall quality of elected officials. In an experimental design, Niederle *et al*. (2013) find a similar mechanism. The authors show that the introduction of gender quotas encourages female participation in general and high-performing female participation in particular, by shifting the odds of election. This emphasizes the importance of endogenizing the candidate's decision to run for office, that is, the supply of candidates, as we do here.

Casas-Arce and Saiz (2011) develop a model that nests different explanations for the under-representation of women in political office. In their paper, discrimination may stem from bias by either voters or party machines, as male political insiders benefit from stalling the additional competition. The imposition of gender quotas leads to both vote gains and more women elected only if discrimination originates in party machines. Under other forms of discrimination, such as higher female candidacy costs or more sceptical citizens, gender quotas reduce voters' utility. Using data from a quota imposition in Spanish elections, the authors find that parties forced to fill a gender quota did experience an increase in votes, as emphasized in Casas-Arce and Saiz (2015). In our paper, gender quotas can improve the average quality of the candidate pool of women and, through electoral competition, drive off lower quality male and female candidates from elected seats. Voters do not discriminate against women candidates and are solely interested in the signal—public speaking or other—from which they infer the candidate's skill level.[7] Because quotas may discourage high-quality men from running for office, the net effect of gender quotas on quality is ambiguous and depends on a well-identified set of parameters. Thus our paper contributes to a small but growing literature on the supply response to quotas.

Our results contribute to the literature in different ways. First, we characterize distinct regions where quotas increase, decrease or have no effect on the average quality of candidates. Second, we gauge the impact of quotas on quality relative to that of societal blockages such as labour market and political 'market' gender discrimination. Third, we uncover important non-linear effects of quotas, whereby low quota levels mostly attract low-skill female candidates and therefore decrease the average ability level of those elected, while higher quota levels attract high-skill female candidates, thus increasing average ability. In our model, individuals decide whether to run spontaneously and it is their characteristics alone, when compared to the pool of candidates, that determine election or not—namely the signal that they sent out on their skill. We can therefore reinterpret our model as depicting the case of an electoral system with open lists or where personalities are under closer scrutiny, such as majoritarian electoral systems.

This paper is organized as follows. Section I presents the benchmark model, and Section II the status quo with under-representation. Section III analyses the effect of quotas on the average quality of elected politicians. Section IV briefly discusses the results and the implications of some important assumptions. Section V concludes. The Appendix provides complete characterizations of the equilibria.

I. The Benchmark Model

We model a citizen-candidate game where parties have no role in the selection of candidates' characteristics. Four groups of citizens decide whether to compete for

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political office. Each citizen is characterized by two sets of individual traits: gender, which is observable and thus easily subject to discrimination, and skills, which are only imperfectly monitored. Thus each individual is either female or male, high- or low-skill. The information on skills is imperfectly monitored via a signal that can be more or less informative. The share of high-skill citizens elected for public office determines the average quality of the political body, regardless of whether the elected official is female or male. Females face discrimination in the private labour market—they are paid lower wages than their male equivalents—and in the political market—they incur higher costs for entering into politics.

A novelty in our model is the introduction of political market discrimination, for instance due to higher entry barriers into a party machine faced by women, a negative prejudice against female candidates or female office-holders, or higher opportunity costs in terms of time due, say, to an unequal distribution of tasks performed at home. The existence of two types of discrimination is a necessary condition to characterize the benchmark situation as an instance where females are under-represented in the elected body. Thus in accordance with empirical facts (recall Figure 3), discrimination in the political market overcomes discrimination in the private labour market, so that the fraction of women elected in the no-quota situation is below 50%. We can then add a quota that reserves a fraction of the elected seats to women, and examine how the average quality of office-holders changes with that quota.

Population is composed of a continuum of citizens of measure $1 + p$, where p is the share of the population elected for public office. Two distinct groups, 'males', denoted by the superscript M, and 'females', denoted by the superscript F, are present in the population in equal proportions. Citizens differ in their skills: a fraction s^g is of type $\bar{s}$, or high-ability, while the complement, $1-s^g$, is of type $\underline{s}$, or low-ability, with $g \in \{M, F\}$ indexing gender. For simplicity, the incidence of high-ability individuals is the same for males and females, that is, $s^M = s^F = s$.

Individual payoffs

Individual utility depends on the citizen status: employed in the private sector, candidate for public office, and finally whether he or she has actually been elected. Citizens derive utility from consumption, which equals individual income earned—either in the private sector or as elected officials—minus taxes paid, minus, when applicable, a cost for entering into politics. This cost is incurred by all candidates, whether elected or not. Office-holders collect tax revenues to provide an indispensable public good, without which society could not function.[8] The key assumption here is that once in office, high-ability citizens are more competent than low-ability citizens in that they are able to provide the public good at a lower tax cost. If $p_{\bar{s}}$ is the fraction of high-ability office-holders, then the provision of the public good requires a lump-sum tax burden of $t = t(p_{\bar{s}})$, where $\mathrm{d}t/\mathrm{d}p_{\bar{s}} < 0$—in other words, a higher average quality of the elected political body leads to a lower provision cost. Hence voters prefer high-quality candidates.[9]

Income in the private sector for high-ability individuals is given by λ^M and λ^F for males and females, respectively. Low-skill males and females earn incomes in the private sector equal to ω^M and ω^F, respectively. Due to gender discrimination in the private sector, we consider $\lambda^M > \lambda^F$ and $\omega^M > \omega^F$, that is, females receive lower wages than males with equivalent skills. Furthermore, we assume that

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$\lambda^F > \omega^M$, so that high-skill females are paid higher wages than low-skill men. From the above it follows that $\lambda^M > \lambda^F > \omega^M > \omega^F$. The private sector wage is paid to voters who do not run for office as well as to losing candidates who return to the private sector.

Successful candidates derive a positive benefit π from holding office. This benefit is independent of gender and includes the direct utility from holding office as well as the net present monetary rewards obtained during the period in office, or expected in future income rewarding the accumulated political experience as office-holder.[10] All candidates, whether elected or not, incur a cost for entering into politics, ϕ^M for males and ϕ^F for females, with $\phi^F > \phi^M$. Hence females suffer wage discrimination in the private market and political discrimination in the electoral market. The higher entry cost in the case of women may be due to a series of different causes, including: costlier access to party lists, controlled by male insiders, the so-called 'old boys network'; the 'technology of campaigns', whereby meetings are held for long hours, at odd hours, over an extended geography, making political participation a challenge for the gender that unfairly performs most of the chores at home and takes care of the very old and the very young; and finally, voter discrimination, requiring higher performance from female candidates to achieve re-election. Goldin (2014) argues that 'the last chapter' towards gender equality must involve changes to enhance temporal flexibility. Such is certainly the case in political life.

In sum, the payoffs for all population groups, net of lump-sum taxes—which are identical for all citizens and omitted henceforth for simplicity—are as follows. If a gender-g, type-i candidate wins the election, then his or her utility is $\pi - \phi^g$, while if he or she loses, the utility is $y_i^g - \phi^g$, $i \in \{\bar{s}, \underline{s}\}$, $g \in \{M, F\}$, where y_i^g is the private market income of a type-i, gender-g citizen. If a citizen does not run at all, the payoff is y_i^g. Table 1 summarizes individual payoffs.

The citizen's decision on whether or not to run for office is thus based on the endogenous probability of winning the election and on relative payoffs, which depend on both gender and skill. Let us define two new objects, which will be useful later to solve the model: $\theta^M = (\pi - \lambda^M)/\phi^M$ and $\theta^F = (\pi - \lambda^F)/\phi^F$. These objects measure the relative payoff from holding office for high-skill males and high-skill females vis-à-vis the corresponding opportunity cost, which comprises the foregone private sector wage and the cost of entering into politics. To induce a status quo situation where women are under-represented in elected bodies, and in line with evidence presented in the Introduction, we consider that the higher cost of entering into politics faced by women outweighs the lower opportunity cost arising from the foregone private sector wage. That is, we assume $\theta^M > \theta^F$.

TABLE 1.
PAYOFFS FOR CITIZENS, CANDIDATES AND OFFICE-HOLDERS

	Males		Females	
	Type-$\bar{s}$	Type-$\underline{s}$	Type-$\bar{s}$	Type-$\underline{s}$
Citizen	λ^M	ω^M	λ^F	ω^F
Candidate	$\lambda^M - \phi^M$	$\omega^M - \phi^M$	$\lambda^F - \phi^F$	$\omega^F - \phi^F$
Office-holder	$\pi - \phi^M$		$\pi - \phi^F$	

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The citizen-candidate game

Citizens in this economy play a citizen-candidate game, along the lines of Besley and Coate (1997) and Osborne and Slivinski (1996). The game is divided into three stages. In the first stage, each citizen decides whether or not to run for public office. Citizens make their decisions on whether or not to be a candidate so as to maximize their own expected utility. This decision is made on the basis of rewards in the public and private sectors, the cost of entering into politics, and the endogenously determined probability of election. If an individual decides to run, then his or her candidacy is publicly known.

In the second stage of the game, all citizens, candidates or not, vote. Each citizen casts a vote for one candidate and one candidate only. Any votes for non-candidates are void. The measure p of candidates receiving the highest share of votes is elected and, whenever necessary, ties are broken with a random draw. The mass of citizens that hold public office can be divided into female members q, and male members k, where $p = k+q$. In the third and last stage of the game, citizens—the non-candidates, the defeated candidates and the elected—collect their payoffs. In order to eliminate trivial equilibria where all citizens run for office, we consider, as in Caselli and Morelli (2004), the cost ϕ^g, $g \in \{M, F\}$, to be infinite for a non-null measure v of citizens. This infinite cost is distributed randomly across males and females so that the numbers of 'potential' male and female candidates are the same.[11] To eliminate equilibria where some public offices go unfilled, we assume that ϕ^g, $g \in \{M, F\}$, is paid only when the measure of candidates exceeds the measure of offices available. The maximum number of candidates is therefore $\mu = 1+p-v$. Obviously, given the assumptions above, half of the potential candidates (0.5μ) are males and the remainder are females.

