

Electoral Systems and the Substantive Representation of Marginalized Groups: Evidence from Women's Issue Bills in South Korea

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Abstract

How do electoral rules shape the substantive representation of traditionally under-represented groups? Using an original dataset of introduced and passed bills in the Korean National Assembly, which has both single-member districts and proportional representation, we examine the extent to which institutions condition the relationship between lawmaker gender and the substantive representation of women. While women lawmakers engage in higher levels of substantive representation of women, proportional representation allows both women and men to introduce more women's issue bills than their counterparts elected through single-member districts. Furthermore, legislators elected through proportional representation are more effective at achieving passage of women's issue legislation when compared to those elected in single-member districts, and this effect is especially pronounced for men. Our findings show that electoral systems matter for the representation of marginalized groups and that proportional representation systems allow both female and male politicians to increase their substantive representation of women.

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Electoral rules, women's representation, legislative behavior, comparative institutions

How electoral institutions incentivize the substantive representation of different constituencies is a crucial question for democratic governance, particularly for traditionally under-represented groups who have been systemically excluded from political processes. This paper examines the extent to which proportional representation (PR) and single-member districts (SMD) encourage lawmakers to pursue legislation on behalf of women, a historically marginalized group in most developed democracies. The extant literature on the substantive representation of women largely focuses on whether an increase in female lawmakers leads to greater representation of women's interests given shared preferences and experiences. Female legislators typically represent women better than their male counterparts contingent on party structure, legislative rules, culture, and other personal- or institution-specific factors (Dodson 2006; MacDonald and O'Brien 2011; Reingold 1992). We show that electoral systems strongly condition the relationship between legislator gender and the representation of women, affecting the quantity of women's issue legislation introduced by legislators of both genders and their legislative effectiveness.

Theories of legislative institutions suggest that SMDs encourage representation of the district median voter, resulting in lawmakers converging on majority-oriented policy positions, at both the district and national levels (Ansolabehere and Jones 2010; Carson et al. 2010). Members elected through PR, seeking to be responsive to the party organization and its leadership and free from needing to appeal exclusively to the median, better represent marginalized or traditionally under-represented groups (Blais and Massicotte 2002; Jones et al. 2002; Shugart, Valdini and Suominen 2005). We extend these theories of electoral systems and legislative behavior to the study of gender representation. While women sponsor women's issue bills at a higher rate than men, in PR systems, male lawmakers sponsor women's issue bills at a similar rate to female lawmakers. Conversely, men elected under single-member district systems sponsor the fewest number of women's issue bills, engaging in the lowest levels of substantive representation. Our findings demonstrate that the substantive representation of women can also occur through men if they are incentivized by the electoral system.

Electoral institutions are also important when considering the ability of legislators to achieve passage of their sponsored women's issue bills. PR members are more successful at passing

these bills (what we term “legislative effectiveness,” Volden & Wiseman 2014), with male legislators more likely to see their sponsored women’s issue bills pass. These findings indicate that PR systems help legislators produce more substantial policy change on gender issues than would otherwise be achieved in SMD systems (Celis et al. 2008; Childs and Krook 2006).

The theory and results have important implications for understanding both legislative institutions and representation. For traditionally marginalized groups in national legislatures, representation not only stems from direct policy interests based on gender identity, but is also the result of the institutional setting incentivizing legislator behavior (Barnes 2016; Carey and Shugart 1995; Hoyland, Hobolt and Hix 2017; Jones et al. 2002). Despite the wide examination of the linkage between electoral systems and gender politics in previous literature, however, the focus has exclusively been on women’s access to politics (Caul Kittelson and Schwindt Bayer 2012; Matland and Studlar 1996; Thames 2017; Vengroff, Nyiri and Fugiero 2003). The impact of electoral rules and institutions on women’s substantive representation is relatively under-examined.

We analyze these latter dynamics in the South Korean congress, which offers an ideal setting to test the effect of electoral rules as the country adopted a two-ballot mixed member system in 2004. Legislators in South Korea are elected under either SMD institutional rules or under a closed-list PR system. This within-country comparison allows for better identification of the causal effect of PR and SMD rules by effectively controlling for various country-level and time-varying contextual factors. Further, the prohibition on dual candidacy in the two systems in South Korea reduces cross-tier contamination compared to other mixed electoral systems. Using machine learning to classify legislative topic areas, we develop a new dataset of bill introductions in the Korean National Assembly from 2004 through 2016 to compare the legislative behavior of women and men elected under each of the country’s electoral systems.

Electoral Institutions and Women’s Descriptive Representation

Most research on the impact of electoral systems on gender politics focuses on descriptive representation, as “[t]he electoral rules are almost the only way legislators can directly “engineer” increases in the number of women...” (Salmond 2006, 176). In the case of gender,

women have distinct interests from men that are shaped by their unequal position in the division of paid and unpaid labor, child-bearing experience, exposure to sexual harassment and violence, and exclusion from most arenas of economic and political power (Mansbridge 1999; Philips 1995).

At the national level, studies find that PR systems tend to result in a higher share of women in legislatures than SMDs (Rule 1994; Salmond 2006; Schwindt-Bayer and Mishler 2005). Implementing gender quotas is easier in PR systems, and as a result, countries are more likely to adopt them as a way of increasing the number of women in the legislature (Christensen and Bardall 2016; Thames and Williams 2013). Even when not required by formal rules, party leaders have considerable control over the party list and because voting is not based on specific candidates, parties can nominate women with little electoral cost (Cox, Fiva and Smith 2018; Matland 1998; Salmond 2006). As a result, party-centered systems like PR are more favorable for women's descriptive representation (Caul Kittelson and Schwindt Bayer 2012; Matland and Studlar 1996; Matland 1998; Thames 2017; Vengroff, Nyiri and Fugiero 2003), though see Welch and Studlar (1990) and Roberts, Seawright and Cyr (2013) for contrasting views. PR institutions also promote the growth of minor parties, which are more likely to nominate women and minority candidates (Jones 1993).

By contrast, in plurality systems, parties have weaker control over which candidates run for office (Aldrich 1995), only one candidate is elected, and competition is more intense, making parties reluctant to nominate minority candidates because of the risk of losing the seat (Matland and Brown 1992). These factors reduce opportunities for the descriptive representation of women. Evidence from Japan, South Korea, and Mexico which have all adopted mixed electoral systems largely corroborates the claim that female legislators are disproportionately elected through PR systems rather than SMDs (Baldez 2007; Eto 2010; Shin 2014).

Although the existing literature posits a strong and positive association between PR system and women's numerical representation, there has been little attention to how electoral system affect substantive representation. Most research has focused on the relationship between gender and lawmaker policy preferences (Caprioli 2000; Regan and Paskeviciute 2003), or relative levels of experience (Weeks and Baldez 2015), rather than legislative behavior. Increased numbers

of female officeholders in PR systems might enhance substantive representation, but this has not been reconciled with the notion that electoral institutions influence the legislative behavior of elected officials, both males and females, in several important ways regardless of descriptive characteristics. Politicians and parties are strategic and seek to maximize their reelection chances and broaden their political base while balancing constituency appeals and conformity with traditional party positions as articulated by both elites and voters.

In the following section, we develop a theory that claims electoral institutions condition the relationship between descriptive and substantive representation. Specifically, we demonstrate how party-centered systems, specifically closed-list PR, and candidate-centered systems like SMD, change the bill sponsorship patterns of male and female lawmakers, and the likelihood of passage for legislation directed at female constituents.

Electoral Systems and Women's Substantive Representation

Consistent with claims that descriptive representation leads to substantive representation, we first theorize that women legislators have a greater baseline preference to pursue the substantive representation of women (Swers 1998; Thomas 1994). This claim is supported by empirical research which demonstrates that women legislators in both advanced industrial democracies and developing states sponsor and cosponsor more women's related legislation than men. For example, an increase in the share of women in legislatures in the United States, Belgium, and Argentina led to more policies related to women, children and families (Barnes 2016; Bratton and Haynie 1999; Franceschet and Piscopo 2008; Reingold 1992; Swers 2005).

Yet, the willingness of legislators to represent traditionally marginalized constituents, even with shared descriptive characteristics, is constrained by the institutional context. Party ideology, committee assignments, constituencies, and organizational culture have all been shown to condition the relationship between descriptive and substantive representation (Dodson 2006; Grey 2006; Homola 2019; Kathlene 1994; Koch and Fulton 2011; MacDonald and O'Brien 2011; O'Brien 2018; Reingold 1992; Thomas 1994). These constraints affect lawmakers' capacity or willingness to pursue substantive representation or policy change on behalf of their constituents. Electoral rules constitute an additional institutional constraint that mediates the

efficacy of women's descriptive representation, as they are, like all elected officials, strategic actors who seek to maximize their electoral fortunes. When institutional rules allow women (and men) to pursue women's issues while enhancing their chances of reelection or party nomination, legislators will engage in greater substantive representation. By contrast, when advocating for women's issues hurts electoral prospects, legislators' engagement in the substantive representation of women will be reduced. Thus, holding constant women's innate preferences to represent women, we claim legislators in PR systems 1) have incentives to court traditionally marginalized groups to assist their party and 2) are free to do so because they are not directly accountable to district voters. The representation style of individual legislators, and the collective representation of parties, are dictated by the audience to which they must appeal.

In candidate-centered electoral systems like SMD, candidates are held accountable by their local constituents. Since only one candidate can be elected from each district, the goal is to garner a plurality of votes and as a result, candidates appeal to the district median. There is substantial evidence for this in the American context, the prototypical SMD system, where House members who deviate from the preferences of their district suffer electorally and have an increased risk of losing their seat if they are "out of step" with their constituents (Canes-Wrone, Brady and Cogan 2002). Other research indicates that House members with diverse constituencies and hence more centrist district medians are less partisan and more moderate, take fewer positions on controversial issues to avoid angering voters, and carefully manage their voting record (Ansolabehere and Jones 2010; Carson et al. 2010). SMD officials' provision of particularistic goods is additional evidence that they almost exclusively attempt to appeal to the median voter (Ashworth and de Mesquita 2006; Stratmann and Baur 2002). Similarly, a within-country analysis of the German mixed electoral system demonstrates that SMD systems provide stronger incentives for the distribution of pork barrel projects (Lancaster and Patterson 1990; Stratmann and Baur 2002). This does not mean that parties have no control over candidacy process in SMDs. However, even in countries like South Korea where parties have relatively strong influence on candidacy process in SMDs, parties consider "competitiveness" of potential candidates and support those who have the highest chance of winning a majority votes (For instance, see Lee and Shin 2016). While some districts have median voters who incentivize

the representation of women, we are interested in average effects across all SMDs, and claim that electoral institutions create little incentive for lawmakers to focus on issues important to traditionally under-represented groups who are rarely district median voters, by definition.

