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Spillover Effects of Quota or Parity Laws: The Case of Ecuador Women Mayors

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Abstract

Do quota or parity laws designed to improve the representation of women in plurinominal elections have a spillover effect to uninominal elections? We empirically test this theory by analyzing the effects of quota and parity legislations implemented in Ecuador for plurinominal elections on the proportion of women elected as mayors. Through an unpublished database, our results show that after the implementation of such legislation, the probability of a woman being elected as mayor almost doubles (*ceteris paribus*). We also find evidence that a possible causal chain for the documented spillover effects is the increasing importance of female role models, motivated by institutional changes shaped by the new legislation.

Keywords: Women in politics, women mayors, sub national politics, spillover effect

Introduction

The presence of women in politics around the world has increased over the last decades, however, this improvement is not homogeneous across the different decision-making arenas (Htun and Piscopo, 2014). In some countries, such as Argentina and Mexico, the number of female legislators has increased faster than that of female ministers (Annesley, et al., 2019). In other countries, such as Guatemala and Venezuela, women now hold half of the benches in Supreme Courts, however, their representation in both the legislative branch and the ministerial cabinet remains marginal. Costa Rica, and to a lesser extent, Ecuador, are outstanding in this aspect as they have experienced a homogenous increase of women in legislatures, ministries, and high courts. In part, non-homogenous increases in woman participation can be explained by the non-homogenous implementation of parity laws and quotas. Quota laws mandate that political leaders nominate specified percentages of women for national elections, and in the case of parity laws, these percentages are set to fifty percent (Franceschet, et al., 2012; Franceschet and Piscopo, 2008).

However, implementation of these laws is generally only possible for plurinominal elections, such as those held for legislators, and not for uninominal elections, such as for mayors or presidents. In this paper, we argue that institutional reforms, such as quota or parity laws, designed to improve the representation of women in plurinominal elections have a spillover effect by which they increase the representation of woman in uninominal elections. We test this theory empirically by analyzing the effects of quota and parity legislations implemented in Ecuador from 1998 to 2008 for legislative (plurinominal) elections on the proportion of women elected as mayors.

Our empirical tests confirm our argument. We find that implementing legislative quota and parity laws has a positive and statistically significant effect on the probability of a woman being elected as mayor. Our results show that after the implementation of such legislation, the probability of a woman being elected a mayor almost doubles (*ceteris paribus*).

Two strains of existing literature can provide the theoretical background for such effects. First, under the new institutionalism approach, spillover effects can be explained by changes in formal and/or informal institutional rules that affect political behaviour. Recently, several studies have emphasized the importance of institutions in gender representation and other areas (Mackay, Kenny and Chappell, 2010). The main idea in these works is that gender constructions are intertwined in the daily life or logic of political institutions. Thus, formal (or informal) changes in these institutions may have broader effects, like contagion effects across all political institutions. In Ecuador's case, the changes in the quota/parity regulations for plurinominal legislative elections may have created institutional changes that impacted uninominal elections.

Second, our results can also be explained by a policy diffusion approach, defined as the process by which institutions, practices, behaviours, or norms are transmitted among individuals and/or social systems (Piatti-Crocker, 2019). This approach has mostly been used to explain how policy waves spread across countries (Piatti-Crocker, 2011; Krook, 2009; True and Mintrom, 2001; Most et al, 1989). We argue that the diffusion effect may not only operate in the international environment, but also within countries. Thus, institutional designs seeking to reduce gender inequalities can produce beneficial results in political arenas for which they were not directly designed.

Empirically identifying the specific causal chain driving such spillover effect is a complex task due to data availability and limitations. However, our data set lets us indirectly explore a possible causal chain for this spillover effect. We argue that the implementation of quota/parity laws for plurinominal elections and the consequent increase in the number of women elected as legislators increases the number of female role models, and thus helps drive the motivation of other women to run for office (Piatti-Crocker, 2019). As more women are elected into office, their political role becomes more broadly accepted, hence more women will develop political ambitions and more female candidates will find support among voters for uninominal elections (Wängnerud, 2009). We find indirect empirical evidence supporting this causal chain, as the probability of electing a female mayor increases when the province has a larger proportion of female legislators.

Analyzing the participation of women in municipal governments is critical for several reasons. First, municipalities meet many of the citizens' immediate needs more than other government institutions, evidencing the nature of the substantive representation of mayors (Van Donk, 2011).¹ Second, in the elections of mayors there is no direct influence from institutional features aimed at improving the representation of women, so these effects are controlled.² The presence of Latin American women in politics has been primarily studied in relation to institutions at a national scale, to the detriment of sub national decision-making arenas, such as municipal governments (Navarro and Sanz, 2018; Sundström and Stockemer, 2015; Hinojosa and Franceschet, 2011; Van Donk, 2011).³ To fill this gap, we comprehensively analyze the main drivers affecting the election of female mayors.

To the best of our knowledge, we are the first to analyze spillover effects for women in uninominal elections (mayors) as a result of quota legislation designed for plurinominal elections (legislators). Two previous studies that are closely related to ours are those performed by Shin (2014) and Davidson-Schmich (2016). Shin (2014) analyzes how the presence of a quota law in mixed proportional representation systems influences parties to feature women as candidates in single-member districts that are also under quota laws. The author argues that when political parties are pressured to fulfill gender quotas in single-member district seats, they tend to look for female incumbents who have already demonstrated their performance during their proportional representation term. Our study differs from Shin (2014) since we analyze the spillover effect to uninominal elections that are not under any quota legislation.

Davidson-Schmich (2016) studies the possible spillover effects from quotas on the proportional representation level of Bundestag to the plurality level, where quotas do not apply. These quotas are self-imposed by some political parties, and they change over time. It is, therefore, difficult to make direct conclusions about possible spillover effects from this study. Moreover, Davidson-Schmich's (2016) empirical evidence includes 2009 and 2013 elections in Germany, years in which quotas for the proportional representation were already in effect. Our study comprises a larger sample that includes elections before and after the implementation of quota laws, allowing for identification of possible spillover effects in a natural experiment setting.⁴

Our study is also related to studies analyzing the the spillover effects of gender quotas to higher positions in other branches of the government. For example, studies based on data from Italy and Sweden have found positive spillover effects (O'Brien and Rickne, 2016; De Paola et al. 2010). However, studies based on findings from Lesotho,

Spain, and Argentina have produced evidence to the contrary (Bagues and Campa, 2020; Evans and Kenny, 2019; Clayton, 2014).

Our article has five sections. In the first section, we discuss the main contributions offered by specialized literature. In the second section, we develop a parsimonious theoretical framework for the spillover effects of institutional reforms designed to improve the representation of women in plurinominal elections on uninominal elections. In the third section, we describe the methodological strategy followed for the measurement of variables and for the empirical verification of the hypotheses. In the fourth section, we present and discuss the empirical findings. In the final section, analyze the theoretical implications of the presence of women in municipal governments and offer some conclusions.