Now we turn to the workings of the political campaign itself. Voters have incomplete information about the candidates—they are unable to use the private labour market to infer a candidate's type and cannot perfectly distinguish between high- and low-skill individuals. However, they observe a signal, high ($\bar{s}$) or low ($\underline{s}$), and the unconditional probability that a signal is correct about a candidate's ability is $\sigma > 0.5$. As in Caselli and Morelli (2004), candidates have no control over their signal, but know in advance what it will be if they run for office. The interpretation is that it is possible to use electoral campaigns—and campaign speeches—to fool voters. To avoid departure from the realistic implication that at least some women are elected in the status quo, we assume that voters discriminate not on the basis of gender, only on the basis of the electoral signal. That is, we consider that the inference voters make on the quality of candidates does not depend on gender, even if the average *ex post* quality of male candidates is higher than that of female candidates. The final equilibrium is computed by backward induction.[12]

Let $p^M_{\bar{s}}$ denote the fraction of high-ability male office-holders and $p^F_{\bar{s}}$ the fraction of high-ability female office-holders. The fraction of high-ability office-holders, $p_{\bar{s}} = (k/p)p^M_{\bar{s}} + (q/p)p^F_{\bar{s}}$, determines the overall quality of the elected political body. To restrict the number of cases to analyse while focusing on the most interesting scenarios, we assume that $p < 0.5(1-s)\mu$. This implies that the expected quality of a signal-$\bar{s}$ candidate is always higher than that of a signal-$\underline{s}$ candidate, thus citizens never vote on a candidate with the latter signal as long as there is at least one candidate with the former signal (see Lemma 1 in the Appendix). We also assume $\theta^M < (\pi-\omega^F)/\phi^F$, implying that a high-skill, high-signal individual has incentives to run for office only when all low-skill, high-signal individuals are already running, regardless of gender. Finally, let $\mu_{\bar{s}} = \sigma s\mu$ denote the maximum number of high-ability, high-signal candidates, and let

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$\mu_{\underline{s}} = (1-\sigma)(1-s)\mu$ denote the maximum number of low-ability, high-signal candidates. These are evenly distributed between male and female populations. Let us define the objects $\overline{\theta} = (0.5\mu_{\overline{s}} + \mu_{\underline{s}})/p$ and $\overline{\overline{\theta}} = (\mu_{\overline{s}} + \mu_{\underline{s}})/p$, which will be key to define regions of interest in the forthcoming sections. The former represents the threshold for the relative payoffs from holding office above which all high-ability, high-signal male citizens stand as candidates. By construction, it coincides with the threshold below which no high-ability, high-signal female citizen is willing to run for office. The latter represents the threshold for the relative payoffs from holding office above which all high-ability, high-signal citizens—either male or female—stand for office.

The aims of this paper can now be simply stated. We analyse the process whereby candidates endogenously arise from a population with two identifiable groups, males and females, both comprising high- and low-skill individuals. Given the relatively higher cost of running for office, females will be under-represented in the status quo. We then study the effects of imposing an exogenous quota on the quality of the elected political body, $p_{\overline{s}}$, for a given measure of seats p.

II. The Status Quo with Under-representation

We now briefly characterize the status quo equilibrium, with no quotas. Our objective here is to determine the ensuing overall quality of those elected, $p_{\overline{s}}$, and the equilibrium measure of females elected, for different values of θ^M and θ^F, the relative incentives that high-skill male and female individuals face when deciding to run for office. A formal and exhaustive characterization of the equilibrium is provided in the Appendix.

Since citizens condition their votes solely on the signal, all candidates with the same signal—whether females or males—face the same probability of election. Let $P_{\overline{s}}$ denote the probability that a high-signal candidate is elected. Then a high-skill, high-signal male citizen stands for office if and only if

$$P_{\overline{s}}[\pi - \phi^M] + (1 - P_{\overline{s}})[\lambda^M - \phi^M] \geq \lambda^M.$$

The left-hand side of this equation represents the expected payoff of running for office, and the right-hand side the sure payoff from remaining in the private sector. Equivalently, a high-skill, high-signal female runs for office if and only if

$$P_{\overline{s}}[\pi - \phi^F] + (1 - P_{\overline{s}})[\lambda^F - \phi^F] \geq \lambda^F.$$

The running conditions for males and females collapse to

$$P_{\overline{s}}\theta^M \geq 1 \text{ and } P_{\overline{s}}\theta^F \geq 1.$$

Since $\theta^M > \theta^F$, whenever a high-skill, high-signal female citizen stands for office, so do *all* high-skill, high-signal male citizens. As to low-ability, high-signal citizens, they face the exact same probability of election as high-skill, high-signal individuals, since they are indistinguishable from the perspective of voters, but have a lower opportunity cost of holding office. It follows that whenever a high-skill, high-signal male citizen runs for office, it is advantageous for *all* low-skill, high-signal citizens to run for office as well.[13]

Let us now analyse how the quality of those elected changes with the relative incentives to run for office, θ^M and θ^F. Consider first the case $\mu_{\underline{s}} \leq p$. If $\theta^M < 1$, then the

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measure of high-ability office-holders, as well as the quality of those elected, is 0, and half of the elected candidates are females. For $\theta^M = 1$, high-ability, high-signal males run for office only if they are elected for sure. As the measure of seats is higher than the measure of all low-ability, high-signal candidates, the remaining places may be filled by high-ability, high-signal males. Hence $p_{\bar{s}}$ takes values in an interval, from 0 until some positive value. The share of elected females is also an interval, with an upper bound at 0.5.

For higher values of θ^M, namely $1 < \theta^M < \overline{\theta}$, high-ability, high-signal males must be indifferent between running or not. If they were not indifferent, then either all would run, so that $P_{\bar{s}}\theta^M < 1$, or none would run, so that $P_{\bar{s}}\theta^M > 1$. In either case, we obtain a contradiction. Hence in equilibrium, $P_{\bar{s}}\theta^M = 1$. Overall quality is increasing in θ^M, since a higher relative return from holding office increases the number of high-skill candidates while decreasing the probability of election. Since no high-ability female stands as candidate, the share of elected females is decreasing, but quality is increasing, in θ^M.

Finally, for $\theta^M \geq \overline{\theta}$, all high-ability, high-signal males stand for office, as $P_{\bar{s}}\theta^M > 1$. The overall quality of office-holders now depends on the value of θ^F. If $\theta^F < \overline{\theta}$, then no high-ability female stands for office, since high-ability male candidates push down the probability of election to $P_{\bar{s}} = 1/\overline{\theta}$. Hence high-skill, high-signal females run only if $\theta^F \geq \overline{\theta}$. For the case $\overline{\theta} \leq \theta^F < \min\{\theta^M, \overline{\overline{\theta}}\}$, high-ability, high-signal females must be indifferent between running or not. An increase in θ^F raises the measure of high-ability female candidates, so as to decrease the probability of election and respect the condition $P_{\bar{s}}\theta^F = 1$. Thus the overall quality of candidates as well as the share of female office-holders increase in θ^F. For $\overline{\overline{\theta}} \leq \theta^F \leq \theta^M$, all high-ability, high-signal females are candidates. Quality is maximal, and there is equal participation across genders in the political body ($q/p = 0.5$).

For the case $\mu_{\underline{s}} > p$, the characterization of the equilibrium is as above, except that for $1 \leq \theta^M < \mu_{\underline{s}}/p$, the probability that a high-skill, high-signal citizen is elected is $P_{\bar{s}} = p/\mu_{\underline{s}} < 1$, and hence $P_{\bar{s}}\theta^M < 1$. In this region, there are no high-ability candidates; the quality of the elected is 0, and the share of females that hold public office is 0.5.

Figure 4 depicts the overall quality of those elected as a function of the relative benefits of holding office, θ^M and θ^F, while Figure 5 represents the percentage of women elected. For low values of both θ^M and θ^F, only low-skill individuals run for office. The overall quality is therefore 0, and half of office-holders are females. As θ^M increases, for the same θ^F—due, in our model, to a fall in λ^M or ϕ^M—some high-ability males run for office, and the overall quality of those elected rises until it reaches a plateau, where all high-skill, high-signal males (and no high-skill females) stand for office. This results in a decline in the percentage of women elected. From that plateau onwards, only an increase in θ^F can further increase the overall quality of elected politicians, by attracting high-skill females to run for public office. As a result, the share of women in the elected body also increases. For sufficiently high values of θ^M and θ^F, all high-ability, high-signal citizens are running, thus half of the elected citizens are females. Notice that high-ability, high-signal male candidates influence the expected returns of high-ability, high-signal female candidates, because the decision of the former lowers the probability of election and this affects the decision of the latter on whether or not to run. Furthermore, for a vast region of parameters, male citizens contribute more towards quality in public office than do female citizens.

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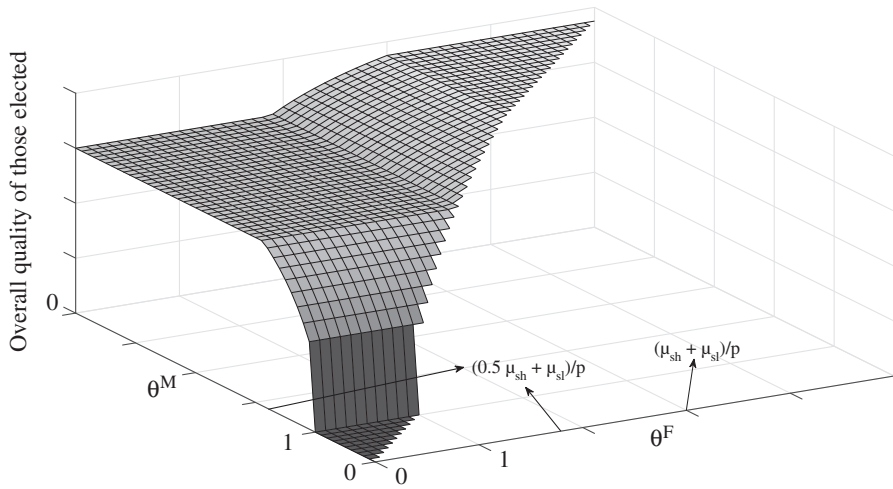

FIGURE 4. Quality of those elected and gender incentives to run for office in the status quo.
Notes: Here 'sh' stands for $\bar{s}$, and 'sl' stands for $\underline{s}$. Hence $\overline{\theta} = (0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p$ and $\underline{\theta} = (\mu_{\bar{s}} + \mu_{\underline{s}})/p$. The figure assumes $\mu_{\underline{s}} < p$.

