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

Mona Lena Krook Rutgers University
Diana Z. O'Brien University of Southern California

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 posit three competing theoretical explanations: political institutions, social indicators of gender equality, and broader trends in women's political recruitment. To test these hypotheses, 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. Using a finite mixture model to evaluate competing hypotheses, we find that political variables—rather than social factors—have the strongest impact on gender parity in cabinets.

Historically, women have been found to hold fewer cabinet positions, and where they have been appointed, they are 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).[1] These traditional distributions suggest 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, including Chilean president Michelle Bachelet in 2006 and Spanish prime minister José Luis Rodríguez Zapatero in 2004 and 2008. Others have pledged to improve the proportion of women in government, as French president Nicolas Sarkozy and Italian prime minister Silvio Berlusconi did in 2007. Women have also been 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. At the same time, more leaders, like British prime minister David Cameron, Canadian prime minister Stephen Harper, and South African president Jacob Zuma have been criticized for including low numbers of women in their cabinets.

These developments suggest that previous gender distributions may be eroding, opening up opportunities for women to rise to positions of executive power. Yet, there is reason for lingering skepticism. On the one hand, there is continued resistance even when women's numbers are small. In April 2009, Israeli newspapers aimed at ultra-Orthodox Jewish readers altered photos of the new cabinet to erase the two female ministers. Similarly, in September 2009 the Iranian parliament rejected two of the three women nominated by President Mahmud Ahmadinejad, the first women proposed in the 30-year history of the Islamic republic. On the other hand, the appointment of women to cabinet posts does not necessarily signify dramatic shifts in gendered patterns. In resigning her position as Minister of State for Europe in 2009, Caroline Flint accused British prime minister Gordon Brown of using

[1]An online appendix with supplementary material for this article is available at http://journals.cambridge.org/jop. Data and supporting materials necessary to reproduce the numerical results will be made available at obrien.wustl.edu upon publication.

The Journal of Politics, Vol. 74, No. 3, July 2012, Pp. 840–855 doi:10.1017/S0022381612000382
© Southern Political Science Association, 2012
ISSN 0022-3816

women as "window-dressing" but excluding them from "real" power.

These conflicting messages raise questions about how these developments might be explained and what they might mean for traditional gender norms. Despite growing media attention, there has been relatively little research on women in cabinets, although these are among the most powerful political positions (Davis 1997; Studlar and Moncrief 1999). Existing work is dated in terms of the years studied (Reynolds 1999; Siaroff 2000; Whitford, Wilkins, and Ball 2007) and largely focuses on 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).

Understanding current patterns, however, does not simply require examining more recent data in a wider range of states, using traditional methods. Rather, we argue, it necessitates rethinking this question at a theoretical, empirical, and methodological level by (1) integrating other literatures that might provide insights into the sources of cross-national variations, (2) developing an outcome variable which recognizes that women's numbers may not be correlated with the gender or prestige of the portfolios to which they are assigned, and (3) utilizing a novel approach to theory testing.

In this article, we fill the first gap by drawing on a variety of literatures to posit three theories regarding women's cabinet status. The *institutional hypothesis* points to the role of political institutions in influencing government-formation processes (Strøm, Budge, and Laver 1994; Tremblay 2008). The *gender equality hypothesis* draws on stratification (Blumberg 1984; Chafetz 1990) and modernization (Inglehart and Norris 2003) theory to point to the status of women and government commitments to women's rights. The *political elite hypothesis*, finally, utilizes research on political recruitment (Norris and Lovenduski 1995; Randall 1982) to suggest that trends in women's access to politics affect the supply of and demand for female nominees and their placement in less traditional policy areas.

The second issue we address by devising a Gender Power Score (GPS) to better capture the position of women in cabinets cross-nationally, using data on women in 117 cabinets as of August 2009.[2] Country scores are based on the proportion of female cabinet ministers, as well as the gender and prestige of their posts, with greater weight given to nominations breaking most with traditional distributions. This measure recognizes that the number of women may not match the gender and prestige of the portfolios to which they are assigned. In some cases, women may hold many positions but be concentrated mainly in feminine and low-prestige ministries, while in others they may occupy few cabinet posts but be allocated masculine and high-prestige portfolios. Including data on all three dimensions is thus necessary to assess and compare women's cabinet status across countries more holistically, acknowledging distinct pathways for achieving greater equality in cabinet nominations.

The third concern we answer by employing a finite mixture model, an approach that allows us to judge the merits of each theory based on the number of countries that it classifies well. This method is particularly appropriate, given that we seek to evaluate multiple hypotheses, each of which must be operationalized via several explanatory variables. It also provides the additional benefit of allowing for causal complexity in accounting for women's cabinet status across all countries. Our findings indicate greatest support for the elite hypothesis, followed by the institutional hypothesis, suggesting that political variables 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 mixture model provides a better fit with the data. We conclude with thoughts on the implications for the study of cabinets and women in politics, as well as for future research.

Previous Research on Gender and Cabinets

Political elites have long been drawn from dominant groups. Over time, however, there has been a shift in many countries towards the belief that 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 of the sexes: in the early 1990s parity cabinets existed only in Finland, Norway, and Sweden (Davis 1997, 14), but in recent years these countries with more than 50% women have grown more diverse to include Chile, Spain, Switzerland, and South Africa. Today most cabinets include at least one woman, indicating a shift from the earlier norm of all-male governments (Escobar-Lemmon and Taylor-Robinson 2009).

[2]We limit our analysis to nonauthoritarian regimes, recognizing that cabinets serve different functions across democratic and nondemocratic governments (Gandhi and Przeworski 2007).

Prior patterns have their roots in gender norms, assigning primary responsibility for affairs in the public sphere to men and a central role in the private sphere to women. Increased nomination of women to cabinets thus has the potential to overturn long-standing gender roles. At the same time, in a process that Borrelli describes as "regendering" (2002, 22), women and men may ostensibly be nominated to the same office but then be directed to assume gender-specific responsibilities. 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 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, employment, equipment, and the budget. More recent research finds that these trends have endured, but suggests that there are also more gender-neutral policy areas, 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 and specializations inside and outside parliament, as well as broader 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 in the preferences of female cabinet appointees (Heath, Schwindt-Bayer, and Taylor-Robinson 2005). All the same, in some cases these linkages have been broken, with women assuming prominent roles as ministers of defense and foreign affairs (cf. Escobar-Lemmon and Taylor-Robinson 2009).

