Electoral institutions, women's representation, and policy outcomes *

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Abstract

Do electoral institutions affect the degree to which female legislators address women's interests in legislative processes? While the growing literature has examined whether increased women's representation causally affects policy outcomes, whether electoral institutions mediate the effect is less known. To fill the gap, this study tests whether proportional representation (PR) encourages female representatives to address women-specific interests more than a single-member district (SMD) does. To elicit the causal impact of electoral institutions, we leverage the unique "best loser" provision of the mixed electoral system in the Japanese House of Representatives elections, where a marginal candidate may win an SMD seat or PR seat by chance. To fully account for the complex structure of the mixed electoral system, we apply the simulation-based regression discontinuity design. Across different legislative activities, we consistently find a significant effect of holding a PR seat: female PR representatives more frequently affiliate with women-related committees, submit question memorandums on women's issues, and endorse petitions regarding women's interests than their male counterparts, but significantly less so when they stand as SMD representatives. The institutional effect likely arises because a female PR representative, who represents a larger district with other co-partisans, has greater incentives to prioritize women-related interests to distinguish herself from her co-partisans. Our results suggest that electoral institutions do affect the relationship between women's nominal representation and their policy consequences. More broadly, our findings bring forward the research agenda in political economics to better understand the political institutions and policy choices and, in particular, underscore the importance of institutional environments in leveraging diverse voices in policymaking.

Keywords: Gender, political representation, electoral institutions, policy outcomes, simulated regression discontinuity

JEL Codes: D72, J16, J71

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1 Introduction

Do political institutions mediate the degree to which greater women's representation affects policy outcomes? The growing literature has examined the public-policy consequences of increased women's representation. Interestingly, however, the resulting evidence varies across countries and political institutions. On the one hand, a body of research shows that increases in female politicians affect the size and composition of spending and the types of proposed bills. These empirical findings corroborate citizen-candidate models (Alesina 1988, Osborne & Slivinski 1996, Besley & Coate 1997), in which candidates are motivated by policy outcomes and intrinsically benefit from holding office. On the other hand, other studies find null effects (Ferreira & Gyourko 2014 on the U.S. cities and Bagues & Campa 2018 on the Spanish municipal councils). Such mixed evidence is particularly interesting given that the gender gap in policy preferences is consistently documented across the world (Alesina & Giuliano 2011). This gives rise to the question of what – in particular what kind of political or electoral institutions — mediates the effect of increased women's representation.

Cross-country comparisons provide preliminary insights into the mediating role of political institutions on the relationship between increased women's representation and policy outcomes. For example, Figure 2 shows that the increased share of female parliamentarians in the last five decades indeed correlates with a greater improvement in the World Bank's *Women, Business, and Law* score, which measures the laws and regulations that affect women's economic opportunity. What draws our attention is that the positive association is driven by countries with proportional representation systems but not by countries with plurality/majority systems.[1] Do PR systems *causally* affect the policy consequences of increased women's representation?

[1] Appendix A provides more details on how to construct Figure 2 and data sources. The observed pattern holds by excluding countries that switched electoral systems sometime between 1971 and 2020 (Figure A.1) or by excluding countries that have introduced gender quotas (Figure A.2).

Motivated by the cross-country observation, this study examines the causal impact of electoral institutions – in particular proportional representation (PR) and single-member district (SMD) plurality – on the degree to which female legislators prioritize women's interests in the parliamentary process. We surmount the identification issue by leveraging a quasi-experimental setting in the Japanese House of Representative elections (1996-2017). More specifically, we exploit the unique "best loser" provision of the mixed electoral system. The mixed system combines an SMD tier and a PR tier and allows us to compare two electoral tiers within the same country and the same election. Moreover, under the "best loser" provision, a candidate who loses their district race by a narrow margin gets a chance to win a seat off the PR list. Importantly, the narrower a district race is, the higher is the chance that the SMD loser wins a PR seat. In fact, the SMD loser almost always wins a PR seat if their district race is very close. Therefore, whether one becomes a "PR representative" or an "SMD representative" is as-good-as-random in narrowly contested races. The impact of winning an SMD seat and its gender gradient are the parameters of our interest.

Japan provides an ideal testing ground because it allows us to see the effect of different electoral tiers on legislative activity while holding constituents and other institutional features constant. The within-country, within-election analysis eliminates endogenous selection of electoral institutions, which often undermines cross-country evidence. Moreover, Japan is one of the few countries that has yet to adopt any gender quota system. Thus the Japanese setting allows us to see the role of electoral institutions in the absence of any additional institutional features that address the gender imbalance in the national parliament.

To fully leverage the complex structure of the mixed electoral system, we employ the simulation-based regression discontinuity design proposed by Kotakorpi, Poutvaara & Terviö (2017). This design takes into account three sources of randomness arising in the

mixed electoral system: within-district competition (winning a district race), across-party competition (own party winning more seats and therefore raising the chances of getting elected through a party list), within-party competition (winning through a party list). We simulate votes and recalculate the election result based on the empirical distribution of ballots cast for parties and district candidates. We repeat simulations for a sufficiently large number (1,000 times),[2] and compute each candidate's *winning propensity* — the percentage of simulated elections in which they win. We use the winning propensity as a running variable for the regression discontinuity. Essentially, when a district winner and a runner-up face very close winning propensities, which candidate gets an SMD seat is as good as random.[3]

As outcome variables, we gauge the degree to which legislators address women's interests by the topic composition of three legislative activities: (i) petition endorsements, (ii) committee assignments, and (iii) submissions of question memorandums. Specifically, we use a dictionary-based approach and classify petitions, committee assignments and question memorandums as women-related if it contains any words[4] related to issues that female voters prioritize more than men: education, childcare, energy, and women's rights.[5] Then we quantify the extent to which each legislator addresses women's interests by (i) the number of women-related petitions that they endorse, (ii) whether or not they attend women-related legislative committees and (iii) whether or not they submit women-related question memorandums.

Our findings are three-fold. First, we find that female legislators more frequently

[2]The number of simulations is set so that the winning propensity stabilizes.

[3]Our identification strategy is in the close spirit as Yuan (2020), who also exploits the best-loser provision to identify the effect of an additional representative on local public expenditure. While Yuan (2020) employ the standard RD design as in Lee (2008), we employ the simulation RD design to fully take into account the complex structure of the mixed electoral system.

[4]Section 2.3 list the complete set of words that are related to women's policy interests.

[5]We identify policy issues that female voters prioritize more than men based on survey conducted before each House of Representatives election. Section 2.2 provides more details on the result of the election survey.

serve on the committees on women's interests, but significantly less so when they stand as SMD representatives. Among PR representatives, the gender gap in the probability of serving on such committees is as large as 27.2 percentage points. The gender gap among SMD representatives, however, goes down to only 12.7 percentage points. Meanwhile, we find no significant gender gradient of the SMD impact on joining committees on men's interests. Female PR legislators are 13 percentage points less likely to assume membership in such committees, but the gender gap does not seem to close among SMD representatives. Our findings are robust with additional covariates.

Second, we find that women are significantly more likely to submit question memorandums related to women's interests, but being an SMD representative may decrease the likelihood that they submit a question memorandum on a women-related issue.

Lastly, we find that female legislators more frequently endorse petitions on women's interests, but significantly less so when they stand as SMD representatives. The gender difference among SMD representatives in the number of petition endorsements related to women's interests is only 0.024 standard deviation units. Meanwhile, the gender gap among PR representatives is as large as 0.081 standard deviation units. Our findings are all robust with additional covariates.

Overall, our results suggest that PR women are more likely to prioritize women's interests than SMD women. One possible mechanism is as follows. Two rules may give different incentives to male and female politicians. For example, SMD electoral districts are smaller both in geographical area and district magnitude.[6] Consequently, an SMD representative, a man and a woman alike, may have incentives to prioritize issues both male and female voters care about. Meanwhile, a female PR representative, who represents a larger district with other co-partisans, may have greater incentives to

[6]The term *district magnitude* refers to the number of members to be elected in each electoral district.

prioritize women's particular interests to distinguish herself from her co-partisans.

This study contributes to the three lines of literature. First, this study is motivated by and contributes to the literature on the public-policy consequences of increased women's political representation. As mentioned earlier, existing evidence is mixed. On the one hand, growing evidence suggests that having a female leader at a local legislature affects the size of the aggregate spending, the composition of the spending, or both (Chattopadhyay & Duflo 2004 on Indian village heads, Casarico, Lattanzio & Profeta 2019 on Italian mayors). Greater women's share at a local legislative body is found to have similar policy implications (Svaleryd 2009 on Swedish local councils, Bhalotra & Clots-Figueras 2014 on Indian state legislatures, and Clayton & Zetterberg 2018 on the relationship between gender quota and government spending in 139 states). At the level of the national legislature, an emerging literature highlights that a female legislator has different policy priorities compared to a male counterpart: Lippmann (2019) shows that, all else equal, female parliamentarians amend more bills on women's issues than their male counterparts in the French Parliament. Like Lippmann (2019), our study underscores that having a female representative (vis-a-vis male representative) can change the salience of policy issues in the national legislature. Our contribution is to provide causal evidence that increased female representation interacts with political institutions.