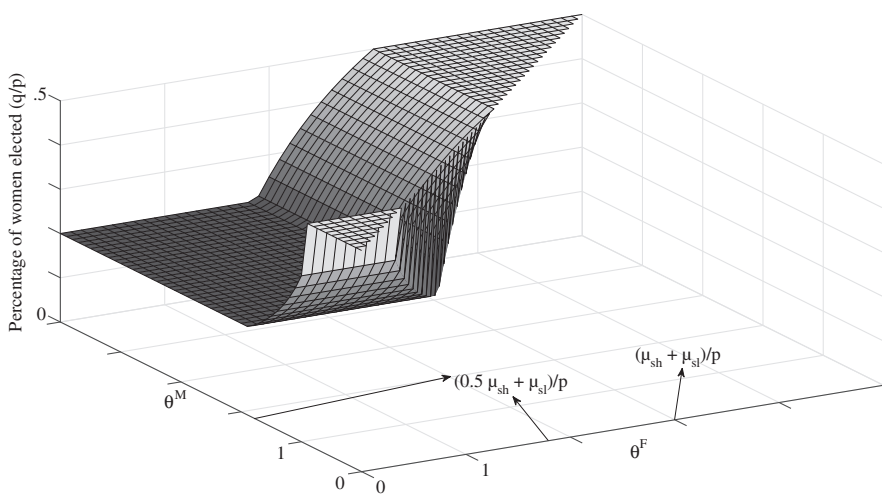

FIGURE 5. Percentage of women elected and gender incentives to run for office in the status quo.
Notes: Here 'sh' stands for $\bar{s}$, and 'sl' stands for $\underline{s}$. Hence $\overline{\theta} = (0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p$ and $\underline{\theta} = (\mu_{\bar{s}} + \mu_{\underline{s}})/p$. The figure assumes $\mu_{\underline{s}} < p$.

III. A MODEL WITH GENDER QUOTAS

We now consider the imposition of a minimal quota on the number of women elected for public office, and describe the resulting political equilibrium. The quota increases the probability of election for female candidates—regardless of being low- or high-skill—and concomitantly decreases the probability of election for male candidates. Let $\overline{q}/p \in [q^{sq}/p, 0.5]$ denote the quota, where q^{sq} is the measure of female office-holders in the status quo.[14] For each quota, $\overline{q}/p$, and given the relative incentives to run for office, $\boldsymbol{\theta} = (\theta^M, \theta^F)$, the political process delivers the quality of elected males, $p_{\bar{s}}^M(\overline{q}/p; \boldsymbol{\theta})$, and of

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TABLE 2.
TWO CASES TO BE ANALYSED

Status quo	No type-$\bar{s}$ males	Some type-$\bar{s}$ males	All type-$\bar{s}$ males
No type-$\bar{s}$ females	—	CASE I	CASE II
Some type-$\bar{s}$ females	—	—	CASE II
All type-$\bar{s}$ females	—	—	—

elected females, $p^F_{\bar{s}}(\overline{q}/p;\boldsymbol{\theta})$. The overall quality of the elected political body, $p_{\bar{s}}(\overline{q}/p;\boldsymbol{\theta})$, delivering the relationship between quotas and quality for each $\boldsymbol{\theta}$, follows immediately.

We focus on two important cases, summarized in Table 2, which depend on the type of high-signal male and female candidates in the status quo. More concretely, we analyse the case where some high-skill, high-signal male and no high-skill, high-signal female citizens stand for office in the status quo, labelled CASE I, and the case where all high-skill, high-signal male citizens stand for office in the status quo (but not all high-skill, high-signal female citizens), labelled CASE II. This distinction is important, since the analysis differs slightly between the two cases. We immediately discard all remaining cases represented in the table, since they lead to non-interesting situations where there is no under-representation of women in the status quo and are directly ruled out by the model's assumptions.

Case I—some high-ability, high-signal male citizens stand for office in the status quo

In CASE I, high-skill, high-signal male candidates must be indifferent between running or not in the status quo. Hence $\min\{1, \mu_{\underline{s}}/p\} \leq \theta^M < \overline{\theta}$. Since there are no high-skill, high-signal female candidates, the quality of elected officials in the status quo is determined only by the number of high-skill male office-holders. The quality level is $p_{\bar{s}} = 1 - \mu_{\underline{s}}/(p\theta^M)$, and the measure of elected female candidates—all of them low-ability, high-signal citizens—is simply $q^{sq} = 0.5\mu_{\underline{s}}/\theta^M$. The following proposition analyses the effects of imposing an exogenous quota $\overline{q}/p \in [q^{sq}/p, 0.5]$ on the quality of the elected political body.

Proposition 1. Suppose that $\min\{1, \mu_{\underline{s}}/p\} \leq \theta^M < \overline{\theta}$. Then:

(i) imposing a gender quota $\overline{q}/p \in [q^{sq}/p, 0.5]$ never raises the quality of the elected political body;
(ii) for any quota level, reducing the relative weight of political discrimination versus private labour market discrimination (increasing θ^F) weakly improves the quality of those elected for public office.

Proof. See the Appendix.

Given θ^M, we need to compute, for different values of θ^F and the quota $\overline{q}/p$, the incentives for each of the four groups of individuals to run for office—high- and low-skill male and female citizens with a high signal. Since the quota reduces the measure of reserved places for men, some high-ability, high-signal male citizens will no longer stand as candidates; otherwise, the relative return from their candidacy would be negative.

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Hence the quality of elected males is decreasing in the quota level. Regarding females, if $\theta^F < \max\{1, \mu_{\underline{s}}/p\}$, then no high-ability female ever stands for office. Let us focus on the region $\max\{1, \mu_{\underline{s}}/p\} \leq \theta^F < \theta^M$. A quota increases the probability of election for females, and for higher quota levels, some high-ability, high-signal female citizens are willing to stand for office. As in the case of males, the equilibrium requires that high-ability, high-signal female citizens are indifferent between running or not. Also, given the symmetry property between males and females, it is not possible to have all high-ability, high-signal women standing for office for any $\overline{q}/p \leq 0.5$. The result is that the quality of elected females is 0 in the status quo, remains 0 for lower quota levels, but may increase for higher quota values. The overall quality of those elected for public office is decreasing in $\overline{q}/p$ as long as the quota discourages some high-ability, high-signal male citizens from running and does not encourage any high-ability, high-signal female citizen to run. It becomes constant when the probability of election for high-signal females is sufficiently high such that high-ability, high-signal female candidates replace unmotivated high-ability, high-signal male citizens who are fleeing to the private sector.

Figure 6 provides a graphic perspective of Proposition 1. For low levels of θ^F, that is, for high levels of political discrimination vis-à-vis private labour market discrimination, the quota necessarily leads to a decrease in the overall quality of those elected. In this region, the quota encourages female citizens to stand as candidates—though only low-ability women have incentives to do so—while discouraging high-quality, high-signal male citizens from running. For higher values of θ^F, that is, for lower levels of political discrimination vis-à-vis private labour market discrimination, the quota changes the incentives of candidacy in such a way that some high-skill, high-signal female citizens become willing to stand as candidates. However, this does not occur immediately at q^{sq}/p as long as $\theta^F < \theta^M$. Hence given θ^F, quality first decreases, as the quota discourages high-quality males from running, but then stabilizes, when some high-skill, high-signal female citizens find it advantageous to stand for office, a situation in which they replace discouraged high-ability males.

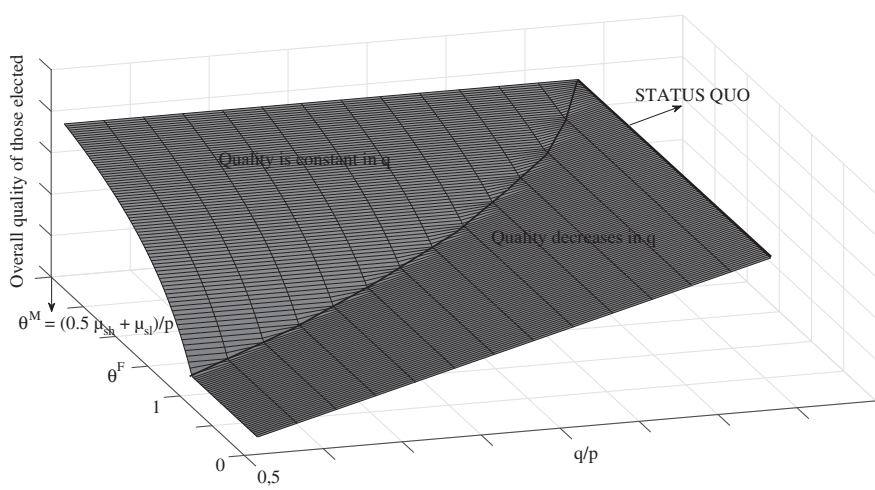

FIGURE 6. Quotas, incentives for high-skill females, and the overall quality of those elected—CASE I.
Notes: Here 'sh' stands for $\overline{s}$, and 'sl' stands for $\underline{s}$. Hence $\overline{\theta} = (0.5\mu_{\overline{s}} + \mu_{\underline{s}})/p$ and $\overline{\overline{\theta}} = (\mu_{\overline{s}} + \mu_{\underline{s}})/p$. The figure assumes $\mu_{\underline{s}} < p$ and $\theta^M = (0.5\mu_{\overline{s}} + \mu_{\underline{s}})/p$.

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One interesting byproduct of this analysis is the following. For a given quota level, lowering political discrimination vis-à-vis private labour market discrimination, that is, increasing θ^F/θ^M, weakly raises the quality of the elected political body. An increase in θ^F, given θ^M, weakly raises the candidacy incentives for high-ability, high-signal female citizens, and thus the potential number of high-ability individuals in the pool of candidates. In the extreme case of equal discrimination in the political market vis-à-vis the private labour market, there is no decay in quality as the quota increases. A natural policy implication is that lowering discrimination in the political market may be a good way to ensure that gender quotas will not compromise the quality of the elected political body.