Women in municipal governments: A deficit

A large number of the variables that explain the increase of women in municipal governments come from modernization theory (Norris and Inglehart, 2001). According to this framework, as countries improve their education levels, they witness an initial increase in their economically active female population. As a result, women get steadily more involved in political life, mainly through participation in the legislature. In a subsequent second phase, the country's labour market undergoes a rearrangement, and the population is encouraged to participate in large, public social groups. In general, during this second phase, the civic values of citizenship revolve around the demand for greater democratic freedoms (Inglehart and Welzel, 2005; Inglehart, 1990; Sugarman and Straus, 1988). This scenario would be favorable for increasing the presence of women in a variety of political decision-making arenas.

For authors who are in agreement with the theory of modernization, the changes that occur in the first phase (transition from agricultural to industrialized societies) and the majority of those that happen in the second (transition from industrialized to post-industrialized or post-materialist democracies) are primarily seen in more cosmopolitan areas (Kaldor, 1970). Expanding on this idea, researchers who study the presence of women in municipal governments take urban regions as a *proxy* of cosmopolitan areas. Thus, there would be a more significant presence of women mayors in urban rather than rural areas, although empirical evidence verifying this hypothesis is limited to countries such as the United States, Australia, the United Kingdom, Finland, and Canada (Smith et al., 2012; Conroy, 2011; Holli, 2011; Tolley, 2011; Borisyuk et al., 2007). Following the logic that more significant modernization of societies is reflected in the improvement of citizen welfare, one of the main variables that literature has identified as being decisive in the increase of female mayors is the education level of the population. The argument here is that the idea that there is a disparity between the capabilities of men and women to hold an elected office vanishes among society as citizens achieve more formal academic knowledge.

As a consequence, cities with a higher education level are more likely to elect female mayors. This hypothesis has been tested in the United States, as well as in Europe. In both geographical contexts, there is agreement regarding that education level has a positive influence on the increase not only of female mayors but also of female councilors (Holman, 2017; Sundström and Stockemer, 2015; Smith et al., 2012). In the same way, an increase in the female population participating in the labor market is another variable repeatedly mentioned as being key to explaining the involvement of more women in municipal governments (Sanbonmatsu, 2002; Studlar and Matland, 1994; Nelson, 1991). In general, the argument being made is that the increasing

presence of women in economic activities not only contributes to reducing such asymmetries, but also gives women a more active role within society (Iversen and Rosenbluth, 2008; Matland, 1998; Paxton, 1997). In the political context, an increased female presence in an economically active population will not only make decision-making arenas more accessible to women, but will also increase the chances that they obtain popularly-elected offices (Kenworthy and Malami, 1999).

From a different perspective, specialized literature has reported that the increase of women in national politics constitutes a “trigger” of opportunities for more female actors to engage in public decision-making at the municipal level (Sundström and Stockemer, 2015; Barnes and Burchard, 2013; Bjarnegard, 2013; Smith et al., 2012; Pini and McDonald, 2011; Fox and Lawless, 2010; Wolbrecht and Campbell, 2007; Campbell and Wolbrecht, 2006). Although much of the research carried out focuses on industrialized democracies, there are also empirical findings for Latin America. For instance, Vásquez (2010) reports a positive relationship between national and sub national women representation in some Latin American countries, although the increase in female legislators occurs faster than that of female mayors (Massolo, 2006, 1996). In Brazil, Meier and Funk (2017) have shown that the increase in female political actors in popular election positions at the national level positively affects the number of women appointed to lead public agencies.

Other research argues that population density also affects the number of female mayors in a given area. Given the gender-based disparity that exists in the political market, the argument that arises is that women are more likely to hold government offices in arenas where there is less power. Given that there would be fewer resources, political and otherwise, to distribute in cities with smaller populations, these cities are more likely to have women elected as mayors. In this regard, there is positive empirical

evidence in several studies carried out for Europe and the United States (Holman, 2017; Ruiloba, 2014; Smith et al., 2012; Gidengil and Vengroff, 1997). This relationship between variables has also been proven in some regional elections in Mexico and other Latin American countries (Vásquez, 2010, Fernández, 2003; Barrera and Aguirre, 2003; Massolo, 2003, 1995).

Some gaps emerge from the review of previous research on the representation of women in municipal governments. First, there is a relative absence of research that considers the effect generated by institutional reforms aimed at plurinominal elections compared to those of uninominal elections. Indeed, although institutional arrangements such as quota or parity laws are primarily designed to improve the representation of women in legislative elections, a positive externality of such modifications could be seen in the increase of female mayors. Second, the few works on female representation in the municipal sphere focus on the presence of female councilors, leaving aside the study of those who exercise executive power at that level, such as female mayors. Although we are aware of the relevance of researching the structure and composition of municipal collegiate bodies, we believe that the analysis of who directs and executes municipal policy is key to assessing to what extent women have achieved higher offices of political power.

Third, works that examine the presence of female mayors tend to be synchronic, and are therefore less suited to the analysis of the historical evolution of female representation. Fourth, the vast majority of research is focused on Europe and the United States, leaving behind other geographical contexts that, due to different social, economic, and political realities, deserve separate consideration. This is the case of Latin America, where existing intensive research is focused only in Mexico and Argentina. The fact that both of these countries have federal governments also suggests

that studies relating to their political systems involve certain characteristics that are not the same in the case of unitary democracies, such as those of most Latin American countries. In the following section, we propose a theoretical framework in which we maintain that institutional reforms aimed at improving the representation of women in plurinominal elections have an indirect effect on uninominal elections, such as those of female mayors. We highlight the importance of changes in the institutional design to the increase in the number of female candidates and in the number of elected female mayors. Furthermore, we consider the specific weight that other variables, including those related to the theory of modernization and to political and social context, could generate in descriptive representation in municipal governments.

Female Mayors: A spillover effect

We argue that although the institutional design of affirmative action or positive discrimination mechanisms seeks to generate incremental effects on the inclusion of women in plurinominal electoral processes, they also indirectly increase the presence of female political actors competing in uninominal elections. Thus, an increase in the number of elected female mayors may be partially explained as an indirect effect of the institutional reforms aimed to increase the number of women in collegiate decision-making arenas such as legislatures. As a result, we propose that the presence of institutional devices aimed at encouraging a greater presence of women in collegiate bodies generates a spillover effect that impacts female actors who seek access to single-person political decision-making arenas, such as municipal governments.

Other factors may have also contributed to intensify such a spillover effect. For example, a larger number of female members of the legislature may constitute an important "trigger" for voters to elect female candidates in municipal elections. Thus,

greater female participation at the national level will be replicated at the local level. Institutional reforms could therefore have an attitudinal effect on voters.