Our study also falls into the broader research agenda of political institutions and policy choices that is paved by Besley & Case (2003). In their work, Besley & Case (2003) review empirical studies in the United States, but do not compare outcomes by whether the political institutions adopt proportional representation or majority rule. Our study fills this gap. Using a unique institutional setting, we study the interplay between gender representation and political institutions, in particular electoral institutions.[7,8]

[7] In political science literature, Krook (2017) also points out that little work has been done on the interplay between gender and post-election behavior across different electoral formulas.

[8] A recent exception is Höhmann (2019), who shows the legislative consequence of PR and SMD using the German Bundestag elections. Our findings are qualitatively consistent with Höhmann (2019). We

Finally, this study highlights that men and women not only have different political leanings on particular issues, but they also place different priorities across the spectrum of issues. The former has been well documented by existing studies. On a uni-dimensional left-right spectrum, female voters lean toward the left compared to male counterparts (Edlund & Pande 2002 on the United States, and Edlund, Haider & Pande 2005 on Western European countries). Alesina & Giuliano (2011) show that women are more pro-redistribution than men in many different countries and political institutions.[9] Correspondingly, experimental evidence show that women are more inequality-averse than men (see Croson & Gneezy 2009 for review).[10] Notably, Funk & Gathmann (2015) depart from the uni-dimensional comparison. They document the gender gap in policy preferences within each of 11 policy areas using surveys conducted after federal referendums in Switzerland (1981-2003). Our study also considers the gender differences in a particular policy environment with multiple policy issues. Yet, in contrast to Funk & Gathmann (2015) that focuses on gender differences *within* issues, we shed light on the gender gap in priorities *across* issues. Such a gender gap implies that having a male or female representative can change prominence of certain issues in the legislative process.

The remainder of the paper is organized as follows. Section 2 provides a brief background of Japan's legislative and electoral systems. By doing so, we highlight the "best loser" provision of Japan's mixed electoral system, the key feature that is critical for our empirical analysis. Section 3 briefly summarizes data sources. Section 4 explains the empirical model, identification, and estimation strategy. Then Section 5 discusses the

exploit the quasi-random assignment of PR and SMD that arises from the unique feature of Japan's mixed system and presents the causal impact of the SMD tier.

[9]Using the data from World Value Survey, Alesina & Giuliano (2011) show that women are more pro-redistribution than men in many different countries and political institutions even after controlling for individual characteristics such as partisanship, religion, educational attainment, income, marital status, age and race.

[10]Croson & Gneezy (2009) review experimental evidence on preference differences between men and women, focusing on three factors that have been extensively studied: risk preferences, social preferences (i.e., the extent to which others' utilities enter into their own utility), and reaction to competition. Inequality aversion falls under the heading of social preferences. The existing literature has consistently shown that women are more inequality-averse than men using ultimatum and dictatorship games.

results. Finally, Section 7 concludes.

2 Contextual background

In this Section, we start with briefly summarizing the Japanese political system. Subsection 2.2 highlights that Japanese women have different policy priorities compared to men. Such gender gap leads us to categorize education, child care, and energy policies as *women's policy interests*. In Subsection 2.3, we turn to quantify the extent to which each legislator addresses women's interests by topic compositions of three legislative behavior: question memorandum submissions, committee assignments, and petition endorsements. Lastly in Subsection 2.4, we present a unique feature of Japanese House of Representatives elections, which we leverage to identify the effect of the electoral rule on the gender gap in legislative behavior.

2.1 Japanese political system

This study focuses on the House of Representatives (*Shugi-in*), the lower chamber of Japan's bicameral legislature. Compared to the upper chamber (the House of Councilors or *Sangi-in*), the House of Representatives has almost double the size (465 seats) and has dominant power. Members of the House of Representatives are elected for four-year terms but the house can be dissolved before the next election. There is no legislative term limit.

As we describe in detail in Subsection 2.4, legislators are elected through two electoral tiers, single-member district (SMD) and regional proportional representation

(PR). Legislators who win one of the 289 single-member districts (SMD legislators) represent their local constituency, while PR legislators represent one of eleven regional blocks.

While Japan has a multi-party system, the Liberal Democratic Party (LDP for short) has continued to be the dominant party since its establishment in 1955. The brief exception was the period between 1993 and 1994 and again between 2009 and 2012. LDP represents the conservatives and is considered as the center-right party in the Japanese political spectrum. The LDP usually forms a coalition with Komeito Party to secure the majority seats.

In terms of women's parliamentary representation, Japan ranks poorly relative to other developed economies. As of January 2021, women comprise 9.9 percent of the House of Representatives seats. This figure is much lower than the global average of 25.6 percent (the Inter-Parliamentary Union).[11] Nonetheless, after 50 years of hovering around three percent, women's share has begun trending upwards since the mid-1990s (Figure 3). Importantly for our analyses, the recent increase in women's share is not due to any policy intervention. In fact, Japan has yet to any gender quotas. This institutional feature allows us to see the role of electoral institutions in the absence of additional institutional features that address the gender imbalance in national parliaments.

2.2 Gender gap in policy priorities in Japan

As is documented in many countries,[12] Japanese female politicians also represent female voters' policy interests more than male politicians. Figure 4 plots the gender gap

[11] The global average is computed by dividing the total number of female parliamentarians by the total number of parliamentarians in the lower chambers and unicameral legislatures of 190 countries. Data are available at `https://data.ipu.org/women-ranking?month=1&year=2021`. Last access: 2021-07-06.

[12] For example, Edlund & Pande (2002), Alesina & Giuliano (2011).

in policy priorities among candidates against the gender gap in policy priorities among voters right before the 2009, 2012, 2014, and 2017 House of Representative elections. Each dot represents one of 16 policy areas k. On the horizontal axis, we show the difference between the percentage of female voters who chose policy k as the top priority and the percentage of male voters who chose policy. We repeat the same procedure for candidates and show it on the vertical axis. Circle dots indicate that both voters and candidates exhibit statistically distinguishable gender gaps.

On the one hand, women significantly prioritize the policy areas in the northeast corner: education and child care, and energy and nuclear power plants. For convenience, we call them women's policy interests. On the other hand, men significantly prioritize the policy areas in the southwest corner: industrial policy, fiscal and monetary policy, decentralization, and administrative reform. We call them men's policy interests. Notice that men's policy interests are often linked with *pork barrel* projects that are directed toward geographical constituencies.

The observed gender gap in policy interests together with citizen candidate models[13] lend support that addressing women's descriptive underrepresentation is critical for public policymaking. Note, however, that the premise that raising women's nominal representation affects policy makings rests on another assumption that women's descriptive representation gets translated into policy outcomes. Does this assumption always hold? What mediates the policy consequence of increased women's representation? These are the central questions that we address.

[13]For examples see Alesina (1988), Osborne & Slivinski (1996), and Besley & Case (2003)

2.3 Measuring and categorizing legislative behavior

Now we turn to quantify the degree to which legislators address women's interests by the topic composition of three legislative activities: legislative committee assignments, written question submissions, and petition endorsements.[14,15] In what follows, we explain each of the three measurements and our classification procedure. We also document how the measurements differ by gender and representing electoral tiers.[16]

Our first measure of legislative activity is the committee assignment. Legislative committees receive bills submitted by both the Cabinet and legislators, discuss and revise them, and finally bring them to the House, where voting takes place. On average, each legislator serves on 1.4 standing committee per session.[17] Figure 5 lists all 17 standing committees.[18] As Figure 5 illustrates, legislative committees serve as a critical intermediate step between bill proposal and voting, and are places where most of the action takes place in law making. Using the results from Section 2.2, we classify as the labor and welfare committee, the education committee, and the environmental committee as women-related.

As Figure 6 shows, more women serve on women-related committees. Female legislators account for 21.5 percent in the labor and welfare committee, 18.6 in the edu-

[14]Roll-call votes are often used to measure legislators' policy preferences in the political science and political economics literature. For examples, see Levitt (1996), Lee, Moretti & Butler (2004), Washington (2008), Fouirnaies & Hall (2018). However, we do not look at legislators' voting behavior because legislators almost always stick to party lines when they vote. Therefore, there is virtually no room for legislators' gender to play a role after controlling for their party affiliation.

[15]Another common way to measure legislative activity is by bill proposal submissions. However, the requirement that bill proposals need at least 20 supporters in the House of Representatives to be formally submitted means that most bill proposals submitted by legislators are essentially party bills. It is rare for individuals to be able to gather so many supporters without the help of any political parties. Hence, it is not an informative way to measure individual legislative activity.

[16]We provide more details on data sources in Section 3.

[17]In fact, 64.2 percent of legislators serve on the only one committee.

[18]Before 2003, there were 21 standing committees, which were consolidated to 17 in 2003. In addition, there are always several temporary committees to address concurrent policy needs. An example of a temporary committee is a committee for the recovery from the 2011 Tohoku Earthquake. In our study, we focus only on standing committees.

cation committee, and 15.5 in the environmental committee.[19] Female legislators indeed represent female voters' interests. Notably, this pattern is more pronounced among PR legislators than SMD legislators. Table 1 summarizes the distribution of committee membership by gender and electoral tier (PR or SMD). The top panel shows that PR women account for larger shares at the labor and welfare, education and environmental committees than SMD women. Meanwhile, the bottom panel shows that PR men and SMD men distribute similarly across committees.

