

All the President's Men? The Appointment of Female Cabinet Ministers Worldwide

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Abstract

Women have traditionally been underrepresented among government ministers, and when included in cabinets have largely been relegated to ‘feminine’ and low-prestige policy areas. Recently, however, some countries have witnessed changes in the number, gender, and/or prestige of women’s appointments. What accounts for this variation in women’s access to ministerial power? To answer this question, we compile an original dataset of 117 countries and construct a new measure, the Gender Power Score, which differentially weights cabinet positions based on women’s numbers and the gender and prestige of the ministries to which they are assigned. Addressing cross-national variations, we use a finite mixture model to evaluate competing hypotheses as to whether a country’s score is best explained by political institutions, social indicators of gender equality, or broader trends in women’s access to politics. We find that political variables – rather than social factors – have the strongest impact on gender parity in cabinets.

Politics has long been viewed as a ‘man’s world,’ with men occupying the vast majority of positions as national leaders and members of parliament (MP). While less studied, this pattern has also proved true for cabinet appointments: women have been found to hold fewer cabinet positions, and where they have been appointed, to be mainly allocated portfolios with ‘feminine’ characteristics and lower levels of prestige (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2009; Reynolds 1999; Russell and DeLancey 2002; Studlar and Moncrief 1999). These gender disparities occurred even in instances where women did the nominating: photos of British prime minister Margaret Thatcher and her cabinet in the 1980s famously featured Thatcher as the only woman among two dozen men.¹ The cabinet put together by Norwegian prime minister Gro Harlem Brundtland in 1986 therefore attracted note when she appointed nearly equal numbers of women and men and assigned women to a diverse range of ministries.² Traditional distributions suggest, however, that women have rarely been viewed as part of the nomination pool for cabinet appointments. Further, where they have been considered, women have largely been relegated to the least powerful positions.

There are indications, nonetheless, that these patterns have begun to change. Several world leaders have appointed parity cabinets in recent years, including Chilean president Michelle Bachelet in 2006 and Spanish prime minister José Luis Rodríguez Zapatero in 2004 and 2008. Others have made pledges to improve the proportion of women in their governments, as French president Nicolas Sarkozy and Italian prime minister Silvio Berlusconi did in 2007. Women have also been

¹ <http://www.newstatesman.com/uk-politics/2009/02/margaret-thatcher-tory> (accessed June 28, 2010). During her eleven years as prime minister, Thatcher included only one other woman in the cabinet who served less than two years.

² Although men continued to occupy positions in defense, finance, and foreign affairs, women were allocated health and social affairs, as well as agriculture, church affairs and education, environment, consumer affairs and government administration, international development, and justice.

increasingly nominated to more ‘masculine’ and high-prestige portfolios. A much-discussed photograph after the 2008 Spanish elections, for example, showed the newly appointed defense minister, Carmen Chacón, inspecting the troops while seven months pregnant.³ Similarly, three of the last four secretaries of state in the United States – Madeleine Albright, Condoleezza Rice, and Hillary Clinton – have been women. At the same time, more and more leaders, like British prime minister David Cameron and Canadian prime minister Stephen Harper, have been criticized for including low numbers of women, and in the case of South African president Jacob Zuma, for not meeting campaign pledges to attain gender balance.

These developments suggest that previous gender distributions may be eroding, opening up opportunities for women to rise to positions of power in the executive branch. Yet, there is reason for lingering skepticism about the transformative nature of women’s appointments. On the one hand, it appears that there is continued resistance even when women’s numbers are relatively small. In April 2009, for instance, Israeli newspapers aimed at ultra-Orthodox Jewish readers altered photos of the new cabinet to erase the two female ministers, Limor Livnat and Sofa Landver. The daily *Yated Neeman* digitally changed the photo to replace the women with two men, while the weekly *Shaa Tova* blacked the women out.⁴ Similarly, in September 2009 the Iranian parliament rejected two of the three women nominated by President Mahmud Ahmadinejad, the first women proposed in the thirty-year history of the Islamic republic.⁵ On the other hand, the appointment of women to cabinet posts – including those not traditionally viewed as feminine and/or with high levels of

³ <http://www.msnbc.msn.com/id/24162934/> (accessed January 15, 2010).

⁴ <http://www.independent.co.uk/news/world/middle-east/now-you-see-the-women-in-the-israeli-cabinet-ndash-and-now-you-dont-1662250.html> (accessed January 15, 2010).

⁵ http://www.rferl.org/content/Iran_Parliament_Approves_Most_Ahmadinejad_Ministers/1813713.html (accessed July 6, 2010).

prestige – does not necessarily signify dramatic shifts in gendered patterns. In resigning her position as Minister of State for Europe in 2009, for example, Caroline Flint accused British prime minister Gordon Brown of using women as “window-dressing” but excluding them from ‘real’ power.⁶

These conflicting messages raise questions about the status of women in cabinets around the globe, as well the broader meaning of their presence for prevailing gender norms. Despite growing media attention, relatively little is known about the status of women in cabinets worldwide, although these are among the most powerful political positions (Davis 1997; Studlar and Moncrief 1999). Existing research is now dated in terms of the years studied (Reynolds 1999; Siaroff 2000; Whitford et al 2007) and largely focuses on a small range of cases, addressing developments in single countries (Borelli 2002; Moon and Fountain 1997; Studlar and Moncrief 1999) or world regions (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2005; Russell and DeLancey 2002). It is not clear, therefore, whether older patterns still hold, or whether – as suggested by recent developments – distributions may be changing to reflect greater gender equality in cabinet appointments. Answering this question is complicated by the fact that, as the examples above indicate, the number of women nominated may not correlate with the gender and prestige of the portfolios to which they are assigned.

Similar observations have been made in other areas of research on gender and politics. Studies of legislatures note, for instance, that women’s numbers may increase but that they may continue to be marginalized in terms of committee assignments (Heath et al 2005; Towns 2003) and opportunities to enact legislation (Childs 2004; Hawkesworth 2003). In a related fashion, work on political parties finds that parties may respond to feminist calls to elect more women and prioritize women’s policy concerns by ignoring both demands, advancing both, or endorsing one at the expense of the other (Lovenduski and Norris 1993; Young 2000). Consequently, women’s status

⁶ <http://www.guardian.co.uk/global/2009/jun/05/caroline-flint-resignation> (accessed January 15, 2010).

may improve along one dimension but remain the same – or even backtrack – along another. Incorporating data on these multiple dimensions in a manner amenable to broader comparative research, therefore, is necessary to assess what women’s cabinet appointments signify globally in terms of gender equality in the executive branch.

In this paper, we seek to fill this gap in the literature by developing a new measure, the Gender Power Score (GPS), to better capture the status of women in cabinets cross-nationally. Country scores are based on the proportion of female cabinet ministers, as well as the gender and prestige of their positions, with greater weight given to nominations that break most with traditional distributions. This measure explicitly recognizes that the overall numbers of women may not necessarily match the gender and prestige of the portfolios to which they are assigned. In some cases, for example, women may occupy many positions but be concentrated mainly in feminine and low-prestige ministries, while in others they may hold few cabinet posts but be allocated many masculine and high-prestige portfolios. Within a single framework, therefore, the GPS offers a way to assess and compare women’s cabinet status across countries, while also acknowledging different potential pathways for achieving greater gender equality in cabinet nominations.

Because cabinets, like other nominally similar political institutions, serve different functions across democratic and non-democratic regimes (Ghandi and Przeworski 2007; Slater 2003), we limit our analysis to 117 countries categorized as “democracies” and “anocracies” by the Polity IV Project and for which data on cabinet composition was available in August 2009. We opted to include anocracies, a middle category on the scale between democracy and authoritarianism, on the grounds that these cases are generally viewed as aspiring democracies (Farber and Gowa 1997). As such, they are qualitatively distinct from autocratic regimes, retaining some of the trappings of democratic structures and commitments. In line with this focus, we pull from a variety of literatures on politics

and inequality in democratic states to propose three hypotheses that might explain cross-national variations in the GPS.

Inspired by work showing how institutional structures and arrangements shape patterns of political inclusion (Strom, Budge, and Laver 1994; Tremblay 2008), the *institutional hypothesis* centers on the role of political institutions in influencing government formation processes. The *gender equality hypothesis*, in contrast, draws on the expectations of stratification (Blumberg 1984; Chafetz 1990) and modernization (Inglehart and Norris 2003) theory to predict that a greater role will be played by social indicators of gender equality and government commitments to women's rights. The *access hypothesis*, finally, utilizes research on political recruitment (Norris and Lovenduski 1995; Randall 1982) to suggest that trends in relation to women's access to political office will in fact be most important, affecting the supply of and demand for female nominees and their placement in less traditional policy areas.

We test these three hypotheses using finite mixture modeling, a statistical technique that is appropriate for evaluating competing theories, but also allows us to explore the possibility that one hypothesis may not explain all instances of variation. The latter is important given our inclusion of diverse cases, which may not all conform to a single dynamic, and in light of our outcome variable, which recognizes that countries may achieve the same score via various combinations of numbers, gender, and prestige. Our empirical analysis finds the greatest support for the access hypothesis, followed by the institutional hypothesis, suggesting that political variables – rather than social factors – have the strongest impact on gender parity in cabinets. We compare these results with those of a standard linear regression model and observe that, among other advantages, the finite mixture model provides a better fit with the data. We conclude with thoughts on the implications for knowledge on cabinets and women in politics, as well as for future research on cabinet composition.

The Gender Power Score

Traditional approaches to studying cabinet nominations have focused primarily on developing typologies of cabinet positions, distinguishing between countries relying on policy specialists, policy liaisons, and policy generalists (Blondel and Thiebault 1991; Polsby 1978), as well as on mapping and explaining distinct career paths to different kinds of cabinet appointments (Silberman 1993). Adding to this literature, work on female ministers has addressed variations in the numbers of women nominated and the nature of the portfolios to which they are assigned.⁷ Nonetheless, studies of women in cabinets have been limited in two respects. First, they tend to elide gender and prestige (Reynolds 1999) or to focus on one to the exclusion of the other (Borrelli 2002; Escobar-Lemmon and Taylor-Robinson 2005; Russell and DeLancey 2002). Second, even if scholars recognize that increased numbers do not always entail a transformation of gender and power distributions (Reynolds 1999; Escobar-Lemmon and Taylor-Robinson 2009; Studlar and Moncrief 1999), they do not fully explore potential tradeoffs between a growth in numbers, on the one hand, and changes in patterns of gender and prestige, on the other. A single score bringing together all three pieces of information presents an opportunity to gain a more complete picture of women's cabinet status, enabling us to compare the overall degree to which gender parity has been achieved, given wide variations across these three outcomes witnessed within individual cases.⁸

Previous Research on Gender and Cabinets

Political elites have long been drawn from dominant groups in society (Putnam 1976). Over time, however, there has been a shift in many countries towards the belief that cabinets should

⁷ A small number of studies have also analyzed the policy impact of women's cabinet appointments (Atchison and Down 2009; Borrelli 2002).