Above and beyond their gendered nature, cabinet assignments also differ in other ways: the amount of media attention they receive, the extent to which they can be used as a stepping stone to higher office, and their authority within the cabinet (Laver and Hunt 1992; Rose 1987; Warwick and Druckman 2006). These variations are reflected in the notion of "inner" and "outer" cabinets, which tend to distinguish the prestige of ministries like defense, finance, and foreign affairs from the rest (Dogan 1989). The portfolios traditionally allocated to women have rarely been part of the inner cabinet (Davis 1997; Lovenduski 1986). However, the relationship has grown less clear over time: women have received more prestigious assignments, serving in high visibility and well-resourced positions (Escobar-Lemmon and Taylor-Robinson 2005).

While the most prestigious appointments are invariably masculine, gender and prestige categories do not map perfectly onto one another (Studlar and Moncrief 1999). 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 ones—like science and technology—are low prestige. This qualifies the assumption that feminine portfolios are intrinsically inferior, given that education, health, and welfare entail some of the largest state expenditures (Moon and Fountain 1997). Sexed patterns nonetheless remain, with progress in women's access across prestige categories being uneven (Escobar-Lemmon and Taylor-Robinson 2005; Studlar and Moncrief 1999).

Prior research thus indicates that numbers, gender, and prestige entail related but distinct outcomes, making it important to consider all three in cross-national comparisons. Despite this, few studies have explored all three trends in global perspective to discern the broader meaning of women's cabinet appointments. Rather, scholars have either explained a subset of these trends in multiple countries (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2005, 2009; Russell and DeLancey 2002) or analyzed all three in a single case (Moon and Fountain 1997; Studlar and Moncrief 1999). Yet, disparities across outcomes provide little guidance for assessing overall patterns. Further, in the absence of comparisons, it is not clear whether trends in one case generalize to others.

Theories of Women's Access to Power

To address the question of cross-national variations, we draw on a variety of literatures to elaborate three competing theories that might explain patterns of political appointment with respect to women. The first concerns the *structure of political institutions*, which influence the degree to which nominators may feel pressured to include and place women in less conventional portfolios. The second focuses on a *gender equality* ethos created by both women's status in society and government commitments. The third argues that *women's presence among political elites* shapes both the supply of, and demand for, more and nontraditional female cabinet appointments.

Political Institutions

The role of institutions has been the subject of extensive research in political science. Cabinet formation studies have identified the constraints that institutions pose for the bargaining power of coalition partners (Strøm, Budge, and Laver 1994), as well as how institutions influence appointments through the structure of executive-legislative relations (Laver and Shepsle 1994). Literature on gender and politics has found, similarly, that institutions shape the relationship between gender norms and the public sphere (Kittilson and Schwindt-Bayer 2010) and inform elite calculations concerning the selection of women (Tremblay 2008). Institutional arrangements also influence women's access to positions of power within legislatures (O'Brien 2012). Variation in appointment procedures, for example, has been shown to influence women's access to high-prestige and masculine committee assignments (Heath, Schwindt-Bayer, and Taylor-Robinson 2005). Taken together, this work suggests that political institutions may inform women's cabinet appointments in terms of who controls and influences nominations, as well as the considerations that go into balancing appointments among members of different groups.

The institutional hypothesis predicts that pressures for gender-equal cabinet appointments *emanate from the political system*. Institutions might shape women's prospects to the degree that they structure the incentives of political actors to be more attentive to descriptive characteristics. We theorize that these will be affected by the *form of government*, with coalitions reducing the number of positions available per party; the *electoral system*, reflecting the extent to which multiple groups are expected and able to be incorporated; and the *system of government* and *degree of legislative control*, influencing legislature strength vis-à-vis the executive. Incentives may also be linked to dynamics connected to institutions like the *ideology of the ruling party* and *degree of democracy*, shaping principles behind appointments, and the *closeness of partisan competition*, leading to enhanced nomination of women to attract female voters.

Gender Equality

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 propose that inequalities between women and men are inversely related to women's level of economic power (Blumberg 1984; Chafetz 1990). Modernization theories predict that improvements in prosperity levels may empower diverse groups by offering opportunities to assume new social and economic roles (Inglehart and Norris 2003), while also leading citizens to embrace "post-materialist" values like gender equality (Inglehart 1997). In countries where women's economic status is high and women's rights to participate in the public sphere are widely accepted, the electorate is less likely to object to women's participation in cabinets. Moreover, women's presence in public life may make it increasingly difficult to exclude them from these posts. Women may thus be more likely to be considered as nominees and placed in more masculine and higher-prestige positions in these states.

The equality hypothesis thus argues that pressures for inclusive cabinets *emanate from the broader society*. It proposes that women's cabinet status is best explained by the degree to which traditional gender norms have declined. We theorize that states in which men and women participate in the public sphere through similar rates of *economic* and *political participation* will see greater gender parity in cabinet appointments due to changed expectations concerning women's appropriate roles. An ethos of gender equality can be further cultivated when governments make explicit *commitments to women's rights*, legitimizing and lending state support to efforts to equalize opportunities between women and men, and where social change has been facilitated through *increased levels of development*, eroding customary power structures and altering how ordinary citizens think about gender equality.

Women in Politics

A third possibility is suggested by the literature on political recruitment. Seeking to explain 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 and the "demand" for female aspirants on the part of political elites (Norris and Lovenduski 1995; Randall 1982). This framework suggests that in countries where women have made substantial inroads into politics, there may be a greater supply of potential female appointees. At the same time, women's presence may contribute to a breakdown of traditional gender norms. In such cases, governments may express a greater demand for female nominees—or be less able to exclude women or deny them masculine and high-prestige assignments.

This hypothesis, in other words, expects that pressures to place women in diverse cabinet portfolios

emanate from the composition of the political elite. Extending the observation that male and female elites tend to look like each other (Phillips 1995), this view suggests that what matters is not whether the average female citizen is empowered, but rather whether some women already occupy important political positions. We theorize that women's access to *political roles*, whether in the *legislative* or the *executive* branch, affects the supply of potential female ministers and whether they are considered for less traditional positions. Women's prospects are also likely to be shaped by dynamics of demand, which we expect to be linked to the *influence of women—individually* or as a *group*—in appointments, as well as by the *existence of cabinet seats on gender issues* that often guarantee women at least one portfolio.

Data and Operationalization

To test these competing theories, we compiled an original dataset coding the sex of cabinet ministers, as well as the gender and prestige of their appointments, in 117 countries in August 2009. Although a cross-sectional lens does not permit us to track developments or draw conclusions about trends at other points in time, it does enable us to undertake comparisons across a larger number of states and in a more recent period than has been analyzed in existing work. We drew on this data to create a novel outcome variable, the Gender Power Score (GPS), to capture women's overall status in relation to all three dimensions. In this section, we explain the criteria used to code the number, gender, and prestige of women's appointments and the variables used to operationalize each of the three hypotheses.