Case II—all high-ability, high-signal male citizens stand for office in the status quo

Consider now $\theta^M \geq \overline{\theta}$, so that all high-skill, high-signal male citizens stand as candidates when gender quotas are absent. The following proposition shows that in this case and under certain conditions, higher quotas raise the overall quality of the elected political body. All that is needed is that quotas attract high-ability female candidates without creating a disincentive for high-ability males to exit the political arena.

Proposition 2. Suppose that $\theta^M \geq \overline{\theta}$. Then we have the following.

(i) There exists a quota level $\overline{q}/p \in [q^{sq}/p, 0.5]$ that raises the quality of the elected body as compared to the status quo only if:

  (a) $\max\{1, \mu_{\underline{s}}/p\} \leq \theta^F < \overline{\theta}$, provided that both θ^F, θ^M and the quota level are sufficiently high; or

  (b) $\overline{\theta} \leq \theta^F < \overline{\theta}$ (provided that $\theta^F < \theta^M$).

(ii) For any quota level, reducing the relative weight of political discrimination versus private labour market discrimination (increasing θ^F) weakly improves the quality of those elected for public office.

Proof. See the Appendix.

Proposition 2 states that the overall quality of the political body increases over the status quo if either one of two conditions is satisfied. In both, the quota cannot discourage any high-ability, high-signal male candidacy, at least for low quota values. In the first condition, high-ability, high-signal female citizens are not running in the status quo, but would be willing to run for a quota value $\overline{q}/p < 0.5$. The overall quality of those elected increases over the status quo if there exists a quota level $\overline{q}/p \in [q^{sq}/p, 0.5]$ such that the measure of high-ability female candidates that are elected offsets the fall in the share of high-ability elected male candidates. In the second condition, high-ability, high-signal female citizens are indifferent between standing or not as candidates in the status quo. A quota encourages more high-ability, high-signal female candidacies without discouraging high-ability, high-signal male ones, therefore leading to an increase in the quality of the political body. In any other situation, namely if the relative weight of political versus private labour market discrimination is sufficiently high ($\theta^F < \min\{1, \mu_{\underline{s}}/p\}$), or if the quota discourages high-ability male candidacies in sufficiently large numbers without encouraging high-ability female candidacies, overall quality decreases.

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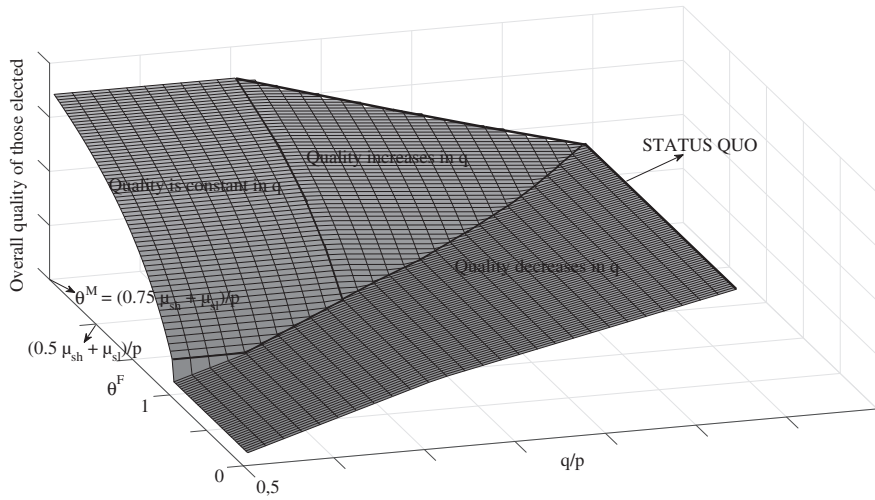

FIGURE 7. Quotas, incentives for high-skill females, and the overall quality of those elected—CASE II.
Notes: Here 'sh' stands for $\bar{s}$, and 'sl' stands for $\underline{s}$. Hence $\overline{\theta} = (0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p$ and $\overline{\overline{\theta}} = (\mu_{\bar{s}} + \mu_{\underline{s}})/p$. The figure assumes $\mu_{\underline{s}} < p$ and $\theta^{M\bar{T}} = (0.75\mu_{\bar{s}} + \mu_{\underline{s}})/p < (\mu_{\bar{s}} + \mu_{\underline{s}})/p$.

Figure 7 provides a graphic description of the effect of quotas on the quality of those elected. We first focus on the most interesting situation where $\theta^M < \overline{\overline{\theta}}$, and discuss thereafter the case of $\theta^M \geq \overline{\overline{\theta}}$. For values of θ^F low enough, specifically for $\theta^F < \max\{1, \mu_{\underline{s}}/p\}$, no high-ability female stands for office in the status quo, and an increase in the gender quota leads to a decrease in the quality of office-holders, first by reducing the probability of election for high-ability, high-signal male candidates, and for higher quota levels also by discouraging their candidacies.

If the relative benefit for female candidates from running for office is higher, so that $\max\{1, \mu_{\underline{s}}/p\} \leq \theta^F < \overline{\theta}$, then two different outcomes are possible. Given θ^F, the quota either discourages high-ability, high-signal male candidacies prior to encouraging high-ability, high-signal female ones, or encourages high-ability, high-signal female candidacies prior to discouraging high-ability, high-signal male ones. In both cases, an increase in the quota from the status quo level q^{sq}/p leads first to a decrease in the overall quality of the elected political body by encouraging low-ability, high-signal female candidacies while reducing the number of seats for high-signal male citizens, some of whom are highly skilled. And in both cases, quality becomes independent of the quota for sufficiently high quota values, as the effect on quality from discouraged high-ability, high-signal male candidacies becomes exactly offset by that of new high-ability, high-signal female candidacies. In this region, the quota increases female representativeness without affecting the overall quality of those elected.[15]

However, these two cases differ for intermediate quota values. In the first case, quality is never increasing in the quota value, since θ^F is not sufficiently high to attract high-ability, high-signal female candidacies prior to discouraging high-ability, high-signal male ones. In the second case, quality becomes increasing in the quota value for some interval, as θ^F is sufficiently high to attract high-ability, high-signal female candidacies prior to discouraging high-ability, high-signal male ones. In this case, the effect of quotas on the quality of politicians is characterized by non-linear effects, say, by first decreasing, then increasing, and thereafter having no effect on quality. The quality of

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office-holders does not necessarily increase above the status quo level, however. For this to happen, the increase in the quality of elected females, $p_{\bar{s}}^{F}$, triggered by new high-ability, high-signal females candidacies, must offset the decay in the number of seats reserved for male candidates, k/p, vis-à-vis the status quo.

Finally, consider $\overline{\theta} \leq \theta^{F} < \theta^{M} < \overline{\overline{\theta}}$, such that there are some high-ability, high-signal female candidacies in the status quo. In this region, any quota above q^{sq}/p encourages more high-ability, high-signal female candidacies by raising their probability of election, without immediately discouraging high-ability, high-signal male citizens from standing for public office. The result is an increase in the share of high-ability office-holders, up until the point where the quota is sufficiently high so that it discourages high-ability male candidacies. When this occurs, the quality of office-holders becomes independent of the quota.

In the above characterization there exists a quota level $\overline{q}/p < 0.5$ whereby after that level some high-ability male candidacies are discouraged. The value of the quota at which that occurs obviously depends on the value of θ^{M}—the higher the relative payoff from holding office, the higher the reduction in the probability of election that high-ability, high-signal male candidates are willing to accept and still run. For $\theta^{M} > (\mu_{\bar{s}} + \mu_{\underline{s}})/p$, all high-ability, high-signal males stand for office for any quota $\overline{q}/p \leq 0.5$, that is, the quota region in which we are interested. In this situation, the region where quotas have no effect on overall quality—the flat region in Figure 7—would disappear, and for sufficiently high values of θ^{F}, quality would be monotonically increasing in $\overline{q}/p$ up to a quota of 0.5.

IV. Discussion

We now carry out some comparative statics and provide a brief discussion of key assumptions in our model.

A decrease in political discrimination as compared to private labour market discrimination, associated with more attractive rewards from public office, that is, larger values of θ^{M} and θ^{F}, encourages high-ability female candidacies without discouraging high-ability male ones, thus increasing the share of high-ability citizens in the pool of candidates for a given quota. Thus our model suggests that policies that avoid gender discrimination in the political market, associated with high rewards from holding office, do not create a trade-off between gender quotas and quality of public officials; in fact, the opposite is true.

Additionally, a more informative signal—higher σ—also increases the quality of those elected for any quota level, since the proportion of high-ability, high-signal citizens willing to enter the candidate pool increases as the screening by voters is more effective. An increase in the share of high-skill individuals in the population, s, has a similar effect. An increase in the measure of seats, p for the same $\overline{q}/p$ weakly increases the chances of election for high-ability types—both males and females, if running—for any θ^{M}, θ^{F}. Hence the share of high-ability candidates weakly increases, and so does quality.[16] Hence our model suggests also that an increase in the share of high-ability individuals and an increase in the effectiveness of political campaigns in screening candidates have important consequences on the quality of those elected and on the effectiveness of a gender quota. In fact, it is the interaction of these parameters of the economy with the quota level that determines whether it is possible to increase female representativeness without harming the quality of office-holders and actually increase it over the status quo.

Our model considers that the ability to act in politics and in the private labour market is identical. However, it may be the case that certain individuals are more talented for some tasks than others, or that the quality of policy-making depends on factors other

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than just the private sector's ability of office-holders. Given the issue at hand, these frameworks are important to the extent that they alter the relative performance of low- versus high-skill citizen-candidates. As an example, consider that performance depends on the difference in salary before and after election. We could hypothesize that the greater increase in salary for low—as opposed to high—ability citizens triggers a better performance from the former, due to their greater opportunity cost of falling back into their low-paying private market jobs. Low quality may thus exert higher effort levels and become more similar to high-quality candidates. We can proxy this, strictly within the scope of our model, by considering a less discriminating signal being sent out to voters. Voters now confuse low- and high-ability candidates more often, and hence the incentives for high-ability citizens—female or male—to run for office would be diminished. A greater number of low-quality candidates would be elected, but results would be qualitatively similar to our current analysis due to their greater incentive to 'excel' in public office.