⁸ See Technical Appendix for a visual representation of this variation.

include individuals from varied professions, regions, races, ethnicities, sexes, religions, and partisan allegiances (Martin 1988). In other words, cabinets should more closely resemble the populations they represent (Borrelli 2002). This ideal has not been attained, although some states have witnessed substantial progress towards equal representation: in the early 1990s parity cabinets existed only in Finland, Norway, and Sweden (Davis 1997, 14), but in recent years countries with more than 40 percent women have grown more diverse to include Chile, Spain, France, Switzerland, Nicaragua, South Africa, Burundi, and Germany.⁹ Moreover, today most cabinets include at least one woman, indicating a move away from the earlier norm of all-male governments (Escobar-Lemmon and Taylor-Robinson 2009).

Prior patterns emerged from gender norms assigning primary responsibility for affairs in the public sphere to men and a central role in the private sphere to women (Elshtain 1981). While all politics tends to be perceived as ‘masculine,’ this is especially true of executive office (Duerst-Lahti 1997). Increased nomination of women to cabinet positions thus has the potential to overturn longstanding expectations about gender roles. At the same time, however, in a process that Borrelli (2002, 22) describes as “regendering,” women and men may ostensibly be nominated to the same office – cabinet minister – but then be directed to assume gender-specific responsibilities, with women filling ‘feminine’ roles and men more ‘masculine’ ones. Davis’s (1997) study of portfolio allocations in Western Europe between 1968 and 1992 provides evidence for this trend. Women were primarily assigned to ministries reflecting the educational and occupational opportunities afforded to women, such as health, social welfare, education, family, culture, and consumer affairs. In contrast, they never held portfolios in areas more closely associated with men, like economic affairs, defense, parliamentary relations, employment, equipment, and the budget. More recent

⁹http://www.wedo.org/wp-content/uploads/5050_cabinetsfactsheet021.pdf (accessed April 13, 2010).

research finds that these trends have endured, but suggest that there are also policy areas that are more gender-neutral, such as the environment, justice, planning and development, sports, and tourism (Escobar-Lemmon and Taylor-Robinson 2009).

The relationship between women and feminine cabinet assignments may stem from a variety of factors, including women's interests in their parliamentary work, women's specializations outside the parliamentary arena, or tendencies to perceive certain ministries as closer to women's concerns (Davis 1997; Studlar and Moncrief 1999). Gendered patterns may thus be rooted in efforts to marginalize women or simply the preferences of female cabinet appointees, although the two sets of effects may be interrelated and difficult to disentangle (Heath et al 2005). All the same, these linkages have been broken in a number of cases, with women assuming prominent roles as ministers of defense and foreign affairs (cf. Escobar-Lemmon and Taylor-Robinson 2009). Together with greater numbers of women, these patterns suggest a double erosion of earlier gendered patterns of inclusion. Such developments, however, continue to be few and far between, casting doubt on a clear relationship between numbers and portfolio allocations. Despite a growth in their numbers, for example, women may continue to be assigned to feminine ministries, as in Australia, where women hold 42 percent of cabinet posts but the majority of these are in traditionally feminine areas such as aging, education, youth, and the status of women. Conversely, women may occupy more masculine portfolios, even if their numbers are relatively low, as in Honduras, where they hold less than 20 percent of positions but serve as ministers of finance, foreign relations, and labor and social security.

Above and beyond their gendered nature, cabinet assignments also differ in other ways: their degree of parliamentary contact, the amount of media attention they receive, the extent to which they can be used as a steppingstone to higher office, and their relative authority within the cabinet (Rose 1987). These variations are reflected in the notion of 'inner' and 'outer' cabinets which, while not designated formally or explicitly, tend to distinguish the prestige of ministries like defense,

finance, and foreign affairs from the rest (Dogan 1989). The portfolios most often allocated to women are rarely part of the inner cabinet: while covering crucial subjects, these are generally ‘unimportant’ by criteria of political clout (Davis 1997; Lovenduski 1986). However, the relationship has grown less clear over time: in Latin America, for instance, some women have received more prestigious cabinet assignments, serving in high visibility and well-resourced positions (Escobar-Lemmon and Taylor-Robinson 2005).

While the most prestigious appointments are invariably masculine, ‘feminine’ and ‘low prestige,’ as well as ‘masculine’ and ‘high prestige,’ do not map perfectly onto one another (Studlar and Moncrief 1999). More specifically, if ministries are classified as high-, medium-, and low-prestige based on such criteria as visibility, policy control, and access to resources, some feminine portfolios – like education, health, and social welfare – fall into the medium-prestige category, while several masculine portfolios – like science and technology – are low prestige.¹⁰ This is an important qualification to the assumption that feminine portfolios are intrinsically inferior, given that education, health, and welfare entail some of the largest expenditures in many national budgets (Moon and Fountain 1997). While gender and prestige of portfolios are not necessarily equivalent, gendered patterns remain apparent nonetheless: women have increasingly achieved more prestigious portfolios, but they are still concentrated in lower prestige positions (Studlar and Moncrief 1999). Progress in women’s access across prestige categories has therefore been uneven (Escobar-Lemmon and Taylor-Robinson 2005).

Findings from prior research thus indicate that numbers, gender, and prestige entail related but distinct outcomes, making it important to consider all three in cross-national comparisons of women’s cabinet status. Despite this, few studies have explored all three trends in global perspective as a means to discern the broader meaning of women’s cabinet appointments. Rather, scholars have

¹⁰ Prestige, by this definition, is not necessarily correlated with the intrinsic importance of a ministry.

focused either on explaining a subset of these trends in multiple countries (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2005 and 2009; Russell and DeLancey 2002), or on analyzing all three in the context of a single case (Moon and Fountain 1997; Studlar and Moncrief 1999). Yet, disparities across these three outcomes provide little guidance for assessing overall patterns of continuity and change. Further, in the absence of broader comparisons, it is not clear whether trends in one case generalize to others. A combined measure standardized to a global sample thus offers an opportunity to develop a more nuanced measure of cabinet gender parity.

Coding Ministries by Numbers, Gender, and Prestige

To this end, we compiled an original dataset coding the sex of cabinet ministers, as well as the gender and prestige of their respective appointments, in 117 countries in August 2009.¹¹ The emphasis was on creating a summary score that captured the degree to which cabinet nominations depart most from traditional patterns of low numbers of women appointed exclusively to feminine and low-prestige portfolios. Consequently, the resulting measure offers a means for assessing a country's overall progress in relation to these three outcomes as a whole.¹² To ensure that the score was accurate and meaningful, we developed a series of criteria for coding numbers, gender, and prestige in cross-national perspective.

We calculated the *numbers* of female cabinet ministers¹³ based on the data for August 2009 reported in the Central Intelligence Agency's (CIA) online directory, *Chiefs of State and Cabinet*

¹¹ This dataset will be available upon publication at [author website].

¹² The analysis was also run using the three separate outcomes, with minor differences, and thus we opted for the combined score as a more nuanced measure capturing cross-national variations.

¹³ As ministers may occupy multiple posts, we recorded the percentage of positions held by women, rather than absolute numbers, to better depict the sex distribution of cabinet responsibilities.

Members of Foreign Governments,¹⁴ listing the individuals holding cabinet positions in countries around the world. Because the nature of this data varied to some degree, reporting the names of sub-cabinet and even non-cabinet officials like heads of central banks, we included in the final percentage only individuals with the title of minister or secretary – and attorneys general who functioned as ministers of justice – following the criteria established by Escobar-Lemmon and Taylor-Robinson (2005). Because the website listed the names of cabinet ministers, not their sex, we took special steps to ensure accuracy. Coding was checked against photographs and biographies provided on news and parliamentary websites, and when these sources fell short, country experts were consulted.

Defining the *gender* of cabinet portfolios was slightly more complicated. Drawing on the existing literature, we distinguished ‘masculine,’ ‘neutral,’ and ‘feminine’ ministries based on feminist insights regarding the public-private divide (Elshtain 1981). We coded ministries as masculine, therefore, if they addressed issues that were traditionally associated with the public sphere and/or with men as a group, including ministries like agriculture, defense, finance, foreign affairs, and labor.¹⁵ Conversely, we categorized portfolios as feminine if they had historically been linked to the private sphere and/or to women as a group, comprising of topics like children, education, health, and women’s affairs. Ministries that did not clearly conform to either criterion were classified as neutral, such as housing, justice, tourism, and ministers without portfolio. For more details on how ministries were coded, see Figure 1.¹⁶

¹⁴ <https://www.cia.gov/library/publications/world-leaders-1/index.html>.

¹⁵ Religion is also classified as masculine in line with feminist thought arguing that men are viewed as the “‘natural’ proprietors of religion, ritual, politics, and other realms of cultural thought” (Ortner 1972, 79).

¹⁶ We devised additional rules to deal with two ministry types: (1) when ministry names varied, we categorized a portfolio with those involving analogous tasks, and (2) when ministry names combined

<Figure 1 about here>

Determining the *prestige* of cabinet positions required a parallel set of coding decisions. Using the template developed by Escobar-Lemmon and Taylor-Robinson (2005), high-prestige positions were distinguished from other portfolios in terms of visibility and significant control over policy. We placed ministries of defense, finance, foreign affairs, and home/internal affairs in this category. Medium-prestige positions, in contrast, control significant financial resources but are conferred lesser status and visibility, encompassing agriculture, education, planning, and transportation. Low-prestige positions, finally, are characterized by their lack of resources for patronage, referring to ministries dealing with issues like culture, sports, and tourism. Because the original classification was developed in relation to Latin America, we expanded each category to reflect the range of ministries witnessed at the global level. For more details on how ministries were coded, see Figure 2.¹⁷

<Figure 2 about here>

Devising a Combined Gender Power Score

With all the ministries coded, our next step was to devise a formula for combining the data for each country to reflect the degree to which gender balance had been achieved in relation to all three dimensions, recognizing that countries may be high on some of these metrics but low on others. Our solution was to give added weight to women's presence in positions that most departed from traditional distributions by multiplying women's proportion of masculine and high-prestige posts by three, neutral and medium-prestige by two, and feminine and low-prestige by one. We

tasks, we coded those mixing a gendered responsibility with a neutral one according to the gender leaning, and those combining feminine and masculine tasks by 'rounding up' the gender scale.

¹⁷ We employed similar rules to amalgamate ministries and adjudicate between prestige levels when these differed, with the main difference being to 'round up' the prestige scale.

summed the resulting values and multiplied these by the total proportion of cabinet positions held by women.