In closed-list PR systems, the representation incentives for both parties and candidates change. Officials in these party-centered electoral systems tend to represent larger constituencies (sometimes, as in South Korea, national constituencies), and each constituency elects more than one representative. The electoral fortunes of members in PR seats are not determined by intense local competition for individual voters, but by the party leadership which has considerable control over nominations to the list (Blais and Massicotte 2002). This structure makes legislators more accountable to party leaders than to local constituents (Collie 1985) and they have greater incentives to develop national profiles and pursue legislative agendas that benefit their party coalition (Shugart, Valdini and Suominen 2005).

One such legislative agenda is policy that can broaden support from social groups that have traditionally been marginalized. Although these groups may not be pivotal, developing legislation targeting them can expand the political base of parties. While attempts to develop “new” constituencies are made by parties in both SMD and PR systems, such behavior is less costly in PR systems because low accountability protects individual politicians from potential electoral backlash from traditional supporters. Legislators’ personal attributes and behavior are of little electoral importance because voters do not seek candidate-specific information during elections. This makes it more difficult for voters to assign blame for disfavored policies, lowering legislators’ individual accountability (Cho 2012), while disincentivizing legislators to engage in the production of policies that appeal to the median voter (Jones et al. 2002). Free from the strict accountability imposed by SMD, legislators in party-centered systems can sponsor and support legislation that appeals to members of the broader party coalition rather than appealing to local evaluations of policy congruence by district voters (See Salmond 2006). As a result, a politician elected via closed party list will be more responsive to national, traditionally underrepresented constituencies, increasing substantive representation of women.

Here, it is important to note that we compare women’s representation across genders and institutional settings and do not claim men are always incentivized to address women’s issues,

or that they do so at the exclusion of addressing other issues. Instead, our argument is that institutional incentives result in greater representation of women by women (or men) in PR *as compared to* women (or men) in SMD systems. And because women have a higher innate level of representation for women, we expect that men will increase their representation of women when serving in PR to a greater extent than women.

Hypothesis 1. *Across all types of electoral systems, women's issue bills are more likely to be sponsored by women as compared to male legislators.*

Hypothesis 2. *Women's issue bills are more likely to be sponsored by legislators, both men and women, in party-centered systems than those in candidate-centered systems.*

Hypothesis 3. *The positive, conditional effect of party-centered systems on women's issue bills sponsorship will be larger for male legislators.*

Electoral Systems and the Legislative Success of Women's Representation

We extend the implications of electoral systems on substantive representation to consider how gender and institutional rules affect legislative success. While the sponsorship of women's issue bills is an important component of representing female constituents, the ability of a legislator to effectively shepherd the passage of their sponsored legislation is perhaps the most important aspect of representative behavior due to its direct and immediate policy implications.

There is an emerging literature on the impact of gender on legislative effectiveness, though there is disagreement on the direction of the effect. Legislative effectiveness is premised on the claim that some members are simply better at pushing their legislation through the policy process (Volden and Wiseman 2014), consistent with claims in congressional studies detailing differences between members who act as “work-horses” and “show-horses”, with the former spending more time and effort attempting to effect policy change (Langbein and Sigelman 1989; Matthews 1960). While not all bills sponsored by even the most effective member will be enacted, the concept of legislative effectiveness is premised on the notion that individual members have agency with respect to whether their bills are passed by the chamber or not.

Some studies suggest that women are more successful because of the difficulties they face running for election and within the legislature (Kathlene 1994). Anzia and Jackman (2012)

provide evidence that women are more effective than men largely because of the bias they suffer from at the electoral stage: only the “most qualified, politically ambitious [478]” women run for office, selecting only these women into Congress. Conversely, other research suggests that women are less effective than men due to emphasis on seniority in most legislatures and the lack of seats women hold on important committees (Jeydel and Taylor 2003; Kerevel and Atkeson 2013). Leadership styles and the gendered nature of legislative institutions may also all conspire to make women less effective, though the exact mechanism behind many of these claims is unclear (Kenney 1996; Rosenthal 1998).

The theory here claims that women are more likely to be effective legislators when it comes to women’s issue bills. Issues of seniority, the gendered nature of legislative institutions, and other factors are likely to be diminished with respect to addressing women’s issues as men cede this legislative turf to women lawmakers, though our empirical tests allow us to adjudicate these competing claims in the same institutional environment. Previous work shows that women are often viewed as having greater competence and expertise in policy areas like education and social welfare. By contrast, male legislators are perceived as experts in “masculine” fields like foreign policy, business, and agriculture (Huddy and Terkildsen 1993; Leeper 1991). Such prevalent gender stereotypes in the legislature may lead to greater support for bills introduced by women related to issues such as gender equality, children, and families (Thomas 1991). Therefore, we argue that women are more likely than men to successfully guide women’s issue bills through the passage process.

Results on legislative effectiveness are largely drawn from SMD systems, and little research considers how electoral institutions affect legislative effectiveness. Members in SMD systems have strong incentives to achieve legislative success as a way of demonstrating effectiveness to their constituents (Cox and McCubbins 2005). Members in PR systems have the ability to work through the party system, nearly guaranteeing approval of legislation by the chamber if the bill is brought to a vote by the leadership given the high levels of party discipline in party-centered systems. Given these competing claims we have no *a priori* expectations that different electoral systems, in a general sense, promote greater legislative effectiveness among their members across *all* types of bills.

Our focus here is on the substantive representation of women and the passage of legislation that addresses these issue types, however. We theorize that PR systems incentivize legislators to work toward passage of women's issue bills to a greater extent than their SMD colleagues. Given the need to appeal to the district median in SMD systems, bills sponsored by politicians in SMD seats tend to be parochial, directed toward a targeted geographic area or specific group, as these members focus on delivering particularistic goods to their district to cultivate a personal vote (Ashworth and de Mesquita 2006). Not only are SMD members more likely to sponsor these types of bills, they have strong incentives to ensure the passage of bills which are locally distributive in nature (Gamm and Kousser 2010; Stratmann and Baur 2002). Women's issue bills are not typically particularistic in the sense that they often do not target specific geographic areas, groups of public service recipients, or institutions.

By contrast, PR politicians are concerned with national constituencies and will focus their attention on general bills targeting broader public policy. For example, we expect PR representatives to legislate on issues like low fertility rates, population aging issues, and career development or equal employment opportunities, each of which are important legislative issue areas for women in South Korea. These types of policies are not distributive in nature and suggest that PR legislators will be more effective in achieving passage of women's issue bills because they are not focused on particularistic policy. As with sponsorship, we expect the conditional effect to be greater for men than women because men have a lower baseline level of women's representation that can be increased through PR.

We find descriptive evidence of the claim that SMD produces more distributive legislation in our data using keyword searches to classify bills as parochial/particularistic or not. Based on our classification, approximately 18% of SMD sponsored bills are parochial in nature, while only 9.6% of PR sponsored bills are. See page A3 in the appendix for more details on the classification codes used to identify particularistic/distributive bills.

Hypothesis 4. *Women are more effective in achieving legislative passage of women's issue bills as compared to men.*

Hypothesis 5. *Legislators, both women and men, elected through party-centered systems are more effective in achieving legislative passage of women's issue bills as compared to those*

elected through candidate-centered systems.

Hypothesis 6. *The positive, conditional effect of party-centered systems on bill passage will be larger for male legislators.*

South Korean Bills Data

The analysis uses an original dataset of all sponsored bills machine coded by topic area¹ in the Korean National Assembly from the 17th to 19th Congress (2004-2016), the period after South Korea adopted a two-ballot mixed member system.² Our focus on South Korea strengthens the internal validity of the study because within-country comparisons provide several advantages in identifying causal effects as compared to cross-national comparisons which differ on dimensions such as party systems, culture, and institutional design.

Voters cast two separate ballots, one for an individual candidate nominated in single-member local districts, and the other for a party list, where the entire country is one constituency. 246 seats out of 300 total are allocated to SMD members.³ While cross-tier contamination in mixed electoral systems is well-documented, such a possibility is smaller in South Korea compared to other mixed members systems. First, unlike other mixed member systems like Japan or New Zealand, dual candidacy for PR and SMD, which is considered to be a major source of contamination (see Crisp 2007), is not allowed in Korea. Another concern is that party leaders assign constituency service duties to PR-list members in hopes of winning nominal-tier elections in that district in the future. Conversely, parties might nominate candidates in nominal districts despite little chance of winning the seat in order to boost the chances of their PR candidates in the same district (Crisp 2007). However, in South Korea, while SMD candidates run in a local

¹Sponsored bills are introduced by a member of the legislature who is designated as the primary sponsor. We limit our analysis to the primary sponsor and exclude government sponsored legislation, and we control for the number of co-sponsors in our analysis.

²South Korea also instituted the current form of gender quotas in 2004 for both PR and SMD elections. The quota requires that 50% of all candidates in PR be women, and that women and men alternate on party lists (i.e., a “zipper” list). In SMD, 30% of all party nominees must be women. In practice, the gender quota tends to be better enforced in PR than in SMD seats (Shin 2014). While this leads to a greater number of women in PR seats relative to SMD seats, this should not affect our inferences; the average quantity of women’s issue legislation will be affected by the number of women at the aggregate level. However, we model the probability of introducing and passing a women’s issue bill at the individual level, and our comparison of legislative behavior is between PR and SMD men and between PR and SMD women.

³While roughly 54 seats are for PR, the exact number varies slightly every election as the total number of seats change.

district, all PR candidates represent one national electoral bloc and no local district is assigned to PR members. The absence of dual candidacy and differing magnitudes of electoral blocs for PR and SMD seats significantly reduces the possibility of cross-tier contamination, allowing for better comparison of legislative behavior in SMD and PR tiers.

Our dataset includes information on the gender of the bill's sponsor, whether they were elected under SMD or PR rules, and whether or not the legislation passed the unicameral legislature.⁴ The bills data were scraped from an online government archive which provides comprehensive information about each bill introduced, including its sponsor, co-sponsors, the date of introduction, committees, the title of the bill, and the bill's outcome.⁵ We use the Comparative Policy Agendas coding scheme which lists 24 separate categories of bill topics, and has been applied to numerous national legislatures (Baumgartner and Jones 2013). A supervised machine learning process, using a train-validate-test procedure, categorized each of the bills into one of the 24 categories over five iterations. The machine learning process uses bill titles which are descriptive and reflect the content of the legislation. See the Appendix page A4 for additional details on the machine coding process and the error rate and see Appendix page A16 for a randomly chosen sample of 21 bills for which the entire text of the bill was read to ensure agreement between the titles and bill contents.