The Gender Power Score

Traditional approaches to studying cabinets have focused on developing typologies of cabinet positions (Blondel and Thiebault 1991), mapping career paths to cabinet appointments (Silberman 1993), and theorizing portfolio allocations among coalition partners (Laver and Hunt 1992; Warwick and Druckman 2006). 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. Yet, these latter studies 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). 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 trade-offs between a growth in numbers and changes in patterns of gender and prestige.

Given wide variations across these three outcomes within individual cases,[3] we conceived a measure for assessing a country's progress away from traditional patterns of low numbers of women appointed exclusively to feminine and low-prestige portfolios, combining information on all three dimensions in order to better compare the overall degree to which gender parity had been achieved. We calculated the *numbers* of women based on the data for August 2009 reported in the Central Intelligence Agency's (CIA) online directory, Chiefs of State and Cabinet Members of Foreign Governments.[4]

Drawing on the extensive feminist literature on the public-private divide (Elshtain 1981; Gatens 1991; Landes 1998), we defined the *gender* of cabinet portfolios according to whether they touched on concerns tied to the public sphere of politics and the economy, including religion and wage labor, *and* have been historically associated with men (Ortner 1972), or to the private sphere of home and the family, including care and education, *and* have been linked closely to women (cf. Gilligan 1982). This double definition meant that the distinction was not simply about the public/private nature of the issues at hand, but also about what portfolios signified normatively in relation to traditional views on men's and women's roles. Portfolios coded as "masculine" were ministries like agriculture, defense, finance, foreign affairs, and labor. Those that were categorized as "feminine" comprised of topics like children, education, health, and women's affairs. Ministries that addressed a public or private dimension—like transportation or housing—but were not linked symbolically to one sex were classified as "neutral," together with ministries not clearly conforming to either criterion, such as justice and

[3]See the Technical Appendix for a visual representation of this variation.

[4]https://www.cia.gov/library/publications/world-leaders-1/index.html. Only individuals with the title of minister or secretary were included.

tourism. For more details on how ministries were coded, see Table 1.[5]

Determining the *prestige* of cabinet positions required a parallel set of coding decisions. Since the seminal contribution of Laver and Hunt (1992), comparative politics scholars have struggled to rank portfolios, recognizing that their importance may vary across national contexts (Warwick and Druckman 2006). These challenges have led scholars interested in exact rankings to use expert surveys from a limited range of countries. Such nuanced lists, however, are not necessary when the focus is on broad categories: much of the literature acknowledges that across countries there is a shared understanding—however rough—of the relative importance of different ministries.

To this end, we drew on the template devised by Escobar-Lemmon and Taylor-Robinson (2005) for Latin America and expanded each category to reflect the range of ministries witnessed at the global level. ''High-prestige'' positions were distinguished in terms of their visibility and significant control over policy. We placed defense, finance, foreign affairs, and home/internal affairs in this category. ''Medium-prestige'' positions, in contrast, controlled significant financial resources but had lesser status and visibility, encompassing agriculture, education, planning, and transportation. ''Low-prestige'' positions, finally, were characterized by lack of resources for patronage, referring to ministries like culture, sports, and tourism. For more details on coding, see Table 2.

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

The procedure for creating a country's GPS can be illustrated with reference to Finland, the state with the highest score in 2009.[6] Women occupied 50% of masculine, 100% of neutral, and 60% of feminine positions; 0% of high-prestige, 86% of medium-prestige, and 0% of low-prestige posts; and 64% of all portfolios. The equation was:

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

The largest score possible is 12, reflecting an all-female cabinet. However, a parity cabinet 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. Women thus exceeded parity in Finland. Most states, in contrast, are well below this mark, with a median score of 0.21 and a mean score of 0.49.

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 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 credit for women's nomination 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 these portfolios mitigates their impact on the overall score.

In contrast, evaluating countries along a single dimension offers only a partial view. On the GPS, Finland ranks close to Norway (2.96), Spain (2.91), and Switzerland (2.77). In terms of gender, however, it compares more closely to France (with a high proportion of masculine positions but only half as many women, resulting in a GPS of 1.60) and Gambia (with nearly identical proportions of neutral and feminine positions but much lower numbers and share of masculine portfolios, leading to a GPS of 0.98). With regard to prestige, finally, Finland is similar to 75 states in having no women in high-prestige positions and 37 in having no women in low-prestige positions. It shares this rank with the worst performing cases, including Hungary and Tajikistan (0.00) and Sudan and Lebanon (0.01). A combined measure thus better captures broader trends than single outcomes, while acknowledging diversity in the ways in

[5]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 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. We employed similar rules when determining prestige levels.

[6]See the Technical Appendix for a full list of country scores.

TABLE 1 Distribution of Ministries by Gender Type

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

which patterns of gender inequality can be challenged and overcome.

The Institutional Hypothesis

We operationalized the institutional hypothesis by coding the form of government as unified if a single party ruled and as a coalition if multiple parties were represented in the cabinet. Data was taken from Banks et al. (2009) and updated as necessary from government and party web sites. The logic was that if a party can fill all cabinet posts, it would be more likely to appoint members from a diverse range of groups (Davis 1997; Reynolds 1999). Conversely, if

TABLE 2 Distribution of Ministries by Prestige Type

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

[1]For OPEC members, any ministry having to do with natural resources, oil, or energy is considered to be high prestige. OPEC members in our sample 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.

portfolios are distributed across multiple parties, this reduces the posts available, undercutting opportunities to "balance" nominations (Escobar-Lemmon and Taylor-Robinson 2005). By the same token, we anticipated that an electoral system based on proportional representation, with higher district magnitudes, would—as it has for women's legislative representation (Tremblay 2008)—cultivate expectations about gender balance. Although the link to cabinet nominations is indirect, we argue that adopting an inclusive approach at one stage would make it difficult to be exclusive at another. We classified systems as proportional, majoritarian, and mixed based on data from the International IDEA.[7]

The system of government was treated as a categorical variable distinguishing between parliamentary, presidential, and semi-presidential regimes, using data from Clark, Golder, and Golder (2009) and Elgie (2007), supplemented by Banks et al. (2009) and government web sites. Executive-legislative relations play a central role in structuring the nomination process, but the direction of effects is not straightforward. Leaders in presidential systems do not need to maintain majority legislative support and may go outside the legislative body to make their selections. However, while lack of legislative input may weaken perceived obligations to take descriptive features into account, this autonomy may also enable presidents to pursue diversity without the constraints of legislative pressure. In contrast, governments in parliamentary systems must have the support of the legislative majority. Yet, while legislatures may enhance pressures for inclusiveness, an increase in the number of veto players may also block such opportunities. The same may hold for semi-presidential systems, where leaders may disagree over who should be appointed (Jensen 2008). We tested these competing predictions, as well as the possibility that these effects were due instead to the degree of legislative control per se by including an additional dichotomous measure capturing whether legislators are involved in the appointment process, using data from Fish and Kroenig (2009).