The procedure for creating each country's Gender Power Score (GPS) can be illustrated with reference to Finland, the state with the highest GPS in 2009. Women occupied 50 percent of masculine, 100 percent of neutral, and 60 percent of feminine positions; 0 percent of high-prestige, 86 percent of medium-prestige, and 0 percent of low-prestige posts; and 64 percent of all cabinet portfolios. The equation was therefore:

$$(3 \times 0.5 + 2 \times 1 + 1 \times 0.6 + 3 \times 0 + 2 \times 0.86 + 1 \times 0) \times 0.64 = 3.67$$

Theoretically, the largest score possible is 12, reflecting an all-female cabinet. A parity cabinet, however, would receive a score of 3 if women and men were equally represented across all portfolio types and each group held half of all positions. The GPS for Finland thus reveals that women exceeded parity in the Finnish cabinet. The majority of states, however, are well below this mark, with a median score of 0.21 and a mean score of 0.49.¹⁸

This scoring strategy has several important advantages. As the Finnish example shows, the share of women across the seven outcomes is highly variable. Women were distributed more or less equally across masculine and feminine positions, but dominated in neutral posts. At the same time, however, the ministries they ran were exclusively medium-prestige. The GPS incorporates these variations, but gives greater weight to gender balance in masculine and high-prestige positions, revealing the degree to which traditional distributions by gender and prestige are being overcome. Countries, however, still receive some credit for the nomination of women to feminine and low-prestige posts. As noted above, women's mere presence on the cabinet can itself be seen as a break with prior norms. Yet, restricting women to feminine and low-prestige portfolios mitigates their impact on the overall score.

¹⁸ See Technical Appendix for a full list of country scores.

The intuitions behind the GPS and the value of ranking countries on a summary score – rather than a separate measure for numbers, gender, and/or prestige – can be demonstrated via additional examples. Australia (42 percent) and Denmark (44 percent) have similarly high percentages of female cabinet ministers. Yet, women hold only 12.5 percent of masculine and no high-prestige positions in Australia, whereas they occupy 33 percent of masculine and 40 percent of high-prestige positions in Denmark. Thus, while numbers are important, they do not fully reflect the degree to which women have been able to access portfolios of different types. Taking these variations into account, the resulting GPS for Australia is 1.39 while the GPS for Denmark is 2.26.

By this formula, countries can also increase their score for greater progress in some areas than others, bringing states with different configurations in line with one another. Trinidad and Tobago, for instance, has 30 percent women in its cabinet but a GPS of 1.27, 0.1 less than Australia. The reason is that, despite their lower numbers, women held 30 percent of masculine and 50 percent of high-prestige positions. The GPS therefore recognizes that states may take alternative pathways to redistributing power within the cabinet: some states may increase women's presence, but not their access to high prestige and masculine positions, while others may include fewer women but place them in masculine and highly visible roles. In so doing, our scoring system enables us to distinguish among countries in terms of their overall progress towards gender parity, acknowledging potential diversity in the ways in which this may be achieved, to measure the meaning of women's cabinet status across countries.

Hypotheses and Variables

Cross-national differences, in turn, raise questions about the sources of this variation. Drawing on a variety of literatures, we theorized three competing hypotheses. The first concerns the *structure of political institutions*, which determine who has the power to make nomination decisions and

influence the degree to which they feel pressured to include and place women in less conventional portfolios. The second hypothesis proposes that *social indicators of gender equality* play a greater part by setting the context for nominations in terms of women's status and government commitments to gender equality. The third discounts such factors, arguing that political institutions and women's social and economic roles may be less crucial than *women's broader access to politics* in creating both supply and demand for more and non-traditional female cabinet appointments. We outline the logic behind these hypotheses and the variables used to test them in the empirical analysis.

Hypothesis 1: Political Institutions

The role of institutions in structuring the dynamics of political life has been the subject of extensive research in political science. Studies of cabinet formation, in particular, have identified the constraints that institutions pose for the bargaining power of coalition partners (Strom, Budge, and Laver 1994), as well as how institutions influence the appointment process through the structure of executive-legislation relations (Laver and Shepsle 1994). Similarly, literature on gender and politics has found that institutions inform elite calculations concerning the selection of female political candidates (Tremblay 2008) and shape the relationship between gender norms and the public sphere (Kittilson and Schwindt-Bayer 2010; Krook and Mackay 2011). Taken together, this work suggests that political institutions may shape the nature of women's cabinet appointments in terms of both who controls and influences cabinet nominations and the considerations that go into balancing appointments between members of different groups.

Existing research points to a number of institutions that may be particularly relevant in this regard. Differences in the *system of government*, for example, have an impact on who has the ability to nominate, as well as who may become, a cabinet minister. Leaders in presidential systems generally have greater latitude than their counterparts in parliamentary systems, as they do not need to

maintain majority legislative support and may go outside the legislative body to make their selections. The ability to impose executive will is more restricted in semi-presidential systems, where the president and prime minister may disagree over who should be appointed (Jenson 2008). In contrast, governments in parliamentary systems must have the support of the legislative majority at all times. In addition, many have a norm, if not a law, requiring that ministers be MPs (Davis 1997).

The result of these structures is that in presidential democracies a single individual can shape nominations, whereas in parliamentary systems the attitudes of the dominant party play a greater role. Whereas individual preferences may vary, pressures from groups within the party and legislature may lead to greater attention to gender balance. Greater turnover rates in parliamentary systems, moreover, may positively affect women's opportunities, due to a tendency for ministers to resign and for elections to be called more frequently, increasing the number of vacancies and decreasing the length of service typically needed for cabinet appointment (Studlar and Moncrief 1997). To capture these effects, we treated the political system as a categorical variable distinguishing between parliamentary, presidential, and semi-presidential regimes, using data from Clark et al (2009) and Elgie (2007), supplemented by Banks et al (2009) and government websites. As legislative involvement in the appointment process might create additional pressures for gender balance, we also included a dichotomous measure of *legislative control*, capturing whether legislative approval was required to confirm appointments or if the legislature itself appointed ministers, using data from Fish and Kroenig (2009).

The number of positions available can also influence the nomination of female candidates, as research on electoral systems demonstrates. More specifically, in countries governed by proportional representation (PR), the use of party lists in multi-member districts generates incentives for parties to ensure 'balanced' tickets that include members of various types of social groups. In contrast, the existence of single-member districts in majoritarian systems highlights the zero-sum situation that

requires displacing men to promote women (Tremblay 2008). Analogous dynamics may operate in relation to cabinet appointments, in terms of the *form of government*. In a unified government, the party in power has the ability to fill all cabinet posts, enabling it to appoint members from a diverse range of groups (Davis 1997; Reynolds 1999). In a coalition government, portfolios are distributed across multiple parties, reducing the number of posts available to any one party. This greater scarcity may increase the likelihood of men being appointed, undercutting opportunities to ‘balance’ nominations (Escobar-Lemmon and Taylor-Robinson 2005). To test these effects, we coded governments as unified if a single party was represented within the cabinet and as a coalition if multiple parties were represented. Data was taken from Banks et al (2009) and updated as necessary from government and party websites.

Further factors may inform the nature and direction of these institutional effects vis-à-vis women’s cabinet appointments. The *ideology of the ruling party*, for example, may affect the proclivity of leaders to nominate women. A vast literature finds that left-wing parties tend to be more open to promoting women to prominent political positions, while right-wing parties typically seek to preserve traditional gender roles (Lovenduski and Norris 1993). Consequently, left governments may be more likely than right governments to appoint female cabinet ministers (Moon and Fountain 1997; Reynolds 1999), as well as to assign them to a variety of portfolios as defined by gender and prestige (Studlar and Moncrief 1997; but see Davis 1997; Siaroff 2000). We classified governments as left- or right-leaning based upon the partisan allegiances of the head of government. This data was coded from Banks et al (2009) and updated as necessary from government and party websites.

In contrast, the *degree of democracy* may have a mixed impact: more democratic countries may have a greater culture of inclusion, but less democratic regimes may promote women to visible positions to bolster their democratic credentials (Townes 2010). To test the role of this variable, we

recorded country scores on the Polity IV index,¹⁹ based on six measures relating to competitiveness and openness of executive recruitment, constraint on chief executive, and competitiveness of political participation. As our sample included both ‘democracies’ or ‘anocracies,’ this permitted us to gauge whether being more or less democratic was important in explaining a country’s cabinet appointments. For related reasons, we also made note of a country’s *electoral system*, which we theorized might affect the broader ethos of inclusion in the sense that having a PR system might reflect a drive towards greater proportionality in all aspects of political life. Whereas some scholars simply distinguish between PR and majoritarian electoral arrangements (Whitford et al 2007), we categorized systems as proportional, majoritarian, and mixed based on data from the International Institute for Democracy and Electoral Assistance.²⁰

Finally, legislative dynamics may also potentially affect a leader’s calculations regarding cabinet nominations in terms of the closeness of *partisan competition*, as gauged by the share of seats held by various parties. Scholars anticipate that a narrow margin may increase the likelihood that a cabinet will contain a woman, as close competition among parties may lead to efforts to appeal to female voters through the enhanced nomination of women (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2005; Studlar and Moncrief 1997). We measured partisan competition in terms of the difference in the percentage of the seats in the lower house of parliament held by the largest and second largest parties, based on data from the Inter-Parliamentary Union *PARLINE Database on National Parliaments*.²¹

¹⁹ <http://www.systemicpeace.org/polity/polity4.htm>.

²⁰ <http://www.idea.int/esd/glossary.cfm>.

²¹ <http://www.ipu.org/parline/>.

Hypothesis 2: Gender Equality

While some scholars focus primarily on political institutions, other bodies of research place greater emphasis on women's social and economic status when assessing the breakdown of traditional gender norms. Various versions of stratification theory, for example, propose that inequalities between women and men are inversely related to women's level of economic power (Blumberg 1984). These disadvantages are exacerbated by men's tendency to dominate elite positions and therefore perpetuate definitions of 'worth' favoring men (Chafetz 1990). In a related fashion, scholars of modernization predict that improvements in levels of prosperity may empower new groups by offering enhanced opportunities for a diverse range of individuals to move into higher social and economic roles (Inglehart and Norris 2003), while also eroding traditional norms by leading citizens to embrace new 'post-materialist' values like gender equality (Inglehart 1997). By this line of reasoning, women may be more likely to be considered cabinet nominees, as well as placed in more masculine and higher-prestige positions, in countries where women's economic status is relatively high and women's rights to participate in the public sphere are widely accepted.