Also, the social context in which a country's elections develop may benefit the participation and election of women in single-member elections. Specifically, as the discussions about women's rights gain room in public forums, voters may be more inclined to elect female candidates. Moreover, if quota or parity laws are the result of the mobilization of women and the enactment of their demands in public policy, the increase in elected female mayors can also be justified at the contextual level. An increase in the public discussions about asymmetric gender representation in politics could have a positive impact on the decision of voters in uninominal elections.

As we explain in the introduction, the spillover effects can be viewed in the framework of the new institutionalism approach (Childs, 2013; Krook and Mackay, 2011; Mackay, Kenny and Chappell, 2010). Since gender constructions are intertwined in the daily life or logic of political institutions, formal changes in these institutions, driven by new legislation, may create contagion effects across all other political institutions.

Moreover, the spillover effect can also be explained by the diffusion approach, discussed in several studies on women and politics (Piatti-Crocker, 2019, 2017, 2011; True and Mintrom, 2001; Most et al, 1989). This approach argues that changes in institutions, practices, behaviors, or norms can be transmitted among individuals and/or social systems. The diffusion approach has commonly been used to explain the expansion (contagion) of quota laws in Latin America (Piscopo, 2015; Piatti-Crocker, 2011; Krook, 2009; Htun and Jones, 2002). However, it can also be applied to understand how these quota laws, which are aimed at multi-member elections, indirectly benefit women in single-member elections.

This positive spillover effect can be viewed as a palliative measure, given the impossibility of creating specific institutional mechanisms to reduce asymmetries between men and women in uninominal elections. However, the speed with which these changes cause an effect is not the same at the uninominal and plurinominal levels. In fact, it is expected that the direct effect of the new institutional design will be stronger than the indirect effect: at least in the first years, the number of female legislators would increase faster than the number of female mayors. This is consistent with the theoretical arguments of the new institutionalism and diffusion models, because institutions and practices take time to adapt, and this has to do with cultural particularities or the context in which these practices will be applied (Piatti-Crocker, et al, 2017). With this basis, our first hypothesis explores how institutional changes directed at plurinominal elections may generate a spillover effect in uninominal elections, as follows:

H1: The presence of institutional designs aimed at increasing the presence of women in plurinominal elections, such as the legislative ones, increases the likelihood of women being elected in uninominal elections, such as those of mayors.

We also explore possible causal mechanisms that allow this externality to take effect. We argue that the implementation of quota/parity laws for plurinominal elections and the consequent rise in the number of women elected as legislators increases the number of female role models, thereby bolstering the motivation of other women to run for office. When it is time to decide who to vote for in municipal uninominal elections, voters observe the nature of variables related to the political, social, or economic context that surrounds them. The number of legislators representing their most immediate geographical space, such as provinces, states, or departments - depending on the administrative distribution of each country - would be among these variables. Thus, if voters observe that there are more women in the legislative body, this would

generate enough incentive for the electors to give their votes to a female candidate for mayor. This fact is related to theories stating that the availability of role models could help to redress the gender gap by shaping the motivation of women to run for office. Thus, women's representation can be seen as a virtuous circle: as more women are elected to office, their political role becomes more accepted, such that more women will develop political ambitions and more female candidates will find support among voters (Wängnerud, 2009).

Consistent with this view, the existing literature has shown that women's political attitudes and behavior are shaped by the gender of their representatives (Fox and Lawless 2004; Lawless and Fox, 2010). This finding is also related to Gilardi's (2015) study on the effects of role models on improving women's representation. According to this perspective, an increasing presence of women in public life, greater female labor participation, and a more visible appearance of women in anti-discrimination discourse have a number of effects on voters, including the symbolic effect of increased female representation in the political sphere. The symbolic effects of representation would not only influence the level of female participation in politics, but also would contribute to a society that is more open to the reduction of gender-based asymmetry.

Thus, our second hypothesis argues that the increase of women in political arenas of a plurinomial election, such as the legislature, can have a positive impact on the rise of women in arenas of an uninominal election, such as the mayor's office. This hypothesis can be structured as follows:

H2: As the number of female legislators increases, the likelihood of women being elected as mayor increases

We also test the effects of the quota/parity legislation on the proportion of female candidates running for uninominal elections. An increase in such a proportion can be seen as indirect evidence of an increase in the political power of women within their political parties⁵, leading to an increase in the probability of them being selected as candidates for uninominal elections (Prihatini, 2019; Hennings and Urbatsch, 2015; Franceschet y Piscopo, 2014; Roza et al., 2010). This, however, will be a long causal chain, and our empirical measure for political power of women (the proportion of female candidates) is very noisy. Due to these data limitations, our results should be taken only as suggestive, especially since previous literature has found evidence that political parties are highly resistant to nominating female candidates in spite of quotas (Morgan and Hinojosa, 2018; Funk, Hinojosa and Piscopo, 2017; and their follow-up and Davidson-Schmich, 2016). Thus our third hypothesis is as follows:

H3: The presence of institutional designs aimed at increasing the presence of women in plurinominal elections, such as the legislative ones, increases the number of women being selected as candidates in uninominal elections, such as those of mayors.

Our empirical model also includes as control variables other drivers that existing literature has identified as influential for female representation in uninominal elections. First, modernization theory proposes that there is a higher level of development in urban areas, resulting in the modification of citizen values and making them more likely to search for significant equity in the representation of men and women (Norris and Inglehart, 2001). Per this theory, if the territorial district in which the municipal election is held is urban, the number of female candidates for mayor should increase, as should the likelihood of a woman being elected as mayor. In line with the previous argument, the education level of the population is a decisive variable

related to the representation of women in the different arenas of political decision-making. In the specific case of the mayors' offices, the argument is that if the voters have more academic training, this knowledge will influence them so that they seek to reduce the disparities between men and women in the political sphere (Holman, 2017; Sundström and Stockemer, 2015; Smith et al., 2012). If voters seek to achieve equity in gender-based political representation, this desire would be reflected in the appointment of more female mayors. Thus, it is expected that as the education level of the population increases, the likelihood of women being elected as mayors increases along with the number of female candidates for mayor.

A higher presence of women in the labor market could also be related to female representation in decision-making political arenas. In this case, the empowerment of women would come from their increased economic autonomy and the reconfiguration of their role in society. Thus, transferring female activity to the economic sphere will constitute a “trigger,” so that there will be a greater presence of women in public offices (Inglehart and Welzel, 2005; Inglehart, 1990; Sugarman and Straus, 1988). Thus, as the economically active female population increases, the likelihood of women being elected mayors increases and the number of female candidates for mayor increases.