The bills data have sponsorship information allowing us to merge it with legislator characteristics scraped from an online directory of Korean legislators (both past and present).⁶ The legislator data include electoral system, name, party, seniority, gender, age, education, and sponsorship information. From the 17th to 19th Congresses, the sample time period, there are 32,513 bills with 299 legislators in the 17th and 18th Congresses, and 300 legislators in the 19th Congress.⁷ Our unit of analysis is bill-sponsor, and there is significant variation across both gender and electoral system, with 5,690 bills proposed by female legislators, of which 3,791 bills were sponsored by women elected through PR. 26,823 bills were proposed by men with 2,981 bills sponsored by those elected through PR. See page A8 in the online appendix

⁴We define legislative success as passage by the legislature.

⁵The data were scraped from the website <http://likms.assembly.go.kr/bill/main.do>.

⁶The data were scraped from the website <http://pokr.kr/person/>.

⁷The analysis uses approximately 30,000 observations as some bills are sponsored by the government or data is missing on one of the variables.

for additional descriptive statistics.

For our dependent variable, we define women's issues as bills falling into the health care, education, social policy, and civil liberties policy categories. The last category, civil liberties/minority issues, explicitly includes bills targeted toward gender and sexual orientation discrimination, according to the Comparative Policy Agendas codebook. Our categorizations are consistent with previous coding schemes.⁸ There is significant debate about how to characterize these issues (Baldez 2011; Beckwith 2011). As O'Brien and Piscopo (2019) summarize, scholars typically categorize women's interests as those that directly affect women (e.g., reproductive rights, gender-based violence), those related to women's traditional roles as caregivers (e.g., childcare), or more broadly defined social and welfare policy (e.g., health, social welfare).

Capturing social and welfare policies is important because women's rights not only come from anti-discrimination laws or bills written directly for women, but from the presence of social and political institutions that disproportionately affect women. For instance, health care bills targeting the disabled or the elderly affect women more than men because in the absence of public support, women are more likely to sacrifice their career to care for these individuals at home. Studies find that domestic responsibilities have more detrimental impacts on women's political career than on men's (Franceschet and Piscopo 2014). Others further show that social welfare spending is positively associated with the extent of women's presence in the total labor force and national parliaments (Detraz and Peksen 2018).

For robustness check, we use an alternative measure of women's issue bills which are more directly related to women's rights. These bills include reproductive rights, childcare, maternal welfare, subsidies for female career development, or sexual violence. Despite the large standard errors for the interaction term due to a small number of bills targeting women (about 4% of the total bills), the results are very consistent. These additional empirical models are discussed in the robustness section and more details are given Appendices D.

Our coding scheme classifies bills into issue categories traditionally defined as encompassing women's issues generally (Beckwith 2011), but like other research (e.g., Franceschet and Piscopo 2008; Volden, Wiseman and Wittmer 2018), we cannot say whether the introduction

⁸Our method is similar to the coding schemes used by Volden, Wiseman and Wittmer (2018).

of these bills advances women's interests, or whether the bills limit general policy goals shared by most women. Coding these bills across more than 32,000 observations is impractical, and defining the ideological content of legislation is highly subjective. If, however, bills introduced within women's issues explicitly seek to limit or reduce additional rights or benefits to women, then the appearance of additional legislation does not produce substantive representation of women.

Our research design protects against this possibility. The relevant comparisons are largely between men and women across electoral institutions, rather than between men and women generally. The threat to claims about greater substantive representation is that men are introducing women's issue bills, but the ideological orientation of the bills actually reduces gender equality. While this might be the case, for that phenomenon to drive our results, men in PR must be proposing these types of bills at a greater rate than men in SMD (and the same must be true for women), though there is no theoretical reason to expect this. All else equal, the ideological orientation of women's issue legislation within gender should be similar across electoral systems. Still, as an additional robustness check, we randomly selected 20 bills sponsored by men and women to ensure the title coding scheme is appropriate and to read for content. All of them were pro-woman and pro-welfare regardless of gender of bill sponsors as shown in Appendix E.

The independent variables of interest are dichotomous indicators for female legislator and electoral system (legislator elected through PR or SMD). The models also control for a number of factors including the number of terms of service for a legislator, which has previously been shown to substantially affect legislator behavior (Schwindt-Bayer and Mishler 2005), other demographic characteristics (e.g. age, age-squared, university-educated), and the socio-economic context, measured as national GDP per capita. We also include the number of co-sponsors of the bill and a variable which measures the total number of bills in the dataset sponsored by a bill's sponsor. Bills that are supported by many legislators are more likely to be passed, as are those sponsored by a legislator who is more active in the legislature. The total number of bills sponsored controls for a legislator's overall level of legislative activity. Finally, we control for whether the bill sponsor moved between electoral systems from the previous election. This is

true for only a very small number of legislators, but these variables also help partially address concerns about selection mechanisms for legislators choosing between systems.⁹ Fixed effects for congressional term and parties are also included to account for any variation across time and parties that may affect the number of women's bills introduced, such as party power/majority status, party ideology, culture, the number of legislators from a given party, the ratio of female legislators in each congress, etc.

The Effects of Gender and Electoral Systems on Women's Representation

The theory suggests that women's issue bills are more likely to be sponsored by women across both types of electoral system (SMD or PR), and that women's issue bills are more likely to be sponsored by both men and women elected through a PR system. We also expect a positive conditional effect for women in PR seats. A second theoretical claim focuses on legislative success and posits that PR legislators have a higher likelihood of passing their legislation. The first set of logit models below predicts whether a bill is classified as addressing a women's issue, controlling for various characteristics and with fixed effects for both party of the legislator and the congress in which the bill was introduced, along with robust standard errors clustered by legislator.

Sponsorship of Women's Issue Bills

As Table 1 model 1 shows, gender of the legislator is significantly related to the sponsorship of women's bills, as is the type of electoral system. The chances a bill is a women's issue bill is 55% greater if the sponsor is a woman (Hypothesis 1), while the effect of PR is a nearly identical increase in the chances a bill concerns women's issues (Hypothesis 2). To find the conditional effect of men and women elected through PR systems, model 2 interacts the two variables. The results show first, that the unconditional effect of gender is still strongly positive and significant, indicating that a bill sponsored by a woman is 75% more likely to be a women's issue bill in an SMD (electoral system of sponsor variable equals zero). Similarly, the electoral

⁹While we observe legislators moving across different congresses, unfortunately it is not possible to use a difference-in-difference or synthetic control strategy. The very small number of legislators switching between the two institutions also does not allow for the use of alternative causal identification strategies.

system component term can be interpreted as the effect of that electoral system for men (the gender variable equals zero). A bill is about 71% more likely to be sponsored by a male legislator in PR than a male legislator in SMD.

Table 1: The Effects of Electoral Systems and Gender on Women’s Bill Sponsorship

	(1)	(2)
Gender of Sponsor (Female=1)	0.44* (0.15)	0.56* (0.19)
Electoral System of Sponsor (PR=1)	0.45* (0.16)	0.54* (0.19)
	(0.03)	(0.03)
Gender x Electoral System		-0.24 (0.28)
Controls	Yes	Yes
Party Fixed Effects	Yes	Yes
Congress Fixed Effects	Yes	Yes
N	30,252	30,252

Note: The dependent variable is whether the bill is classified as addressing women’s issues.

Full models with control variables are available in Appendix F.

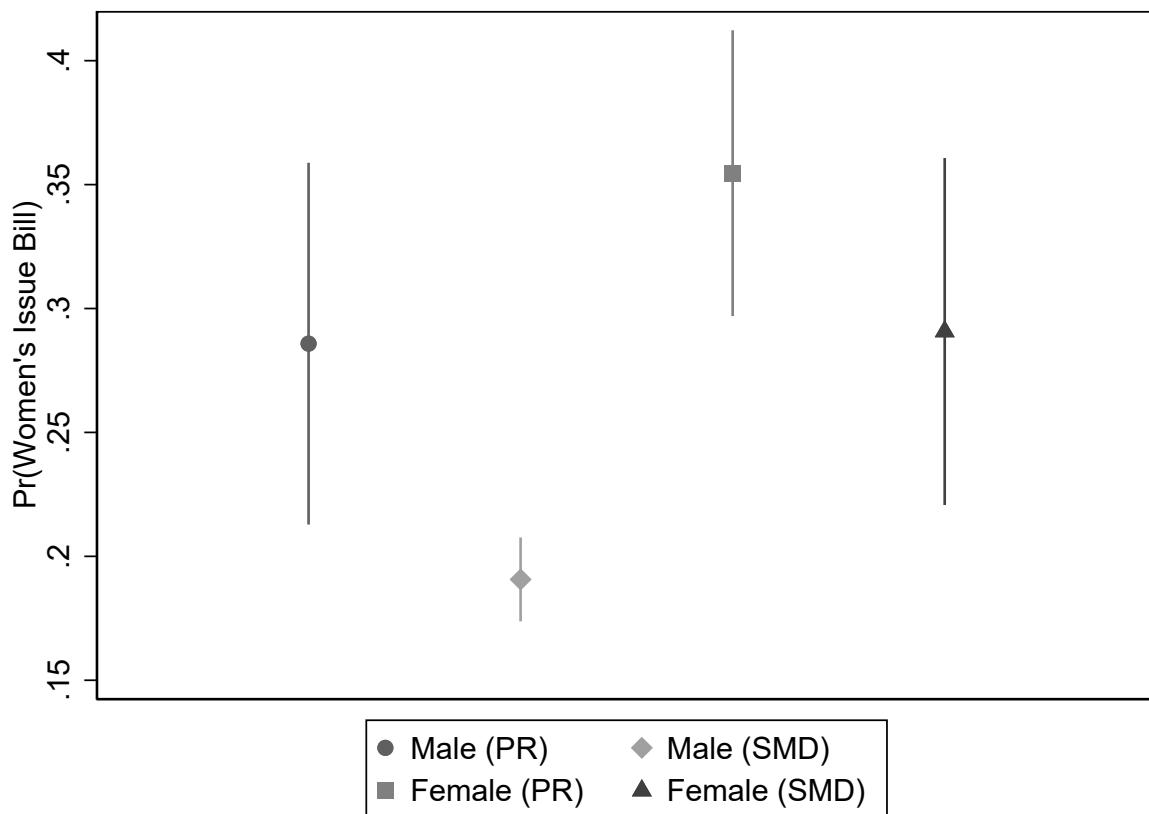
All models are logistic regression with standard errors clustered by legislator (598 clusters).