Working from these theories, the rate of *female labor force participation* might be expected to be associated with a higher GPS.²² In addition to giving women more economic resources, work outside the home requires venturing out into the public sphere, meaning that women's participation may have the effect of eroding traditional gender roles, while also enabling women to gain skills that may lead them to aspire to a career in politics or become more politically engaged (Iversen and Rosenbluth 2008). However, wide gaps between female elites and ordinary women may also mean

²² Other scholars of women and cabinets have included a measure of women's education (Escobar-Lemmon and Taylor-Robinson 2005), but we excluded this variable because it is not implied by these theories. Additionally, women may be highly educated in states with otherwise oppressive gender norms (Shahidian 1991) and data for university-level education is missing for many countries.

that aggregate measures of women's status in the labor force have little or no impact on cabinet nominations (Escobar-Lemmon and Taylor-Robinson 2005; Reynolds 1999). To test these effects, we noted the percentage of the workforce that was comprised of women in 2008 based on data from the World Bank's *Gender Statistics Data Base*.²³

A second factor, related to men's hegemony over elite positions, is the number of years since the *first female cabinet minister* was appointed. Countries with a historical legacy of women's cabinet participation may be more likely to have a government tradition of including women, at the same time that citizens would be more accustomed to seeing women as cabinet ministers. Surprisingly, previous research has not explored the impact of this variable.²⁴ We calculated the time since the first female minister based on the listing provided by the *Worldwide Guide to Women in Leadership*.²⁵

In terms of definitions of 'worth,' *state commitments to women's rights* might be expected to influence elite behavior when nominating individuals to high profile positions, as they reflect – at least at an official level – the nature of government discourse on the need for greater gender equality. One indication of a country's orientation in this regard is its ratification of the United Nations Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), adopted in 1979 by the General Assembly and described as an international bill of rights for women. CEDAW defines discrimination and sets up an agenda for ending it in all forms. Article 7, in particular, addresses women in political and public life, committing states to “ensure women, on

²³ <http://databank.worldbank.org/>.

²⁴ Other researchers have included the years since women's suffrage (Reynolds 1999), but this measure does not speak to elite legacies concerning women's nomination to cabinet posts.

²⁵ <http://www.guide2womenleaders.com/First-female-ministers.htm>.

equal terms with men, the right... (b) to participate in the formulation of government policy...and to hold public office and perform all public functions at all levels of government.”²⁶

Countries acceding to the treaty are legally bound to put its provisions into practice, as well as to submit reports at least every four years on the steps they have taken towards greater compliance. As of May 2009, 186 states had signed CEDAW, with only seven member states not ratifying the treaty. The large number of signatories belies the fact that many countries do not accept or implement all of the articles, meaning that ratification on its own may not be an accurate measure of government policy. There is much greater cross-national variation, however, in years since CEDAW ratification, ranging from 0 (not ratified) to 29 (ratified in 1980).²⁷ Swift signing of the treaty may signal two trends: strong commitment from an early stage and/or a greater length of time for its provisions to become part of elite discourse.²⁸ This measure thus offers a better reflection of state policy than merely signing the convention, and we included it as a means to capture broader state recognition of women’s rights.

Modernization theories, in turn, would anticipate *levels of development* to be associated with trends in cabinet composition, as growing levels of prosperity contribute to an erosion of customary power structures, enabling citizens to envision – and act on – new realities.²⁹ Scholars have reported mixed findings in relation to the impact of development on women’s legislative representation, but

²⁶ <http://www.un.org/womenwatch/daw/cedaw/text/econvention.htm>.

²⁷ <http://hdrstats.undp.org/en/indicators/71.html>.

²⁸ Other scholars have used region as a proxy (Davis 1997; Reynolds 1999; Siaroff 2000), but governments in the same region often adopt distinct strategies vis-à-vis women’s political inclusion.

²⁹ In contrast, religion as a proxy for culture (Reynolds 1999; Whitford et al 2007) is less precise, as it is impossible to capture within a single measure nuances such as the level of religious fragmentation, degree of religiosity, and intra-religion variation with respect to attitudes towards women.

observe greater proportions of women in more developed states (Matland 1998). While development can be measured by focusing exclusively on gross domestic product (GDP), like other work on women in cabinets (Escobar-Lemmon and Taylor-Robinson 2005), we used the United Nations Development Programme's Human Development Index (HDI) for the year 2007,³⁰ which measures countries' average achievement in three areas: life expectancy at birth, adult literacy rates and gross enrollment in education, and GDP per capita (cf. Russell and DeLancey 2002).³¹ This measure permits a more direct test of the argument that higher levels of development influence societal levels of well-being in ways that might lead to greater openness towards women in leadership positions and the creation of a larger pool of eligible female candidates.

Hypothesis 3: Women in Politics

In addition to the institutions and equality hypotheses, a third possibility is suggested by the literature on political recruitment. Seeking to explain trends in women's legislative representation, this work theorizes that the number of women elected is the combined result of the 'supply' of women available to run for office and the 'demand' for female aspirants on the part of political elites (Randall 1982). Supply is shaped by the resources and ambitions of potential female candidates, while demand hinges on elite evaluations drawing on "information short-cuts" that look to "background characteristics as a proxy measure of abilities and character" in ways that have tended to disadvantage women and members of minority groups (Norris and Lovenduski 1995, 14). This framework suggests that in countries where women have made substantial inroads into the political sphere, there may be a greater supply of potential female cabinet appointees. At the same time,

³⁰ <http://hdrstats.undp.org/en/indicators/87.html>.

³¹ We selected the HDI over the UNDP's Gender Development Index, measuring inequalities between women and men, due to greater missing data and close correlation between the two indices.

because political offices have historically been considered the preserve of men, women's presence may contribute to a breakdown of traditional gender norms – especially in instances where women have been entrusted with higher levels of political responsibility. Where women have made greater inroads, therefore, governments may express a greater demand for female nominees – or be less able to exclude women or deny them masculine and high-prestige assignments.

Although dynamics of supply and demand are mutually reinforcing, a number of factors embody tendencies in each respect. With regard to supply, the history of a *female presiding officer* reveals not only a country's willingness to give women prominent political roles, but also the resources that women have for garnering high-level political positions. However, this factor speaks to questions of demand as well in terms of elites' attitudes towards gender equality in political appointments, as speakers are elected by their colleagues in parliament. In both cases, the ability to achieve these posts captures women's visibility – and perhaps more importantly, women's seniority – in parliamentary politics. Because trends over time offer a better reflection of women's status in this regard, we collected data on the history of women serving in this capacity. For this variable, therefore, we recorded whether, by the year 2009, a woman had ever been elected as a speaker or presiding officer based on data in the *United Nations Human Development Report 2009*.³²

In addition to women in top leadership positions, the *percentage of women in parliament* may also be important for supply and demand,³³ especially in countries where being an MP is a formal or informal requirement for cabinet nomination. Many earlier studies uncover a positive and statistically significant relationship with women's cabinet presence (Davis 1997; Escobar-Lemmon and Taylor-

³² <http://hdrstats.undp.org/en/indicators/133.html>.

³³ We initially included gender quotas as well, but faced problems of multicollinearity, consistent with work finding that quotas are a major predictor of variations in women's parliamentary representation (Tripp and Kang 2008). We therefore excluded quota variables from the analysis.

Robinson 2005; Kobayashi 2004; Moon and Fountain 1997; Reynolds 1999; Siaroff 2000; Whitford et al 2007), although the causal relationship is not always clearly articulated. There are several possible reasons for this link, the primary one being that female MPs form part of the pool of potential cabinet ministers, regardless of whether being an MP is a legal requirement. However, female MPs may also play a role in pressuring governments to include and assign women less traditional cabinet portfolios – pressures which are likely to be greater as women’s numbers increase. For this measure, we used data on the proportion of women elected to the single or lower house of parliament in the same election as these appointments were made, drawing on the Inter-Parliamentary Union’s website on *Women in National Parliaments*.³⁴

Similarly, the presence of a *female national leader* may have three positive effects on the GPS. Having a woman in the country’s top political position may reflect an expanded pool of prominent female politicians with the requisite political experience for diverse cabinet assignments. It may also, according to research on role model effects (Wolbrecht and Campbell 2007), be a signal that citizens are more open to women in positions of political power and may view women’s exclusion or marginalization negatively. Finally, the attitudes of female leaders may themselves be important. Given their own status as women in a ‘man’s world,’ female presidents and prime ministers may feel less inclined to preserve earlier gender roles, leading them to nominate more women and assign them to a range of ministries. Further, they may share a sense of solidarity with other women – or may simply be more likely than men to know and recognize capable female candidates.

Prior evidence for the positive role of female leaders is mixed, however. One study of cabinet appointments in Western Europe observes a positive and statistically significant correlation between the proportion of women in government and the presence of a female prime minister (Davis 1997). Yet, other work suggests that these tendencies depend upon the individual women in

³⁴ <http://www.ipu.org/wmn-e/classif.htm>.

question: while Bachelet made a campaign promise to appoint women to half of all cabinet positions, and later gave women posts as ministers of defense and finance, other female leaders attributed the low numbers of women nominated to their governments to the lack of women with requisite political experience, contacts, and ambition (Jenson 2008). To test these effects against the GPS, data was taken from the CIA *Chiefs of State and Cabinet Members of Foreign Governments* website in August 2009 to record the presence of a female president or prime minister.

Within the cabinet itself, finally, the presence of a *ministry of women's affairs* may be associated with higher scores on the GPS, due to its effects on the demand for female cabinet appointees. Although there are some notable exceptions, these ministries tend to be headed by women, and therefore act as a guarantee of sorts that women will be allocated at least one cabinet position. Of course, if this is the only portfolio that women hold, this factor is unlikely to improve a country's rating, as such ministries are classified as feminine and low-prestige. However, governments around the world typically create these portfolios in response to international pressures for women's increased policy representation (True and Mintrom 2001). Consequently, the establishment of such an office may reflect recognition of women's issues and perspectives as politically salient and important. In such cases, there may be greater receptivity to women's inclusion in policy-making in a wide range of issue areas, thus diversifying their cabinet nominations. We coded this as a binary variable, using data from the CIA in August 2009.

Explaining Women's Cabinet Appointments

Although we excluded autocracies from our sample, analyzing 117 countries with varied profiles in female cabinet appointments by number, gender, and prestige raises questions about the degree to which these cases can be meaningfully compared. Standard regression techniques, employed in existing research on women in cabinets, assume *a priori* that effects will operate in a

similar fashion across all countries. Finite mixture modeling, in contrast, departs from this approach by opening this assumption up to empirical investigation, explicitly testing for the existence of subpopulations of cases that may be best explained by distinct theories. In other words, all three hypotheses may be true but only for specific subsets of the data. By clustering countries according to how well they are classified by each theory, this technique also enables us to discover which hypothesis offers the most powerful explanation of cross-national variations in the GPS. As this method has not yet been used extensively in political science, we also ran a standard linear regression model and compared the two sets of results, noting the important findings that were missed with the non-mixture model techniques.