Finally, previous research has found that if the position of a popular election has more political power - economic and social resources included - it is less likely that women will be elected to this position (Holman, 2017; Smith et al., 2012; Vásquez, 2010). A common *proxy* variable used to measure the degree of political power is the size of the population over which the appointed authority will be elected. In other words, cities with large populations are less likely to have a woman as mayor. Thus, as the size of the city population increases, the likelihood of women being elected mayors decreases and the number of female candidates for mayor decreases.

In the next section, we will discuss the methodological strategy applied to empirically test the proposed hypotheses. We start with a description of the Ecuadorian case, specifically of the essential political and electoral characteristics surrounding the elections of mayors. Then, we explain the mechanisms that we use to get the necessary information to build the variables. We also briefly discuss how the proportion of women mayors has evolved during the analyzed period and examine the impact of some of the explanatory variables. Finally, we discuss the regression models, including logistic regressions and penalized logistic regressions to control for rare events (Heinze and Schemper, 2002; Firth, 1993).

Methodology and Data

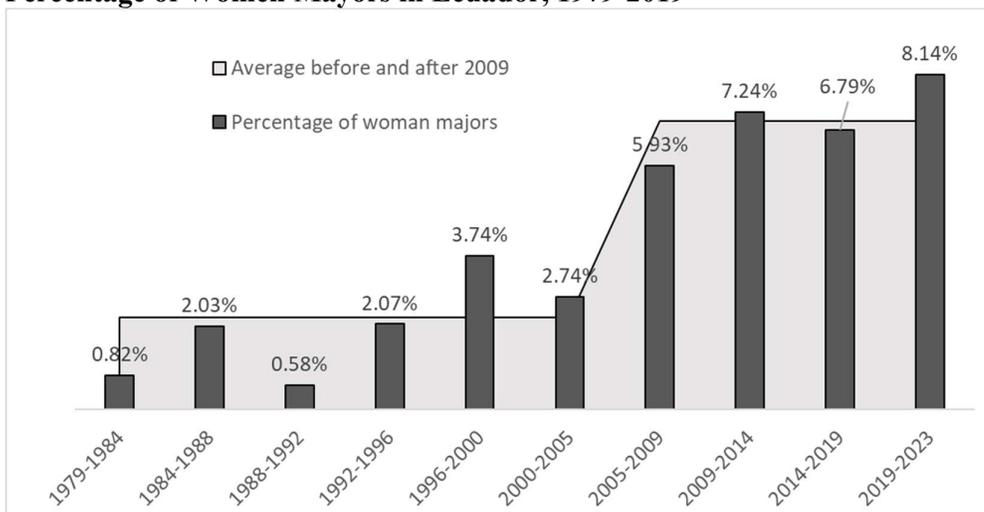
To empirically verify the hypotheses posed in this article, we analyze Ecuadorian male and female elected mayors and the proportion of female candidates between 1979 and 2019. Ecuador is an excellent laboratory in which to study the changing prevalence of female mayors for many reasons. First, for almost a decade this country has had quota/parity laws that are among the most progressive in Latin America (Caminotti and Freidenberg, 2018). Second, while studies have been performed on the exponential increase in the number of women legislators, ministers, and especially supreme and constitutional court judges in Ecuador over the past decade, we know much less about how many women preside over municipal governments. Third, since the return to a democratic regime, the election of mayors in Ecuador is carried out in uninominal districts.⁶

Mayoral elections in Ecuador take place every four years, and until 1996, they were held together with the presidential election. As of that year, aside from 2009, the elections of mayors take place in the middle of the presidential term. In total, ten such

processes have been carried out, and there have been 1,949 mayors, with some of them holding office for more than one term. Since 1988, it has been possible to participate in these electoral processes without being affiliated with any political party. Although the elections are held in uninominal districts, candidates for mayor may present themselves as part of a political party or movement that also offers a list of candidates running for the municipal council. For the election of mayors, there is no run-off election, so whoever obtains a simple majority of the votes is awarded the office for four years. The number of cantons has been increasing over time, and ranges from 122 at the beginning of the democratic period (1979) to 221 in the last two electoral processes (2014 and 2019).⁷

To measure the presence of female mayors, we collect data of elected mayors, men and women, in each canton in the year of the electoral process. Our sample includes one thousand nine hundred forty-nine observations ($N=1949$) corresponding to mayors elected in the ten electoral processes carried out between 1979 and 2019.⁸ With this information we create a dichotomous variable, $Woman\ mayor_{it}$, which takes the value of 1 if the elected mayor of canton I in period t is a woman, or 0 if it is a man. The mean of the variable $Woman\ mayor_{it}$ during the studied period is 3.50%. The lowest female representation is 0.82%, recorded in the period 1979-1984, while the most significant presence of women mayors is 8.14% in the last electoral process (2019-2023). From Figure 1, where we plot the percentage of female mayors for every electoral process, we can observe that starting in the 2005 elections, there is a marked improvement in the representation of women in comparison with the previous 25 years. The increasing tendency continues for the 2009 election. The average proportion of female mayors before 2009 is 2.23% and after 7.03%, an increase of more than 200%.

Figure 1
Percentage of Women Mayors in Ecuador, 1979-2019

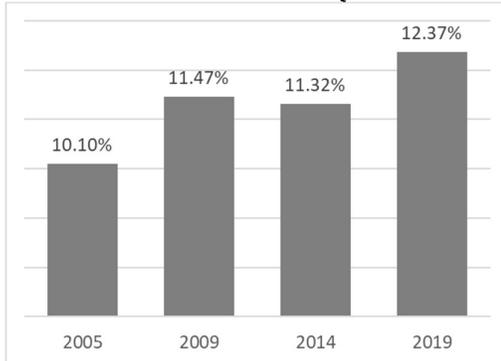


Elaborated by authors

Sources: File research, mass media, Tribunal Supremo Electoral and Consejo Nacional Electoral.

To measure the number of women being selected as candidates in uninominal elections, we construct the variable *FemaleCandidates_{it}*, which captures the percentage of women among the candidates running for mayor. Unfortunately, this information is only available for the past four electoral processes, and as a consequence, the original sample shrinks to 881 observations for regression using this variable as dependent variable. In Figure 2, we report the percentage of female candidates per election in our sample. In general, the presence of female candidates who run for mayor is small, varying from 10.10% to 12.21% in our sample period.

Figure 2
Women Candidates to Mayor in Ecuador, 2005-2019



Elaborated by authors. Source: Consejo Nacional Electoral.