We now discuss a situation in which individuals have different talents for different tasks; that is, citizens can be high-skilled when performing tasks in the private labour market and low-skilled when in the political arena, and vice versa. As the model's solution becomes highly cumbersome in this case, we provide only a brief sketch of the results. Notice that it is the ability in the private labour market that still determines the opportunity cost of running for office.

Let us for a moment abstain from gender quotas and consider solely the status quo outcome as a function of the relative incentives to run for office, θ^M and θ^F. Consider in addition that the signal is informative only on the ability of a candidate to act in politics, thus being independent on the private labour market ability. For simplicity, we consider also that the share of citizens with some ability pair is distributed evenly across male and female citizens, so that symmetry in the distribution of skills across genders exists.

For $\theta^M < 1$, no citizen (either male or female) who is highly skilled in the private labour market runs for office, since the opportunity cost is too high. Quality may however be non-nil in equilibrium, since some of the elected citizens may be highly skilled in politics. As in the benchmark model, there is no under-representation of the discriminated group in equilibrium, due to the symmetry assumptions. For $\theta^M = 1$, a high-signal male citizen who is highly skilled in the private labour market runs for office only if elected for sure. This citizen can, however, be poorly skilled in political office, as opposed to the benchmark model, wherein any high-signal citizen lured into candidacy in such circumstances was necessarily highly skilled. For intermediate values of θ^M, high-signal male citizens endowed with high private labour market ability must be indifferent between running or not. The reasoning is identical to that presented previously, though quality now increases at a lower rate in θ^M, since some of these male candidates are poorly skilled in the political arena. No high-signal female who possesses high private labour market skills runs for office for any $\theta^F < \theta^M$, since the opportunity cost is too high relative to the equilibrium probability of election. Female under-representation therefore increases in θ^M.

For sufficiently high values of θ^M, all high-signal male citizens endowed with high political ability run for office. In this case, high values of θ^F are able to lure into candidacy high-signal female citizens endowed with a high-skill level in the private labour market. Quality increases in θ^F (and under-representation decreases), though at a lower rate than in the benchmark model, since some of them are poorly skilled to perform political tasks. For sufficiently high values of θ^M and θ^F, all high-signal citizens who

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possess high skills in the political market run for office. There is no under-representation, and quality is maximal.[17]

From the above, it is clear that considering an additional source of ability in the political market changes both the quality level and the derivative of quality with respect to the relative incentives of running for office in the status quo. A gender quota therefore has identical effects to the ones in the benchmark model: it discourages high-signal male citizens who possess high skills in the private labour market from running while encouraging high-signal female candidates with high private labour market skills. The main difference is that now some of the encouraged or discouraged citizens are poorly skilled in the political arena, and thus the derivative of quality with respect to quotas is weakly lower vis-à-vis the benchmark model. The key message of the paper remains unchanged.

In our model, quotas need to be permanent in order to have enduring effects on the quality of those elected, as the status quo is left unchanged with the policy. One can envisage, however, that binding quotas can lead to a permanent decrease in the political bias against female candidates or female office-holders. This could work through the election of more female representatives, leading to a 'demonstration effect', with permanent impact. In terms of our model (for sufficiently high values of θ^M), this could be represented by a permanent decline in the degree of political discrimination to $\phi^{F'} < \phi^F$ once the quota level attains a certain threshold $q'/p \in \{q^{sq}/p, 0.5\}$.[18] If such shocking policy is sufficiently aggressive and the decline in prejudice against female candidates is sufficiently strong, then the status quo shifts to a case where the number of elected female candidates is forever at a higher level, that is, there exists a new equilibrium with $q^{sq\prime}/p \in \{q'/p, 0.5\}$. A temporary quota might therefore trigger a permanent change in the status quo, yielding an outcome wherein office-holders are more gifted, due to the stronger incentives that high-skilled female candidates have in running for office.

For the sake of tractability, our model also assumes that male and female relative benefits from holding office are independent of each other. It is under this assumption that the comparative statics on θ^M and θ^F are conducted in the paper. However, Figure 3 in the Introduction suggests that the decrease in political discrimination goes hand in hand with a decrease in economic discrimination, though the latter decreases at a higher rate. A natural implication is that countries with lower levels of political discrimination tend to be associated with larger values for $\theta^M - \theta^F$. For the same return of holding office, this yields a lower number of female representatives, as well as lower quality of office-holders.

V. Conclusion

We model the relationship between gender quotas and the quality of elected public officials in an economy where individuals from two publicly identifiable groups—males and females—composed of high- and low-skill individuals, endogenously decide whether or not to run for office. The model is applicable to any selection process—in politics, academia or elsewhere—imposing a quota on a verifiable characteristic in the presence of an imperfectly observable characteristic such as candidate quality. Imposing a quota increases the probability of election for the discriminated group and decreases it for the originally over-represented group, but the impact on the overall quality of those elected depends on the incentives on weather or not to run faced by the high-skilled individuals from each group. The overall effect of the quota on the quality of the political body can

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be positive, negative or null. When the rewards from public office are low, a quota decreases the overall quality of the political body. Likewise when the rewards from public office are high, but women are significantly discriminated against in the political market vis-à-vis the labour market. In this case, a quota discourages high-ability male candidacies while encouraging low-ability female ones. When the rewards from public office are high, and political discrimination against women is low when compared with private labour market discrimination, a quota is able to encourage high-ability female candidacies without discouraging high-ability male ones. In this case, a quota may translate into an increase in the quality of elected public officials.

Importantly, a small increase in quotas can decrease quality of elected public officials, whereas a higher increase in quotas reverses the effect—a non-linear effect that can bring the quality of those elected for public office above the status quo level for relatively high quota values. Moreover, an important byproduct of our analysis is that the introduction of gender quotas should not be dissociated from policies lowering political discrimination across genders, as lowering discrimination weakly increases the quality of office-holders and may also increase the effectiveness of quotas as a means to foster quality of elected officials. The answer to the question posed in the title is straightforward: yes, gender quotas can raise the quality of politicians.

In our model, the quality of politicians is related solely to individual skills and is independent of gender. There is a wider conceptual debate on the benefits of more equitable gender-based representation. For instance, Dahlerup (2003) cites three arguments in favour of gender quotas, which have been present in most debates since the initial fight for women's suffrage: (i) the justice argument, i.e. women represent half of the population and hence should have the right to half of the seats; (ii) the experience argument, i.e. women have different experiences that ought to be represented; (iii) the interest group argument, i.e. women and men have partly conflicting interests and thus men cannot represent women. The experience and interest group arguments may be relevant for extensions of our model, as they might affect the average quality of the pool of elected politicians. In these cases, in contrast with our model, the quality of the elected politicians depends on the distribution of individual characteristics among the elected, and not solely on the sum of those individual characteristics. Our model does not consider either the effect of quotas on three dimensions of quality referred to in the literature. First, the presence of a diversified elected body can increase the average quality of the elected themselves, through the imparting of diverse experience. Second, quotas can create role models for groups that lack them dearly, thus influencing the effort and the choices of the next generation. Third, the average quality of a group may affect the quality of each individual. These may be important issues to be examined in future research.

APPENDIX

Characterization of the status quo equilibrium

Note that each candidate votes for herself or himself. Given our assumption that citizens cannot anticipate differences in average quality between the pool of male and the pool of female candidates, even if they exist, there is no reason for non-candidates to discriminate between genders —they condition their vote solely on the candidates' signal, regardless of gender. It is obvious that a type-i, signal-j, gender-g candidate will run for office if and only if

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$$P_j \frac{\pi - y_i^g}{\phi^g} \geq 1,$$

where P_j is the probability that a signal-j candidate is elected. Due to the private market discrimination, whenever a type-$\bar{s}$, signal-$\bar{s}$, gender-g citizen prefers to run for office, so does a type-$\underline{s}$, signal-$\bar{s}$ citizen of the same gender. Similarly, if a type-$\bar{s}$, signal-$\underline{s}$, gender-g citizen is running for office, then so must be a type-$\underline{s}$, signal-$\underline{s}$ citizen of the same gender. We now introduce the following lemma.

Lemma 1. If the measure of signal-$\bar{s}$ candidates is non-zero, then non-candidates never vote for a signal-$\underline{s}$ candidate.

Proof. Let $\widetilde{C}_j$ denote the measure of signal-j candidates, and suppose that $\widetilde{C}_{\bar{s}}$ is non-empty. If voters believe that the number of elements of type $\bar{s}$ is higher in $\widetilde{C}_{\underline{s}}$ than in $\widetilde{C}_{\bar{s}}$, then some type-$\bar{s}$, signal-$\underline{s}$ are candidates. This implies that all low-ability, low-signal citizens are candidates as well, since from our assumptions, $\theta^M < (\pi - \omega^F)/\phi^F$ and $\theta^M < (\pi - \omega^M)/\phi^M$. Given that $0.5(1-s)\mu > p$, we have $\widetilde{C}_{\underline{s}} > p$. Hence $P_{\bar{s}} = 0$, and no signal-$\bar{s}$ candidate is elected. This implies that $\widetilde{C}_{\bar{s}}$ is empty: a contradiction.

We now analyse the quality of those elected and the share of females in politics as a function of θ^M and θ^F (with $\theta^M > \theta^F$). Several regions are considered.

$\theta^M < 1$: Whenever $\theta^M < 1$, no type-$\bar{s}$ citizen, male or female, runs for office, as the expected utility of holding office for any high-skill individual is negative. Voters simply randomize their voting decisions, as all candidates have the same expected ability. Obviously, quality is 0, and the share of elected females is representative of the population, that is, $q^{sq}/p = 0.5$.