As the analysis employs Gaussian (normal) linear regression models, it requires a minor transformation of the outcome variable. Because the GPS is both bounded at zero and right-skewed, with many values near zero and a long right tail, its relationship with the explanatory variables could not be analyzed using a standard approach.³⁵ For this reason, we used a log transformation to normalize the score. However, given that the log transformation can only be performed on the open interval – that is, all cases must reflect a value above zero – we had to devise a correction to preclude any case from receiving a zero score. Our correction added an individual to each cabinet who was half male and half female and was distributed among the categories so as to respect their marginal distributions.³⁶ This maintained the relative values of the original score, such that the correlation between the two was 0.999.

³⁵ The Technical Appendix includes graphs illustrating this distribution and the log transformation.

³⁶ For example, a cabinet may have 10 members consisting of 2 masculine, 3 neutral, and 5 feminine and 6 high-prestige, 2 medium-prestige, and 2 low-prestige ministers. Following the correction, the cabinet would be represented as having 11 members with 2.2 masculine, 3.3 neutral, and 5.5

Methods

Finite mixture models are a standard tool within the applied statistics community, but have thus far not been applied widely in political science (cf. Hill 2001; Imai and Tingley 2010). They are designed to accommodate data in which observations arise from more than one group and these group affiliations are not known by the researcher (Everitt and Hand 1981; McLachlan and Peel 2000). Consequently, these techniques are useful for determining whether in fact subpopulations exist among our observations. By the same token, finite mixture models can help us to establish how well our hypotheses match the data – as well as to identify cases that do not seem to be consistent with any theory. For these various reasons, these methods are preferable to more common regression procedures, which treat all observations as if they are drawn from a single population, therefore producing biased results. Conducting three separate analyses with these techniques is not an option, precisely because subpopulations – if they exist – are not known in advance. To recognize this possible diversity, the modeling strategy must allow for different types of behaviors to distinguish groups and account for the fact that group membership labels are not observed.

Formally, finite mixture distributions can be described by the following equation

$$p(x) = \pi_1 f_1(x) + \dots + \pi_J f_J(x) = \sum_{j=1}^J \pi_j f_j(x)$$

where π_i is the proportion of the sample that can be described by density f_i and the f_i are density functions for different groups within the population. Given the three theoretical explanations

feminine and 6.6 high-prestige, 2.2 medium-prestige, and 2.2 low-prestige ministers. Equal distributions mean that the 0.2 extra member would be counted as 0.1 female and 0.1 male.

posited here, the population is assumed to have $J=3$ subpopulations.³⁷

The clustering of observations into the three models is based on the posterior probability, $\zeta_{i,m}$ that observation i is consistent with theory m . These probabilities are used to weight the observations when fitting the models, so that observations with a higher probability of belonging to the cluster exert greater influence on the component's coefficient estimates than those with a lower probability of belonging to the subpopulation. In order to classify countries, we selected a threshold λ and identified observation i as statistically significantly consistent with theory m if its posterior probability was greater than this threshold. To allow us to classify as many observations as possible while ensuring that the rate of false positives did not exceed a reasonable level, we drew on the approach suggested by Imai and Tingley (2010) to establish that for $\alpha=0.05$ in our sample, $\lambda=0.61$.³⁸

Results

The posterior possibilities permit us to cluster our observations into subpopulations, and in the process, provide a novel approach to theory testing (Imai and Tingley 2010). After fitting the model, we were able to determine which cabinets were consistent with each of the three theories, and thus, which hypothesis – if any – explained the GPS for the majority of states. For the subset of countries in each cluster, we were also able to generate coefficient estimates and standard errors for the variables of interest. Based on the threshold λ , we found that 106 of the 117 observations were consistent with one of our three theories, with only 11 countries failing to fit any theory well.

<Table 1 about here>

³⁷ The finite mixture model was fit using the *flexmix* package in R (Grün and Leisch 2008; R Development Core Team 2010).

³⁸ See the Technical Appendix for the method used to calculate this threshold.

As Table 1 shows, the majority of our observations were consistent with the access hypothesis: nearly 60 percent – 71 of 117 states – fell within this cluster with a high probability. Though the majority of observations were explained by this theory, the institutional hypothesis captured 20 percent of the data well, amounting to 26 countries. The finite mixture model, in contrast, provided relatively little support for the gender equality hypothesis: only 9 states were well-explained by this account. The remaining 11 observations did not cluster well.

The *access hypothesis* resulted in a cluster of 72 cases, 71 of which could be considered well-classified. The results of this model are displayed in Table 2. Figure 3 graphs the predicted median values and 95 percent confidence intervals for the statistically significant variables, revealing the size of their effects. Confirming the importance of both the supply and demand for female candidates, a history of a female presiding officer was significant: a state that has never had a female speaker had a median predicted value of only 0.173 on the GPS, while a state that has had one had a predicted value of 0.436. The percentage of women in parliament was also positively correlated. Comparing the values of the first and third quartiles of the percentage of women in office yielded a difference in predicted values of 0.198, from 0.106 for legislatures with 11.5 percent women to 0.304 for legislatures with 27.5 percent women. The existence of a ministry of women’s affairs was similarly associated with a country’s GPS: states in this cluster without such a ministry had a predicted GPS value of 0.174, while those with a women’s minister had a median predicted value of 0.261. In comparison, the presence of a female national leader was not statistically significant.

<Table 2 and Figure 3 about here>

The *institutional hypothesis*, by way of comparison, led to a cluster of 28 countries, 26 of which could be considered well-classified. Table 3 and Figure 4 report the results from this model. Contrary to expectations, presidential and semi-presidential systems were positively correlated with the GPS as compared with parliamentary regimes. Holding all other variables constant, moving from

a parliamentary system to a presidential regime increased the median GPS value by 1.072, from 0.533 to 1.605. Changing from a parliamentary system to a semi-presidential regime increased the median GPS value by 0.734, from 0.533 to 1.267. Moving from a semi-presidential system to a presidential regime was also positively correlated with the GPS, increasing the median value by 0.338, from 1.267 to 1.605. Similarly, the legislature's control over ministerial appointments was negatively correlated with the GPS. A country with a greater degree of legislative control had a median predicted value of 1.267, while a state in which the legislature did not had a predicted value of 0.561.

<Table 3 and Figure 4 about here>

In contrast to these findings, our predictions were confirmed in terms of form of government, ideology of the ruling party, degree of democracy, and intensity of party competition. Unified cabinets were positively correlated with the GPS: a state with a divided cabinet had a median predicted value of 0.747, while one with a unified cabinet had a predicted value of 1.267. Left regimes were also positively correlated. A state that had a non-left government had a median predicted value of 0.553, while a state with a left government had a predicted value of 1.268. A country's polity score was positively correlated as well. Comparing the values of the first and third quartiles of the polity score yielded a difference in predicted values of 0.116, from 1.191 for states with a polity score of 2 to 1.307 for states with a polity score of 6. Partisan competition was negatively rather than positively associated with the GPS: as the gap in vote share between the first and second largest parties increased, the GPS decreased, indicating that more competitive systems were indeed better for women. Comparing the values of the first and third quartiles yielded a difference in predicted values of 0.230, from 1.356 for legislatures in which the largest party held 6 percent more seats to 1.126 for those in which it held 55 percent more. Our expectations regarding electoral systems, however, were disconfirmed: majoritarian electoral systems, when compared to

proportional and mixed systems, were positively correlated with the GPS. Holding all other factors constant, moving from a PR to a majoritarian system increased the median value by 0.308, from 0.959 to 1.267. Changing from a majoritarian or a PR system to a mixed system, in contrast, led to a decrease in the median GPS value, by 1.223 and 0.914 points respectively.

The *gender equality hypothesis*, lastly, produced a cluster of 17 cases, 9 of which are well-classified. Table 4 reports the coefficient estimates and standard errors from this model and Figure 5 provides the predicted median values and 95 percent confidence intervals for the statistically significant variables. All four factors were positively correlated with the GPS. Comparing the values of the first and third quartiles in terms of female labor force participation yielded a difference in predicted values of 0.520. More concretely, a country in which women comprised less than 40 percent of the workforce had a predicted median GPS of 0.445, while one with a 47 percent female participation rate had a predicted value of 0.965. Similarly, juxtaposing the values of the first and third quartiles of the years since the first female minister was appointed produced a difference of 0.291, from 0.687 for states where the first female minister gained office 40 years ago to 0.978 for states where the first female minister gained office 62 years ago. In terms of government commitments, comparing the first and third quartile values of years since CEDAW ratification yielded a difference in predicted values of 0.566, from 0.576 for a state ratifying 15 years ago to 1.142 for a state ratifying 26 years ago. Finally, moving from the first to the third quartile in levels of development produced a difference of 0.265, from 0.709 for states with an HDI of 0.5918 to 0.974 for states with an HDI of 0.9370.

<Table 4 and Figure 5 about here>

Discussion

Finite mixture modeling provides a novel approach to theory testing because it allows for subpopulations within the data to be explained by different hypotheses. As it groups observations

based on their probability of inclusion in each cluster, it enables assessment of these competing hypotheses based on the percentage of observations that are consistent with each theory. In our analysis, over 60 percent of the observations were well explained by the access hypothesis, indicating strong support for this claim. However, the analysis also revealed that some cases were better explained by the structure of political institutions and broader indicators of gender equality – findings that are consistent with the notion that the cases in our sample were in fact drawn from different subpopulations.

Taken together, over 80 percent of cases were best explained by the first and third theories. As a whole, these findings suggest that, while slower-moving processes of women’s social and economic empowerment do shape cabinet nomination processes in a small group of states, political factors have the greatest impact on gender parity in cabinets. Among these political variables, however, measures of women’s political access were able to account for variations among three times as many countries as the design of political institutions. Thus, while the structures informing the broader nomination context are important, patterns in more states can be explained by the degree to which women have been elected to a variety of other political offices. The most likely reason for this is that women’s broader visibility in the political sphere has contributed to erosion in prevailing gender norms, which have historically tended to exclude women from cabinets – and in cases where they have been nominated, to relegate them to more feminine and less prestigious ministries. As women have achieved more high profile political positions, therefore, there have been increases in both the supply and demand for female cabinet appointees in a variety of policy areas.

The posterior inclusion probabilities also allow us to assess the criticism that institutions, equality, and access are not distinct hypotheses, but instead capture a single ethos regarding women’s inclusion in public life. If this were true, we would expect many cabinets to have posterior inclusion probabilities that split either more evenly between the three hypotheses or between a subset of the

clusters. A closer look at the list of inclusion probabilities makes it clear that this is generally not the case. For example, most countries grouped in the access cluster have high posterior inclusion probabilities and are not divided across the access and equality clusters. A major advantage of finite mixture modeling, indeed, is precisely this list of inclusion probabilities, which enables the analyst to see how well each case fits with each of the three theories. A standard regression simply does not provide this information, obscuring knowledge about how cases are distributed across hypotheses.