In addition to these structural features, we expected that the partisan and democratic nature of institutions would play a role in shaping incentives with regard to cabinet nominations. Left-wing governments have been found to be more likely than those on the right to appoint female ministers (Moon and Fountain 1997; Reynolds 1999) and to assign them to a variety of portfolios (Studlar and Moncrief 1997). Conservative parties, in contrast, typically seek to preserve traditional gender roles. We categorized governments as left- or right-leaning based upon the partisan allegiances of the head of government, with data from Banks et al. (2009), updated as necessary. Degree of democracy, we anticipated, would contribute to an enhanced culture of inclusion as the more democratic a state was, the more difficult it would be to exclude members of half of the population from consideration. We measured this using the Polity IV index.[8]

Addressing a final feature of institutions combining partisan and democratic elements, we recorded the closeness of partisan competition, on the grounds that competition among parties may lead to efforts to appeal to female voters by nominating women (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2005; Studlar and Moncrief 1997). We reasoned that as the electoral landscape grew more competitive, parties would seek to capture women's support, leading them to showcase their commitment to inclusion through the recruitment of women to a diverse range of portfolios. We measured this variable 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*.[9]

The Equality Hypothesis

To assess the power of the equality hypothesis, we recorded the rate of female labor-force participation as a measure of women's status as economic actors, noting the percentage of the workforce that was comprised of women in 2008 based on data from the World Bank's *Gender Statistics Data Base*.[10] Wage labor not only entails exposure to the public sphere, but also gives women resources and skills that may lead them to become politically engaged (Iversen and Rosenbluth 2008). Given our focus, we measured women's status as political actors in terms of the number of years since the first female cabinet minister was appointed, reasoning that countries with a historical legacy of women's cabinet participation may be more likely to

[7]http://www.idea.int/esd/glossary.cfm.

[8]http://www.systemicpeace.org/polity/polity4.htm. We also coded cases using Freedom House classifications for countries that were "free" and "partially free" (see the Technical Appendix). As the analysis reached similar results, we opted for the Polity measure due to its focus on executive power.

[9]http://www.ipu.org/parline/

[10]http://databank.worldbank.org/

have a government tradition of including women, at the same time that citizens would be more accustomed to seeing women in this role. We calculated this variable based on the listing provided by the *Worldwide Guide to Women in Leadership*.[11]

State commitments, in turn, reflect the nature of government discourse on gender equality. Although these may be captured in various ways, one indicator is 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. As of May 2009, 186 states had signed CEDAW, with only seven member states not ratifying the treaty. There is much greater cross-national variation, however, in years since CEDAW ratification, ranging from 0 (not ratified) to 29 (ratified in 1980).[12] We employed this latter measure on the grounds that swift signing may signal strong commitment from an early stage and a greater length of time for the treaty's provisions to become part of elite discourse.

Lastly, cross-national research has found that modernization contributes to the emergence of new values that shape citizens' attitudes and behaviors, including a change in traditional gender roles (Inglehart and Norris 2003). We coded development levels using the United Nations Development Programme's Human Development Index (HDI) for the year 2007,[13] quantifying countries' average achievement in three areas: life expectancy at birth, adult literacy rates and gross enrollment in education, and gross domestic product (GDP) per capita.[14] As others have also argued (Escobar-Lemmon and Taylor-Robinson 2005; Russell and DeLancey 2002), this index is preferable to GDP per capita on its own, as it provides a fuller gauge of societal levels of well-being on dimensions that have been found to transform the degree to which citizens embrace the principle of gender equality.

The Elite Hypothesis

To evaluate the elite hypothesis, we operationalized political roles by considering first, whether a woman had served as the presiding officer of the national parliament and, second, whether a woman was currently the president or prime minister. In both instances, women's presence indicates that some women, at least, have been able to garner high-level political positions, accumulate experience for diverse cabinet assignments, and contribute to women's visibility in the public realm. For the first variable, data was taken from the *United Nations Human Development Report 2009*.[15] Data on female national leaders was taken from the CIA *Chiefs of State and Cabinet Members of Foreign Governments* web site.

Women's influence was conceptualized in terms of the presence of a female national leader and the percentage of women in parliament. Given their own status as women in a ''man's world,'' female leaders may feel less inclined to preserve gender roles, although prior evidence on these accounts is admittedly mixed (Davis 1997; Jensen 2008). By the same token, female MPs may play a role on the demand side in lobbying governments to include and assign women to less traditional cabinet portfolios, pressures which are likely to be greater as women's numbers increase. On the supply side, they may also form part of the broader pool of potential cabinet ministers (Davis 1997; Escobar-Lemmon and Taylor-Robinson 2005; Moon and Fountain 1997; Reynolds 1999; Siaroff 2000; Whitford, Wilkins, and Ball 2007). Data on women's presence in legislatures when nominations were made came from the Inter-Parliamentary Union's web site on *Women in National Parliaments*.[16]

The final demand-side variable included in the analysis was the existence of a ministry of women's affairs. Although there are some exceptions, these ministries are almost always headed by women. Of course, if this is the only portfolio that women hold, it will have only limited influence on the GPS, as such ministries are classified as feminine and low-prestige. However, we theorized that presence via this means can break the initial barrier of women's appointment. This may lead to a norm of including women and could also afford individual female politicians an opportunity to gain valuable experience and exposure that might lead to less feminine and more prestigious appointments in future cabinets. We coded this as a binary variable, using data from the CIA.

[11]http://www.guide2womenleaders.com/First-female-ministers.htm

[12]United Nations Development Programme (2009, 163–66)

[13]United Nations Development Programme (2009, 171–74)

[14]We selected the HDI over the UNDP's Gender Development Index because it has fewer missing observations. As the two indexes are highly correlated, however, this poses no problem for the analysis.

[15]United Nations Development Programme (2009, 186–89)

[16]http://www.ipu.org/wmn-e/classif.htm

Explaining Women's Cabinet Appointments

Rather than comparing a single theory to an alternative hypothesis of a null effect, we posited three frameworks explaining women's cabinet appointments, which we operationalized using three sets of covariates. The standard empirical strategy would be to estimate a single regression model that included all covariates and then to compare the sign and significance of the coefficient estimates. As each hypothesis in this study includes multiple measures, this conventional approach would look for all—or the majority—of the covariates associated with one hypothesis to be significant, with those for the others being uncorrelated with the GPS.