Standard errors in parentheses. *p<.05

As Brambor, Clark and Golder (2006) point out, “[t]he analyst cannot even infer whether X has a meaningful conditional effect on Y from the magnitude and significance of the coefficient on the interaction term.” [p.74]. Given that both our independent variable (gender) and conditioning variable (electoral system) are binary, to properly interpret the conditional effects, we create a graph that displays the predicted probabilities for each of the four conditions (male, female, PR, SMD). The difference between any two point estimates in the graph is the marginal effect. In Figure 1, the predicted probability of a women’s issue bill when sponsored by a male legislator in PR .29, while the predicted probability of a women’s issue bill when sponsored by a male legislator elected through an SMD is .19. The difference between these estimates is statistically significant and indicates a substantively large increase in the probability of a woman’s issue bill if the sponsor is a male in PR compared to a male in SMD. The third point from the

left in the graph is the predicted probability of a women’s issue bill when sponsored by women in PR systems, and is equal to .36. Thus, a women’s issue bill is nearly *twice* as likely when the sponsor is a woman elected through PR as compared to a man serving in SMD, though the differences between women in PR and those in SMD are not statistically significant. Finally, a women’s issue bill is about as likely when sponsored by a man in PR or a woman in SMD (the difference between the two is not statistically significant) and a women’s issue bill is least likely than when the sponsor is a man elected through SMD.

Figure 1: Predicted Probability of a Women’s Issue Bill by Gender and Electoral System of Sponsor



Note: Predicted probabilities from results presented in model 2 in Table 1. Lines above and below point estimates display 95% confidence intervals.

The results are largely supportive of Hypothesis 3: women legislators in all types of seats are significantly more likely to engage in the substantive representation of women as compared to men in SMD, but the electoral system conditions the relationship between gender and representation. PR seats provide a representation “bonus” for women constituents from male leg-

islators: their sponsorship behavior in PR closely approximates women. The extant literature on women’s political representation has focused on how PR increases women’s representation by bringing more women into the legislature, but our findings demonstrate that PR increases women’s representation through male legislators who act on behalf of women, creating cross-gender coalitions in support of women’s issues in the legislature.

Passage of Women’s Issue Bills

Our second set of hypotheses concern the passage of women’s issue bills. In Table 2, four models are shown. Models 1 and 2 show the results for *all* introduced bills (as a reference), while models 3 and 4 show the results for *women’s issue bills* only. Models 1 and 3 show the unconditional effects for the gender and electoral system variables, while models 2 and 4 show the results for an interaction between gender and electoral system. The dependent variable is whether or not the National Assembly passed the bill (passage equals one) and as with the previous models, fixed effects for party and congress and robust standard errors clustered by legislators are included.

Table 2: The Effects of Electoral Systems and Gender on Bill Passage

	All Bills		Women’s Issue Bills	
	(1)	(2)	(3)	(4)
Gender of Sponsor (Female=1)	-0.14*	0.26	0.05	-0.07
	(0.07)	(0.13)	(0.09)	(0.16)
Electoral System of Sponsor (PR=1)	0.11	0.03	0.38*	0.41*
	(0.07)	(0.09)	(0.12)	(0.15)
Gender x Electoral System		0.23		-0.07
		(0.13)		(0.23)
Controls	Yes	Yes	Yes	Yes
Party Fixed Effects	Yes	Yes	Yes	Yes
Congress Fixed Effects	Yes	Yes	Yes	Yes
N	30,279	30,279	6,758	6,758

Note: The dependent variable is whether the bill passed the National Assembly.

Models 1 and 2 show the results for all bills, models 3 and 4 restrict the sample to bills classified

All models are logistic regression with clustered standard errors by legislator.

Full models with control variables are available in Appendix F.

(599 clusters in models 1 and 2, 513 clusters in models 3 and 4).

Standard errors in parentheses. *p<.05

In model 1, all bills sponsored by women are less likely to pass, indicating that women may be less effective in the legislature overall. In the first model, bills sponsored by women are about 23% less likely to pass as compared to men. A similar effect is seen in model 2, where the gender component term indicates the effect of female sponsorship on passage when the woman is in an SMD; the chances a bill passes for these sponsors is the lowest of any of the four comparisons, about 23% less than men in SMD.

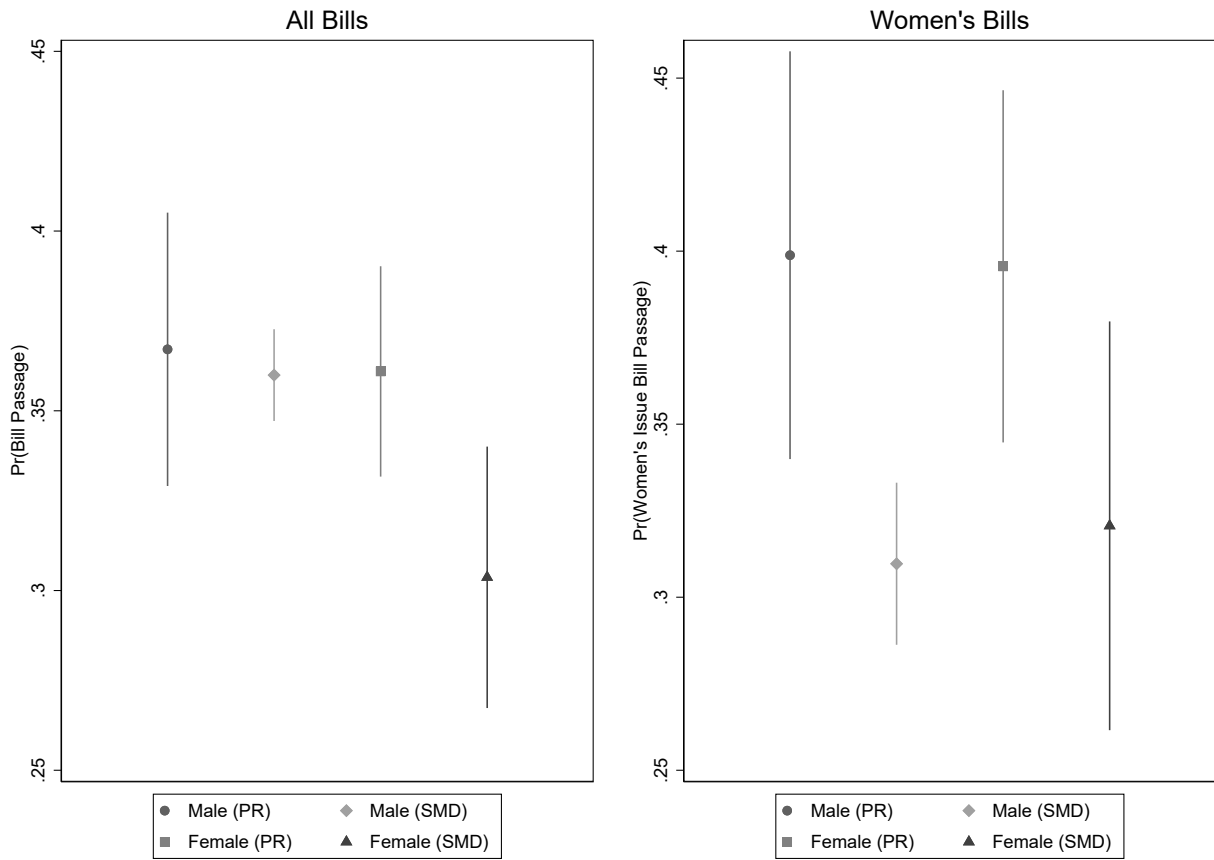
In model 3, members in PR are more successful at achieving passage of their women's issue bills than those in SMD, confirming Hypothesis 5. There is no effect for women, holding electoral system constant, which does not support Hypothesis 4. In models 3 and 4, however, both women and men in PR are more successful in achieving passage of women's issue bills compared to men in SMD. Predicted probabilities for the passage of all bills and women's issue bills are shown in Figure 2. The left panel plots the predicted probabilities of bill passage for the interaction between gender and electoral system for all bills, while the right panel plots the predicted probabilities for women's issue bills only. Bills of all types sponsored by women in SMD are less likely to pass than bills sponsored by men in SMD, though the differences between women in SMD and men in PR or women in PR are not quite significant at the .05 level. This result indicates that SMD may disempower women legislators.

But, the conditional effect of electoral system is meaningful and significant for women's issue bills. The probability of a women's issue bill passing is higher for men in PR (.4) than for men in SMD (.31) and their difference is statistically significant. For women, while the predicted probability of women in PR is higher than those in SMD, the difference is not statistically significant at the conventional level. These findings lend partial support of Hypothesis 6. That is, PR systems increase the passage of women's issue bills and allow men to pass women's issue bills at a greater rate than men in SMD.

Testing Legislator Accountability: Party Issue Emphasis and Legislative Behavior

Although our findings above demonstrate that PR politicians are more likely than those in SMD systems to pursue women's issue bills and are also more effective in advancing those

Figure 2: Predicted Probability of Bill Passage by Electoral System and Gender



Note: Predicted probabilities from results presented in models 2 and 4 in Table 2. Lines above and below point estimates display 95% confidence intervals.

bills, the theory claims that these outcomes result from different accountability mechanisms created by each electoral institution. We argue that politicians in PR seats are accountable to their parties rather than to local constituencies, as members in SMD seats are. One possible way to directly test this relationship would be to examine district voter preferences and a legislator's propensity to sponsor and pass women's issue bills. Unfortunately, voter-level data indicating support for women's issue positions are not available, but we can test the conditional effect of each parties' emphasis on women's issues. PR legislators should be much more responsive to their party's demand for these types of issues as compared to SMD legislators, making them much more likely to sponsor legislation related to women's issues in response.

The Comparative Manifesto Project contains data that can be aggregated to create a party emphasis score for women's issues. We use four issue areas: welfare, education, equality,

and specific demographically defined special interest groups, including women (Volgens et al. 2018).¹⁰ To find the level of emphasis on women's issues, we aggregate the absolute values of each party's manifesto score in these areas such that a higher score indicates a greater emphasis on these issues for a given party.¹¹ The empirical model interacts this variable with legislator electoral system to predict women's issue bill sponsorship. The models are logit regression with robust standard errors clustered to legislator and party and congress fixed effects.