$\theta^M = 1$: If $\theta^M = 1$, then type-$\bar{s}$, signal-$\bar{s}$ male citizens run for office if elected for sure. Hence all type-$\underline{s}$, signal-$\bar{s}$ citizens (males and females) must be running as well, as $\theta^M < (\pi - \omega^F)/\phi^F$ and $\theta^M < (\pi - \omega^M)/\phi^M$. If $\mu_{\underline{s}} < p$, then the remaining places are filled by type-$\bar{s}$, signal-$\bar{s}$ male candidates, and $P_{\bar{s}} = 1$. If we let $C_{\bar{s}}^g$ denote the measure of high-skill, high-signal candidates of gender g, then $C_{\bar{s}}^M \in [0, p - \mu_{\underline{s}}]$, and the quality of elected males is

$$p_{\bar{s}}^M \in \left[0, 1 - \frac{0.5\mu_{\underline{s}}}{p - 0.5\mu_{\underline{s}}}\right].$$

The overall quality of those elected is

$$p_{\bar{s}} \in \left[0, 1 - \frac{\mu_{\underline{s}}}{p}\right].$$

Finally, the share of elected females is $q^{sq}/p \in [0.5\mu_{\underline{s}}/p, 0.5]$. If we consider instead that $\mu_{\underline{s}} \geq p$, then there are more low-ability, high-signal individuals than the number of offices. The probability of election is $P_{\bar{s}} = p/\mu_{\underline{s}} < 1$, and no high-ability male stands as candidate. The result is $p_{\bar{s}} = 0$ and $q^{sq}/p = 0.5$.

$1 < \theta^M < (0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p = \overline{\theta}$: Consider first that $\mu_{\underline{s}} < p$. In this region, any type-$\bar{s}$, signal-$\bar{s}$ male citizen must be indifferent between running or not. Suppose not. Then: either none would run, which implies $P_{\bar{s}} = 1$, so that $P_{\bar{s}}\theta^M > 1$, a contradiction; or all of them would run, which implies $P_{\bar{s}} = 1/\overline{\theta}$ and $P_{\bar{s}}\theta^M < 1$, another contradiction. Therefore we must have $P_{\bar{s}}\theta^M = 1$. As $\theta^F < \theta^M$, no type-$\bar{s}$, signal-$\bar{s}$ female citizen runs for office, but all low-type, high-signal citizens do. The measure of high-skill, high-signal male candidates is found by solving the equation

$$\frac{p}{C_{\bar{s}}^M + \mu_{\underline{s}}} \theta^M = 1,$$

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which yields $C_{\bar{s}}^M = p\theta^M - \mu_{\underline{s}}$. The quality of elected males is

$$p_{\bar{s}}^M = \frac{C_{\bar{s}}^M}{C_{\bar{s}}^M + 0.5\mu_{\underline{s}}} = 1 - \frac{0.5\mu_{\underline{s}}}{p\theta^M - 0.5\mu_{\underline{s}}}.$$

The probability of election is $P_{\bar{s}} = 1/\theta^M$, and the overall quality of the elected body is

$$p_{\bar{s}} = \frac{C_{\bar{s}}^M}{C_{\bar{s}}^M + \mu_{\underline{s}}} = 1 - \frac{\mu_{\underline{s}}}{p\theta^M}.$$

Finally, $q^{sq}/p = 0.5\mu_{\underline{s}}/(p\theta^M)$. If $\mu_{\underline{s}} \geq p$, then the above characterization still holds for $\mu_{\underline{s}}/p \leq \theta^M < \overline{\theta}$. For $1 < \theta^M < \mu_{\underline{s}}/p$, no high-ability male stands for office, and the characterization is similar to the case of $\theta^M = 1$.

$\theta^M \geq (0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p = \overline{\theta}$: In this region, all signal-$\bar{s}$ male candidates stand for office and the quality of elected males is $p_{\bar{s}}^M = \mu_{\bar{s}}/(\mu_{\bar{s}} + \mu_{\underline{s}}) = 1/\overline{\overline{\theta}}$. To see this, note that if $\theta^F < \overline{\theta}$, then no high-ability female stands as candidate, since for the current probability of election $P_{\bar{s}} = 1/\overline{\theta}$, the expected return of running for office is negative ($P_{\bar{s}}\theta^F < 1$). As $\theta^M > \overline{\theta}$, all high-signal males must be running. If $\overline{\theta} \leq \theta^F < \overline{\overline{\theta}}$ (provided that $\theta^F < \theta^M$), then type-$\bar{s}$, signal-$\bar{s}$ females must be indifferent between running or not running, and consequently all high-signal males stand for office. Finally, if $\theta^F \geq \overline{\overline{\theta}}$, then all signal-$\bar{s}$ female citizens run for office, and consequently so do all signal-$\bar{s}$ male citizens. The characterization of the equilibrium is as follows.

- If $\theta^F < \overline{\theta}$, then no type-$\bar{s}$ female runs for office. The probability of election is $P_{\bar{s}} = 1/\overline{\theta}$. The quality of those elected is $p_{\bar{s}} = 0.5\mu_{\bar{s}}/(0.5\mu_{\bar{s}} + \mu_{\underline{s}})$, and the fraction of elected females is $q^{sq}/p = 0.5\mu_{\underline{s}}/(0.5\mu_{\bar{s}} + \mu_{\underline{s}})$.
- If $\overline{\theta} \leq \theta^F < \overline{\overline{\theta}}$, then high-ability, high-signal females are indifferent between running or not. The measure of high-skill female candidates is found by solving the equation

$$\frac{p}{C_{\bar{s}}^F + 0.5\mu_{\bar{s}} + \mu_{\underline{s}}}\theta^F = 1,$$

which yields $C_{\bar{s}}^F = p\theta^F - 0.5\mu_{\bar{s}} - \mu_{\underline{s}}$. The probability of election of a high-signal citizen is $P_{\bar{s}} = 1/\theta^F$, and the average quality of elected females is

$$p_{\bar{s}}^F = \frac{C_{\bar{s}}^F}{C_{\bar{s}}^F + 0.5\mu_{\underline{s}}} = 1 - \frac{0.5\mu_{\underline{s}}}{p\theta^F - 0.5(\mu_{\bar{s}} + \mu_{\underline{s}})}.$$

The share of elected females is

$$q^{sq}/p = P_{\bar{s}}\frac{C_{\bar{s}}^F + 0.5\mu_{\underline{s}}}{p} = 1 - \frac{0.5(\mu_{\bar{s}} + \mu_{\underline{s}})}{p\theta^F}.$$

Finally, the overall quality of those elected is

$$p_{\bar{s}} = \frac{C_{\bar{s}}^F + 0.5\mu_{\bar{s}}}{C_{\bar{s}}^F + 0.5\mu_{\bar{s}} + \mu_{\underline{s}}} = 1 - \frac{\mu_{\underline{s}}}{p\theta^F}.$$

- For $\theta^F \geq \overline{\overline{\theta}}$, the probability of election is at its minimum, $P_{\bar{s}} = 1/\overline{\overline{\theta}}$. All high-signal females run for office, implying $C_{\bar{s}}^F = 0.5\mu_{\bar{s}}$, hence $p_{\bar{s}}^F = p_{\bar{s}} = \mu_{\bar{s}}/(\mu_{\bar{s}} + \mu_{\underline{s}})$. Finally, $q^{sq}/p = 0.5$.

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Proof of Proposition 1

Consider an exogenous quota $\overline{q}/p \in [q^{sq}/p, 0.5]$. Recall that in CASE I, only some high-ability, high-signal males stand for office in the status quo (they are indifferent between running or not), so $1 \leq \theta^M < \overline{\theta}$ if $\mu_{\underline{s}} < p$, and $\mu_{\underline{s}}/p \leq \theta^M < \overline{\theta}$ if $\mu_{\underline{s}} \geq p$. Obviously, for $\overline{q} = q^{sq}$, the equilibrium is as posited in the previous subsection.

Let $P^M_{\overline{s}}$ denote the probability that a signal-$\overline{s}$ male candidate is elected, and note that $P^M_{\overline{s}} = (p - \overline{q})/(C^M_{\overline{s}} + 0.5\mu_{\underline{s}})$—the measure of places reserved for males over high-signal male candidates. Let $\overline{q}^M = p - 0.5\mu_{\underline{s}}/\theta^M$, and observe that $\overline{q}^M/p \geq 0.5$. Suppose not. Then

$$1 - \frac{0.5\mu_{\underline{s}}}{p\theta^M} < 0.5 \quad \Longleftrightarrow \quad \theta^M < \frac{\mu_{\underline{s}}}{p}.$$

If $\mu_{\underline{s}} < p$, then the minimum value that θ^M can take is 1, and we obtain a contradiction. If $\mu_{\underline{s}} \geq p$, then the minimum value that θ^M can take is $\mu_{\underline{s}}/p$, and we get $\underline{p} > p$, another contradiction. This implies that for $q^{sq}/p \leq \overline{q}/p \leq 0.5$, a non-null measure of type-$\underline{s}$, signal-$\overline{s}$ male citizens stands for office. This measure, $C^M_{\overline{s}}$, is obtained by solving the equation

$$\frac{p - \overline{q}}{C^M_{\overline{s}} + 0.5\mu_{\underline{s}}}\theta^M = 1,$$

yielding

$$C^M_{\overline{s}} = (p - \overline{q})\theta^M - 0.5\mu_{\underline{s}}, \quad q^{sq}/p \leq \overline{q}/p \leq 0.5.$$

Note that given θ^M, a higher quota decreases the measure of high-ability male candidates so that the probability of election remains unchanged. The quality of elected males is

$$p^M_{\overline{s}} = 1 - \frac{0.5\mu_{\underline{s}}}{(p - \overline{q})\theta^M}, \quad q^{sq}/p \leq \overline{q}/p \leq 0.5.$$

Similarly, let $\overline{q}^F/p = 0.5\mu_{\underline{s}}/(p\theta^F)$, and note that $\overline{q}^F/p \leq (>)\ 0.5$ is equivalent to $\theta^F \geq (<)\ \mu_{\underline{s}}/p$. Therefore if $\mu_{\underline{s}} \leq p$, then we get $\overline{q}^F/p \leq 0.5$ for $1 \leq \theta^F < \theta^M$. If $\mu_{\underline{s}} > p$, then we obtain $\overline{q}^F/p > 0.5$ for $1 \leq \theta^F < \mu_{\underline{s}}/p$, and $\overline{q}^F/p \leq 0.5$ for $\mu_{\underline{s}}/p \leq \theta^F < \theta^M$. We now consider these cases separately.

