

**Appendix**  
**Do Voters Prefer Gender Stereotypic Candidates?**  
**Evidence from a Conjoint Survey Experiment in Japan**

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**1. Sampling Methodology**

The sample has been stratified by sex (male and female) and age groups (20-29 years old, 30-39 years old, 40-49 years old, 50-59 years old, and 60 years old or older) based on the 2010 census data in Osaka Prefecture. In collecting the data, we randomly drew our samples from the Rakuten Research's subject pool according to the fixed quotas so that the total sample matched the census population in Osaka Prefecture. We invited 3,022 people, and a total of 2,686 people among them completed the conjoint experiment tasks in our survey. Detailed descriptive statistics on our sample are shown in Table A1.

**Table A1 Demographics of Survey Sample**

	<b>Number</b>	<b>Percentage</b>
<b>Sex</b>		
Male	1340	49.9%
Female	1346	50.1%
<b>Age group</b>		
20-29 years old	435	16.2%
30-39 years old	477	17.8%
40-49 years old	552	20.6%
50-59 years old	376	14.0%
60 years old or older	846	31.5%
<b>Highest education level</b>		
Junior high school	53	2.0%
High school	717	26.9%
2-year junior college	631	23.7%
4-year college/university	1122	42.1%
Graduate school	144	5.4%
<b>Annual household income</b>		
less than 2 million yen	264	11.7%
2-4 million yen	579	25.6%
4-6 million yen	622	27.5%
6-8 million yen	377	16.6%
8-10 million yen	225	9.9%
more than 10 million yen	198	8.7%
<b>Party support</b>		
Liberal Democratic Party	514	20.4%
Democratic Party of Japan	89	3.5%
Clean Government Party	93	3.7%
Japan Communist Party	114	4.5%
Osaka Ishin	837	33.3%
Other	124	4.9%
None (independent)	745	29.6%

*Note: NA respondents have been excluded from this table.*

Table A2 displays how our sample compares to the census in Osaka Prefecture. Each cell reports the deviation between the census and our sample for a particular group. The results show that our samples accurately reflect the census population. The deviations are very small (from .5 to 1.8 percentage points) and always within the margin of error. We also checked to see if the rate of responses for our conjoint experiment question varied across groups, and found no variation that could introduce any significant bias into our results.

**Table A2 Deviations of Demographic Characteristics from Census**

Sex	Age				
	20-29	30-39	40-49	50-59	60-over
Male	-0.012	0.009	-0.018	0.005	0.005
Female	-0.005	0.011	-0.010	0.007	0.009

## **2. Representativeness of Osaka Prefecture in Japan**

Osaka Prefecture is the center of the second largest metropolitan area of Japan. It has a population of approximately 8.8 million people, and its population density is the second largest behind Tokyo. Hence, the views of our respondents drawn from Osaka Prefecture may have overly represented those in urban areas compared to those in rural areas. Yet, we have evidence that suggests they do not necessarily have significantly different views and gender stereotypes from that of the entire population in Japan. According to the results of our own national survey conducted in Japan (separately from the survey used in this study) before the 2016 upper house election, we found no statistically significant difference in their responses to the following questions between those in Osaka Prefecture and those in other prefectures in Japan:

**Table A3 Responses to Survey Questions about Female Prime Minister**

Question 1: When a female politician assumes the prime minister position, would you support her if she is a well-qualified person?

	Osaka Prefecture	Other prefectures
Yes	64	956
No	14	177
Don't know	25	295
Total	103	1428

$p = 0.593$

Question 2: Do you think Japan is ready for a female prime minister or not?

	Osaka Prefecture	Other prefectures
Yes	63	823
No	47	491
Don't know	6	94
Total	116	1408

$p = 0.438$

As shown in the above tables, for both questions, the share of respondents who are affirmative to a female prime minister appears to be slightly smaller among respondents in Osaka Prefecture than those in other prefectures, but the difference between them is not statistically significant ( $p = 0.586, 0.266$ , respectively). The pattern of responses is also found to be no different between those in Osaka Prefecture and those in other prefectures for both questions ( $p = 0.593, 0.438$ , respectively).