<Table 5 about here>

For the sake of comparison, the results of a standard linear regression model are presented in Table 5. This approach, which does not account for the sub-populations within the data, finds that the percentage of women in the legislature, the presence of a female presiding officer and a ministry of women's affairs, non-parliamentary regimes, polity score, and women's labor force participation are positively and significantly correlated with the GPS. Mixed electoral systems are found to be negatively associated with the GPS. This approach, however, provides no principled interpretation for adjudicating which hypothesis offers the best account, beyond noting a mix of coefficients that are statistically significant (and non-significant). Moreover, juxtaposing these results against the findings for the finite mixture model, the effects of a number of variables are non-significant – and in several instances, the directionality is reversed. The implication of overlooking subpopulations is that including all observations biases the parameter estimates for each hypothesis, an intuition that is supported by assessing model fit using the Bayesian information criterion (BIC): the BIC of the mixture model (346.8773) compares favorably with that of the standard regression (369.0334). Our analysis, therefore, offers several important advances – theoretical, empirical, and methodological – over previous research, providing new insights into the status of women in cabinets cross-nationally.

Conclusions

The position of women in cabinets around the world has recently garnered substantial media attention, albeit in opposing directions. On the one hand, a growing list of cabinets now include close to equal numbers of women and men, and more women are assuming non-traditional cabinet roles in portfolios viewed either as masculine or with very high levels of prestige. On the other hand, women's appointments continue to be controversial in some places, leading to criticism or rejection of female nominees, as well as female cabinet ministers voicing discontent, arguing that they have been excluded from centers of decision-making power. Inspired by these competing evaluations, this paper constructed a new measure to measure the status of women relative to men in three areas: the overall distribution of portfolios; the allocation of feminine, neutral, and masculine ministries; and the assignment of low-, medium-, and high-prestige positions. The resulting distribution revealed that women had achieved near-parity in their presence in some cabinets – although the vast majority of countries were clustered much closer to the zero mark.

Drawing on a variety of literatures, we theorized that one of three hypotheses might explain a country's score: political institutions, social indicators of gender equality, and women's broader access to politics. We then applied finite mixture modeling techniques to analyze our data and found that the third hypothesis on women's access explained more than 60 percent of our observations – but that the first theory regarding political institutions also accounted for about 20 percent of the cases. As a whole, these findings suggested that political variables – rather than social factors – have the strongest impact on gender parity in cabinets. Because finite mixture modeling is relatively new to political scientists, we compared our results with those of a standard linear regression, the approach used in previous studies of this topic. We discovered that the mixture model lent greater nuance to the findings by recognizing different subpopulations, therefore offering better insights

into the role of different variables, at the same time that it provided a better fit with the data than standard techniques.

These findings are encouraging for proponents of equal representation, in that they signal that it may be possible to take steps – via various political initiatives like quotas and other reforms – to activate the mechanisms for future progress in women’s cabinet nominations. For scholars, the paper offers new theoretical and empirical contributions, including a more comprehensive coding scheme leading to a new summary measure of women’s cabinet status in more than 100 countries worldwide. It also employs a novel methodological approach, finite mixture modeling, to test the relative weight of three competing hypotheses to explain cross-national variations. Our results have a number of implications for current and future research on gender and on cabinet composition.

First, the status of women in the executive branch has been a relatively under-studied topic. As a result, the majority of existing studies are not only dated, but also tend to focus on a more limited range of countries and/or features of cabinet nominations. We incorporate data from 2009, expand the study to a cross-national analysis of democracies and anocracies, and combine attention to the proportion of seats held by women with the gender and prestige of the portfolios to which women are appointed, thereby offering a more up-to-date and complete assessment of women’s status in cabinets around the world. We showed, empirically, that women’s rank in different areas may conflict and developed the Gender Power Score as a means to provide a more nuanced conceptualization of gender parity in cabinet appointments. Although our analysis was limited to only one moment in time, August 2009, the measure could be applied to data from multiple years, providing an opportunity to track how women’s status has evolved across time and space.

Second, we drew on a variety of theoretical intuitions to propose three hypotheses to explain variations in country scores along this measure. This approach sought to establish whether there were any links between women’s standing in cabinets and the design of political institutions and

other trends in women's social, economic, and political empowerment. Our use of finite mixture modeling indicated that nearly all of our observations – 105 out of 117 – were well-classified by one of these hypotheses at an α -level of 0.05. The remaining countries, however, were not well explained by any of the theoretical frameworks that we posited. Turkey, for example, had posterior inclusion probabilities that were split almost equally across the three subpopulations: 0.36 for the first hypothesis, 0.29 for the second hypothesis, and 0.35 for the third hypothesis. Instances such as these suggest that, while these three theories can account for trends in the vast majority of countries, more work is needed to develop additional theories, which may be aided by in-depth analyses of these particular cases.

Third, we combined research on cabinets with feminist insights in order to present a more nuanced mode of theorizing the nature of women's cabinet nominations. The resulting framework, however, could be adapted quite easily to analyze other changes in cabinet composition, particularly with regard to other politically marginalized groups. It could also be applied to study portfolio allocation among different coalition partners. While the classification of ministries by prestige could be directly imported, the main challenge would be to devise a means for categorizing ministries according to their racial or ideological nature, for example. While requiring additional theorizing, such an exercise could yield valuable insights for understanding the stakes of cabinet nomination processes, capturing potential trade-offs between numbers and the character and importance of different cabinet portfolios.

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Figure 1: Distribution of Ministries by Gender Type

Masculine	<p>Agriculture, Food Safety, Fisheries, & Livestock Communication & Information Construction & Public Works Correctional Services/Police Defense, Military & National/Public Security Enterprise</p>	<p>Finance & Economy Foreign Affairs Government/Interior/Home Affairs Industry & Commerce Labor Religious Affairs Science & Technology Transportation</p>
Neutral	<p>Civil Service Displaced Persons & Expatriates Energy Environment & Natural Resources Housing Justice Minority Affairs</p>	<p>Parliamentary Affairs Public Works Planning & Development Regional Reform Sports Tourism</p>
Feminine	<p>Aging/Elderly Children and Family Culture Education</p>	<p>Health and Social Welfare Heritage Women's Affairs Youth</p>

Figure 2: Distribution of Ministries by Prestige Type

High Prestige	Defense, Military & National/Public Security Finance and Economy	Foreign Affairs Government/Interior/Home Affairs
Medium Prestige	Agriculture, Food Safety, Fisheries, & Livestock Civil Service Communications and Information Construction and Public Works Correctional Services/Police Education Energy Environment and Natural Resources ¹ Health and Social Welfare	Housing Industry and Commerce Justice Labor Planning and Development Parliamentary Affairs Enterprise Public Works Religious Affairs ² Transportation
Low Prestige	Aging/Elderly Children and Family Culture Displaced Persons & Expatriates Heritage Minority Affairs Regional	Reform Science & Technology Sports Tourism Women's Affairs Youth

¹ For OPEC members, any ministry having to do with natural resources, oil, or energy is considered to be a high prestige. OPEC members include: Algeria, Angola, Ecuador, Nigeria, and Venezuela.

² For the two Islamic republics—Mauritania and Pakistan—religion or religious affairs is considered to be a high prestige position.

Table 1: Posterior Inclusion Probabilities for All Cabinets Separated by Cluster

Cluster 1: Access				Cluster 2: Political Institutions				Cluster 3: Gender Equality							
Country	$\zeta_{i,1}$	$\zeta_{i,2}$	$\zeta_{i,3}$	Country	$\zeta_{i,1}$	$\zeta_{i,2}$	$\zeta_{i,3}$	Country	$\zeta_{i,1}$	$\zeta_{i,2}$	$\zeta_{i,3}$	Country	$\zeta_{i,1}$	$\zeta_{i,2}$	$\zeta_{i,3}$
Albania	1.00	0.00	0.00	Malawi	0.80	0.00	0.20	Cambodia	0.16	0.84	0.00	Angola*	0.47	0.00	0.53
Algeria	1.00	0.00	0.00	Mauritania	1.00	0.00	0.00	Cameroon	0.26	0.73	0.01	Austria*	0.39	0.00	0.61
Argentina	1.00	0.00	0.00	Mauritius	1.00	0.00	0.00	CAR	0.17	0.82	0.00	Australia	0.06	0.00	0.94
Armenia	1.00	0.00	0.00	Mexico	1.00	0.00	0.00	Colombia	0.00	1.00	0.00	Belgium*	0.41	0.00	0.59
Benin	1.00	0.00	0.00	Moldova	0.99	0.00	0.01	Costa Rica	0.37	0.63	0.00	Botswana	0.08	0.00	0.92
Bolivia	0.99	0.00	0.01	Mozambique	1.00	0.00	0.00	Ecuador	0.14	0.86	0.00	Denmark *	0.41	0.00	0.59
Brazil	1.00	0.00	0.00	Netherlands	1.00	0.00	0.00	Ethiopia	0.25	0.75	0.00	Egypt *	0.46	0.00	0.54
Bulgaria	1.00	0.00	0.00	New Zealand	1.00	0.00	0.00	Ghana	0.13	0.83	0.04	France	0.00	0.00	1.00
Burkina Faso	1.00	0.00	0.00	Nicaragua	0.98	0.00	0.02	Guinea-Bissau	0.15	0.85	0.00	India	0.02	0.00	0.98
Burundi	0.99	0.00	0.01	Niger	1.00	0.00	0.00	Haiti	0.16	0.83	0.01	Italy*	0.42	0.00	0.58
Canada	1.00	0.00	0.00	Norway	1.00	0.00	0.00	Honduras	0.19	0.81	0.00	Liberia	0.38	0.00	0.62
Chad	1.00	0.00	0.00	Papua New Guinea	1.00	0.00	0.00	Hungary	0.00	1.00	0.00	Rwanda	0.07	0.00	0.93
Chile	1.00	0.00	0.00	Paraguay	1.00	0.00	0.00	Indonesia	0.25	0.75	0.00	Slovenia	0.02	0.00	0.98
Cote d'Ivoire	0.63	0.00	0.37	Peru	1.00	0.00	0.00	Israel	0.01	0.99	0.00	Sweden*	0.41	0.00	0.59
Croatia	1.00	0.00	0.00	Philippines	1.00	0.00	0.00	Jamaica	0.35	0.65	0.00	Sudan	0.01	0.00	0.99
Czech Republic	1.00	0.00	0.00	Poland	1.00	0.00	0.00	Kenya	0.20	0.79	0.01	Uruguay	0.33	0.00	0.67
DRC	1.00	0.00	0.00	Portugal	1.00	0.00	0.00	Malaysia	0.27	0.71	0.02	Yemen *	0.42	0.00	0.58
Estonia	1.00	0.00	0.00	Republic of Congo	1.00	0.00	0.00	Mali	0.08	0.92	0.00				
Finland	1.00	0.00	0.00	Romania	1.00	0.00	0.00	Mongolia	0.02	0.98	0.00				
Gabon	1.00	0.00	0.00	Russia	1.00	0.00	0.00	Namibia	0.20	0.80	0.00				
Gambia	1.00	0.00	0.00	Senegal	1.00	0.00	0.00	Nepal	0.19	0.81	0.00				
Georgia	1.00	0.00	0.00	Serbia	1.00	0.00	0.00	Nigeria	0.28	0.72	0.00				
Germany	1.00	0.00	0.00	Sierra Leone	1.00	0.00	0.00	Pakistan	0.00	1.00	0.00				
Greece	1.00	0.00	0.00	Slovakia	1.00	0.00	0.00	Panama	0.00	1.00	0.00				
Guatemala	1.00	0.00	0.00	South Africa	1.00	0.00	0.00	Tajikistan	0.00	1.00	0.00				
Guyana	1.00	0.00	0.00	Spain	1.00	0.00	0.00	Tunisia	0.00	1.00	0.00				
Ireland	1.00	0.00	0.00	Sri Lanka	1.00	0.00	0.00	Turkey*	0.35	0.36	0.29				
Japan	1.00	0.00	0.00	Switzerland	1.00	0.00	0.00	United Kingdom*	0.43	0.57	0.00				
Kyrgyzstan	1.00	0.00	0.00	Tanzania	1.00	0.00	0.00								
Latvia	1.00	0.00	0.00	Thailand	1.00	0.00	0.00								
Lebanon	0.96	0.00	0.04	Timor-Leste	1.00	0.00	0.00								
Lesotho	1.00	0.00	0.00	Togo	1.00	0.00	0.00								
Lithuania	1.00	0.00	0.00	Trinidad & Tobago	1.00	0.00	0.00								
Macedonia	1.00	0.00	0.00	Venezuela *	0.50	0.00	0.50								