Another key measure of legislative activity is the submission of written questions to the Cabinet. In the Japanese Diet, legislators can submit written questions to the Cabinet and the Cabinet is obliged to write a formal answer. Question submissions are a reasonable measure of individual legislative activity, because, unlike bill proposals, legislators can submit questions individually for an unlimited number of times. Submitting written questions gives politicians, especially those outside of the ruling party, the chance to get detailed answers on issues they care about. Hence, we use the submission of written questions to see what issues politicians are paying and bringing attention to.

Our third measure of legislative activity is the endorsement of citizens' petitions. In Japan, any citizen has the right to submit a petition with one or more legislators' endorsements. The petition is received by one of the legislative committees based on the petition's topic.[20] Importantly, legislators are not bound by their party affiliation regarding how many and which petitions they endorse. It is also common that more than one legislator endorses the same petition, and moreover in a bipartisan way. Also, they can endorse a petition to a committee which they are not affiliated with. Therefore, petition endorsement captures legislators' revealed preferences over the set of policy-

[19]This pattern holds in each session, suggesting that the pattern is not driven by a particular period of time. Figure B.3 shows women's share of each standing committee at each session. Albeit volatile, women consistently hold a large share in the labor and welfare committee, education committee, and environmental committee. Meanwhile, women are underrepresented in the committees that are related to men's interests, namely the committees on industry, finance, and local affairs.

[20]After submission, petitions are examined in the relevant house committee and then the house floor.

relevant topics.

To classify written questions and petitions, we employ a dictionary-based approach : We first derive lists of words associated with women's policy interests shown in Section 2.2. Then we classify written questions and petitions as *women-related* if the title includes either of the following words:

list 1 (narrow definition) men-and-women, women, girls, pregnant-women, birth, cervical cancer, sexual harassment, domestic violence, sexual violence, separate-surnames, gender, mother

list 2 (broad definition) men-and-women, women, girls, pregnant-women, birth, cervical cancer, sexual harassment, domestic violence, sexual violence, separate-surnames, gender, mother, childcare, out-of-marriage children, toddler, childcare leave, children, single-parent, education, school, adolescence, energy, electricity generation, reusable energy, nuclear, nuclear power plant, electricity

The list 1 narrowly defines women-related topics: the list includes words related to women's rights, health, safety, and life events. Meanwhile, list 2 expands list 1 to provide a wider definition of women-related topics that covers key words related to the primary policy priorities of female voters and legislators in Figure 4: education, childcare, and energy. We use these definitions throughout the paper.

Based on the classification, Table 2 shows whether a politician ever submits a written question related to women-related issues, by gender and electoral tier. We find that while 12.6% of women submit questions on women-related issues, only 5% of men do so. Moreover, for both female and male legislators, PR legislators are much more likely to submit women-related questions.

Similarly, Table 3 summarizes whether a legislator ever endorses petitions on women's interests, broadly defined, by gender and electoral tier (PR or SMD). The top panel shows that 76.2 percent of PR women endorsed petitions on narrowly-defined women's issues, which is far greater than the proportion for SMD women. Meanwhile, the bottom panel compares PR men and SMD men. While PR men are more likely to endorse petitions on women's issues than SMD men, the likelihood is far smaller than PR women.

To sum up, we descriptively find that PR does promote more women to represent women's interests compared to SMD does, which is consistent with the earlier cross-country comparisons. Whether this relationship is causal, however, remains unanswered. To address this issue, we leverage the "best-loser" rule of the mixed electoral system, which we describe in the next subsection, and elicit quasi-random assignment of electoral tier to each legislator.

2.4 "Best loser" provision of the mixed electoral system

The Japanese House of Representatives (JHOR) employs the Mixed Member Majoritarian (MMM) electoral system.[21] The MMM combines single-member districts (289 seats as of the year 2017) and semi-closed-list regional proportional representation (176 seats).[22] The Japanese MMM system allows double nominations in the district race

[21]The Japanese House of Representatives adopted the Mixed Member Majoritarian system in 1996, which is the year when our sample starts. Before introducing MMM, the House of Representatives had employed the multi-member plurality system since 1947.

[22]The MMM system does not produce a parliament in which seat shares are proportional to general vote shares as in the Mixed Member Proportional system (MMP), which is employed, for example, by the German Bundestag and New Zealand's House of Representatives. Instead, the MMM allocates a fixed number of the seats (176 seats which are divided by 11 regional blocks) proportionally and adds the district seats (289 seats) to these. From the viewpoint of legislators' electoral incentives, Bawn & Thies (2003) theorize that SMD candidates under the MMM (both SMD-only candidates and dual nominees) are district-focused because they primarily aim to win in their district even though they may end up being elected through their party list. On the other hand, PR-only candidates are more likely to

and the party list. In fact, the double nominees account for 83.68 % between the 1996 and 2017 elections.[23] In the SMD tier, voters vote for a candidate and elect a representative by first-past-the-post. Meanwhile, in the PR tier, voters vote for a party, and seats are apportioned to parties according to d'Hondt formula. Each party gives seats from the top of their candidate list.

While the PR tier is technically closed-list,[24] the *best-loser* provision allows voters to influence the ballot rank in party lists. Before election, parties present fixed ballot lists but they may give identical rankings to multiple candidates as long as these candidates run for both SMD and PR tiers. After polls close, SMD winners opt out from the party lists. Then in the PR tier, each party re-ranks their candidates in lexicographical order: candidates are first ranked according to the prefixed rankings. Then for candidates whose pre-election rankings are the same, within-group rankings are determined based on the proportion of their votes compared to the winning candidate in their single-member district. Thereby, the closer the losing margin is in a district race, the more likely the candidate gets a higher rank and wins a seat off the PR list. Table B.3 shows an example for PR party lists with pre and post election rankings in the 2017 election.

This best-loser provision yields quasi-random variation in electoral tiers for those who marginally win or lose their district races. On the one hand, those who marginally win their district seats represent their local constituents. On the other hand, those who marginally lose their district seats almost always end up winning PR seats and represent regional blocks, which cover a much broader constituency than single-member districts. By chance, these marginal winners differ in whom they represent. As we describe in detail in Section 4, we leverage such quasi-random variation to identify the causal impact

represent organized interests. We exclude PR-only legislators from our analyses.

[23]There is no gender gap on this front. 83.54 % of male candidates and 85.93 % of female candidates run for both SMD and PR.

[24]Under the closed-list PR system, voters cast partisan ballots. Meanwhile under the open-list PR system, voters vote for one or more candidates within party lists.

of electoral tiers on legislators' committee memberships and, in particular, test whether the PR tier promotes more women to act on behalf of women compared to the SMD tier.

3 Data

Before carrying out the causal analyses, we summarize our data sources.[25]

Electoral outcomes. We build our main dataset based on the Reed and Smith House of Representatives elections data. Their dataset provides not only electoral outcomes but also candidates' personal characteristics including candidates' gender, age, party affiliation given each election, and the number of wins in the past House of Representatives elections.

Committee assignments. We collect information on committee memberships from the House of Representatives annual reports (*Shugiin no ugoki* 1999-2017).

Submission of written questions. We source data on written question submissions in the House of Representatives between session #148 and #203 from the House of Representatives online database. This data includes basic information on the submitted written question, including the question title, the question content, the name of the submitter, the submission date, and the Cabinet's response. During the period, 10493 questions were submitted, which corresponds to 10591 submitters.

Petitions to the House of Representatives. We collect rich data on petitions submitted to the legislative committees within the House of Representatives between

[25] As we present in Subsection 2.2, we draw data on candidates' and voters' policy priorities from the University of Tokyo and Asahi Survey in 2009, 2012, 2014, and 2017.

the 143rd and 204 sessions.[26] Our data include the petition's title, number of signatories, list of legislators that endorsed the petition, name of the committee that examined the petition, and the examination result. During the periods we study, 7486 petitions were submitted, and a total number of 99570 legislators endorsed these petitions and delivered them to relevant legislative committees. Out of 7486 petitions, 6915 petitions, or 92.4 percent, were presented to a standing committees whereas the rest were presented to a special committees.

We link all of the above data using candidates' first and last names and electoral districts as matching keys. The match rate is 100 percent. Table 4 summarizes mean characteristics of male and female legislators in our dataset. Column 1 is for all politicians who won a seat in the House of Representatives elections between 1996 and 2017, and column 2 is for our base sample, which is limited to politicians who participated in SMD elections i.e., excludes candidates who only ran in PR elections. Columns 3 and 4 further divide the sample in column 2 by gender. Row 1 shows that 8% of all legislators are female, and we find a similar proportion of 7% among politicians who ran in SMD elections. Row 2 shows that the average age of all legislators is 53.35, but female legislators tend to be younger on average, with a mean of 49.12. The number of total previous wins is also different by gender, where male politicians who ran as SMD candidates have won 4.10 times on average, while their female counterparts have only won 2.78. The next two rows for party affiliation show that men are more likely to be in the LDP compared to women, while women are more likely to be in the JCP compared to men. The final row shows that, among those who participated in SMD elections, the average probability of winning for men is 0.75, which is significantly higher than the 0.56 average for women. Hence, women are more likely to be elected through PR than SMD.

[26] The online records start on July 30, 1998.

4 Identification strategy

As illustrated in Section 2.4, the "best loser" provision of the JHOR's electoral system yields as-good-as-random variation as to whom a legislator represent, either a single member district or a regional PR block. Such quasi-random variation allows us to identify the causal impact of the electoral tier (SMD or PR) on legislative activity.