In practice, variables from multiple hypotheses are likely to be associated with the outcome. A common means of interpreting this result would be that the analysis lends some support for each hypothesis. This approach, however, leaves us without a metric for comparing the relative importance of the three theories. At best, we can examine predicted differences for each set of covariates, while holding all others constant. This would indicate which sets of covariates have the largest impact, but would not tell us which hypothesis the majority of the data supports. Indeed, a variable may have a large effect that is driven by a small number of observations. In light of these limitations—and drawing on Imai and Tingley (2012)—we analyzed the data using a finite mixture model. This enables us to classify cases according to how well they fit each theory. As this method has not yet been extensively used in political science, we also fit a standard regression model and compare the two sets of results.

Methods

Finite mixture models are designed to accommodate data in which observations arise from more than one group, and these group affiliations are unknown a priori (Everitt and Hand 1981; McLachlan and Peel 2000). After specifying a model for each hypothesized subpopulation, this approach simultaneously tests whether clusters exist within the data and estimates the parameter values for each model in the mixture. Formally, finite mixture distributions can be described as

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

where π_j is the proportion of the sample that can be described by density f_j, and the f_j are density functions for different groups within the population.

Traditionally, finite mixture models are used to allow parameter values to vary across unobserved clusters, therefore increasing the flexibility of the model. Imai and Tingley (2012), in contrast, propose specifying a set of nonnested regression models, each of which captures an alternative theory. Using this approach, it is possible to compare the proportion of observations that are statistically significantly consistent with each model, and in turn, provide a measure of the explanatory power of the proposed hypotheses. In other words, 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. Given our three theoretical explanations, we assume that our population of cases has J=3 subpopulations, one associated with each hypothesis.[17]

Observations are clustered into the three models based on the conditional 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. To compare our competing theories—institutions, equality, and elites—we determined the proportion of observations that were statistically significantly associated with each of the three models containing our independent variables.

If almost all observations were consistent with a single cluster, this would provide strong support for the hypothesis operationalized via this model. In contrast, if most observations failed to be well classified by any model, this would indicate that none of the posited theories explained the variation in the GPS. To classify countries in this way, we selected a threshold λ and identified observation i as statistically significantly consistent with theory m if its conditional probability was greater than this threshold. To allow us to classify as many observations as possible, while also ensuring that the rate of false positives did not exceed a reasonable level, we drew on the approach suggested by Imai and Tingley (2012) to establish that for $\alpha = 0.05$ in our sample, $\lambda = 0.61$.[18]

In order to employ Gaussian (normal) linear regression models, the analysis required a minor transformation of the outcome variable. Because the

[17]The finite mixture model was fit using the flexmix package in R (Grün and Leisch 2008).

[18]See the Technical Appendix for the method used to calculate this threshold.

GPS is both bounded at zero and right-skewed, with many values near zero and a long right tail, we used a log transformation to normalize the score.[19] However, given that the log transformation can only be performed on the open interval—all cases must reflect a value above zero—we devised 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 to respect their marginal distributions. This maintained the relative values of the original score, such that the correlation between the two was 0.999.

Results

The conditional probabilities used to cluster our observations into subpopulations also enable us to determine which cabinets were significantly consistent with each of the three theories, and thus, which hypothesis—if any—explained the GPS for the majority of states. For 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.

As Table 3 shows, the majority of our observations were consistent with the elite hypothesis: nearly 60%—71 of 117 states—fell within this cluster with a high probability.[20] Though the majority of observations were explained by this theory, the institutional hypothesis captured 20% of the data well, amounting to 26 countries. The finite mixture model, in contrast, provided relatively little support for the gender equality hypothesis: only nine states were well-explained by this account. The remaining 11 observations did not cluster well.

The elite hypothesis resulted in a cluster of 72 cases, 71 of which could be considered well-classified.[21] Confirming the importance of both the supply of, and demand for, female candidates, a history of a female presiding officer was positively correlated with the GPS, as were the percentage of women in parliament and the existence of a ministry of women's affairs. The presence of a female national leader was not statistically significant (see Table 4). The institutional hypothesis, in contrast, led to a cluster of 28 countries, 26 of which could be considered well-classified. Our predictions were confirmed for the form of government, ideology of the ruling party, degree of democracy, and intensity of party competition. However, the electoral system and degree of legislative control were statistically significant, but in the opposite direction than we anticipated (see Table 5). The electoral system finding indicates that candidate selection approaches across the legislative and executive arenas are not necessarily related. A possible explanation may be the tendency of PR systems to generate coalition governments, which may in turn restrict women's appointment. Similarly, legislative strength vis-à-vis the executive branch did not result in a higher GPS, suggesting that powerful executives may offer opportunities for leaders to recruit women to diverse posts. Lastly, the equality hypothesis produced a cluster of 17 cases, nine of which are well-classified. All four factors used to operationalize this theory were positively correlated with the GPS (see Table 6).

Discussion

As finite mixture modeling allows for subpopulations within the data to be explained by different models, it provides a novel approach to theory testing. In grouping observations based on their probability of inclusion in each cluster, more specifically, it enables assessment of competing hypotheses based on the percentage of observations that are consistent with each theory. In our analysis, over 60% of the observations were well explained by the elite hypothesis, indicating strong support for this claim. However, the analysis also revealed that some cases were better classified by the models accounting for political institutions and indicators of gender equality. This, in turn, further supports our use of the finite mixture model—rather than a more conventional approach—as the cases in our sample appear to be drawn from different subpopulations.

The fact that over 80% of cases were best explained by the first and third theories suggests 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,

[19]See the Technical Appendix for the graphs illustrating this distribution and the log transformation.

[20]We also fit additional models to the individual measures that comprise the GPS—the logged percentage of women, the weighted gender measure, the weighted prestige measure, and each of the weighted measures multiplied by the percentage of women—and found that the elite hypothesis still classified the largest number of countries. See the Technical Appendix for details.

[21]Plots of the predicted values of this and the next two models are in the Technical Appendix.