Figure 3 shows the marginal effect of PR systems on women's issue bill sponsorship varying levels of a party's emphasis on women's issues. The graph provides support for the proposed theoretical mechanism. When a party's emphasis on aggregated women's issues is about 20 (minimum value), the probability a PR member sponsors a women's issue bill increases to about .09 as compared to SMD members. The predicted probabilities continue to increase for parties which place a very high emphasis on women's issue bills. When a party's emphasis on aggregated women's issues is 45, the probability increases to .16 and it is statistically significant, though at the maximum value (50), standard errors are larger due to paucity of observations. These results show that PR members are highly responsive to the party organization's preferences, providing strong evidence that the accountability mechanism differs between SMD and PR systems.

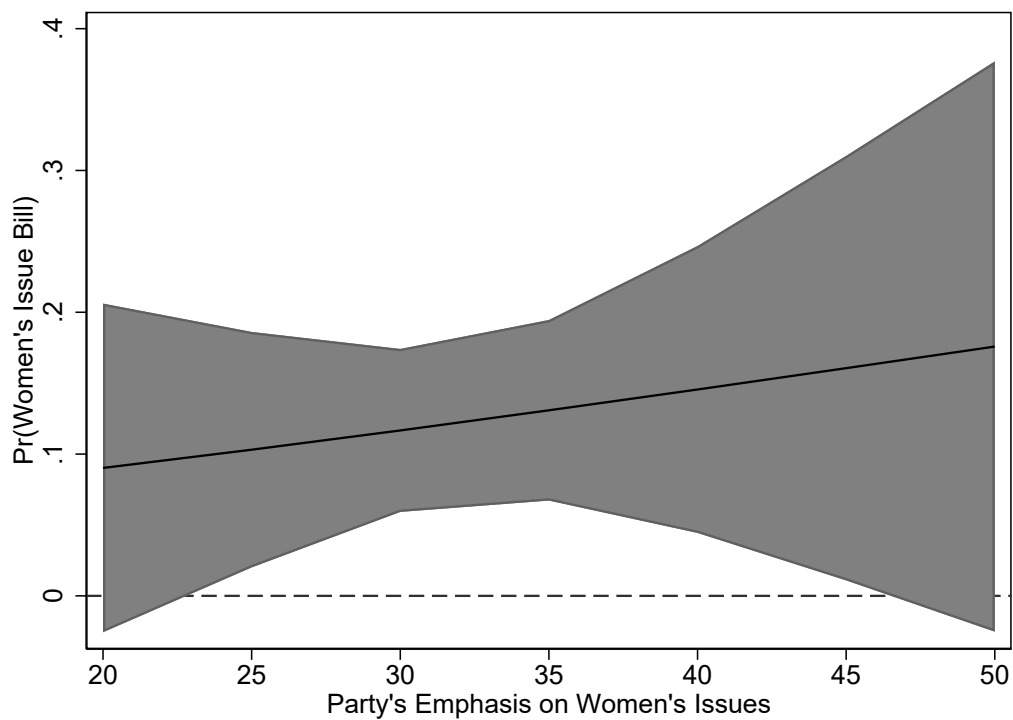
Robustness Check

In order to ensure that our results are not sensitive to model specification or the machine coding/categorization scheme used to construct the dependent variable, the results are reanalyzed using an alternative dependent variable. The new measure of women's issue bills is narrowly defined by legislation that directly influences women's rights. These bills include, but not limited to, those that are related to daycare, child care, sex, gender, gender equality/discrimination, female, sexual harassment/violence/assault. See page A9 in the appendix for more information and detailed coding rules. As presented in Appendix D, though statis-

¹⁰The CMP data has drawn some criticisms (Benoit and Laver 2007). Nevertheless, a series of tests confirmed a high reliability of the data (Klingemann et al. 2006).

¹¹As with the previous analyses, we are uninterested in the direction (i.e. liberal or conservative) of parties' positions as our bills data do not differentiate the direction of women's issue bills. For our aggregation we use *per503* (equality), *per504* (welfare state expansion), *per505* (welfare state limitation), *per506* (education expansion), *per507* (education limitation), *per706* (non-economic demographic groups).

Figure 3: The Marginal Effects of PR on Women's Issue Bill Sponsorship Varying Party Emphasis on Women's Issues



Note: The gray area displays 95% confidence intervals. Women's issues include those related to welfare, education, equality, and non-economic demographic groups as coded by the Comparative Manifesto Project.

tically significance is weaker due to the substantially smaller number of women's issue bills defined narrowly, the differences between legislators in SMD and PR districts are largely consistent with our main results. This alternative construction gives confidence that the results are not due to the choices made regarding which policy categorization qualify as women's issues.

There are two possible confounding factors that we address empirically. First, both the introduction and passage of women's issue bills are likely to vary by party of the legislator. For example, members of progressive or pro-women parties will be more likely to sponsor women's issue bills and see their bills pass as compared to members of other parties. There are significant differences in the willingness of different parties to represent women. Our research focus is not on explaining the origin of partisan differences here, but we use fixed effects for parties in the empirical models, which allows the baseline level of gender representation to vary for different party members, and also serves as a proxy for member ideology.

Second, rather than institutional incentives, differences in sponsorship and passage may be due to unobserved differences between those candidates who self-select into SMD elections or onto the party list. Our empirical models control for the most important demographic characteristics such as age, number of terms, and education. We also test the theorized causal mechanism (member accountability to the party) and find that institutional incentives drive legislator behavior, even when controlling for individual legislator characteristics. (See below for more details).

Additionally, candidates in different electoral systems may differ on unobservable characteristics. Empirically, these unobserved differences only matter if they are correlated with both our key independent variables *and* the dependent variable, are simultaneously uncorrelated with any other demographic characteristic that is measured and controlled for (e.g., age, number of terms, and education), and are uncorrelated with party identification or time (effects captured by the congress- and party- fixed effects). Because we also investigate the theorized causal mechanism that PR systems encourage party responsiveness by individual members, for an unobservable legislator characteristic to be driving the results, that characteristic must also be uncorrelated with the relationship between electoral system and legislator responsiveness.

Discussion

The increase in descriptive representation of women in legislatures around the world has led to questions about effects on substantive representation. In examining the link between the two types of representation, we focus on the conditionality of substantive representation as the result of a country's electoral institutions. In South Korea, members are elected under both SMD and PR systems allowing for strong inferences about how the electoral system alone affects legislative behavior, holding constant potentially confounding factors at the national level. Not only does our theory and analysis speak to the substantive representation of women, it also speaks to the legislative success of women's issue in the Korean assembly. As other research shows, women lawmakers, who provide descriptive representation, are the best advocates for women, and they provide valuable substantive representation because of their shared societal experiences. We claim electoral institutions condition the relationship between gender and substantive representation, and demonstrate that when it comes to everyday legislative activities (bill sponsorship and shepherding it through the passage process), PR systems change the incentives for lawmakers of both genders.

While we find, consistent with our theoretical expectations, that women substantively represent women in the Korean assembly by introducing more women's issue bills, the results clearly show that men sponsor women's legislation at roughly the same rate as women in SMD, if they are elected through a PR system. PR systems not only increase the number of women in legislatures, as previous research shows, who in turn act on women's issues, we find that they also increase the rate at which men do the same. This spill-over effect produces "bonus" representation for women, who see their interests met by women elected in both SMD and PR, but also by men elected through PR. Conversely, men elected in SMD are much less likely to introduce women oriented legislation, consistent with our theoretical expectations.

The behavior of male legislators in PR systems is important for another reason: as the second set of analyses show, men in PR seats are more successful than women in SMD systems in achieving legislative success. Men in PR systems are similarly successful as their women counterparts suggesting that PR systems can produce policy change relevant to women's interest even for men. This is because given different accountability incentives, PR politicians

tend to focus on bills that target broader groups of individuals, while SMD politicians tend to legislate on more particularistic bills. Our finding suggests that though women in South Korea may introduce women's issue bills at a greater rate than men in SMD, women in SMD seats are less successful in seeing the legislation pass, reducing the substantive representation of women (likely because of entrenched patterns of discrimination or exclusion from the centers of legislative power). But, this deficit can be made up by legislators from PR seats, both women and men, who are equally as effective.

How applicable are these findings to other advanced, developed democracies? We acknowledge that we cannot observe the counterfactual of an individual legislator's substantive representation in both an SMD system and a PR system, but our research design allows us to minimize cross-tier contamination while also holding institutional design and other country-level factors constant. In addition, South Korea has a conservative political culture in terms of gender equality with only about 15% of legislators who are women. In that sense, South Korea offers a more difficult test in demonstrating pro-women legislative behavior and the finding that male politicians in PR systems act on behalf of women provides even stronger evidence for our arguments.

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Appendices/Supplementary Information for Online Publication:
Electoral Systems and the Substantive Representation of
Marginalized Groups

Contents

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Appendix A Parochial Bills and Electoral Systems

In Table A below, we calculate the proportion of parochial bills among women-related legislation (defined in the methods section) introduced by legislators in PR and SMD seats. Parochial bills are defined as those that target narrowly defined beneficiaries, such as specific groups of individuals, institutions, or geographical regions. These groups were identified by a keyword search of bill titles that include words such as single parent, Korean expats abroad, war veterans, retired soldiers, teachers, mixed blood individuals, North Korean refugees, victims of land mines/natural disasters/man-made disasters, Korean Japanese, artists, farmers, and public officials. Specific institutions include research institutes, religious organizations, military, government institutions, or educational institutions. Targeted regions include areas affected by natural disasters, areas near by military bases, areas near by large infrastructures (e.g. dam, nuclear power plants...etc), or rural areas.

While these data only provide descriptive evidence, the table confirms that politicians in SMD seats have a greater propensity to target specific groups of individuals or regions.

Table A1: Share of Parochial Bills Sponsored by Legislators in Different Electoral Systems, 2004-2016

Congress #	Parochial bills (%)			
	17th	18th	19th	Avg.
PR legislators	10.07	9.56	9.03	9.55
SMD legislators	20.30	17.83	15.62	17.92

Appendix B Detailed Explanation of Machine Learning Process

Introduction: We followed a systematic process for categorizing the approximately 63,000 Korean legislative bills into 24 categories, of which 21 are adopted from categories used in Comparative Policy Agenda as listed below. We added two additional categories that are specific to South Korean contexts: North Korea and History (e.g. Gwangju democratic movements, Truth reconciliation committees, Korean war...etc). Finally, we added an ‘others’ category for bills that cannot be categorized under these 23 labels.