We employ the simulation-based regression discontinuity design à la Kotakorpi, Poutvaara & Terviö (2017). Compared to the standard regression discontinuity design popularized by Lee (2008), the simulation-based regression discontinuity design employs simulations to compute the running variable.

Under the complex structure of the mixed electoral system, randomness of election outcomes arises from three different margins: the candidate's vote count affects their district race's outcome (i.e., within-district competition); the party's overall vote count affects the party's seat allocation (i.e., between-party competition); and lastly due to the "best-loser" provision, how close the candidate's vote count is to their district's winner affects their rankings in their party list (i.e., intra-party competition). A random perturbation in the vote distribution changes the election result through these three margins.

We carry out the simulation-based regression discontinuity design in the following steps. First, we re-sample votes from the empirical distributions of votes cast on candidates and parties.[27] [28] Based on the simulated votes, we apply first-past-the-post in the SMD tier and the best-loser provision and d'Hondt formula in the PR tier to re-calculate the election result.[29] Then, we repeat this *simulated-election* 1,000 times.

[27] Note that we only observe the marginal distributions of votes cast on candidates and parties. Therefore, for the purpose of simulations, we assume that these two distributions are independent

[28] Following Kotakorpi, Poutvaara & Terviö (2017), we set the re-sampling size as 15 percent of observed eligible voters.

[29] In a simulated election, we take the pre-election party lists as given.

For each candidate, we calculate the share of wins in 1,000 simulated elections. This *winning propensity* is a uni-dimensional, continuous metric summarizing one's likelihood of winning and lies between 0 and 1. Candidates with zero winning propensity are "the always losers." Candidates with one winning propensity are "the always winners." Then the rest are "the swings" and have some chance of winning, but their win is not insured.

Finally, we normalize the winning propensity by taking a distance from the threshold. We define the election unit as a year and single-member district pair. Then the threshold is the mean of the winning probability of a winning candidate and a runner up.

With the normalized winning propensity as the running variable, we apply the regression discontinuity design. We restrict the sample to legislators whose winning propensities fall in the interval $P_i \in [-h, h]$[30] and estimate the following regression model:

$$\begin{aligned} Y_i =&(\alpha_0 + \delta_0 F_i) + (\alpha_1 + \delta_1 F_i) P_i^* \\ &+ \left\{(\alpha_2 + \delta_2 F_i) + (\alpha_3 + \delta_3 F_i) P_i^*\right\} T_i + \gamma x_i' + \epsilon_i \end{aligned} \tag{1}$$

where T_i is an indicator taking one if i is a SMD legislator, F_i is an indicator taking one if i is female, and P_i^* is the normalized winning propensity. The coefficient α_2 captures the effect for male legislators of winning an SMD seat (vis-a-vis a PR seat), and δ_2, our parameter of interest, captures the gender gradient of the effect of winning an SMD seat. Figure 1 visualizes the key regression coefficients. The baseline model does not include any covariates. We also present regression results with a set of covariates x, which includes an indicator of i being affiliated with the Liberal Democratic Party, and i's tenure at the

[30]Following Grembi, Nannicini & Troiano (2016), we compute the optimal bandwidth as the average of the optimal bandwidths for the male regression and female regression.

House of Representatives.

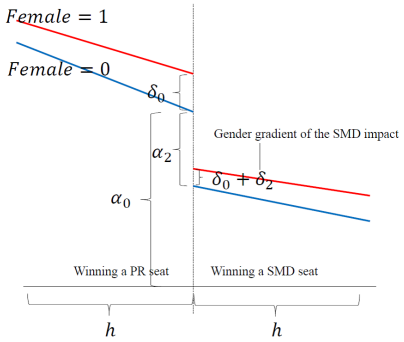


Figure 1: Illustrating the regression coefficients

Figure 7a shows the distribution of the running variable. We find no evidence that the running variable is manipulated around the cutoff. Furthermore, Figure 7b graphically shows the first stage by regressing the SMD dumour on the running variable. As is expected, there is a discontinuous jump at the cutoff value of zero.

5 Results

This section presents the results from the similated regression discontinuity. Subsection 5.1 reports the results for committee assignments. Subsection 5.2 reports the results for question submissions. Lastly, Subsection 5.3 shows the results for petition endorsements. Across the three legislative activities, we consistently find a significant effect of holding a PR seat.

5.1 Committee assignment

First, Table 5 shows results from the regressions of equation 1 with two different outcomes: Column 1 and 2 look at an indicator taking one if a legislator serves on the committees on women's interests (labor and welfare, education, and environment). Meanwhile Column 3 and 4 look at an indicator variable taking one if a legislator serves on the committees on men's interests (finance, industrial policy, and local affairs). The first row shows the gender gap among PR representatives. The second row presents the ceteris paribus effect of winning an SMD seat. The third row presents the key coefficient of interest — the gender gradient of the effect of winning an SMD seat.

Female legislators more frequently serve on the committees on women's interests, but significantly less so when they are SMD representatives. Among PR representatives, the gender gap in the probability of serving for such committees is as large as 27.2 percentage points. The gender gap among SMD representatives, however, goes down to only 12.7 percentage points. Our findings are robust to additional covariates. Meanwhile, we find no significant gender gradient of the SMD impact on joining committees on men's interests. Female PR legislators are 13 percentage-points less likely to assume membership in such committees, but the gender gap does not seem to close among SMD representatives. Our findings are robust to additional covariates.

5.2 Question Submissions

Next, Table 6 shows the results of regressions of equation 1 with the probability of submitting questions related to women's interests as the outcome variable. We first find that women are significantly more likely to submit written questions related to female

voters interests. The coefficient on the dummy variable for female legislators is around 0.09 for the whole sample in columns 1-2 and around 0.05 for the sample excluding outliers above the 95th percentile in columns 3-4. This means that female legislators are 5 to 10 percentage-points more likely to submit questions related to women's interests.

Although less robust, we also find a weak negative effect of winning an SMD seat on the likelihood of submitting women-related questions. In the regression without controls in column 1, we estimate that winning an SMD seat causes legislators to become around 3.3 percentage-points less likely to submit questions related to women's interests. The magnitude of the estimate decreases once we add controls for party affiliation and tenure, but the coefficient remains negative. In columns 3 and 4, we exclude outliers with a total submission count above the 95 percentile. Although the standard errors remain high, all estimates become consistent with the descriptive statistics, where both the coefficient on winning an SMD and the gender gradient are negative.

5.3 Petition endorsement

Lastly, Tables 7 and 8 show results from regressions on legislator's petition endorsements. Focusing on the extensive margin of petition endorsements, Table 7 columns 1-2 looks at an indicator taking one if a legislator has ever endorsed any petition. With the full set of covariates, Column 2 shows no causal effect of holding an SMD seat on the probability of endorsing any petition, nor its gender gradient: the effect of winning an SMD seat is 0.7 and its gender gradient is 0.9, but both are statistically insignificant. Columns 3-4 look at the intensive margin of petition endorsements, namely the number of petitions that a legislator has endorsed during their term in standard deviation units. With the full set of covariates, Column 4 shows that holding an SMD seat decreases the number of petition endorsements by -0.07 standard deviation units. Its gender gradient,

however, is 0.12 standard deviation units and statistically indistinguishable from zero. The type of seat does not affect the gender differences in the number of petition endorsements. This finding is robust when we look at the total number of signatories that a legislator has endorsed during their term (Columns 5-6). Note that there is no gender difference in endorsing any petition (the first row in Column 1-2) but a female legislator endorses more petitions than a male counterpart regardless of the type of the seat they hold (the first row in Column 3-4).

Table 8 shows results for petition endorsements related to women's interests. Columns 1-2 look at the number of petition endorsements related to women's interests defined in Section 2. With the full set of covariates, Column 2 shows that the gender gradient of holding a SMD seat is -0.056 and statistically significant. Consequently, the gender difference among SMD representatives in the number of petition endorsements related women's interests is only 0.024 standard deviation units. Meanwhile, the gender gap among PR representatives is as large as 0.081 standard deviation units. Our finding is robust to a narrower definition of women's interests (Columns 3-4). Consistent with the cross-country correlational evidence, our findings suggest that female legislators more frequently endorse petitions on women's interests, but significantly less so when they are SMD representatives.

6 Discussion

Through which mechanism does the PR tier differentially affect the gender differences in legislative behavior? There are at least two possibilities. First, legislators may request the committee that best balances their future electoral success and their own ideological goals. According to Pekkanen, Nyblade & Krauss (2006), however, parties

may or may not accommodate legislators' requests. Instead, parties may strategically allocate their own members across committees to cultivate party reputations and improve electoral prospects. In the absence of data on committee requests, I conclude that our findings are driven by both legislators' and parties' motives.

7 Conclusion

This study examines whether a single member district (SMD) formula (vis-a-vis proportional representation or PR) constrains women from focusing on women's interests. To elicit the causal impact of electoral formulas, we leverage the unique "best loser" provision of the mixed electoral system in the Japanese House of Representatives elections, where a marginal candidate may win a SMD seat or PR seat by chance. To fully account for the complex structure of the mixed electoral system, we apply the simulation-based regression discontinuity design.

Consistent with the cross-country correlational evidence, we find that greater women's representation increases the prevalence of women's interests in the legislative process, and this pattern is more pronounced among female legislators representing PR blocks than their SMD counterparts.