Our empirical tests are based on two econometric models. The first uses $Woman\ mayor_{it}$ as a dependent variable and the second uses $FemaleCandidates_{it}$. The first model is directly related to hypothesis 1 and 2, so is designed to evaluate the effects of the quota/parity laws on the likelihood of electing a female mayor and the increase in role models as a possible causal chain. Due to the dichotomous nature of $Woman\ mayor_{it}$, the model is based on the following logistical regressions:

Model (1)

$$\Pr(WomanMayor_{it} = 1 / X_{it}) = \text{Logit}(\alpha + \beta_1 Quota / Parity_t + \beta_2 WomenLegislators_{it} + \beta_3 Urban_t + \beta_4 EducationRate_{it} + \beta_5 EAFP_{it} + \beta_6 Population_{it})$$

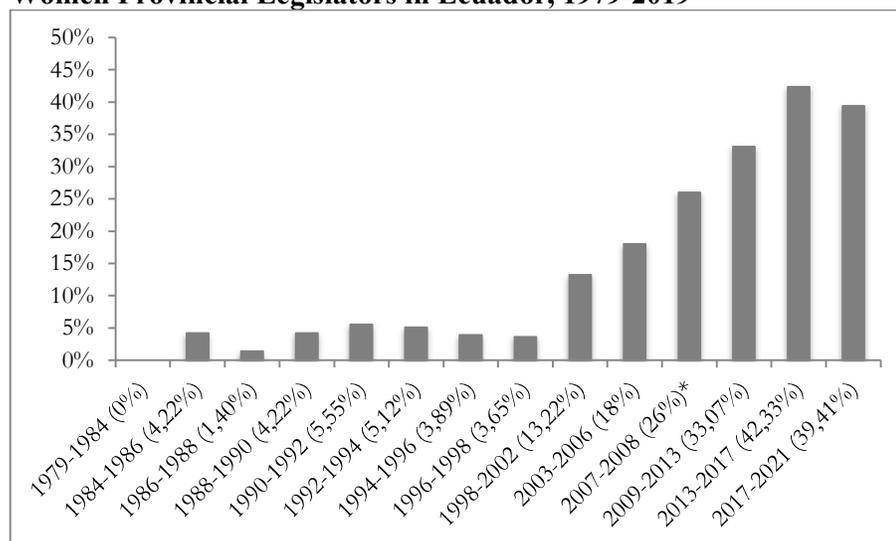
The second model is related to hypothesis 3, and therefore uses $FemaleCandidates_{it}$ as the dependent variable to measure the effects of the changes in regulations on the proportion of female candidates. Thus, we use a linear regression model:

Model (2)

$$FemaleCandidates_{it} = \alpha + \beta_1 Quota / Parity_t + \beta_2 WomenLegislators_{it} + \beta_3 Urban_t + \beta_4 EducationRate_{it} + \beta_5 EAFP_{it} + \beta_6 Population_{it} + \varepsilon_{it}$$

The explanatory variables for both models are the same and are defined below. In order to test if women's representation in the provincial legislature has influenced the likelihood of electing female mayors (H2), we use the variable *Women Provincial Legislators_{it}* that represents the percentage of women elected as legislators for the province to which each canton belong. Until 1998, legislators held provincial office for two years and national office for four years. From the legislative period ranging from 1998-2003, both positions lasted for four years. As we mentioned, our variable records the same percentage of women as provincial legislators for all cantons that are part of the same province. Figure 2 shows the percentage of women in the Ecuadorian unicameral legislature for our sample period. It is clear that after 1998 there is a steady increase in the number of women deputies. Furthermore, with the Constitution of 2008, the presence of female provincial legislators is more important than in previous periods.

Figure 3
Women Provincial Legislators in Ecuador, 1979-2019



Elaborated by authors. Source: Asamblea Nacional.

* The period 2007-2008 originally was 2007-2010; however, in 2008 President Correa announced a constituent assembly and subsequently closed the legislative branch. The constituent deputies acted “as if” they were congressmen along the policy-making process of new constitution.

In order to measure the spillover effect of institutional reforms over the increase of women mayors (H1), we focus on the institutional changes in the Ecuadorian electoral system that started with the approval of the new constitution in 1998. This constitution states that women must account for at least 20% of participation in the lists for plurinominal elections. In order to implement such changes, the Organic Law of Elections was reformed in the year 2000, mandating a minimum of 30% of female participation in the lists and an increase of 5% each electoral cycle until reaching parity. However, the organism in charge of elections (Tribunal Supremo Electoral) created additional regulations that did not completely allow for the fair implementation of the quotas for the 2000 and 2002 elections. These regulations were deemed unconstitutional in November 2002, but they were replaced by regulations in which the political parties were in charge of the implementation and control of the quotas.

The promulgation of the new constitution in 2008 is the critical event that marks a real intention to generate a change in the preferences of the voters. This constitution directly promoted parity, since it mandated that, for subsequent plurinominal elections, the lists of candidates must be structured alternately between men and women or vice versa. In fact, the presence of women in the legislature, as shown in Figure 2, has grown considerably since the 2008 Constitution. However, this effect is not observed in similar levels in the executive government, where the number of female ministers is still relatively small (Sotomayor and Huertas-Hernández, 2021). In order to capture these institutional changes, we contract the dichotomous variable, *Quota/Parity_t*, which takes the value of 1 for the elections held after the implementation of the Constitution of 2008, and 0 for all previous elections. In our sample, there are 7 electoral processes before 2008 (for mayoral periods starting in 1979, 1984, 1988, 1992, 1996, 2000 and 2005) and 3 after (2009, 2014 and 2019). Our selection of the year 2008

for our dummy variable $Quota/Parity_t$ is based on an empirical test that includes dummy variables for each one of the 10 elections in our sample. Results (reported in our empirical section) show that the significant structural change happened after the 2009 election.

To identify if the socio-demographic composition of the canton in which the election takes place affects the election of female mayors, we construct the trichotomic variable $Urban_t$ that takes the value of 1 for urban cantons, 0 for rural cantons, and 0.5 for cantons in which the difference between urban and rural population is not considerable. Specifically, urban cantons are those in which 60% or more of the people are living in an urban area, and rural cantons are similarly defined as those in which 60% or more of the population lives in a rural area. In other cases, we consider that cantons are a *hybrid* between both categories. The information to construct this variable was obtained from the National Institute of Statistics and Census (INEC). In our sample, of the 1,949 cantons observed, 66.80% are rural, 15.85% are urban, and 17.34% are in an intermediate position. Although the gap between rural and urban cantons has decreased over time, this difference remains significant. In 1979, for example, of the 122 existing cantons, 71.31% were rural, 14.75% urban and 13.93% *hybrid*; and in 2019, of the 221 cantons, 59.72% are rural, 19.45% urban, and 20.81% are in the intermediate status.

To assess whether the improvement in the levels of education of the population favors the election of female mayors, we build the continuous variable $EducationRate_{it}$ that captures the academic enrollment rate reported for each canton i along the period t . Regarding the possible influence of an increasing number of women being incorporated into the labor market on the number of female mayors, we take as an empirical reference the data relating to the percentage of the female

population that is economically active, represented by the variable $EAFP_{it}$. To measure the effect of population size on the likelihood of electing a female mayor, we use the information from the population and housing censuses carried out every ten years in Ecuador. Thus, we build the continuous variable $Population_{it}$ that represents the population in canton i between the period t in millions of persons. Data for $EducationRate_{it}$, $EAFP_{it}$, and $Population_{it}$ come from INEC. Annex 1 shows descriptive statistics for all the variables used in our empirical analysis.