21 Bill Categories adopted from Comparative Policy Agenda projects

Macroeconomics; Civil rights & Liberty and Minority issues; Health; Agriculture & Fisheries; Labor and Employment; Education; Environment; Energy; Immigration; Transportation; Law & Crime; Social policy; Regional and urban policy & planning; Banking, finance and internal trade; Defense; Space, Science & Communications; Foreign trade; International affairs&Foreign aid; Governance & Government operations; Public lands & Water management; Culture & Media

In order to categorize bills, we split our process into iterations, which consisted of first hand coding a small subset of bills, and second using supervised machine learning techniques to categorize a large subset of bills (all based on bill titles). We followed this sequential process five times. Had we stopped after the first iteration we could have categorized all remaining bills with 81 percent accuracy; however, we deemed this level of accuracy insufficient. By adhering to our iteration process, we were able to successfully categorize all approximately 63,000 bills with less than two percent error.

The classifier used is “softmax regression” from the LogisticRegression Python function. Python can apply either a logistic regression or softmax regression model depending on how many classes there are. Note that we have 24 classes rather than two.

Steps:

1. Clean Korean bill titles

- (a) Split every character
 - (b) Split and keep all numbers
2. Divide data into train, validate, and test sets
 - (a) Approximately 60-20-20 percentage split
3. Make a pipeline that applies the TF-IDF vectorizer and a logistic regression algorithm to the training dataset in sync to avoid unwarranted information leakage
4. Analyze the error on the validation set
 - (a) Find total number incorrect
 - (b) Calculate percentage incorrect
5. Iterate through the prior steps if unsatisfied with the error on the validation set
6. Analyze the error on the test set
7. Apply algorithm to unseen data
8. Filter probability at 90 percent
9. Persist with those bills with higher than .9 probability
 - (a) Push those bills with lower than or equal to .9 probability to next iteration
10. Repeat steps on next iteration

Train-Validate-Test Procedure: The training set is used to train the algorithm. The validation set is used to validate the training of the algorithm. The validation set is a semi-unseen dataset: we allow the algorithm to see it after it is trained, but the validation set is not used to train the algorithm directly. If the algorithm was allowed to see the validation set, information would be “leaked” into the training dataset. This process is valid because we use the test set at the end, before the algorithm classifies truly unseen data. So, applying our algorithm on the test set tells us how our algorithm is likely to perform on truly unseen data. This means we can test different algorithms on the training dataset as long as what we do helps to better predict

on the validation set. Generally, in machine learning, the algorithm tends to do slightly worse on the test set than on the validation set. Usually, this difference is negligible, as it was in our case.

Each iteration proceeded as follows. First, a few thousand bills were hand-coded by the authors into one of the 24 categories using the text of the bill titles. Unlike in many legislatures, bill titles in Korea are highly descriptive and individual bills encompass only one topic area.¹² Because there are over 30,000 bills in the sample, it is impractical to read bill text and classify accordingly. To ensure that bill titles accurately reflect bill content, we randomly sampled 20 bills, read the full text, and compared their content to the title description. The results are shown in Table E1 in the appendix, and confirm the usefulness of using titles to categories bills.

The hand-coded bills were split into three categories: train, validate, and test. The first subset of bills was used to train the algorithm, which uses the text in the already classified data to determine how to classify additional bills. The validate subset of the hand-coded data is used to determine how well the algorithm classifies bills as compared to the human coder. That is, it compares its own classification to the hand-coded classification and generates an error rate (the percentage of bills classified as falling into different topic areas by the algorithm and the human coder). Finally, the last subset of data is classified using the algorithm. The algorithm does not have access to the test set of bills until the error rate for the validation set is sufficiently low, to ensure that the error rate will be generalizable to the test set. Thus, the error rate is a measure of how well the algorithm will do in classifying the next set of uncategorized bills *a priori*.

For each iteration, the error rate was less than 2%, meaning for the subset of data on which the algorithm classification was compared to the human classification, there was a topic area discrepancy for less than 2% of the bills. We repeated the above process through five iterations, with a sixth iteration in which the remaining bills were human coded. Iterations are necessary because the algorithm classifies bills into one of the 24 topic areas and assigns a probability that each bill falls into that category. We required that the algorithm be more than 90% confident that a bill fit into that category, a highly conservative (i.e., bills are highly unlikely to be misclassified) threshold. If the algorithm was not 90% sure that a bill fits into a category, it was

¹²In the United States, for example, many bills are composed of a combination of smaller bills, making them harder to categorize.

not classified. Thus, each iteration finishes with a successful classification of a certain number of bills, and remaining bills which cannot be classified with 90% certainty. A subset of these additional bills were hand-coded, and the process repeated. Bills which could not previously be classified by the algorithm can be classified in a future iteration because as more bills are hand-coded, the algorithm “learns” how to classify additional bills. We set the 90% certainty threshold because that maintained an error rate under 2%; as the threshold declines, the algorithm assigns codes to a greater set of bills for which it is less confident, but more discrepancies between human coding and machine coding occur.

Table 3: Details of Supervised Machine Learning Outcomes for Each Iteration

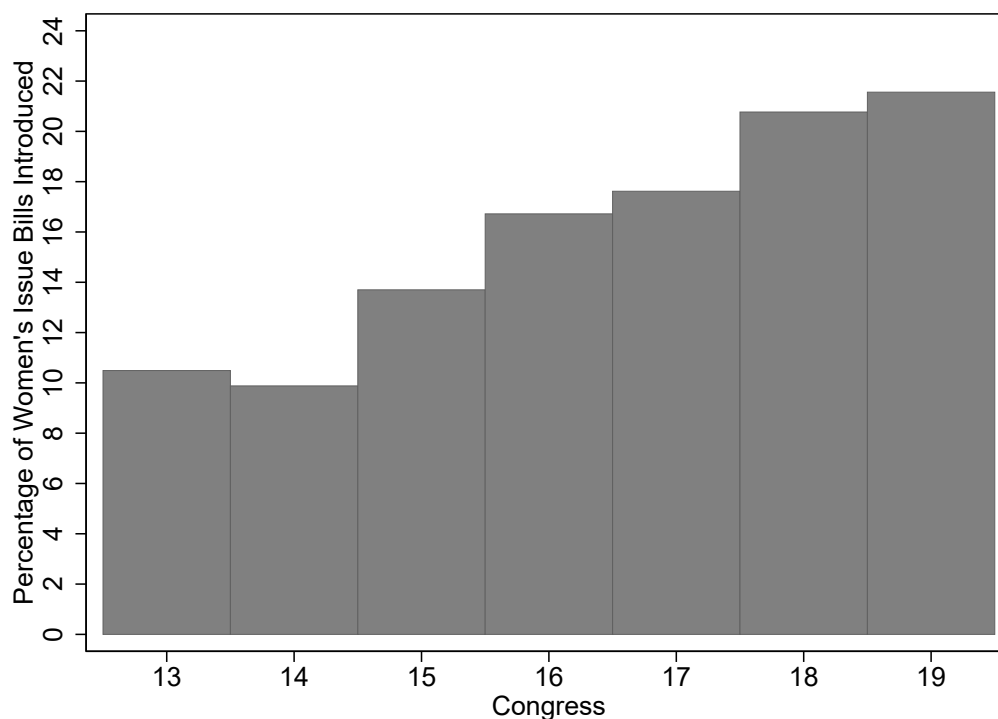
Iteration	No. Of Unclassified Bills at Start	No. Hand Coded	No. Machine Classified	Percentage Error	No. of Unclassified Bills at End
1	62923	6003	24849	1.11%	32071
2	32071	1998	8775	1.80%	21298
3	21298	2031	4678	1.57%	14589
4	14589	2011	3420	1.59%	9158
5	9158	2031	1754	1.97%	5373
6	5373	5373	NA	NA	NA
Total	62923	19447	43476	1.61%	NA

Appendix C Descriptive Statistics

Table C1: Percentage of Korean Legislators by Electoral System and Gender, 2004-2016

Congress Gender	17th		18th		19th		Total
	PR	SMD	PR	SMD	PR	SMD	
Men	8.5	72.91	7.37	77.17	8.23	73.18	85.26
Women	14.74	3.86	10.15	5.13	10.55	8.05	14.74
Across all Congresses							
	PR	SMD					
Male	6.56	78.71					
Female	9.24	5.5					
Total	15.80	84.2					

Figure C1: Percentage of Women's Issue Bills Introduced in Korean National Assembly by Congress



Note: Bars show the percentage of sponsored bills classified as women's issue bills. PR system introduced in the Korean Assembly in the 17th Congress.

Appendix D Predicting Sponsorship and Passage using the Alternative Categorization of Women's Bills

As noted in the text, we construct our own bill categorization as a robustness check using a keyword search of bill titles. Korean bill titles are long and descriptive and provide information on the content of the legislation. Further, Korean bills only cover one subject. This categorization is different from the one created in the text in that rather than using a supervised machine learning process, we simply categorize a bill as directly addressing a women's issue if it contains at least one of the following keywords. The key words commonly appear in bill titles and explicitly target women's issues, narrowly defined, consistent with an approach which typically categorize women's interests as those that directly affect women (e.g., reproductive rights, gender-based violence), or those related to women's traditional roles as caregivers (e.g., childcare) O'Brien and Piscopo (2019). The number of women's bills categorized using this method is far fewer than the number found by the supervised machine learning process (10,729 bills or 17% of the sample are identified using the machine learning process, whereas only 1,844 bills or 4.34% are identified using the key word search process.)

Words/phrases used to identify women's issue bills

- "daycare"
- "childcare" *or* "infant care"
- "child education support"
- "gender equality"
- "mother-child welfare"
- "single parents"
- "sexual harassment" *or* "sexual violence" *or* "sexual assault" *or* "domestic violence"
- "prostitution"
- "female scientists"
- "Committee of women"
- "gender discrimination"

- “women’s jobs” *or* “women’s career” *or* female employment
- “pregnant women” *or* “pregnancy” *or* “child birth”
- “family-friendly business”
- “women in agriculture”

The results shown below are robustness checks of the main results presented in the text. The results are consistent with those presented in Table 1. Figure D1 shows the predicted probabilities for the interaction term in model 2 in Table D1, and the differences between legislators in SMD and PR districts are consistent with the results shown in Figure 1 though the estimated effect is much smaller, due to the smaller number of bills classified as addressing women's issues. Note that we only show results for women's issue bills because the keyword search identifies those. The results for all bills are shown in the main text.