Our results suggest that electoral institutions *do* mediate the policy consequences of increased women's parliamentary representation. More research is needed to better understand how different institutions better translate women's nominal representation into substantive, policy outcomes. More broadly, our findings also underscore the importance of institutional environments in reflecting diverse voices in policymaking.

Figures

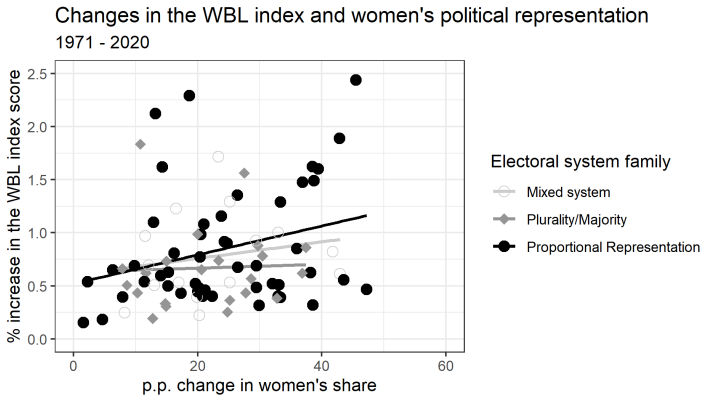


Figure 2: This figure plot the percentage change in the *Women, Business, and Law* index scores against the percentage-point change in the proportion of seats held by women in national parliaments. Among 50 countries that have PR systems, the slope of the linear fitted line is 0.06 with the p value of 0.06. Among 23 countries that have Plurality/Majority systems, the slope of the linear fitted line is 0.56 with the p value of 0.56. Among 17 countries that have mixed systems, the slope of the linear fitted line is 0.38 with the p value of 0.38.

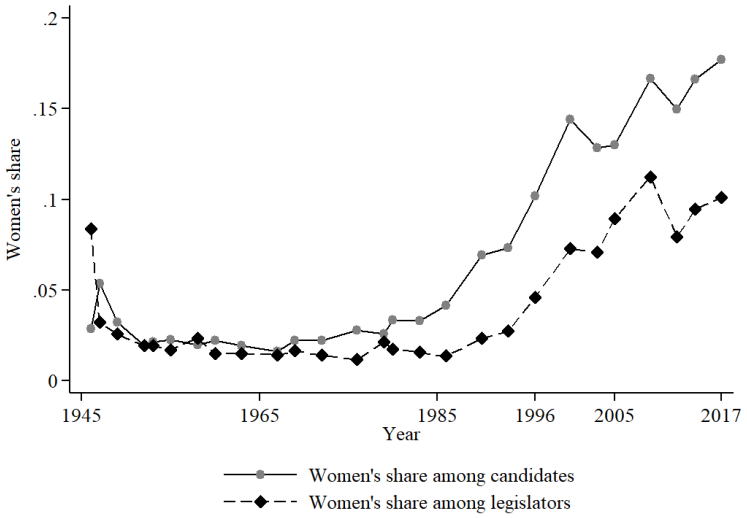


Figure 3: Women's share among candidates and winners in the Japanese House of Representatives elections *Data*: Japan House of Representatives elections 1946-2017. By-elections are excluded.

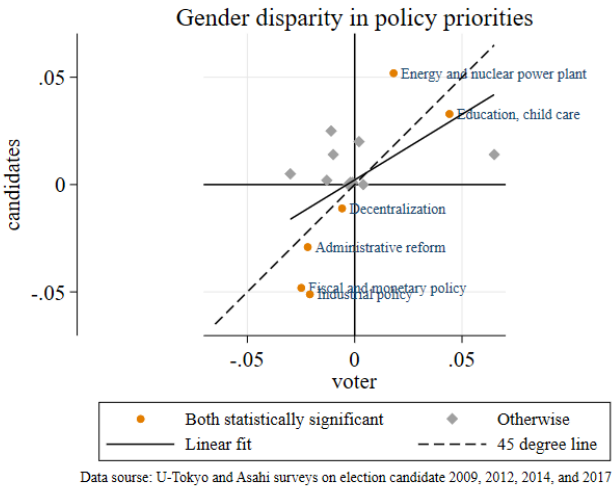


Figure 4: The gender gap in policy priorities among voters and candidates in the House of Representatives elections. Each dot indicates a year and policy area pair. *Data*: University of Tokyo and Asahi Shinbun Survey 2009, 2012, 2014, and 2017.

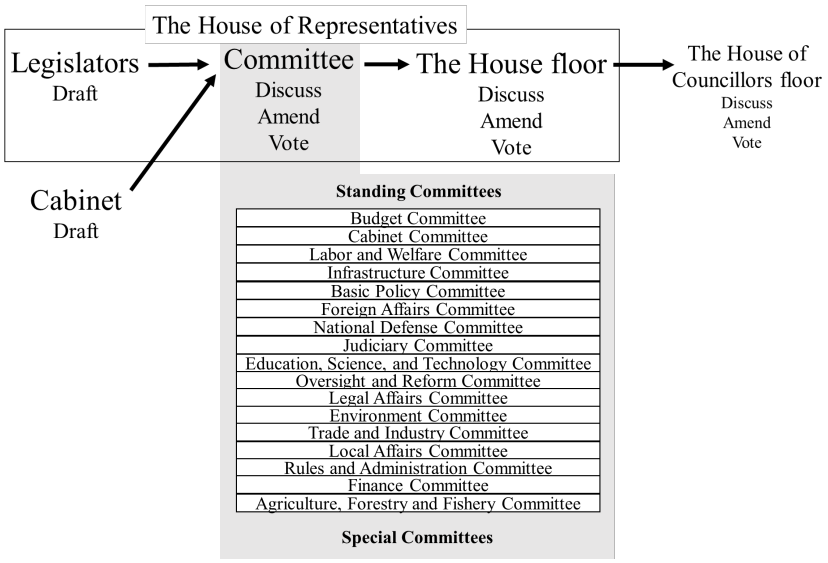


Figure 5: This figure shows the flow of legislation in the House of Representatives. Bills are submitted either by Cabinet or legislators, then delivered to one of the House committees. As of 2017, there are 17 standing committees in the House of Representatives. Additionally, several special committees are held every Diet session in order to address current policy needs. Committees discuss and revise the bills. The discharged bills are voted by floor.

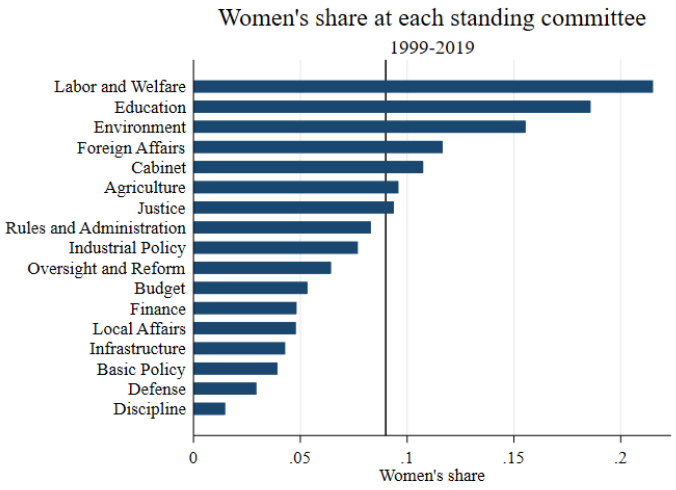
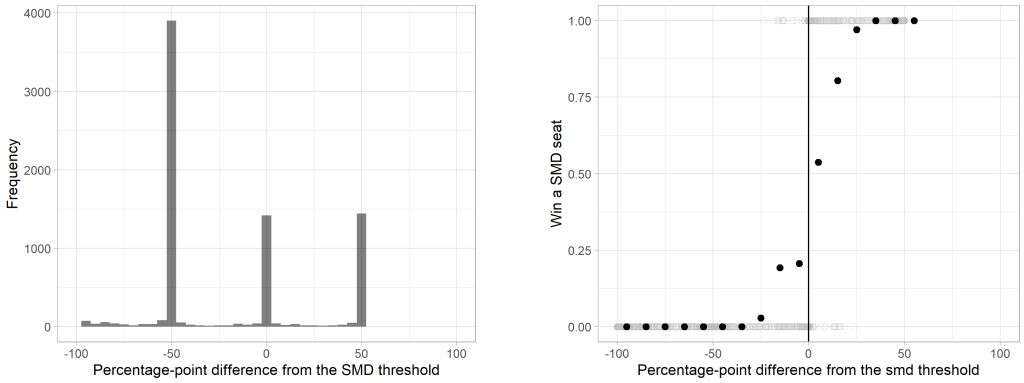


Figure 6: *Note*: This figure shows women's share at each standing committee between the 143rd nd 204th house sessions. The vertical line benchmarks the overall women's share at the House of Representatives during the time that we study. *Data*: House of Representatives Annual Report 1999-2019



(a) (b)

Figure 7: (7a) The distribution of the running variable and (7b) the first stage *Data*: Japan House of Representatives elections 1996-2017. By-elections are excluded from the sample.