TABLE 3 Inclusion Probabilities for all Cabinets Separated by Cluster

Cluster 1: Institutions				Cluster 2: Equality				Cluster 3: Political Elites							
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	$\zeta_{i,1}$	$\zeta_{i,2}$	$\zeta_{i,3}$
Cambodia	0.16	0.84	0.00	Angola*	0.47	0.00	0.53	Albania	1.00	0.00	0.00	Mauritius	1.00	0.00	0.00
Cameroon	0.26	0.73	0.01	Austria*	0.39	0.00	0.61	Algeria	1.00	0.00	0.00	Mexico	1.00	0.00	0.00
CAR	0.17	0.82	0.00	Australia	0.06	0.00	0.94	Argentina	1.00	0.00	0.00	Moldova	0.99	0.00	0.01
Colombia	0.00	1.00	0.00	Belgium*	0.41	0.00	0.92	Armenia	1.00	0.00	0.00	Mozambique	1.00	0.00	0.00
Costa Rica	0.37	0.63	0.00	Botswana	0.08	0.00	0.92	Benin	1.00	0.00	0.00	Netherlands	1.00	0.00	0.00
Ecuador	0.14	0.86	0.00	Denmark*	0.41	0.00	0.59	Bolivia	0.99	0.00	0.01	New Zealand	1.00	0.00	0.00
Ethiopia	0.25	0.75	0.00	Egypt*	0.46	0.00	0.54	Brazil	1.00	0.00	0.00	Nicaragua	0.98	0.00	0.02
Ghana	0.13	0.83	0.04	France	0.00	0.00	1.00	Bulgaria	1.00	0.00	0.00	Niger	1.00	0.00	0.00
Guinea-Bissau	0.15	0.85	0.00	India	0.02	0.00	0.98	Burkina Faso	1.00	0.00	0.00	Norway	1.00	0.00	0.00
Haiti	0.16	0.83	0.01	Italy*	0.42	0.00	0.62					Papua New Guinea	1.00	0.00	0.00
Honduras	0.19	0.81	0.00	Liberia	0.38	0.00	0.62	Burundi	0.99	0.00	0.01				
Hungary	0.00	1.00	0.00	Rwanda	0.07	0.00	0.93	Canada	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	Chad	1.00	0.00	0.00	Peru	1.00	0.00	0.00
Israel	0.01	0.99	0.00	Sweden*	0.41	0.00	0.59	Chile	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	Cote d'Ivoire	0.63	0.00	0.37	Poland	1.00	0.00	0.00
Kenya	0.20	0.79	0.01	Uruguay	0.33	0.00	0.67					Portugal	1.00	0.00	0.00
Malaysia	0.27	0.71	0.02	Yemen*	0.42	0.00	0.58	Croatia	1.00	0.00	0.00	Republic of Congo	1.00	0.00	0.00
Mail	0.08	0.92	0.00					Czech Republic	1.00	0.00	0.00				
Mongolia	0.02	0.98	0.00									Romania	1.00	0.00	0.00
Namibia	0.20	0.80	0.00					DRC	1.00	0.00	0.00	Russia	1.00	0.00	0.00
Nepal	0.19	0.81	0.00					Estonia	1.00	0.00	0.00	Senegal	1.00	0.00	0.00
Nigeria	0.28	0.72	0.00					Finland	1.00	0.00	0.00	Serbia	1.00	0.00	0.00
Pakistan	0.00	1.00	0.00					Gabon	1.00	0.00	0.00	Sierra Leone	1.00	0.00	0.00
Panama	0.00	1.00	0.00					Gambia	1.00	0.00	0.00	Slovakia	1.00	0.00	0.00
Tajikistan	0.00	1.00	0.00					Georgia	1.00	0.00	0.00	South Africa	1.00	0.00	0.00
Turkey*	0.35	0.36	0.29					Germany	1.00	0.00	0.00	Spain	1.00	0.00	0.00
United Kingdom*	0.43	0.57	0.00					Greece	1.00	0.00	0.00	Sri Lanka	1.00	0.00	0.00
								Guatemala	1.00	0.00	0.00	Switzerland	1.00	0.00	0.00
								Guyana	1.00	0.00	0.00	Tanzania	1.00	0.00	0.00
								Ireland	1.00	0.00	0.00	Thailand	1.00	0.00	0.00
								Japan	1.00	0.00	0.00	Timor-Leste	1.00	0.00	0.00
								Kyrgyzstan	1.00	0.00	0.00	Togo	1.00	0.00	0.00
								Latvia	1.00	0.00	0.00	Trinidad & Tobago	1.00	0.00	0.00
								Lebanon	0.96	0.00	0.04				
								Lesotho	1.00	0.00	0.00	Venezuela*	0.50	0.00	0.50
								Lithuania	1.00	0.00	0.00	Uganda	0.63	0.00	0.37
								Macedonia	1.00	0.00	0.00	Ukraine	1.00	0.00	0.00
								Malawi	0.80	0.00	0.20	United States	0.88	0.12	0.00
								Mauritania	1.00	0.00	0.00				
												Zambia	1.00	0.00	0.00

Note: The 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 Institutions ($\zeta_{i,1}$), Equality ($\zeta_{i,2}$), and Elites ($\zeta_{i,3}$) 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.

measures of women's status among political elites 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. What matters most, in other words, is women's status among political elites—not institutional factors or their broader status in society as a whole.

Further, the conditional inclusion probabilities generated by the analysis allow us to address the

Table 4 Coefficient Estimates and Standard Errors for Elite Component

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	-3.01	0.15	-19.71	< 0.001
Female Leader	0.31	0.21	1.45	0.15
%Women in Legislature	6.60	0.64	10.24	< 0.001
Female Presiding Officer	0.92	0.14	6.74	< 0.001
Ministry of Women's Affairs	0.41	0.13	3.10	< 0.001

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

criticism that institutions, equality, and elites are not distinct hypotheses, but instead capture one ethos regarding women's presence in public life. If this were true, we would expect many cabinets to have conditional inclusion probabilities that split either more evenly between the three hypotheses or between a subset of the clusters. A closer look at the list makes it clear that this is not the case. For example, most countries grouped in the elite cluster have high conditional inclusion probabilities and are not divided across the three clusters. A major advantage of finite mixture modeling 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 does not provide this information, obscuring knowledge about how cases are distributed across hypotheses.

Table 5 Coefficient Estimates and Standard Errors for Institutions Component

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	-2.27	0.04	-60.21	< 0.001
Unified Gov.	0.53	0.02	30.38	< 0.001
Left Gov.	0.83	0.02	50.34	< 0.001
Presidential	1.10	0.02	50.26	< 0.001
Semi-Presidential	0.87	0.02	41.99	< 0.001
Competitiveness	-0.38	0.05	-7.10	< 0.001
Polity Score	0.02	0.00	5.33	< 0.001
Appoint Min	-0.82	0.02	-44.92	< 0.001
Majoritarian	0.28	0.02	15.67	< 0.001
Mixed	-3.06	0.03	-113.06	< 0.001

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.