Discussion of Empirical Findings

In Table 1, we present estimation results for the parameters of our empirical Models 1 and 2. As explained in the previous section, Model 1 uses $Woman\ mayor_{it}$ as the dependent variable. We present estimation results for Model 1 using logistical regressions with robust standard errors, as well as a penalized logistical regression (Heinze and Schemper, 2002; Firth, 1993)⁹ that controls biases that could produce the presence of rare events. The dependent variable $Woman\ mayor_{it}$ may be considered a rare event variable since only 3.5% of the observations are female mayors, and as described in Figure 1, women mayors did not exceed 10% in any elections in our sample period (1979-2019).¹⁰ The sample size for Model 1 includes the complete 1,941 observations. The Model 2 dependent variable is $FemaleCandidates_{it}$, and we report linear regression results (OLS) with robust standard errors. The Model 2 sample size only includes 811 observations since the dependent variable is only available as of 2005. We report estimated coefficients and the corresponding z -statistics in parenthesis below. The symbols *, **, and *** represent statistical significance at 10%, 5%, and 1% levels, respectively.

Results for Model 1, using Logit and Rare Event Logit, show that the variable *Parity* has a positive, statistically significant effect, which implies that the existence

of a quota or parity law has a substantial impact over the probability of more female mayors being elected. Thus, we verify our main hypotheses (H1), and conclude that a change in the institutional design aimed at stimulating the participation of women in plurinominal elections generates a positive externality over female representation in uninominal elections, measured by a larger number of women elected as mayors.

Table 1
The Effects of Quota/Parity rules in Ecuador

Variables	Model 1 Logit	Model 1 Rare Event Logit	Model 2 OLS
Quota/Parity	1.08*** (2.83)	1.07*** (3.02)	3.28** (2.64)
Women Provincial Legislators	0.01* (1.93)	0.01** (1.96)	0.04* (1.67)
Urban	0.69* (1.89)	0.69* (1.93)	7.17*** (4.55)
Education Rate	-0.09 (-0.80)	-0.09 (-0.85)	-1.04** (-2.05)
EAFP	-0.01 (-1.27)	-0.01 (-1.33)	-0.10** (-2.38)
Population	0.45 (1.08)	0.52 (1.33)	1.38 (1.03)
Trend			
Constant	-3.03*** (-5.52)	-3.00*** (-5.32)	16.93*** (5.48)
Observations	1,941	1,941	811
R2 (Pseudo 1 and 2)	0.0522		0.05

*, **, *** represent significance at 10, 5 and 1 % levels.

We additionally confirm that an increased representation of women in the provincial legislature, measured by the variable *Women Provincial Legislators*, also positively affects the probability of electing a female mayor, confirming our third hypothesis (H3). Notice that the introduction of the parity law in 2008 also affected the number of elected female legislators (*Women Legislators*), suggesting that these two

variables are possibly correlated. Nevertheless, our results for Model 1 show that both variables (*Parity* and *Women Legislators*) are simultaneously significant. These results reinforce the evidence in favor of hypothesis 1 and allow for greater certainty about the causal links of the institutional changes. We confirm that the increased number of female provincial legislators has an effect on the representation of females as mayors, but an additional spillover effect captured by the variable *Parity* is also significant.¹¹

These empirical findings show that the effects of the “rules of the game”, which are the parity/quota laws in this case, are important not only for the representation of women in the legislature, but also in other areas of government. Therefore, the idea that institutions matter is reinforced by our results, since rules aimed at benefiting women's participation in plurinomial elections have beneficial, albeit indirect, effects on uninominal elections.

Although with less statistical significance in Model 1, the fact that a canton is urban (*Urban_{it}*) also positively influences the election of female mayors. This empirical finding is in line with the theory of modernization regarding the greater progressivity in value terms of geographical areas with greater access to certain goods or services. On the other hand, the educational background of the population (*Education Rate*), the female presence in the labor market (*PFEA*), and the population of cantons (*Population*) are not statistically significant. Interestingly, the variables *Education Rate* and *PFEA* have a negative coefficient in our regressions.

These results are similar to the ones reported in studies about Latin American women in ministerial cabinets and could be explained by the structural asymmetries of the labor market (Gasparini and Tornarolli, 2009; Escobar-Lemmon and Taylor-Robinson, 2005). In fact, these researchers point out that if women's education increases

or they are more productive at work, they have fewer opportunities to stand for elections and take office.¹² Specifically, given the existing market distortions that exacerbate gender exclusion, an improvement in women's education levels does not necessarily imply an increase in their job opportunities. Thus, structural problems reduce the impact of women's efforts to reduce gender asymmetries.

Results for Model 2 are very similar to the ones described for Model 1. The number of women candidates is positively influenced by the 2008 parity law, confirming H2 and the externality effect. Moreover, we find evidence that the possible explanation for the externality effect is the increase in the proportion of female candidates running for the election that may be caused by an increase in the political power of women in their political party. This is also evidenced by a positive but marginally significant coefficient for the variable *Women Legislators*. The effects of *Urban_t* are strongly significant, showing that the theory of modernization is relevant to the proportion of female candidates in a given geographical area. The effects of *Education Rate* and *EAFP* are significant and negative, confirming the results in the previous literature, as described above.

Next, we focus on evaluating the magnitude of the effects of each variable included in our empirical models. In the first column of Table 2, we report the marginal effects for our logit Model 1 evaluated at the mean of each independent variable. The reported results can be interpreted as the effect of an infinitesimal increase in the explanatory variable on the probability of electing a female mayor, for an average canton. Our results show that the largest effect corresponds to the variable measuring the introduction of the parity law of 2008. According to our model, the introduction of parity laws for plurinominal elections increased the probability of electing a female mayor by 3.72% for an average canton. Since the unconditional probability of a woman

being elected mayor in our sample is 4.36%, an increase of 3.72% implies that the probability of electing a woman mayor almost doubled after the changes of 2008 for an average canton.¹³

Table 2
Marginal Effects for changes Quota/Parity rules in Ecuador

Variables	At the mean	Urban=1	Urban=0
Quota/Parity	0.0372*** (2.9510)	0.0596** (2.2261)	0.0318*** (2.9835)
Women Provincial Legislators	0.0004* (1.9086)	0.0007* (1.8263)	0.0004* (1.8462)
Urban	0.0236* (1.8774)	0.0379 (1.2973)	0.0202** (2.2168)
Education Rate	-0.0031 (-0.7970)	-0.0049 (-0.7124)	-0.0026 (-0.8264)
EAFP	-0.0005 (-1.2997)	-0.0008 (-1.3290)	-0.0004 (-1.2612)
Population	0.0156 (1.0739)	0.0249 (1.0656)	0.0133 (1.0600)
Observations	1,941	1,941	1,941

*, **, *** represent significance at 10, 5 and 1 % levels.