Tables

Table 1: Committee membership by gender and electoral tier

Standing committee	**PR tier (%)**	**SMD tier (%)**	**Total**
Female			
Cabinet	6.3	7.6	6.9
Local Affairs	3.9	3.2	3.6
Justice	4.1	8.4	5.8
Foreign Affairs	4.2	9.5	6.3
Finance	2.6	4.8	3.5
Education	16.6	9.8	13.9
Labor and Welfare	21.1	14.3	18.4
Agriculture	8.5	4.6	6.9
Industrial Policy	5.6	5.5	5.6
Infrastructure	3.1	4.2	3.6
Environment	9.1	7.0	8.3
Defense	1.7	1.6	1.6
Basic Policy	0.4	4.6	2.1
Budget	4.3	5.6	4.8
Oversight and Reform	5.5	3.2	4.6
Rules and Administration	2.9	5.1	3.7
Discipline	0.2	1.0	0.5
Total	100.0	100.0	100.0
Obs	1,784	1,206	2,990
Male			
Cabinet	6.6	4.9	5.6
Local Affairs	7.7	6.6	7.1
Justice	6.3	5.0	5.5
Foreign Affairs	4.6	4.7	4.7
Finance	6.7	6.8	6.8
Education	7.0	5.3	6.0
Labor and Welfare	6.9	6.4	6.6
Agriculture	7.2	5.9	6.4
Industrial Policy	7.1	6.2	6.5
Infrastructure	8.5	7.4	7.8
Environment	4.9	4.1	4.4
Defense	4.7	5.7	5.3
Basic Policy	2.3	6.7	5.0
Budget	7.3	9.1	8.4
Oversight and Reform	6.5	6.6	6.5
Rules and Administration	4.1	4.1	4.1
Discipline	1.6	4.4	3.3
Total	100.0	100.0	100.0
Obs	11,913	18,492	30,405

Note: This table reports the house committee membership by gender and electoral tier between the 146th and 200th house sessions. A unit of observation is a legislator and session pair.

Table 2: Percentage of legislators that ever submitted questions related to women's interests, by gender and electoral tier

Ever submitted question on women's issues	**PR tier (%)**	**SMD tier (%)**	**Total**
Female			
0	83.4	92.9	87.4
1	16.6	7.1	12.6
Total	100.0	100.0	100.0
Obs	175	127	302
Male			
0	91.0	97.3	95.0
1	9.0	2.7	5.0
Total	100.0	100.0	100.0
Obs	1,145	1,957	3,102

Note: This table reports the percentage of legislators ever submitted women-related questions by gender and electoral tier between the 148th and 203rd house sessions. A unit of observation is a legislator and election year pair.

Table 3: Percentage of legislators that ever signed petitions related to women's interests, by gender and electoral tier

Ever signed petition(s) on women's issues	**PR tier (%)**	**SMD tier (%)**	**Total**
Female			
0	23.8	42.5	31.5
1	76.2	57.5	68.5
Total	100.0	100.0	100.0
Obs	193	134	327
Male			
0	42.4	50.3	47.4
1	57.6	49.7	52.6
Total	100.0	100.0	100.0
Obs	1,346	2,250	3,596

Note: This table reports the share of legislators who ever signed petitions related to broadly-defined women's interests by gender and electoral tier between the 143rd and 204th house sessions. A unit of observation is a legislator and election year pair.

Table 4: Descriptive Statistics

	All Elected	Participated in SMD Election		
		All	Male	Female
Female	0.08	0.07	0.00	1.00
	(0.28)	(0.26)	(0.00)	(0.00)
Age	53.35	52.98	53.28	49.12
	(10.90)	(10.83)	(10.81)	(10.40)
Total Previous Wins	3.92	4.00	4.10	2.78
	(2.93)	(2.93)	(2.97)	(2.05)
LDP	0.52	0.55	0.56	0.43
	(0.50)	(0.50)	(0.50)	(0.50)
JCP	0.03	0.02	0.01	0.05
	(0.17)	(0.13)	(0.12)	(0.21)
Won SMD	0.61	0.74	0.75	0.56
	(0.49)	(0.44)	(0.43)	(0.50)
N	3927	3241	3003	238

Notes: This table provides the mean and standard deviations (in parentheses) of key characteristics of legislators elected in the House of Representatives elections between 1996 and 2017. The first column has all elected politicians in the sample, while the remaining columns restrict the sample to politicians who participated in SMD elections.

Table 5: RD results for the house committee assignments

	The probability of getting assigned to committees on			
	women's interests		men's interests	
	(1)	(2)	(3)	(4)
Female	0.272***	0.256***	−0.130**	−0.143***
	(0.055)	(0.054)	(0.055)	(0.054)
Winning a SMD seat	−0.069**	−0.039	−0.045*	−0.019
	(0.027)	(0.028)	(0.027)	(0.028)
Female × SMD	−0.146	−0.176*	0.109	0.078
	(0.107)	(0.106)	(0.109)	(0.108)
Liberal Democratic Party		0.059**		0.066***
		(0.024)		(0.024)
Japan Communist Party		0.047		0.020
		(0.065)		(0.065)
Tenure		−0.026***		−0.023***
		(0.004)		(0.004)
Dep.var.mean	0.28	0.28	0.27	0.27
Observations	1,423	1,423	1,389	1,389
Residual Std. Error	0.443	0.437	0.443	0.438

Note: *p<0.1; **p<0.05; ***p<0.01

This table shows the regression discontinuity estimates of the effect of electoral formulas and its gender gradient on the house committee assignments between the 146th and 200th house sessions. In columns 1-2, the dependent variable equals one if a legislator serves on any standing committee related to women's interests (labor and welfare, education, and environment committees). In columns 3-4, the dependent variable equals one if a legislator serves on any standing committee related to men's interests (finance, industrial policy, and local affairs). The variable *Female* equals one for female legislators. The variable *SMD* equals one for legislators winning a single-member-district seat. The variable *Liberal Democratic Party* and *Japan Communist Party* equal one for legislators affiliated with the Liberal Democratic Party and the Japan Communist Party, respectively, in any given election. The variable *Tenure* is the number of winnings in the past House of Representatives elections. Standard errors are in parentheses.

Table 6: RD results for the number of women-related questions

	Probability of submitting questions on female issues			
	Whole Sample		Exclude Outliers	
	(1)	(2)	(3)	(4)
Female	0.093**	0.095***	0.049*	0.050*
	(0.037)	(0.036)	(0.026)	(0.026)
Winning a SMD seat	−0.033*	−0.010	−0.012	−0.007
	(0.018)	(0.019)	(0.012)	(0.013)
Female × SMD	0.010	0.015	−0.009	−0.003
	(0.071)	(0.070)	(0.049)	(0.049)
Liberal Democratic Party		−0.116***		−0.040***
		(0.016)		(0.011)
Communist Party		0.107**		0.055
		(0.050)		(0.038)
Tenure		0.002		0.002
		(0.003)		(0.002)
Mean	0.0931	0.0931	0.0356	0.0356
Observations	1,342	1,342	1,208	1,208
Residual Std. Error	0.288	0.282	0.185	0.183

*p<0.1; **p<0.05; ***p<0.01

Notes: This table shows the regression discontinuity estimates of the effect of electoral formulas and its gender gradient on the submission of questions related to women's interests between the 148th and 203rd house sessions. The dependent variable is the probability of submitting a question related to women's issues. Column 1 and 2's sample definition includes all available observations, while column 3 and 4's sample definition excludes observations with the total number of submitted questions above the 95th percentile threshold. The variable *Female* equals one for female candidates. The variable *SMD* equals one for candidates winning a single-member-district seat. The variable *Liberal Democratic Party* and *Japan Communist Party* equal one for candidates affiliated with the Liberal Democratic Party and the Japan Communist Party, respectively, in any given election. The variable *Tenure* is the number of winnings in the past House of Representatives elections. Standard errors are in parentheses.

Table 7: RD results for the share of legislators who has ever signed any petition and the number of petition endorsements

	Ever endorsed petition(s)		The number of petition endorsements (std.dev.)		Total no. of signatories on endorsed petitions (std.dev.)	
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.036	0.030	0.388^{***}	0.177^{***}	0.219^{*}	0.058
	(0.031)	(0.031)	(0.123)	(0.051)	(0.128)	(0.070)
Winning a SMD seat	−0.022	−0.007	-0.370^{***}	-0.072^{***}	-0.354^{***}	-0.061^{*}
	(0.015)	(0.015)	(0.059)	(0.025)	(0.063)	(0.036)
Female × SMD	−0.016	−0.021	−0.303	−0.058	−0.099	0.085
	(0.060)	(0.060)	(0.239)	(0.098)	(0.255)	(0.139)
Liberal Democratic Party		-0.025^{*}		-0.265^{***}		-0.264^{***}
		(0.014)		(0.022)		(0.032)
Japan Communist Party		0.053		4.977^{***}		4.409^{***}
		(0.036)		(0.060)		(0.082)
Tenure		-0.006^{**}		−0.005		−0.006
		(0.002)		(0.004)		(0.006)
Dep.var.mean	0.93	0.93	0.45	0.45	0.73	0.73
Observations	1,428	1,428	1,518	1,518	1,327	1,327
Residual Std. Error	0.247	0.246	1.001	0.411	1.019	0.553

Note: *p<0.1; **p<0.05; ***p<0.01

This table shows the regression discontinuity estimates of the effect of electoral formulas and its gender gradient on the number of petition endorsements related to women's interests between the 143rd and 204th house sessions. In columns 1-2, the dependent variable equals one if a legislator has never endorsed any petition. In columns 3-4, the dependent variable is the number of petition endorsements submitted to any committees. In columns 5-6, the dependent variable is the total number of signatories endorsed by the legislator. In all columns, the dependent variable is in standard deviation units. The variable *Female* equals one for female candidates. The variable *SMD* equals one for candidates winning a single-member-district seat. The variable *Liberal Democratic Party* and *Japan Communist Party* equal one for candidates affiliated with the Liberal Democratic Party and the Japan Communist Party, respectively, in any given election. The variable *Tenure* is the number of winnings in the past House of Representatives elections. Standard errors are in parentheses.