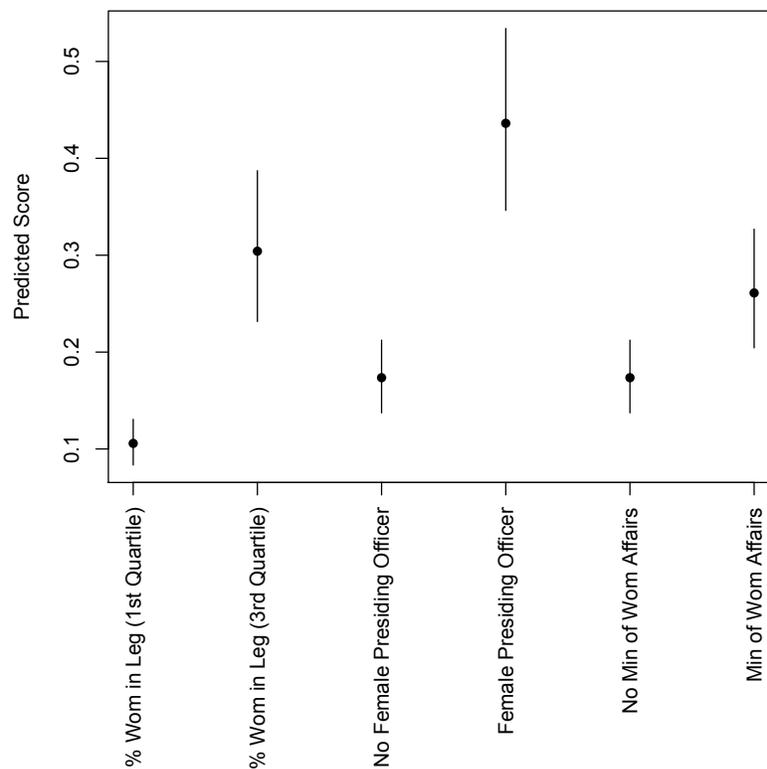
Notes: The posterior inclusion probabilities, $\zeta_{i,m}$, represent the probability that observation i is consistent with theory m . For each cabinet, the table presents the probability that the observation is consistent with the Access ($\zeta_{i,1}$), Political Institutions ($\zeta_{i,2}$), and Gender Equality ($\zeta_{i,3}$) hypotheses. Cabinets marked with an * fail to meet the threshold ($\lambda=0.61$) to be considered statistically significantly consistent with any theory at the $\alpha=0.05$ level. For more details on the calculation of λ , see the Technical Appendix.

Table 2: Parametric Mixture Model of Gaussian Linear Regression (on the Log Scale) of the Gender Power Score of Cabinets Cross-Nationally (Cluster 1: Access Hypothesis)

	Estimate	Std. Error	t value	Pr(> t)
Intercept	-3.01	0.15	-19.71	0.00
Female Leader	0.31	0.21	1.45	0.15
% Women in Legislature	6.60	0.64	10.24	0.00
Female Presiding Officer	0.92	0.14	6.74	0.00
Ministry of Women's Affairs	0.41	0.13	3.10	0.00

Notes: The outcome variable is the log of the corrected Gender Power Score (GPS). N =72.

Figure 3: Predicted Median Values and 95% Highest Posterior Density Intervals of the Gender Power Score for Statistically Significant Variables (Cluster 1: Access Hypothesis)



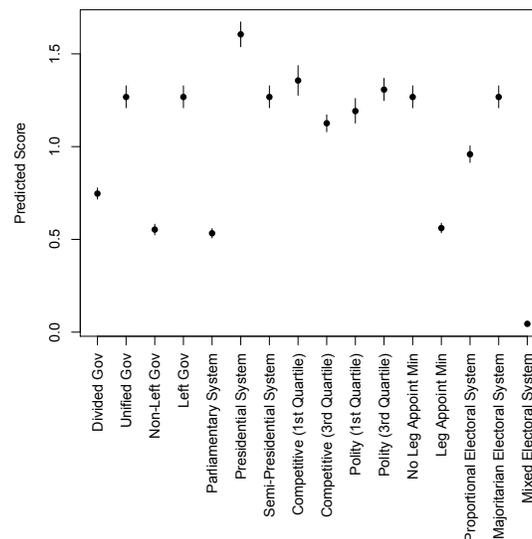
Note: In calculating the predicted median value for each predictor, all other covariates were held at their mean (for continuous variables) or modal (for categorical variables) values.

Table 3: Parametric Mixture Model of Gaussian Linear Regression (on the Log Scale) of the Gender Power Score of Cabinets Cross-Nationally (Cluster 2: Political Institutions Hypothesis)

	Estimate	Std. Error	t value	Pr(> t)
Intercept	-2.27	0.04	-60.21	0.00
Unified Gov.	0.53	0.02	30.38	0.00
Left Gov.	0.83	0.02	50.34	0.00
Presidential	1.10	0.02	50.26	0.00
Semi-Presidential	0.87	0.02	41.99	0.00
Competitiveness	-0.38	0.05	-7.10	0.00
Polity Score	0.02	0.00	5.33	0.00
Appoint Min	-0.82	0.02	-44.92	0.00
Majoritarian	0.28	0.02	15.67	0.00
Mixed	-3.06	0.03	-113.06	0.00

Notes: The outcome variable is the log of the corrected Gender Power Score (GPS). The baseline categories include: divided government, non-left government, parliamentary system, legislature does not oversee ministerial appointments, and proportional electoral systems. N =28.

Figure 4: Predicted Median Values and 95% Highest Posterior Density Intervals of the Gender Power Score for Statistically Significant Variables (Cluster 2: Political Institutions Hypothesis)



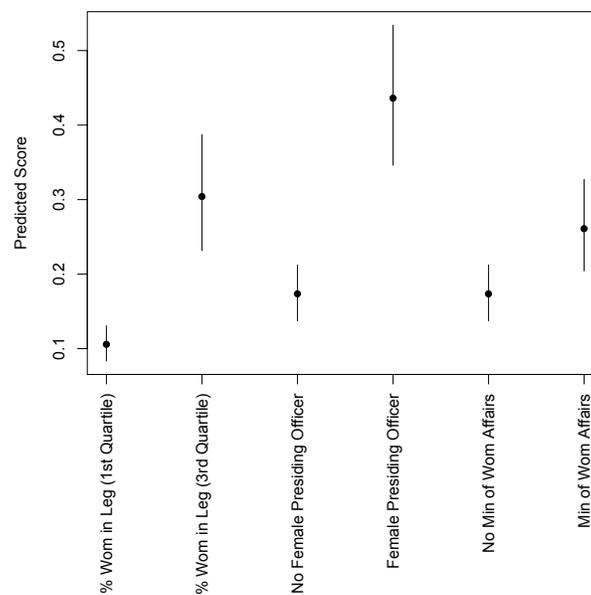
Note: In calculating the predicted median value for each predictor, all other covariates were held at their mean (for continuous variables) or modal (for categorical variables) values.

Table 4: Parametric Mixture Model of Gaussian Linear Regression (on the Log Scale) of the Gender Power Score of Cabinets Cross-Nationally (Cluster 3: Gender Equality Hypothesis)

	Estimate	Std. Error	t value	Pr(> t)
Intercept	-8.12	0.04	-191.10	0.00
HDI	0.92	0.05	19.12	0.00
Labor Force Participation	0.11	0.00	119.85	0.00
CEDAW	0.06	0.00	54.00	0.00
First Female Minister	0.02	0.00	26.80	0.00

Notes: The outcome variable is the log of the corrected Gender Power Score (GPS). N =17.

Figure 5: Predicted Median Values and 95% Highest Posterior Density Intervals of the Gender Power Score for Statistically Significant Variables (Cluster 3: Gender Equality Hypothesis)



Note: In calculating the predicted median value for each predictor, all other covariates were held at their mean (for continuous variables) or modal (for categorical variables) values.

Table 5: Standard Linear Regression (on the Log Scale) of the Gender Power Score of Cabinets Cross-Nationally

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-5.889	0.849	-6.935	0.000
Female Leader	0.112	0.305	0.367	0.714
% Women in Legislature	4.570	0.884	5.170	0.000
Female Presiding Officer	0.581	0.206	2.820	0.006
Ministry of Women's Affairs	0.445	0.208	2.137	0.035
Unified Gov.	0.210	0.193	1.089	0.279
Left Gov.	-0.080	0.177	-0.451	0.653
Presidential	0.721	0.242	2.983	0.004
Semi-Presidential	0.554	0.242	2.287	0.024
Competitiveness	0.355	0.492	0.722	0.472
Polity Score	0.093	0.028	3.290	0.001
Appoint Min	-0.261	0.207	-1.260	0.211
Majoritarian	0.070	0.228	0.308	0.759
Mixed	-0.900	0.243	-3.706	0.000
HDI	0.335	0.704	0.476	0.635
Labor Force Participation	0.047	0.014	3.446	0.001
CEDAW	0.014	0.015	0.958	0.341
First Female Minister	-0.001	0.006	-0.216	0.830

Notes: The outcome variable is the log of the corrected Gender Power Score (GPS). The baseline categories include: no female leader, no female presiding officer, no ministry of women's affairs, divided government, non-left government, parliamentary system, legislature does not oversee ministerial appointments, and proportional electoral systems. N =117.