Table 6 Coefficient Estimates and Standard Errors for Equality Component

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	-8.12	0.04	-191.10	< 0.001
HDI	0.92	0.05	19.12	< 0.001
Labor Force Participation	0.11	0.00	119.85	< 0.001
CEDAW	0.06	0.00	54.00	< 0.001
First Female Minister	0.02	0.00	26.80	< 0.001

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

For the sake of comparison, the results of a standard linear regression model are presented in Table 7. This approach finds that the percentage of female MPs, a female presiding officer, a ministry of women's affairs, nonparliamentary regimes, degree of democracy, and women's wage labor are positively and significantly correlated with the outcome variable. As a whole, these results lend some support to all three hypotheses. At the same time, because variables representing each theory are associated with changes in the GPS, this model offers no metric for determining which hypothesis explains the majority of observations.

The standard approach also fails to account for subpopulations within the data. Treating all observations as drawn from one population biases the parameter estimates towards the null hypothesis. This occurs because each predictor is significant for only a subset of observations; for others, the relationship is zero. Compared to the standard regression, the coefficient estimates generated by the mixture model have smaller standard errors, even though the effective sample size is smaller. The left-government, competitiveness, and first female minister predictors, for example, have large standard errors in the traditional model—meaning that they are indistinguishable from zero. These variables are significant in the mixture model, as expected in the presence of subpopulations.

Assessing model fit using the Bayesian information criterion offers further support for our approach: the BIC of the mixture model (346.87) compares favorably with that of the standard regression (369.03). As an additional test, we also fit the model with a fourth component—identical to the standard regression—that included all the covariates. If the standard regression model were preferable to the mixture model, we would expect the mixture model with the largest penalized log-likelihood to

TABLE 7 Standard Linear Regression (on the log scale) of the Gender Power Score

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.89	0.85	-6.94	< 0.001
Female Leader	0.11	0.31	0.37	0.714
%Women in Legislature	4.57	0.88	5.17	< 0.001
Female Presiding Officer	0.58	0.21	2.82	0.006
Ministry of Women's Affairs	0.45	0.21	2.14	0.035
Unified Gov.	0.21	0.19	1.09	0.279
Left Gov.	-0.08	0.18	-0.45	0.653
Presidential	0.72	0.24	2.98	0.004
Semi-Presidential	0.55	0.24	2.29	0.024
Competitiveness	0.36	0.49	0.72	0.472
Polity Score	0.09	0.03	3.29	0.001
AppointMin	-0.26	0.21	-1.26	0.211
Majoritarian	0.07	0.23	0.31	0.759
Mixed	-0.90	0.24	-3.71	< 0.001
HDI	0.34	0.70	0.48	0.635
Labor Force Participation	0.05	0.01	3.45	0.001
CEDAW	0.01	0.02	0.96	0.341
First Female Minister	-0.00	0.01	-0.22	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.

include only this fourth component. Model fit should be improved when removing the components representing the three hypotheses and keeping only the single-regression model.

Estimating the model with different numbers of components and comparing the maximum likelihood solutions indicates that this is not the case. Even when including the full model as a component, the majority of observations clustered with the components representing the three alternative theories. Thus, the observations are better explained as a mixture of three subpopulations—each representing one hypothesis—rather than a single homogenous population. 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. On the one hand, a growing list of cabinets now include close to equal numbers of women and men, and more women are assuming nontraditional cabinet roles. On the other hand, women's appointments continue to be controversial, leading to criticism or rejection of female nominees, as well as claims by female ministers that they have been excluded from centers of decision-making power. Inspired by these competing evaluations, this article constructed a new measure of the status of women relative to men in three areas: overall distribution of portfolios; allocation of feminine, neutral, and masculine ministries; and assignment of low-, medium-, and high-prestige positions.

Drawing on a variety of literatures, we theorized that each country's score might be explained by one of three hypotheses: political institutions, gender equality, and women's political recruitment. We then analyzed the data with a finite mixture model. We found that this method better captures the data-generating process than the standard linear regression model used in previous studies. This new approach thus offers new insights into the role of different hypotheses, while also providing a better fit to the data than standard techniques.

Taken together, the results indicate that the third hypothesis on female elites explained more than 60% of our observations—but that the first theory regarding institutions also accounted for about 20% of the data. Political variables, rather than social factors, thus had the strongest impact on gender parity in cabinets. Perhaps the most striking finding was that in a majority of cases women's cabinet appointments were explained by the presence of more women among political elites—something that can be promoted through concrete political strategies like gender quotas—rather than by variables that are far more difficult to change, like the existence of favorable political institutions, changes in the status of ordinary women, or evolution of attitudes towards gender equality.

In this respect, the results provide cause for optimism. As opposed to being dependent on changes to the political system or deeply held gender norms, increasing the supply of female elites alone may improve women's access to positions of power within governments. Rapidly adopted in recent years, quotas have proven an effective means for increasing the numbers of women in political office (Krook 2009). Once successfully implemented over several elections, these policies may in turn increase women's access to ministerial posts. At the same time, however, our findings indicate that women's presence in high-level office may have little direct relationship to the position

of women within society. Existing research indicates that the election of more women may not change public attitudes (Kittilson and Schwindt-Bayer 2010), raising doubts as to the extent to which women's increased access to cabinet posts influences women in the population more generally.

These results have a number of implications for current and future research on gender and cabinet composition. First, we showed that women's rank in different areas may conflict and developed the GPS 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 in cabinets has evolved across time and space. Second, 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. 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 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 portfolios.

Acknowledgments

We would like to thank Mindy Sher for research assistance and to acknowledge the financial support of the Weidenbaum Center at Washington University in St. Louis. Earlier versions of the article were presented at the annual meetings of the American and Midwest Political Science Associations and the Women and Public Policy Program's Seminar Series at the Harvard Kennedy School, and we received useful comments from Farida Jalalzai, Claire Annesley, and Brian Crisp, as well as anonymous reviewers at the *Journal of Politics*.

References

Banks, Arthur, Thomas Christian Müller, William Overstreet, and Judith F. Isacoff, eds. 2009. *Political Handbook of the World 2009*. Washington, DC: CQ Press.

Blondel, Jean, and Jean-Louis Thiebault, eds. 1991. *The Profession of Government Minister in Western Europe*. London: MacMillan.

Blumberg, Rae. 1984. "A General Theory of Gender Stratification." *Sociological Theory* 2: 23–101.

Borrelli, MaryAnne. 2002. *The President's Cabinet*. Boulder, CO: Lynne Rienner.

Chafetz, Janet Saltzman. 1990. *Gender Equity*. Newbury Park, CA: Sage.

Clark, William Roberts, Matt Golder, and Sona Nadenichek Golder. 2009. *Principles of Comparative Politics*. Washington, DC: CQ Press.