$\mu_{\underline{s}} \leq p$ and $1 \leq \theta^F < \theta^M$: The measure of high-skill, high-signal female candidates is

$$C^F_{\overline{s}} = \begin{cases} 0 & \text{if } q^{sq}/p \leq \overline{q}/p \leq \overline{q}^F/p, \\ \overline{q}\theta^F - 0.5\mu_{\underline{s}} & \text{if } \overline{q}^F/p < \overline{q}/p \leq 0.5, \end{cases}$$

and the quality of elected females is

$$p^F_{\overline{s}} = \begin{cases} 0 & \text{if } q^{sq}/p \leq \overline{q}/p \leq \overline{q}^F/p, \\ 1 - \frac{0.5\mu_{\underline{s}}}{\overline{q}\theta^F} & \text{if } \overline{q}^F/p < \overline{q}/p \leq 0.5. \end{cases}$$

The quality of the elected body is

$$p_{\overline{s}} = \begin{cases} \frac{1}{p}\left[(p - \overline{q}) - \frac{0.5\mu_{\underline{s}}}{\theta^M}\right] & \text{if } q^{sq}/p \leq \overline{q}/p \leq \overline{q}^F/p, \\ 1 - \frac{0.5\mu_{\underline{s}}}{p}\frac{\theta^M + \theta^F}{\theta^M\theta^F} & \text{if } \overline{q}^F/p < \overline{q}/p \leq 0.5. \end{cases}$$

Hence $p_{\overline{s}}$ is weakly decreasing in $\overline{q}$ and weakly increasing in θ^F.

$\mu_{\underline{s}} > p$ and $\mu_{\underline{s}}/p \leq \theta^F < \theta^M$: This case is similar to the previous one, and all the above characterization holds.

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$\mu_{\underline{s}} > p$ and $1 \leq \theta^F < \mu_{\underline{s}}/p$: Here, high-ability males exit politics as the quota increases, but no high-ability female stands for office for any $\overline{q}/p \leq 0.5$. Therefore

$$p_{\overline{s}} = \frac{1}{p}\left[(p - \overline{q}) - \frac{0.5\mu_{\underline{s}}}{\theta^M}\right], \quad q^{sq}/p \leq \overline{q}/p \leq 0.5,$$

which is strictly decreasing in the quota $\overline{q}/p$, and does not depend on θ^F.

Proof of Proposition 2

In CASE II, all high-ability, high-signal males stand for office in the status quo, thus $\theta^M \geq \overline{\theta}$. Again, for a quota $\overline{q}/p = q^{sq}/p$, the equilibrium is as depicted in the first subsection of this Appendix.

If the quota is such that all high-skill, high-signal males run for office, then male quality is $p_{\overline{s}}^M = \mu_{\overline{s}}/(\mu_{\overline{s}} + \mu_{\underline{s}})$. This occurs for $\overline{q} \leq p - 0.5(\mu_{\overline{s}} + \mu_{\underline{s}})/\theta^M$. If the quota is above this value, then the quality of elected males is as depicted in the previous subsection. Let $\overline{q}_1^M/p = 1 - 0.5(\mu_{\overline{s}} + \mu_{\underline{s}})/(p\theta^M)$ and $\overline{q}_2^M/p = 1 - 0.5\mu_{\underline{s}}/(p\theta^M)$, and note that $\overline{q}_2^M/p \geq 0.5$. The argument follows the same steps as in the previous subsection. The term $\overline{q}_1^M/p$ is below 0.5 if and only if $\theta^M < \overline{\overline{\theta}}$. Thus we can write $p_{\overline{s}}^M$ as

$$p_{\overline{s}}^M = \begin{cases} \frac{\mu_{\overline{s}}}{\mu_{\overline{s}}+\mu_{\underline{s}}} & \text{if } q^{sq}/p \leq \overline{q}/p \leq \min\{\overline{q}_1^M/p, 0.5\}, \\ 1 - \frac{0.5\mu_{\underline{s}}}{(p-\overline{q})\theta^M} & \text{if } \min\{\overline{q}_1^M/p, 0.5\} < \overline{q}/p \leq 0.5. \end{cases}$$

Regarding the quality of elected females and overall quality, we have to consider several regions for θ^F separately. $\theta^F < 1$: In this situation, no high-ability female ever stands for office. The quality of elected females, $p_{\overline{s}}^F$, is 0. Thus the quality of those elected,

$$\text{(A1)} \qquad p_{\overline{s}} = \begin{cases} \frac{p-\overline{q}}{p}\frac{\mu_{\overline{s}}}{\mu_{\overline{s}}+\mu_{\underline{s}}} & \text{if } q^{sq}/p \leq \overline{q}/p \leq \min\{\overline{q}_1^M/p, 0.5\}, \\ \frac{1}{p}\left[(p - \overline{q}) - \frac{0.5\mu_{\underline{s}}}{\theta^M}\right] & \text{if } \min\{\overline{q}_1^M/p, 0.5\} < \overline{q}/p \leq 0.5, \end{cases}$$

is decreasing in the quota level $\overline{q}/p$, and does not depend on θ^F.

$1 \leq \theta^F < (0.5\mu_{\overline{s}} + \mu_{\underline{s}})/p = \overline{\theta}$: As shown in the first subsection of this Appendix, no high-ability female runs for office in the status quo in this region. A higher quota raises the probability of election for high-signal females. Possibly, for a quota below 0.5, high-ability, high-signal females will become indifferent between running or not. Furthermore, in this region it is not possible to have all high-ability, high-signal females standing for office for any $\overline{q}/p \leq 0.5$. To see this, note that the measure of female candidates is $C_{\overline{s}}^M = \overline{q}\theta^F - 0.5\mu_{\underline{s}}$, and the maximum value that this can take is $0.25\mu_{\overline{s}}$. Let $\overline{q}^F/p = 0.5\mu_{\underline{s}}/(p\theta^F)$, and consider first that $\mu_{\underline{s}} > p$ and $1 \leq \theta^F < \mu_{\underline{s}}/p$, so $\overline{q}^F/p > 0.5$. The quality of elected females is 0, and the overall quality of those elected is given by equation equation A1.

Now consider the following cases: (i) $\mu_{\underline{s}} > p$ and $\mu_{\underline{s}}/p \leq \theta^F < \overline{\theta}$; (ii) $\mu_{\underline{s}} \leq p$. In both situations, type-$\overline{s}$, signal-$\overline{s}$ females stand for office for a quota below $\overline{q}/p \leq 0.5$ (they will be indifferent between running or not). The quality of elected females is

$$p_{\overline{s}}^F = \begin{cases} 0 & \text{if } q^{sq}/p \leq \overline{q}/p \leq \overline{q}^F/p, \\ 1 - \frac{0.5\mu_{\underline{s}}}{\overline{q}\theta^F} & \text{if } \overline{q}^F/p < \overline{q}/p \leq 0.5. \end{cases}$$

If $\overline{q}_1^M/p \leq \overline{q}^F/p$, then the quality of those elected is

$$p_{\overline{s}} = \begin{cases} \frac{p-\overline{q}}{p}\frac{\mu_{\overline{s}}}{\mu_{\overline{s}}+\mu_{\underline{s}}} & \text{if } q^{sq}/p \leq \overline{q}/p \leq \overline{q}_1^M/p, \\ \frac{1}{p}\left[(p - \overline{q}) - \frac{0.5\mu_{\underline{s}}}{\theta^M}\right] & \text{if } \overline{q}_1^M/p < \overline{q}/p \leq \overline{q}^F/p, \\ 1 - \frac{0.5\mu_{\underline{s}}}{p}\frac{\theta^M+\theta^F}{\theta^M\theta^F} & \text{if } \overline{q}^F/p < \overline{q}/p \leq 0.5. \end{cases}$$

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Again, $p_{\bar{s}}$ is weakly decreasing in $\bar{q}$ and weakly increasing in θ^F. Finally, consider $\bar{q}^F/p < \bar{q}_1^M/p$. This is equivalent to stating that $\theta^F > 0.5\mu_{\underline{s}}\theta^M/(p\theta^M - 0.5(\mu_{\bar{s}} + \mu_{\underline{s}}))$. We get

$$p_{\bar{s}} = \begin{cases} \frac{p-\bar{q}}{p}\frac{\mu_{\bar{s}}}{\mu_{\bar{s}}+\mu_{\underline{s}}} & \text{if } q^{sq}/p \leq \bar{q}/p \leq \bar{q}^F/p, \\ \frac{p-\bar{q}}{p}\frac{\mu_{\bar{s}}}{\mu_{\bar{s}}+\mu_{\underline{s}}} + \frac{\bar{q}}{p}\left[1 - \frac{0.5\mu_{\underline{s}}}{\bar{q}\theta^F}\right] & \text{if } \bar{q}^F/p < \bar{q}/p \leq \min\{\bar{q}_1^M/p, 0.5\}, \\ 1 - \frac{0.5\mu_{\underline{s}}}{p}\frac{\theta^M+\theta^F}{\theta^M\theta^F} & \text{if } \min\{\bar{q}_1^M/p, 0.5\} < \bar{q}/p \leq 0.5. \end{cases}$$

Hence quotas increase quality over the status quo if there exists $\bar{q}/p \leq \min\{\bar{q}_1^M/p, 0.5\}$ such that

$$\frac{p-\bar{q}}{p}\frac{\mu_{\bar{s}}}{\mu_{\bar{s}}+\mu_{\underline{s}}} + \frac{\bar{q}}{p}\left[1 - \frac{0.5\mu_{\underline{s}}}{\bar{q}\theta^F}\right] > \frac{0.5\mu_{\bar{s}}}{0.5\mu_{\bar{s}}+\mu_{\underline{s}}},$$

which is equivalent to

$$\text{(A2)} \qquad \bar{q} > \frac{0.5(\mu_{\bar{s}}+\mu_{\underline{s}})}{\theta^F} - \frac{0.5\mu_{\bar{s}}}{0.5\mu_{\bar{s}}+\mu_{\underline{s}}}.$$

Hence for quality to increase, θ^M and θ^F must be sufficiently high, so $\bar{q}^F < \bar{q}_1^M$, and the quota value must respect equation equation A2. Finally, note that quality is weakly increasing in θ^F.