The Gender Power Score

Table 1: Cabinets by Gender Power Score

Hungary (0.00)	Japan (0.18)	Mozambique (0.62)
Tajikistan (0.00)	Republic of Congo (0.19)	Colombia (0.65)
Sudan (0.01)	Mauritania (0.19)	Liberia (0.66)
Lebanon (0.01)	Cameroon (0.20)	Uruguay (0.67)
Tunisia (0.02)	Greece (0.20)	Uganda (0.69)
Ukraine (0.02)	Jamaica (0.21)	Guinea-Bissau (0.70)
Pakistan (0.02)	Czech Republic (0.21)	Ghana (0.73)
Brazil (0.02)	CAR (0.21)	Namibia (0.76)
Yemen (0.02)	Russia (0.21)	Niger (0.79)
Kyrgyzstan (0.02)	Senegal (0.21)	Belgium (0.79)
Sri Lanka (0.03)	Latvia (0.21)	USA (0.87)
Papua New Guinea (0.03)	Zambia (0.22)	Burundi (0.88)
Georgia (0.03)	Portugal (0.23)	Poland (0.88)
Thailand (0.03)	Nigeria (0.25)	New Zealand (0.96)
Turkey (0.04)	Mongolia (0.26)	Gambia (0.98)
Israel (0.04)	Haiti (0.26)	Moldova (1.00)
Slovakia (0.04)	Estonia (0.27)	Slovenia (1.00)
Togo (0.04)	Nepal (0.27)	Lesotho (1.02)
Guatemala (0.05)	Bolivia (0.29)	Canada (1.05)
Albania (0.05)	Indonesia (0.30)	Costa Rica (1.16)
Paraguay (0.06)	Chad (0.32)	Panama (1.24)
Cambodia (0.06)	Romania (0.33)	Trinidad and Tobago (1.28)
India (0.06)	Kenya (0.35)	Ecuador (1.36)
Lithuania (0.06)	Ireland (0.35)	Australia (1.39)
Mauritius (0.07)	Italy (0.35)	Austria (1.46)
Algeria (0.08)	Timor-Leste (0.40)	Peru (1.56)
Egypt (0.08)	Botswana (0.40)	France (1.60)
Malaysia (0.08)	Burkina Faso (0.40)	Netherlands (1.61)
Sierra Leone (0.09)	Mali (0.43)	Germany (1.63)
Philippines (0.10)	Venezuela (0.44)	Rwanda (1.70)
DRC (0.11)	Guyana (0.44)	Argentina (1.79)
Ethiopia (0.13)	Honduras (0.45)	Chile (1.87)
Cote d'Ivoire (0.13)	Serbia (0.48)	South Africa (2.03)
Armenia (0.13)	Tanzania (0.54)	Denmark (2.26)
Croatia (0.13)	United Kingdom (0.55)	Sweden (2.30)
Macedonia (0.13)	Angola (0.57)	Switzerland (2.77)
Mexico (0.14)	Nicaragua (0.57)	Spain (2.91)
Benin (0.14)	Bulgaria (0.58)	Norway (2.96)
Gabon (0.14)	Malawi (0.59)	Finland (3.67)

Figure 1 shows the percentage of women in different types of cabinet positions (masculine, neutral, and feminine or high, medium, and low) disaggregated by country. Along the x-axis are the countries, ranked by their GPS value. This figure illustrates the variation within individual cases across the seven variables that define the score. For example, many countries have a high percentage of women in low prestige ministries, yet the percentage of women in feminine ministries is much lower (because women are receiving low-prestige but gender neutral portfolios.)

Figure 1: Distribution of Ministries by Country

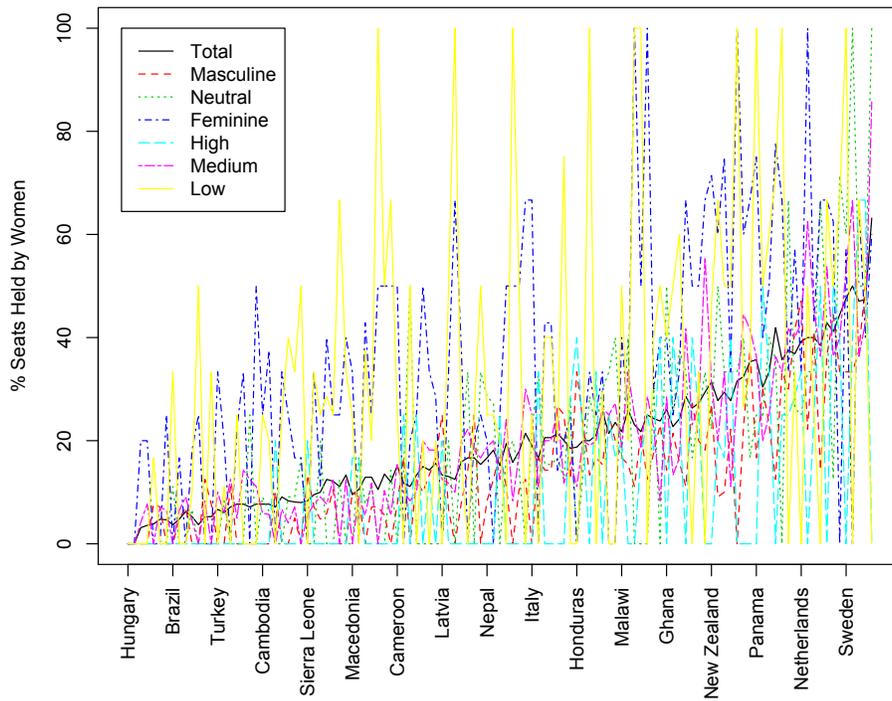
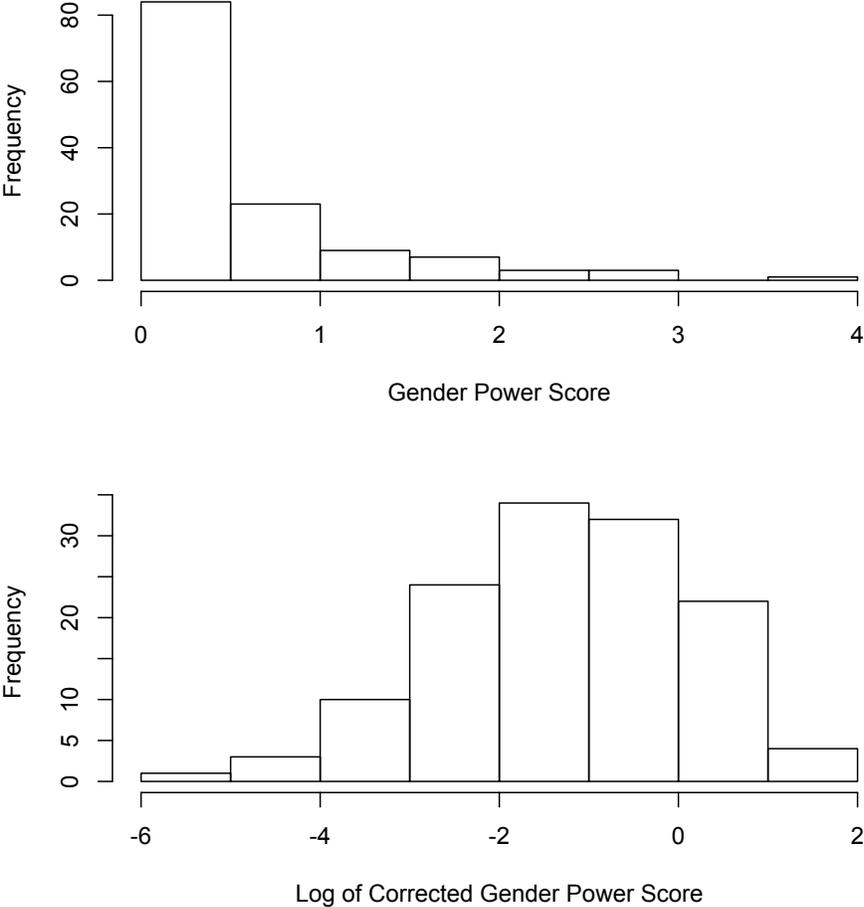


Figure 2 presents histograms of the GPS both before and after the correction and log transformation. The first plot indicates that the variable is right-skewed and thus needs to be normalized prior to specifying a Gaussian linear regression model. The second plot demonstrates that the data follow a normal distribution following the log transformation.

Figure 2: Histograms of the Gender Power Score



Computing the Threshold λ

The finite mixture model approach use the posterior probability, $\zeta_{i,m}$, that observation i is consistent with theory m both to cluster each observations into one of the three models and to weight the observations when calculating coefficient values and standard errors. Using these posterior inclusion probabilities, the researcher can determine which observations are consistent with each of the three hypotheses, and which cases are not consistent with any theory. In order to do this, it is necessary to select a threshold λ above which observation i is considered consistent with theory m .

Rather than selecting an arbitrary threshold, drawing on Imai and Tingley (2010) we calculated the value of λ that would allow us to classify as many observations as possible while ensuring that the rate of false positives did not exceed a reasonable threshold (in this case $\alpha = 0.05$). From their paper, we implemented the following formula in R:

$$\lambda = \inf \left\{ \lambda : \frac{\sum_{i=1}^N \sum_{m=1}^M (1 - \zeta_{i,m}) \mathbf{1}\{\zeta_{i,m} \geq \lambda\}}{\sum_{i=1}^N \sum_{m=1}^M \mathbf{1}\{\zeta_{i,m} \geq \lambda\} + \prod_{i=1}^N \prod_{m=1}^M \mathbf{1}\{\zeta_{i,m} < \lambda\}} \leq \alpha \right\} \quad (1)$$

The code for the function is as follows:

```
### alpha is the significance level
### post is the matrix of posterior weights

get.lambda<-function(alpha,post){
f<-function(lambda,alpha,post){
  post.logical<-1*(post>=lambda)
  x<-sum((1-post)*post.logical)/(sum(post.logical)+prod(1-post.logical))
  y<-1*(x>alpha)
  return(y+lambda)
}
```

where the $\zeta_{i,m}$ were calculated using the GrShn and Leisch (2008) flexmix package. Applying this to our data, we found that for our α -level, $\lambda = 0.61$.