Although with less statistical significance, the increase in female provincial legislators and the fact that the election takes place in an urban population also positively affect the likelihood of electing female mayors. We find that a 1% increase in the percentage of female provincial legislators increases the possibility of electing a female mayor by 0.04%. Urban cantons have an average of 2.36% more probability of electing female mayors. The population's level of formal education, the presence of women in the economically active population, and the population of the canton have no significant effect. Our results in the first column of Table 2 focus only on an average canton. To better understand the effects of the new legislation of 2008 in different types of cantons we computed marginal effects for urban and not-urban cantons. The results reported in the second and third columns of Table 2 show that the introduction of the

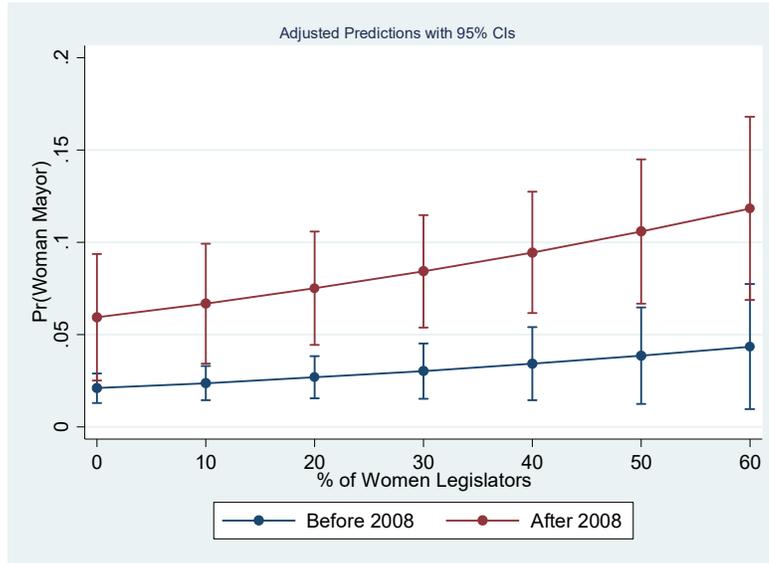
parity law had a larger effect for urban jurisdictions with a 5.96% increase in the probability of electing a female mayor, compared with a 3.18% for a non-urban canton.

Similar analysis can be performed to evaluate the effects of the quota/parity law based on the percentage of female provincial legislators. In Figure 4, we report predicted probabilities for our logit Model 1, assuming different percentages of female provincial legislators. The blue line shows the predicted probability of electing a female mayor before the quota/parity law, while the red line demonstrates the predicted probability after the introduction of this institutional arrangement. As predicted by our model, as the percentage of female provincial legislators increases, the probability of electing female mayors also increases (H3). The effect is not linear, but represents a growing trend: the higher the percentage of female provincial legislators, the greater the impact on the probability of electing female mayors. For example, after 2008, an increase in female provincial legislators, from 0% to 10% of the legislative body, implies an increase of less than 0.75% (from 5.93% to 6.67%) in the probability of electing female mayors. However, a rise to 50% to 60% of female provincial legislators leads to an increase of almost 1.25% (from 10.58% to 11.83%) in the probability of electing female mayors.

In this figure, we can also evaluate the effect of the quota/parity law, which is represented by the distance between red and blue lines. As we reported in Table 2, for an average canton with 14% of provincial legislators being female, there is an increase of 3.72% in the probability of electing a female mayor. However, there is a more significant effect in cantons where there are a higher percentage of female provincial legislators: for cantons with 60% female provincial legislators, the probability can increase up to 7.49%. We can perform a similar analysis to evaluate to what extent the

fact that the canton is a rural or urban area can affect the presence of female mayors (H4).

Figure 4
Predicted Probabilities of Electing Women Mayors



Finally, we focus on the interpretation of the results of our linear regression for Model 2, reported in the third column of Table 1. The coefficients of this linear model can be directly interpreted as marginal effects on the dependent variable, percentage of female candidates. Thus, the implementation of the quota/parity law increased the percentage of female candidates running for mayor by 3.28%. The magnitude of this impact is very significant since the average percentage of female candidates is only 11.32%. The largest effect in the percentage of female candidates is driven by the variable *Urban_{it}*, as urban cantons have 7.17% more female candidates. *Education Rate* and *EAFP* have a smaller and only marginally significant effect.

In summary, the implementation of the quota/parity laws not only improved the descriptive representation of women in the Ecuadorian legislature but also indirectly generated positive effects on the number of female mayors and in the number of female

candidates running for mayor. In other words, an institutional arrangement aimed at increasing the number of women running in plurinominal elections produced a positive externality over uninominal elections. In terms of causal mechanisms, the analyzed findings allow us to argue that the rise in female legislators at the provincial level affects the will of the voters at the regional (canton) level. Also, we have some suggestive evidence showing an increase in the proportion of woman selected as candidates after the quota/parity reforms. These effects would be materialized in an increase in votes for women mayors.

Robustness Test

Our main results are based on the dichotomous variable $Quota/Parity_t$ that takes the value of 1 for the elections held after the Constitution of 2008, and 0 for all previous elections (2009, 2014 and 2019). However, as explained above, the quota-related institutional changes in Ecuador started with the 1998 Constitution, so it is possible that it had effects in the 2000 and 2005 elections. To account for this effect, we create 9 dummy variables, to control for the relevant 10 electoral process in our sample: $Elec_{1978}$, $Elec_{1984}$, $Elec_{1988}$, $Elec_{1992}$, $Elec_{2000}$, $Elec_{2005}$, $Elec_{2009}$, $Elec_{2014}$, and $Elec_{2019}$. Our base case will be the 1996 elections, where all other dummies are equal to 0, and thus the coefficients on the dummies can be interpreted as an increase in the probability of electing a female mayor since the 1996 elections.

Results reported in Table 3, show that the significant changes start in the 2009 elections, confirming the selection of our $Parity_t$ variable. In unreported experiments, we estimate our Model 1 using the elections of 2005 for the construction of the $Quota/Parity_t$ dummy, and our results related to the spillover effects are robust to such change.