$(0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p \leq \theta^F < (\mu_{\bar{s}} + \mu_{\underline{s}})/p$: Let us now consider the final region, where some high-ability, high-signal females are running for office in the status quo, and let $\tilde{q}^F = 0.5(\mu_{\bar{s}} + \mu_{\underline{s}})/\theta^F$. Note that $\tilde{q}^F > 0.5p$, which implies that one cannot have all high-ability females running for office for any $\bar{q} \leq 0.5p$. The quality of elected females is

$$p_{\bar{s}}^F = 1 - \frac{0.5\mu_{\underline{s}}}{\bar{q}\theta^F}, \quad q^{sq} \leq \bar{q} \leq 0.5p.$$

Now suppose that $\bar{q}_1^M \geq 0.5p$. The quality of those elected is

$$p_{\bar{s}} = \frac{p-\bar{q}}{p}\frac{\mu_{\bar{s}}}{\mu_{\bar{s}}+\mu_{\underline{s}}} + \frac{1}{p}\left[\bar{q} - \frac{0.5\mu_{\underline{s}}}{\theta^F}\right], \quad q^{sq} \leq \bar{q} \leq 0.5p.$$

Quality is increasing in $\bar{q}$, thus quotas improve quality over the status quo. Also, quality is increasing in θ^F. Now consider $\bar{q}_1^M < 0.5p$. The quality of those elected is

$$p_{\bar{s}} = \begin{cases} \frac{p-\bar{q}}{p}\frac{\mu_{\bar{s}}}{\mu_{\bar{s}}+\mu_{\underline{s}}} + \frac{1}{p}\left[\bar{q} - \frac{0.5\mu_{\underline{s}}}{\theta^F}\right] & \text{if } q^{sq} \leq \bar{q} \leq \bar{q}_1^M, \\ 1 - \frac{0.5\mu_{\underline{s}}}{p}\frac{\theta^M+\theta^F}{\theta^M\theta^F} & \text{if } \bar{q}_1^M < \bar{q} \leq 0.5p. \end{cases}$$

It is immediate that a quota results in an increase in quality for levels slightly above the status quo, and remain constant when high-ability, high-signal females entering politics replace high-ability, high-signal males who are exiting to the private labour market. An increase in θ^F raises the quality of those elected.

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NOTES

1. Quotas can be legally mandated or voluntary, and imposed on aspirants, candidates or those elected. The figures discussed herein refer to all types of quotas. See Dahlerup (2013), Celis *et al.* (2011) and Krook (2014) for a discussion on quota types.
2. Reservation of elected seats and reservation of places in electoral lists have quite different effects, and here we care only about the former. Galasso and Nannicini (2011) model candidate selection by ideological parties that can choose between high-valence and low-valence candidates, where the latter are party loyalists with a lower skill set. The authors predict that parties will select higher-skill candidates to more contestable districts, so that in highly competitive circumscriptions, candidates converge to a higher skill set. Besley *et al.* (2013) consider both gender and competence in a system of proportional representation. Using data for Sweden, the authors find that the share of elected women and competent men increases with the quality of party leadership. Moreover, quotas tend to raise the competence of men in municipalities where the initial share of women is low, but the reverse occurs when the initial share of women is high.
3. Our model applies to any situation where 'candidates' go through a 'selection process', such as the selection of minorities for higher education or the selection of job candidates by a firm (see, for instance, Goldin and Rouse (2000) for a natural experiment focused on gender discrimination in a selection process). Supporting our conclusions, Baltrunaite *et al.* (2012) find evidence suggesting that the introduction of quotas is associated with the substitution of less competent men for more competent women, leading to an increase in the average education level of elected politicians. Murray (2010) compares new women parliamentarians in France, elected after the parity law, to their male counterparts and to women elected prior to the parity law. The author does not find evidence that parity produced weaker politicians. Different profiles of male and female politicians seem to reflect wider social barriers to women's political careers, which would be hard to overcome without the parity law. Swamy *et al.* (2001) do not address the issue of gender quotas, but conclude that women are less involved in bribery and are less likely to close their eyes to bribe-taking. Using microdata, the authors also find evidence that corruption is less severe in countries where women hold a larger share of parliamentary seats or comprise a larger share of the labour force.
4. The persistence and pervasiveness of gender discrimination in wages is well documented; see, for example, Blau and Kahn (1992, 1996), who report a female/male earnings ratio of 65.4% for the USA, 70.5% in Norway and 73.3% in Australia. Female workers tend to receive less pay for the same job, when compared with males with similar skills. Some evidence suggests that women are discriminated against as political candidates and that this is due to different perceptions on the part of voters. For instance, Milyo and Schosberg (2000) estimate that the gender-based quality difference leads to an electoral advantage for female incumbents of close to 6 percentage points, but the bias against female incumbents on the part of voters lowers the net effect to about 4 percentage points. (For more on voter bias against female candidates, see Fréchette *et al.* 2008; Beaman *et al.* 2009; De Paola *et al.* 2010.) Women are also discriminated against as elected officials (Duflo and Topalova 2004).
5. This can be due to a negative voter perception directed at women or their involvement in additional private activities that increase the cost of entering into politics, such as childrearing and childcare, for the same objective candidate characteristics. An immediate consequence of a high degree of political discrimination is that female candidates, in equilibrium, have lower expected ability than male candidates. Chattopadhyay and Duflo (2004) find evidence in this direction for 'reserved' councils in India, showing that women elected to reserved seats are poorer than their male counterparts, less experienced, less educated, and less likely to be literate. Using data for Indian village councils, Beaman *et al.* (2009) find that voters are biased against female candidates, but this bias diminishes once they learn that women can lead effectively. See also Cavalcanti and Tavares (2007) for an evaluation of the aggregate economic cost of gender discrimination.
6. We do not endogenize the choice over quotas or quota levels. For a discussion on this issue, see Fréchette *et al.* (2008).
7. Our model does parametrize the cost of running a campaign, assumed larger for female candidates and discouraging both high- and low-skilled women from running for office. This parameter mimics barriers imposed by male-dominated party machines that discourage female candidacies, or simply a higher cost to achieve a family–life balance as compared with male counterparts.
8. This assumption implies that the benefits of the public good are uniform across individuals, so that citizens have no incentive to become candidates to change the composition of public expenditures. In addition, the political process is not 'wasteful', that is, the society would not be better off by eliminating the elected seats.

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9. Several papers suggest that women politicians may deliver a higher level or quality of public services. Such may be the case in public health–Bhalotra and Clots-Figueras (2014) show that female political representation improves public provision of antenatal and childhood health services–and education–Clots-Figueras (2012) shows that increased female political representation raises the likelihood that individuals complete primary education in urban areas. On a different front, gender quotas in the composition of private firms' board members may affect the type of decisions undertaken by the firm. Matsa and Miller (2013), for instance, find that a higher presence of female board members induced by a quota is associated with fewer workforce reductions and higher employment levels. In our model, discounting for skill, men and women are equally productive in public office.
10. Diermeier *et al.* (2005) estimate that experience in elected politics significantly increases wages in post-congressional occupations in both the private and public sectors, though the marginal effect decreases quite rapidly with experience. These authors argue that the quality of politicians in itself is unrelated to potential wages outside politics. Messner and Polborn (2004) introduce the consideration—rare in political economy models—that public office may be differently attractive to different sets of citizens, and it is the combination of the characteristics of both office and citizen that determines who runs and the quality of the elected politicians. The authors also show that the expected quality of running candidates might actually decrease as the remuneration of the official increases. However, for sufficiently high levels of remuneration, the job becomes more and more attractive, and eventually the expected quality of running candidates increases. Gagliarducci and Nannicini (2013) investigate the relationship between wage and the performance of elected officials, concluding that better-paid politicians are more skilled individuals who tend to downsize government expenditure.
11. We assume that men and women are equally competitive in their propensity to run for office, and decide to do so based only on the relative payoffs of private employment and public office. Gneezy *et al.* (2009) ran a controlled experiment to determine whether males and females have different propensities to select themselves into competitive environments. The authors found that the answer depends on the cultural characteristics of society—matrilineal or patrilineal. Their conclusions suggest that there are no intrinsic gender differences as far as the propensity to compete is concerned.
12. One may want to assume, for instance, that the screening technology is more efficient within the same gender, so that the signal sent by female (male) candidates is more accurately perceived by female (male) citizens. This type of gender-based selective screening on the part of voters would not alter the qualitative nature of our message. Moreover, it seems to contradict any hard evidence collected thus far.
13. For males this is obvious; for females it is implied by $\theta^M < (\pi - \omega^F)/\phi^F$.
14. We consider only cases where the quota is active, in the sense that the measure of reserved seats for women is greater then the measure of women who hold office in the status quo. Additionally, the maximum quota value implies an equal share of male and female citizens in public office.
15. The first case implies $\max\{1, \mu_{\underline{s}}/p\} \leq \theta^F < 0.5\mu_{\underline{s}}\theta^M/(p\theta^M - 0.5(\mu_{\bar{s}} + \mu_{\underline{s}}))$, while the second case requires $0.5\mu_{\underline{s}}\theta^M/(p\theta^M - 0.5(\mu_{\bar{s}} + \mu_{\underline{s}})) \leq \theta^F < (0.5\mu_{\bar{s}} + \mu_{\underline{s}})/p = \overline{\theta}$.
16. There are regions where an increase in p has no effect on quality whatsoever, for instance, if all high-ability, high-signal males but no high-ability females are running for office.
17. These results naturally depend on the distribution of citizens into the four skill pairs. A greater asymmetry in the distribution of skills results in quantitatively different implications, though qualitatively our main result continues to go through.
18. Assuming that $\phi^F = \phi^F(q/p)$, with $\mathrm{d}\phi^F/\mathrm{d}(q/p) < 0$, is tricky because it implies the solution of a fixed point whose existence is not assured without further assumptions.

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