Table 8: RD results for the number of women-related petitions

	The number of petitions related to women's issues broadly defined (std.dev.)		The number of petitions related to women's issues narrowly defined (std.dev.)	
	(1)	(2)	(3)	(4)
Female	0.102^{***}	0.076^{***}	0.049^{***}	0.038^{***}
	(0.019)	(0.010)	(0.008)	(0.004)
Winning a SMD seat	-0.053^{***}	-0.010^{**}	-0.018^{***}	-0.002
	(0.010)	(0.005)	(0.004)	(0.002)
Female × SMD	-0.079^{**}	-0.048^{**}	-0.031^{**}	-0.016^{**}
	(0.038)	(0.020)	(0.015)	(0.007)
Liberal Democratic Party		-0.044^{***}		-0.011^{***}
		(0.005)		(0.002)
Japan Communist Party		0.679^{***}		0.286^{***}
		(0.012)		(0.004)
Tenure		0.0003		0.001^{*}
		(0.001)		(0.0003)
Dep.var.mean	0.067	0.067	0.020	0.020
Observations	1,358	1,358	1,426	1,426
Residual Std. Error	0.155	0.082	0.061	0.030

Note: *p<0.1; **p<0.05; ***p<0.01

This table shows the regression discontinuity estimates of the effect of electoral formulas and its gender gradient on the number of petition endorsements related to women's interests between the 143rd and 204th house sessions. In columns 1-2, the dependent variable is the number of petition endorsements submitted to women-related committees. In columns 3-4, the dependent variable is the number of petition endorsements related to women's interests. In columns 5-6, the dependent variable is the number of petition endorsements related to narrowly-defined women's interests. In all columns, the dependent variable is in standard deviation units. The variable *Female* equals one for female candidates. The variable *SMD* equals one for candidates winning a single-member-district seat. The variable *Liberal Democratic Party* and *Japan Communist Party* equal one for candidates affiliated with the Liberal Democratic Party and the Japan Communist Party, respectively, in any given election. The variable *Tenure* is the number of winnings in the past House of Representatives elections. Standard errors are in parentheses.

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A Association between increased women's parliamentary representation and policy consequences: cross-country evidence

Figure 2 shows that the increased women's parliamentary representation is positively associated with the improved *Women, Business, and Law* score in the last five decades. Hereby we provide more details on the figure and data sources.

On the y axis, we use the *Women, Business, and Law* score (henceforth WBL score) to proxy policy outcomes for which more women than men are likely to be interested in and relevant to. World Bank has been publicizing the WBL score every year since 1971. The the WBL score measures the laws and regulations that affect women's economic opportunity. The score is based on eight sub-indicators "structured around women's interactions with the law as they move through their lives and careers: mobility, workplace, pay, marriage, parenthood, entrepreneurship, assets, and pension"(World Bank 2021). The score takes values between 0 and 100 with a larger number indicating improved economic opportunities for women. The WBL score best fits our purpose because it focuses on the law and regulations, and covers the longer time horizon than other indices, such as the Global Gender Gap Index.

On the x axis, we use the percentage-point change in women's share in national parliaments (either the unicameral legislature or the lower house of the bicameral legislature) between 1971 and 2020. For the year of 1971, we draw data from *Historical Data on Women in National Parliaments* that the Inter-Parliamentary Union (IPU) provides.[31] and use the share of seats held by women in the latest election before 1971. For the year

[31] `https://data.ipu.org/historical-women`. Last access: 2021-07-05.

of 2020, we draw data from IPU's monthly ranking of women in national parliaments as of January 2020. For presentation purposes, we prefer to use percentage-point change rather than percentage change. This is because women's parliamentary representation was very small and nearly zero in some countries in 1971, which blows up the percentage change between 1971 and 2020.

Finally, we draw data on the electoral system family (Proportional Representation, Plurality/Majority, or Mixed system) from IPU's *Global Data on National Parliaments*.[32] Our final dataset includes 90 countries, which we list in Table A.1 below.

In addition, we show that the observed pattern holds when we exclude countries that have switched electoral systems and when we exclude countries that have introduced gender quotas.

One may worry that Figure 2 may confound the effect of switching electoral systems between 1971 and 2020. To address this concern, we exclude countries that have switched electoral systems before and reproduce the figure. To identify countries that have switched their electoral systems, We draw historical data on electoral systems from the *Electoral Management Design Database* that The International Institute for Democracy and Electoral Assistance (IDEA) provides.[33] Such countries are marked "Yes" in the last column of Table A.1. We should note that the first year that each country enters into this database varies, and the majority enters in 1990s. Therefore, we may be missing countries that have switched their electoral systems before 1990. With this caveat in mind, we find that our main finding holds with the restricted sample. As Figure A.1 shows increased women's parliamentary representation is still positively associated with the improved WBL score among countries that have PR countries, but not among countries that have

[32] `https://data.ipu.org/compare?field=chamber\%3A\%3Afield\_electoral\_system\&structure=any\_\_lower_chamber\#map`. Last access: 2021-07-05.

[33] `https://www.idea.int/data-tools/data/electoral-management-design`.Last access: 2021-07-05.

Plurality/Majority systems.

Another concern is that the introduction of gender quotas among PR countries drives our result. To address this concern, we exclude countries that have gender quotas in place as of June 2021, and reproduce the figure. We draw data on the presence of gender quota from IPU's *Global Data on National Parliaments*[34] Such countries are marked "Yes" in the second last column in Table A.1. While restricting our sample to countries that do not have gender quotas significantly reduces the sample size, our main finding still holds: as Figure A.2 shows, increased women's parliamentary representation is still positively associated with the improved WBL score among countries that have PR countries, but not among countries that have Plurality/Majority systems.

[34] `https://data.ipu.org/compare?field=chamber\%3A\%3Afield\_is\_electoral\_quota\_women\&structure=any\_\_lower\_chamber\#map`. Last access: 2021-07-05.

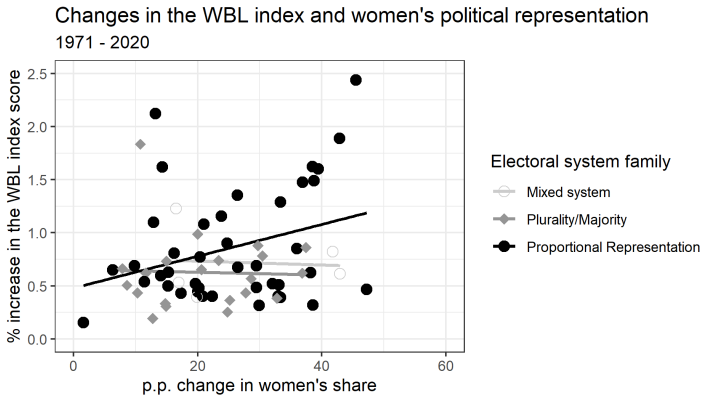


Figure A.1: This figure plots the percentage change in the *Women, Business, and Law* index scores against the percentage-point change in the proportion of seats held by women in national parliaments without gender quotas. Among 42 countries that have PR systems, the slope of the linear fitted line is 0.07 with a p value of 0.07. Among 21 countries that have Plurality/Majority systems, the slope of the linear fitted line is 0.88 with a p value of 0.88. Among 7 countries that have mixed systems, the slope of the linear fitted line is 0.83 with a p value of 0.83.

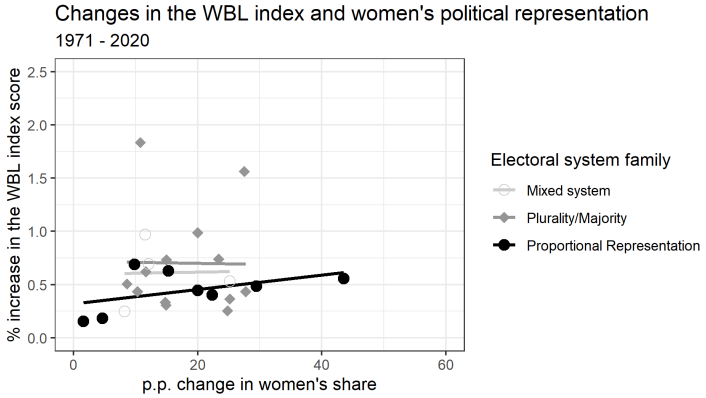


Figure A.2: This figure plots the percentage change in the *Women, Business, and Law* index scores against the percentage-point change in the proportion of seats held by women in national parliaments without gender quotas. Among 8 countries that have PR systems, the slope of the linear fitted line is 0.23 with a p value of 0.23. Among 13 countries that have Plurality/Majority systems, the slope of the linear fitted line is 0.96 with a p value of 0.96. Among 4 countries that have mixed systems, the slope of the linear fitted line is 0.97 with a p value of 0.97.