Table 3
Robustness test

VARIABLES	Model 1 Logit	Model 1 Rare Event Logit
<i>Elec_1978</i>	-1.72 (-1.58)	-1.38 (-1.51)
<i>Elec_1984</i>	-0.65 (-0.93)	-0.56 (-0.85)
<i>Elec_1988</i>	-1.74 (-1.63)	-1.40 (-1.56)
<i>Elec_1992</i>	-0.79 (-1.14)	-0.70 (-1.07)
<i>Elec_2000</i>	-0.12 (-0.21)	-0.11 (-0.19)
<i>Elec_2005</i>	0.65 (1.27)	0.62 (1.30)
<i>Elec_2009</i>	1.24** (2.20)	1.20** (2.26)
<i>Elec_2014</i>	1.04* (1.71)	1.00* (1.77)
<i>Elec_2019</i>	1.24** (2.00)	1.19** (2.16)
Women Provincial Legislators	0.01 (1.02)	0.01 (1.08)
Urban	0.81** (2.22)	0.81** (2.27)
Education Rate	-0.16 (-1.32)	-0.17 (-1.46)
EAFP	-0.02* (-1.69)	-0.02* (-1.72)
EAFP	0.61 (1.45)	0.67* (1.70)
Population	-2.24*** (-3.22)	-2.18*** (-3.18)
Observations	1,941	1,941
Pseudo R2	0.0756	

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Conclusions and Theoretical Implications

In this article, we analyze and empirically test the indirect and positive effect that quota/parity laws for plurinominal elections -such as legislative elections- have on the uninominal elections -such as mayoral elections. We find evidence that quota/parity laws create a spillover effects that significantly improve the probabilities of women being elected as mayors. In accordance with the new institutionalism and feminism theories, we find that when the “rules of the game” are structured to improve the representation of women in plurinominal elections, this can generate indirect positive effects on other public decision-making arenas, such as uninominal elections. Thus, the benefits of institutional reforms should not only be assessed in the political arenas to which they are clearly oriented, but they should be also analyzed in a broader context.

Moreover, we find some indirect empirical evidence that the availability of female role models in the country is a possible causal chain driving the spillover effect. However, this increase in the number of elected mayors and legislators is not observed in the ministerial cabinets, where the number of female ministers is still relatively small (Sotomayor and Huertas-Hernández, 2021). Studying the possible reasons explaining this relative absence of women in other political decision-making arenas would be a valuable future research agenda.

One of the main challenges of electoral systems is to increase female representation in uninominal elections such as mayoral elections, since reforms via quota or parity laws are difficult to apply. Our results show that a valid solution is the increase of female role models that can be achieved through the implementation of quotas or parity legislation at the level of plurinominal elections. Our findings show that such policies have some effect, but also that female representation in Ecuador at legislative and mayor levels is still anemic.

More effective and innovative reforms should be implemented, dealing with structural changes in the understanding of the roles of women and men in the public sphere. As evidenced by Atkeson (2003), the simple presence of female candidates is not enough to increase political engagement, but the presence of competitive female candidates is a key factor to increasing women's political involvement and interest. Thus, reforms should include public and private financing of programs that promote female political participation and competitiveness (Muñoz-Pogossian and Freidenberg, 2020). Examples of possible reforms include publicly funded women's leadership training programs, such as the ones implemented in Panama, Mexico, Costa Rica, Colombia, Brazil and Honduras, special campaign financing for woman, such as Brazil's free airtime specifically for female candidates, or financial incentives for political parties that get women elected, as in Chile and Costa Rica.

Future research agendas should not only include descriptive aspects of female representation in different political decision-making arenas, but should also focus on more substantive aspects that evaluate the performance of elected women. In the case of mayors, there is much left to learn in relation to what they propose and accomplish in their municipalities. Given that mayors are the head of sectional governments, their performance will have a critical impact, not only on the number of elected officers, but also on female representation in society.

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Annex 1

Descriptive Statistics

Variable	N	Med	Stand Desv	Min	Max
Education	1,942	6.52	1.76	0.95	12.37
PFEA	1,942	28.34	13.49	0.64	63.74
Women Prov. Legisl.	1,949	14.10	19.81	0.00	75.00
Population	1,948	0.06	0.19	0.00	2.35
Female Candidates	881	11.32	13.66	0.00	75.00

Discrete Variable

Values	Urban Freq.	%
0	1302	66.8
0.5	338	17.34
1	309	15.85
Total	1949	100

Endnotes

¹ We use mayor or female mayor for the person who is the chief of municipal governments. In some countries, this officer is called governor.

² The institutional design to improve women's participation is focused on plurinomial elections, such as legislative elections. Mayors are elected in uninominal elections.

³ The lack of research about female mayors does not exist only in Latin America. In Europe the research about politics and gender in sub national perspective is minimal too (Navarro and Sanz, 2018; Sundström and Stockemer, 2015).

⁴ Other studies that analyze the effects of the presence of women in political decision arenas are Armesto (2007) for Mexico, Gilardi and Dlabac (2019) in Switzerland; Bhalotra, et al. (2018) for India, Geys and Sorensen (2019) for Norway, and Ferreira and Gyourko (2014) for the United States.

⁵ The number of women in political parties has increased in the last decades, however not in the expected magnitude (Folke and Rickne, 2016; O'Brien, 2015).

⁶ Until the early 1990s, the election of mayors was limited to the province capitals and to a few cities that, without having this status, were assumed as such due to their population size (e.g. Milagro or Quevedo). In the rest of the cities, "presidents of the municipal councils" with the same powers of mayors were elected. Since the mid-1990s, all the actors that preside over municipalities are called mayors.

⁷ The political-administrative division in Ecuador is compound by provinces, cantons, and parishes. So, a province has cantons, and cantons have parishes. To provinces the executive power is in the *prefectos provinciales*, and to cantons is in mayors.

⁸ Municipal elections in Ecuador took place for: 1979-1984, 1984-1988, 1988-1992, 1992-1996, 1996-2000, 2000-2005, 2005-2009, 2009-2014, 2014-2019; and, 2019-2023.

⁹ In the case of logistic regression, penalized likelihood also has the attraction of producing finite, consistent estimates of regression parameters when the maximum likelihood estimates do not even exist because of complete or quasi-complete separation

¹⁰ Although the presence of mayors is minimal in most Latin American countries, Ecuador is one of the most striking cases. Colombia also follows a pattern similar to Ecuador because during the last electoral processes between 8% and 10% of appointed mayors were women (Batlle, 2018).

¹¹ In non-reported regressions, we include interaction terms between variables *Parity* and *Women legislators*, and we did not find significant results. This finding reflects an independent effect of each of the variables over the likelihood of electing female mayors.

¹² We recognize that this literature is not directly comparable, since focuses on female individual characteristics and our data reflects the education at the canton level. However, we only argue that the driving forces behind these results may be the same.

¹³ Alternatively, we also estimate the model removing the variable Women Provincial Legislators, to evaluate possible collinear effects with our Quota-Parity variable. The marginal effects of Quota-Parity increase to 5% in this case. Thus the results reported in the text can be considered as the most conservative results.