Davis, Rebecca Howard. 1997. *Women and Power in Parliamentary Democracies: Cabinet Appointments in Western Europe, 1968–1992*. Lincoln: University of Nebraska Press.

Dogan, Mattei. 1989. *Pathways to Power: Selecting Rulers in Pluralist Democracies*. Boulder, CO: Westview.

Elgie, Robert. 2007. "What Is Semi-Presidentialism and Where Is It Found?" In *Semi-Presidentialism Outside Europe*, ed. Robert Elgie and Sophia Moestrup. New York: Routledge, 1–13.

Elshtain, Jean Bethke. 1981. *Public Man, Private Woman*. Princeton, NJ: Princeton University Press.

Escobar-Lemmon, Maria, and Michelle M. Taylor-Robinson. 2005. "Women Ministers in Latin American Government." *American Journal of Political Science* 49 (4): 829–44.

Escobar-Lemmon, Maria, and Michelle M. Taylor-Robinson. 2009. "Getting to the Top: Career Paths of Women in Latin American Cabinets." *Political Research Quarterly* 62 (4): 685–99.

Everitt, Brian S., and David J. Hand. 1981. *Finite Mixture Distributions*. London: Chapman & Hall.

Fish, M. Steven, and Matthew Kroenig. 2009. *The Handbook of National Legislatures: A Global Survey*. New York: Cambridge University Press.

Gandhi, Jennifer and Adam Przeworski. 2007. "Dictatorial Institutions and the Survival of Autocrats." *Comparative Political Studies* 40: 1279–2301.

Gatens, Moira. 1991. *Feminism and Philosophy*. Cambridge, UK: Polity.

Gilligan, Carol. 1982. *In a Different Voice*. Cambridge, MA: Harvard University Press.

Grün, Bettina, and Friedrich Leisch. 2008. "FlexMix Version 2: Finite Mixtures with Concomitant Variables and Varying and Constant Parameters." *Journal of Statistical Software* 28 (4): 1–35.

Heath, Roseanna M., Leslie A. Schwindt-Bayer, and Michelle M. Taylor-Robinson. 2005. "Women on the Sidelines: Women's Representation on Committees in Latin American Legislatures." *American Journal of Political Science* 49 (2):420–36.

Imai, Kosuke, and Dustin Tingley. 2012. "A Statistical Method for Empirical Testing of Competing Theories." *American Journal of Political Science* 56 (1): 218–36.

Inglehart, Ronald. 1997. *Modernization and Postmodernization*. Princeton, NJ: Princeton University Press.

Inglehart, Ronald, and Pippa Norris. 2003. *Rising Tide*. New York: Cambridge University Press.

Iversen, Torben, and Frances Rosenbluth. 2008. "Work and Power." *Annual Review of Political Science* 11: 479–95.

Jensen, Jane S. 2008. *Women Political Leaders: Breaking the Highest Glass Ceiling*. New York: Palgrave.

Kittilson, Miki Caul, and Leslie A. Schwindt-Bayer. 2010. "Engaging Citizens: The Role of Power-Sharing Institutions." *Journal of Politics* 72 (4): 990–1002.

Krook, Mona Lena. 2009. *Quotas for Women in Politics*. New York: Oxford University Press.

Landes, Joan B., ed. 1998. *Feminism, the Public, and the Private*. New York: Oxford University Press.

Laver, Michael, and W. Ben Hunt. 1992. *Policy and Party Competition*. New York: Routledge.

Laver, Michael, and Kenneth A. Shepsle, eds. 1994. *Cabinet Ministers and Parliamentary Government*. New York: Cambridge University Press.

Lovenduski, Joni. 1986. *Women and European Politics*. Brighton, UK: Harvester.

McLachlan, Geoffrey J., and David Peel. 2000. *Finite Mixture Models*. New York: John Wiley & Sons.

Moon, Jeremy, and Imogen Fountain. 1997. "Keeping the Gates? Women as Ministers in Australia, 1970–96." *Australian Journal of Political Science* 32 (3): 455–66.

Norris, Pippa, and Joni Lovenduski. 1995. *Political Recruitment*. New York: Cambridge University Press.

O'Brien, Diana Z. 2012. "Gender and Select Committee Elections in the British House of Commons." *Politics & Gender*. Forthcoming.

Ortner, Sherry B. 1972. "Is Female to Male as Nature Is to Culture?" *Feminist Studies* 1 (2): 5–31.

Phillips, Anne. 1995. *The Politics of Presence*. Oxford, UK: Clarendon Press.

Randall, Vicky. 1982. *Women and Politics*. London: Macmillan.

Reynolds, Andrew. 1999. "Women in the Legislatures and Executives of the World." *World Politics* 51 (4): 547–72.

Rose, Richard. 1987. *Ministers and Ministries* New York: Oxford University Press.

Russell, Catherine A., and Mark W. DeLancey. 2002. "African Women in Cabinet Positions–Too Few, Too Weak." *Asian Women* 15 (12): 147–63.

Siaroff, Alan. 2000. "Women's Representation in Legislatures and Cabinets in Industrial Democracies." *International Political Science Review* 21 (2): 197–215.

Silberman, Bernard S. 1993. *Cages of Reason*. Chicago: University of Chicago Press.

Strøm, Kaare, Ian Budge, and Michael J. Laver. 1994. "Constraints on Cabinet Formation in Parliamentary Democracies." *American Journal of Political Science* 38 (2): 303–35.

Studlar, Donley T., and Gary F. Moncrief. 1997. "The Recruitment of Women Cabinet Ministers in the Canadian Provinces." *Governance* 10 (1): 67–81.

Studlar, Donley T., and Gary F. Moncrief. 1999. "Women's Work? The Distribution and Prestige of Portfolios in the Canadian Provinces." *Governance* 12 (4): 379–95.

Tremblay, Manon, ed. 2008. *Women and Legislative Representation*. New York: Palgrave.

United Nations Development Programme. 2009. *Human Development Report*. New York: Palgrave.

Warwick, Paul V., and James N. Druckman. 2006. "The Portfolio Allocation Paradox." *European Journal of Political Research* 45 (4): 635–65.

Whitford, Andrew, Wilkins, Vicky M., and Mercedes G. Ball. 2007. "Descriptive Representation and Policymaking Authority: Evidence from Women in Cabinets and Bureaucracies." *Governance* 20 (4): 559–80.

Mona Lena Krook is Associate Professor in the Department of Political Science at Rutgers University, New Brunswick, NJ 08901.

Diana Z. O'Brien is Assistant Professor in the Department of Political Science at the University of Southern California, Los Angeles, CA 90089.