Table A.1: List of countries in the cross-country analyses

Country	Electoral System Family	Gender Quota	Switch Electoral Sytem
Egypt	Mixed system	No	Yes
Guinea	Mixed system	Yes	
Hungary	Mixed system	Yes	
Italy	Mixed system	Yes	Yes
Japan	Mixed system	No	Yes
Jordan	Mixed system	No	Yes
Lesotho	Mixed system	Yes	Yes
Madagascar	Mixed system	No	Yes
Mauritania	Mixed system	Yes	Yes
Mexico	Mixed system	Yes	
Nepal	Mixed system	Yes	Yes
Niger	Mixed system	Yes	
Panama	Mixed system	Yes	
Philippines	Mixed system	Yes	Yes
Republic of Korea	Mixed system	Yes	
Senegal	Mixed system	Yes	
Thailand	Mixed system	Yes	Yes
Australia	Plurality/majority	Yes	
Bhutan	Plurality/majority	No	
Botswana	Plurality/majority	No	
Canada	Plurality/majority	Yes	
Ethiopia	Plurality/majority	Yes	
France	Plurality/majority	Yes	
Gabon	Plurality/majority	No	
Gambia (The)	Plurality/majority	No	
Ghana	Plurality/majority	No	
India	Plurality/majority	No	
Jamaica	Plurality/majority	No	
Kenya	Plurality/majority	Yes	
Lao People's Democratic Republic	Plurality/majority	No	
Malaysia	Plurality/majority	Yes	
Mauritius	Plurality/majority	No	
Mongolia	Plurality/majority	Yes	Yes
Samoa	Plurality/majority	Yes	
Singapore	Plurality/majority	No	
Trinidad and Tobago	Plurality/majority	No	
United Kingdom	Plurality/majority	Yes	
United Republic of Tanzania	Plurality/majority	Yes	
United States of America	Plurality/majority	No	
Zambia	Plurality/majority	No	
Albania	Proportional representation	Yes	Yes
Algeria	Proportional representation	Yes	Yes
Argentina	Proportional representation	Yes	
Austria	Proportional representation	Yes	
Belgium	Proportional representation	Yes	
Brazil	Proportional representation	Yes	
Bulgaria	Proportional representation	Yes	Yes
Burkina Faso	Proportional representation	Yes	
Burundi	Proportional representation	Yes	
Cambodia	Proportional representation	No	
Cameroon	Proportional representation	Yes	
Colombia	Proportional representation	Yes	
Costa Rica	Proportional representation	Yes	
Cyprus	Proportional representation	Yes	
Denmark	Proportional representation	No	
Dominican Republic	Proportional representation	Yes	
Ecuador	Proportional representation	Yes	
El Salvador	Proportional representation	Yes	
Equatorial Guinea	Proportional representation	No	
Finland	Proportional representation	No	
Greece	Proportional representation	Yes	
Guatemala	Proportional representation	Yes	
Honduras	Proportional representation	Yes	
Iceland	Proportional representation	Yes	
Indonesia	Proportional representation	Yes	
Iraq	Proportional representation	Yes	
Ireland	Proportional representation	Yes	
Israel	Proportional representation	Yes	
Lebanon	Proportional representation	No	Yes
Luxembourg	Proportional representation	Yes	
Malta	Proportional representation	No	
Morocco	Proportional representation	Yes	Yes
New Zealand	Proportional representation	No	Yes
Nicaragua	Proportional representation	Yes	
Norway	Proportional representation	Yes	
Paraguay	Proportional representation	Yes	
Peru	Proportional representation	Yes	
Poland	Proportional representation	Yes	
Portugal	Proportional representation	Yes	
Rwanda	Proportional representation	Yes	
San Marino	Proportional representation	Yes	
South Africa	Proportional representation	Yes	
Spain	Proportional representation	Yes	
Sri Lanka	Proportional representation	No	
Sweden	Proportional representation	Yes	
Switzerland	Proportional representation	Yes	
Togo	Proportional representation	Yes	Yes
Tunisia	Proportional representation	Yes	Yes
Turkey	Proportional representation	Yes	
Uruguay	Proportional representation	Yes	

B Women's share at a standing committee by session

Table B.2: Percentage of legislators who are assigned to committees on their prioritized issues

category	n	percent
Assigned to committee on the most concerning issue (all legislators)	408	25.26%
Assigned to committee on the most concerning issue (first-time legislators only)	108	31.67%
Assigned to committees on the top-3 most concerning issues (all legislators)	876	54.24%
Assigned to committees on the top-3 most concerning issues (first-time legislators only)	223	65.40%

This table shows the share of legislators who are assigned to committees on their prioritized issues. The first row and the third row show the share among all legislators while the second and the fourth row shows the share among the first-time legislators, i.e., legislators who serve for the House of Representatives for the first time between 2005 and 2017. Data on policy priorities are drawn from the University of Tokyo and Asahi survey. Data on committee assignments are drawn from the House of Representatives annual reports. We link these two data sources by legislators' first and last names as well as their representing districts.

Does the committee assignment reflect legislators' policy priorities? To answer this question, we correlate the policy priorities and committee assignments in the 45th, 46th, 47th and 48th House of Representatives elections. Table B.2 shows the share of legislators who are assigned to committees on the their prioritized issues. About a quarter of all legislators are assigned to the committee concerning their most prioritized issue. Looking at the top 3 prioritized issues, more than half of the legislators are assigned to the committees that are matched to their priorities. Importantly, the pattern is similar (if anything more prevalent) when we restrict our sample to the first-time legislators only. This is a piece of suggestive evidence that committee assignments reflect legislators' policy priorities.

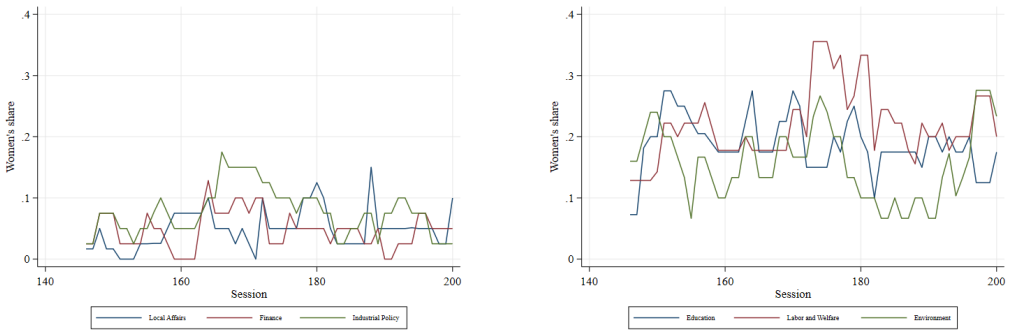


Figure B.3: Women's share at a standing committee by session. The left panel presents women's share at three committees related to men's interests. The right panel presents women's share at three committees related to women's interests. *Data*: Japan House of Representatives elections 1996-2017. By-elections are excluded from the sample.

Table B.3: An example for PR party lists

Liberal Democratic Party				
Votes				1,816,184
Seats				6
Pre-election ranking	Name	SMD	Own vote share /smd winner's vote share	Post-election ranking
1	Tsuji Kiyoto	1	100.000	
1	Ishihara Hirotaka	1	100.000	
1	Taira Masaaki	1	100.000	
1	Wakamiya Kenji	1	100.000	
1	Ishihara Nobuteru	1	100.000	
1	Sugawara Kazuhide	1	100.000	
1	Suguki Hayato	1	100.000	
1	Shimomura Hirofumi	1	100.000	
1	Kamoshita Ichiro	1	100.000	
1	Matsushima Midori	1	100.000	
1	Akimoto Tsukasa	1	100.000	
1	Onishi Hideo	1	100.000	
1	Hirasawa Katsuei	1	100.000	
1	Matsumoto Yohei	1	100.000	
1	Kihara Seiji	1	100.000	
1	Ito Tatsuya	1	100.000	
1	Ogura Masanobu	1	100.000	
1	Hagiuda Koichi	1	100.000	
1	Inoue Nobuharu	1	100.000	
1	Ochi Takao	0	98.029	1
1	Yamada Miki	0	96.862	2
1	Odawara Kiyoshi	0	95.527	3
1	Matsumoto Bunmei	0	72.836	4
24	Ando Takao			5
25	Takagi Kei			6
26	Yosaho Makoto			
27	Maekawa Megumi			
28	Nishida Jo			

The Constitutional Democratic Party of Japan				
Votes				1,405,836
Seats				4
Pre-election ranking	Name	SMD	Own vote share /smd winner's vote share	Post-election ranking
1	Kaieda Banri	1	100.000	
1	Ochiai Takayuki	1	100.000	
1	Nagatsuma Akira	1	100.000	
1	Kan Naoto	1	100.000	
1	Tezuka Yoshio	0	97.895	1
1	Suematsu Yoshinori	0	94.088	2
1	Hatsushika Akihiro	0	84.545	3
1	Yamahana Ikuo	0	82.424	4
1	Matsuo Akihiro	0	80.739	
1	Suzuki Yosuke	0	76.983	
1	Yoshida Harumi	0	76.387	
1	Maeda Junichiro	0	57.632	
1	Hojo Tomohiko	0	55.547	
1	Takahashi Narihisa	0	50.225	
1	Ido Masae	0	46.407	
1	Yamashita Yoko	0	40.069	