The results using the dependent variable confirm that both women and men in PR sponsor more women's issue bills than representatives in SMD seats, though women in either system sponsor more than men in either system, supporting Hypothesis 1 and 2. Differently from the results in the main text however, women in PR do not sponsor more women's issue bills than women in SMD at a statistically significant level, though the point estimate is higher.

Similarly, the results in Figure D2 showing the conditional effect of gender and electoral system on legislative passage are also very similar. Notably, and consistent with the results in the main text, women in PR systems are more successful at passing their legislation as compared to men in SMD systems. The differences between men in PR and women in PR or SMD are not statistically significant, as they are in the main text. Again, we attribute the large confidence interval to the paucity of observations. Broadly these results are consistent with the main results, while also demonstrating the utility of using the supervised machine learning process to identify a much larger number of women's issue bills than would be identified by a simple keyword search.

While this narrow definition of women's issue bills addresses issues that are directly relevant to women, it is important to note that other issues such as minimum wage laws, and regulations related to part-time jobs that may not only target women but disproportionately affect females are excluded. Given their socio-economic status in the society, a majority of part-time, irregular jobs with low wage and little employment protection are taken by women. In addition, although legislations related to welfare for other individuals such as the elderly are not included in this alternative definition of women's issue bills, one can argue that when elderly care is not subsidized by government, the burden of care work are most likely to fall on

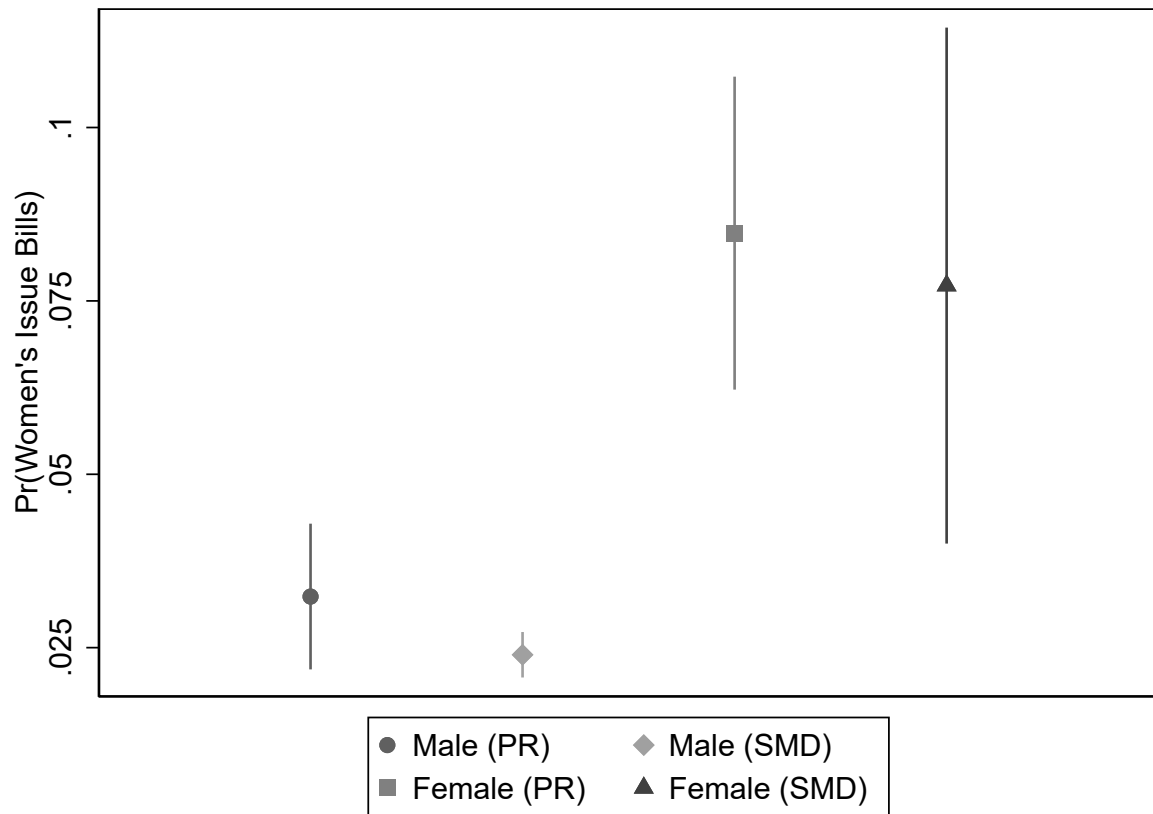
women's shoulders, particularly given the socio-cultural context of South Korea. Therefore, we believe that though our alternative analysis shows that there exists a large gendered difference in sponsorship of bills related to childcare and sexual violence, regardless of electoral systems, representation styles are still very important in promoting (not undermining) the substantive representation of women, as politicians in PR seats are more likely to legislate bills, such as those related to labor market, social welfare, and civil rights, that hugely affect women's rights and welfare in multifaceted ways.

Table D1: The Effects of Electoral Systems and Gender on Women’s Bill Sponsorship—Alternative DV

	(1)	(2)
Gender of Sponsor (Female=1)	1.14* (0.19)	1.23* (0.28)
Electoral System of Sponsor (PR=1)	0.20 (0.20)	0.31 (0.19)
Terms Served of Sponsor	-0.15* (0.07)	-0.14* (0.07)
Sponsor University Educated (Yes=1)	0.01 (0.24)	0.03 (0.23)
Sponsor Age	0.17# (0.10)	0.18# (0.10)
Sponsor Age ²	-0.00* (0.00)	-0.003* (0.001)
Number of Bills Introduced by Sponsor	-0.004* (0.002)	-0.004* (0.002)
Sponsor Moved to PR	-1.40* (0.65)	-1.45* (0.63)
Sponsor Moved to SMD	-0.09 (0.28)	-0.13 (0.29)
Number of Bill Cosponsors	-0.00 (0.00)	-0.00 (0.00)
Yearly GDP Per Capita	1.45* (0.71)	1.48* (0.71)
Gender x Electoral System		-0.21 (0.36)
Constant	-2.91 (2.90)	-3.20 (2.99)
Party Fixed Effects	Yes	Yes
Congress Fixed Effects	Yes	Yes
Pseudo R-squared	0.05	0.05
N	30,230	30,230

Note: The dependent variable is whether the bill is classified as addressing women’s issues based on containing one of the keywords listed in Appendix B. GDP Per Capita measured in tens of thousands of won. All models are logistic regression with standard errors clustered by legislator (596 clusters). Standard errors in parentheses. *p<.05

Figure D1: Predicted Probability of Electoral System and Gender on the Sponsorship of Women's Issue Bills—Alternative DV



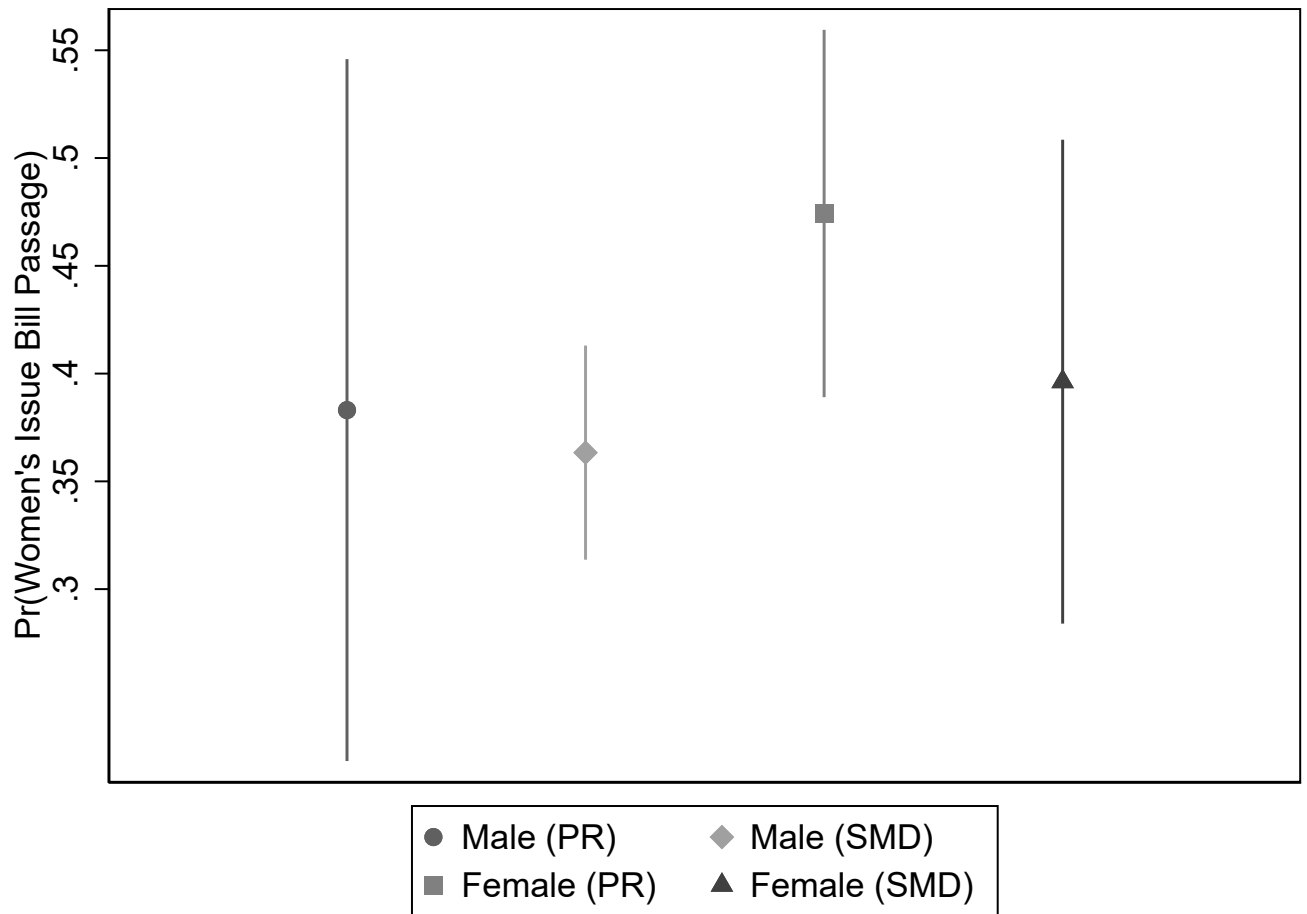
Note: Predicted probabilities from results presented in model 2 in Table D1. Lines above and below point estimates display 95% confidence intervals.

Table D2: The Effects of Electoral Systems and Gender on Women’s Issue Bill Passage—Alternative DV

	(1)	(2)
Gender of Sponsor (Female=1)	0.25 (0.24)	0.15 (0.29)
Electoral System of Sponsor (PR=1)	0.23 (0.24)	0.09 (0.40)
Terms Served of Sponsor	-0.08 (0.10)	-0.09 (0.11)
Sponsor University Educated (Yes=1)	-0.03 (0.33)	-0.08 (0.34)
Sponsor Age	-0.05 (0.14)	-0.06 (0.14)
Sponsor Age ²	0.001 (0.002)	0.001 (0.002)
Number of Bills Introduced by Sponsor	0.0002 (0.003)	0.0002 (0.0003)
Sponsor Moved to SMD	-0.33 (0.24)	-0.28 (0.26)
Number of Bill Cosponsors	-0.02* (0.01)	-0.02* (0.01)
Yearly GDP Per Capita	-4.84* (1.35)	-4.87* (1.36)
Gender x Electoral System		0.25 (0.50)
Constant	9.95* (4.42)	10.32* (4.56)
Party Fixed Effects	Yes	Yes
Congress Fixed Effects	Yes	Yes
Pseudo R-squared	0.04	0.04
N	1,047	1,047

Note: The dependent variable is whether the bill passed the National Assembly for women’s issue bills only using the alternative dependent variable described in Appendix D. GDP Per Capita measured in tens of thousands of won. Sponsor Moved to PR variable is not included because all values are zero. All models are logistic regression with clustered standard errors by legislator (284 clusters). Standard errors in parentheses. *p<.05

Figure D2: Predicted Probability of Electoral System and Gender on Women’s Issue Bill Passage—Alternative DV



Note: Predicted probabilities from results presented in model 2 in Table D2. Lines above and below point estimates display 95% confidence intervals.

Appendix E Description of Randomly Sampled Bills

Table E1

Congress Number	Bill Number	Gender of Sponsor	Title/Summary
18	1803028	M	Act for the Enhancement of Convenience for the Disabled, Elderly, and Pregnant Women Establish accountability systems in each relevant bureau and merge multiple and redundant committees in order to enhance the effectiveness of the decision-making process.
18	1811008	M	Partial Amendment to the Elementary and Secondary Education Act Grant full-time teacher status to health instructors to enhance the quality of education in the context of increased school violence and student health issues related to drugs, smoking, drinking, and sexual misconduct.
17	172494	M	Partial Amendment to the Elementary and Secondary Education Act In order to enhance education development in rural areas and low-income neighborhoods in cities, governments are to relax regulations on public schools and allow hybrid forms of public schools (e.g., charter schools).
19	1909688	M	Partial Amendment to the Infant Care Act Current legislation requires proof of employment from both parents for a student to be eligible for priority in daycare admission. However, often the children of parents in the agricultural or fishing sectors have been excluded from such support due to their inability to provide official documentation. The proposed bill aims to address this problem by including these children and consider their parents as full-time workers
18	1814214	F	Partial Amendment to the Child Welfare Act Provide "monthly children cash subsidies" to minors under the age of 12.
19	1901614	F	Partial Amendment to the Child Welfare Act Mandate education for adults who are convicted of child abuse, including those who are suspended from prosecution. Also, the definition of child abuse should include "domestic violence".
19	1903335	M	Partial Amendment to the Child Welfare Act Mandates a child's guardian to take the necessary measures for the regular health screening for a child.
18	1807987	M	Partial Amendment to the Act on Sexual Protection of Children and Adolescents The term, "Yeoja" used in the current Act on Sexual Protection of Children and Adolescents tends to imply a pejorative concept of women and stereotyped role of females. Therefore, this term is to be replaced with "Yeoseong" to promote a more gender equal concept.
17	173480	M	Elderly Pension ("Hyodo" Pension) Act Provide a national pension to senior citizens aged 65 or older who meet certain economic criteria in order to reduce rates of elderly poverty.

Table E1 (continued)

Congress Number	Bill Number	Gender of Sponsor	Title/Summary
17	176273	F	Partial Amendment to the Act on Sexual Protection of Youth In order to prevent the recurrence of offense, the government should expand and enhance the registration system, access system, and employment restriction system. Also, in the case of rape of a child under the age of 13, probation and suspension of the prosecution should be restricted.
19	1917907	F	Partial Amendment to the Act on Enforcement of Child Support Those who have not provided child support can be banned from traveling abroad. Additionally, relevant government bureaus can provide information about the person's income and assets without his/her consent.
18	1808451	M	Partial Amendment to the Act on Equal Employment and Work-Family Compatibility Support Expand parental leave to parents who adopt a child
17	174684	F	Partial Amendment to the Basic Women's Development Act In order to enhance the outcomes of women-related facilities, national and local governments should evaluate the performance of its centers and facilities related to women (e.g. women's career development center) and publicly report the evaluation results. These results will be used in assessing the future budget and government subsidies.
19	1900281	M	Partial Amendment to the National Health Promotion Act Establish electronic systems which allow local governments to assess household economic circumstances in order to enhance the effectiveness of child care subsidies.
19	1915988	M	Legislation on the use of hospice and palliative care Establish the system for individuals to make end-of-life decisions that can enhance the quality of life for patients and their guardians.
17	172561	F	Partial Amendment to the Maternal and Child Health Act National and local governments should fund all preventative care and vaccinations for pregnant women, infants, and children.
19	1902867	M	Partial Amendment to the Long-term Care Insurance Act Remove any existing language in the present versions of the law that can implicitly exclude senior citizens who live alone from accessing long-term insurance coverage for at-home care.

Table E1 (continued)

Congress Number	Bill Number	Gender of Sponsor	Title/Summary
19	1913090	F	Partial Amendment to the Basic Act on National Demographics National and local governments should prepare a separate budget to address challenges related to reduced birthrates and population aging.
18	1813881	M	Partial Amendment to the Act on the Prevention of Sexual Violence and Victim Protection Institutional capacity development to support disabled victims of sexual violence.
19	1915961	M	Partial Amendment to the Welfare Act for the Disabled Provide tax subsidies to aid the transportation needs of disabled people living in rural areas or those with low incomes.

Appendix F Main Analyses

Table 4: The Effects of Electoral Systems and Gender on Women's Bill Sponsorship

	(1)	(2)
Gender of Sponsor (Female=1)	0.44* (0.15)	0.56* (0.19)
Electoral System of Sponsor (PR=1)	0.45* (0.16)	0.54* (0.19)
Terms Served of Sponsor	-0.01 (0.03)	-0.01 (0.03)
Sponsor University Educated (Yes=1)	-0.27 (0.23)	-0.24 (0.23)
Sponsor Age	0.06 (0.06)	0.06 (0.06)
Sponsor Age ²	-0.001 (0.001)	-0.001 (0.001)
Number of Bills Introduced by Sponsor	0.04 (0.2)	0.05 (0.1)
Sponsor Moved from SMD to PR	-1.79* (0.35)	-1.83* (0.38)
Sponsor Moved from PR to SMD	-0.24 (0.19)	-0.29 (0.20)
Number of Bill Cosponsors	-0.01* (0.00)	-0.01* (0.00)
Yearly GDP Per Capita	-0.09 (0.53)	-0.08 (0.52)
Gender x Electoral System		-0.24 (0.28)
Constant	-3.80 (2.17)	-4.10 (2.17)
Party Fixed Effects	Yes	Yes
Congress Fixed Effects	Yes	Yes
Pseudo R-squared	0.03	0.03
N	30,252	30,252

Note: The dependent variable is whether the bill is classified as addressing women's issues.

GDP per capita measured in tens of thousands of won.

Coefficients for Number of Bills Introduced multiplied by 100.

All models are logistic regression with standard errors clustered by legislator (598 clusters).

Standard errors in parentheses. *p<.05

Table 5: The Effects of Electoral Systems and Gender on Bill Passage

	All Bills		Women's Issue Bills	
	(1)	(2)	(3)	(4)
Gender of Sponsor (Female=1)	-0.14*	0.26	0.05	-0.07
	(0.07)	(0.13)	(0.09)	(0.16)
Electoral System of Sponsor (PR=1)	0.11	0.03	0.38*	0.41*
	(0.07)	(0.09)	(0.12)	(0.15)
Terms Served of Sponsor	-0.04	-0.04	0.02	0.02
	(0.02)	(0.02)	(0.04)	(0.04)
Sponsor University Educated (Yes=1)	0.12	0.10	0.21	0.21
	(0.09)	(0.09)	(0.17)	(0.17)
Sponsor Age	0.003	-0.002	0.03	0.03
	(0.04)	(0.04)	(0.06)	(0.06)
Sponsor Age ²	0.2	0.3	-0.004	-0.002
	(0.04)	(0.04)	(0.1)	(0.1)
Number of Bills Introduced by Sponsor	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Sponsor Moved to PR	0.80*	0.84*	0.68	0.67
	(0.34)	(0.37)	(0.97)	(0.97)
Sponsor Moved to SMD	-0.09	-0.05	-0.11	-0.12
	(0.12)	(0.11)	(0.15)	(0.16)
Number of Bill Cosponsors	-0.0002	-0.0002	-0.01*	-0.01*
	(0.002)	(0.0002)	(0.00)	(0.00)
Yearly GDP Per Capita	-3.49*	-3.49*	-3.94*	-3.93*
	(0.35)	(0.36)	(0.63)	(0.63)
Gender x Electoral System		0.23		-0.07
		(0.13)		(0.23)
Constant	3.89*	4.15*	2.43	2.33
	(1.18)	(1.26)	(2.22)	(2.21)
Party Fixed Effects	Yes	Yes	Yes	Yes
Congress Fixed Effects	Yes	Yes	Yes	Yes
Pseudo R-squared	0.02	0.02	0.03	0.03
N	30,279	30,279	6,758	6,758

Note: The dependent variable is whether the bill passed the National Assembly.

Models 1 and 2 show the results for all bills, models 3 and 4 restrict the sample to bills classified as addressing women's issues. GDP Per Capita measured in tens of thousands of won.

Coefficients for Sponsor Age² are multiplied by 100.

All models are logistic regression with clustered standard errors by legislator.

(599 clusters in models 1 and 2, 513 clusters in models 3 and 4).
Standard errors in parentheses. * $p < .05$