We also checked the number of female candidates running for office in the last two lower house elections. The results show that there is no statistically significant difference between electoral districts in Osaka Prefecture and those in other prefectures, suggesting that female candidates are not overrepresented in single-seat constituencies in Osaka Prefectures compared to those in other prefectures.

**Table A4 Number of Candidates Running in Single-seat Constituencies**

2014 Lower house election		
	Osaka Prefecture	Other prefectures
Male	52	765
Female	13	129
Total	65	894

$p = 0.222$

2017 Lower house election		
	Osaka Prefecture	Other prefectures
Male	53	726
Female	8	149
Total	61	875

$p = 0.429$

In Osaka Prefecture, there is a regional party called the “Osaka Ishin” party, whose supporters exhibit the largest negative bias against female candidates (see Figure 3). The share of female candidates running for this party (10.7%) was below the national average (16.6%) in the 2014 lower house election, but this is very similar to other conservative parties, including the Liberal Democratic Party (11.9%). Interestingly, our results also demonstrate that supporters of “left-leaning” liberal parties—such as the Democratic Party of Japan and the Japan Communist Party—do not necessarily positively endorse female candidates.

### **3. Experimental Design**

In our study, we conducted a conjoint survey experiment. This design has at least two desirable properties for making causal inferences about the effects of candidate sex on voter evaluation. First, the conjoint analysis enables us to compare the relative explanatory power of each attribute value on the resulting choice on the same scale. In real world elections, the sex of

the candidate is frequently correlated with other factors, which makes it difficult to distinguish in observational data about how much candidate sex on its own is affecting voters. By randomizing these characteristics at a time, our experiment makes them independent and enables us to observe the effects of sex itself or in combination with other traits. For this study, it is particularly important that conjoint experiments allow us to estimate the interaction effects of multiple treatment components in candidate evaluation, because we are interested in whether the same traits could have different effects on voter choice depending on candidate sex.

Second, the conjoint analysis also enables us to minimize the effect of social desirability bias. It is difficult to assess public acceptance of a female candidate by asking people directly due to the potential for social desirability effects in surveys (Burden, Ono, and Yamada 2017; Krupnikov et al. 2016; Streb et al. 2008). Respondents opposed to seeing a woman in the parliament are likely to bow to prevailing social norms and falsely report that they are willing to endorse a female candidate. In our conjoint experiment, we embedded candidate sex as one of the multiple attributes that describe a candidate. This makes it very difficult for our respondents to know the genuine intention of our experiment. Moreover, by using the conjoint experiment, we are able to elicit true attitudes on sensitive questions such as the effect of candidate sex on voting behavior because this research design allows respondents to justify any particular choice of candidates with a number of reasons (Hainmueller, Hopkins, and Yamamoto 2014, p.3).

Our conjoint experiment was conducted in Japanese. For the reader's convenience, Figure 1 in the manuscript presented an example of one set of candidate profiles that was translated from Japanese into English. The original one written in Japanese is shown below.

**FIGURE A1 Experimental Design (original design in Japanese)**

以下の2人の候補者が、同じ政党から国政選挙に立候補を検討していると想定してください。  
 あなたは、どちらの候補者を支持しますか。支持する候補者を1人だけ選んでください。  
 どちらを支持するかはつきりとは言えない場合でも、あえて言えばこの候補、という方を選んでください。

	候補者1	候補者2
人柄	明確なビジョンを持ち、先見の明がある	周囲の様々な意見に耳を傾け、謙虚に話を聞く
学歴	大学院卒	大学卒
政策ポジション (男女共同参画)	男性も女性と同等に家事・育児に関与すべきだ	男性も女性と同等に家事・育児に関与すべきだ
政策ポジション (安全保障)	国際紛争には平和的手段で望むべき (ハト派)	国際紛争には平和的手段で望むべき (ハト派)
政策ポジション (貧困問題)	貧困は本人の努力ではなく社会の問題	貧困は社会ではなく本人の努力の問題
重視する政策分野	消費者問題	外交政策
性別	男性	女性

候補者1

○

候補者2

○

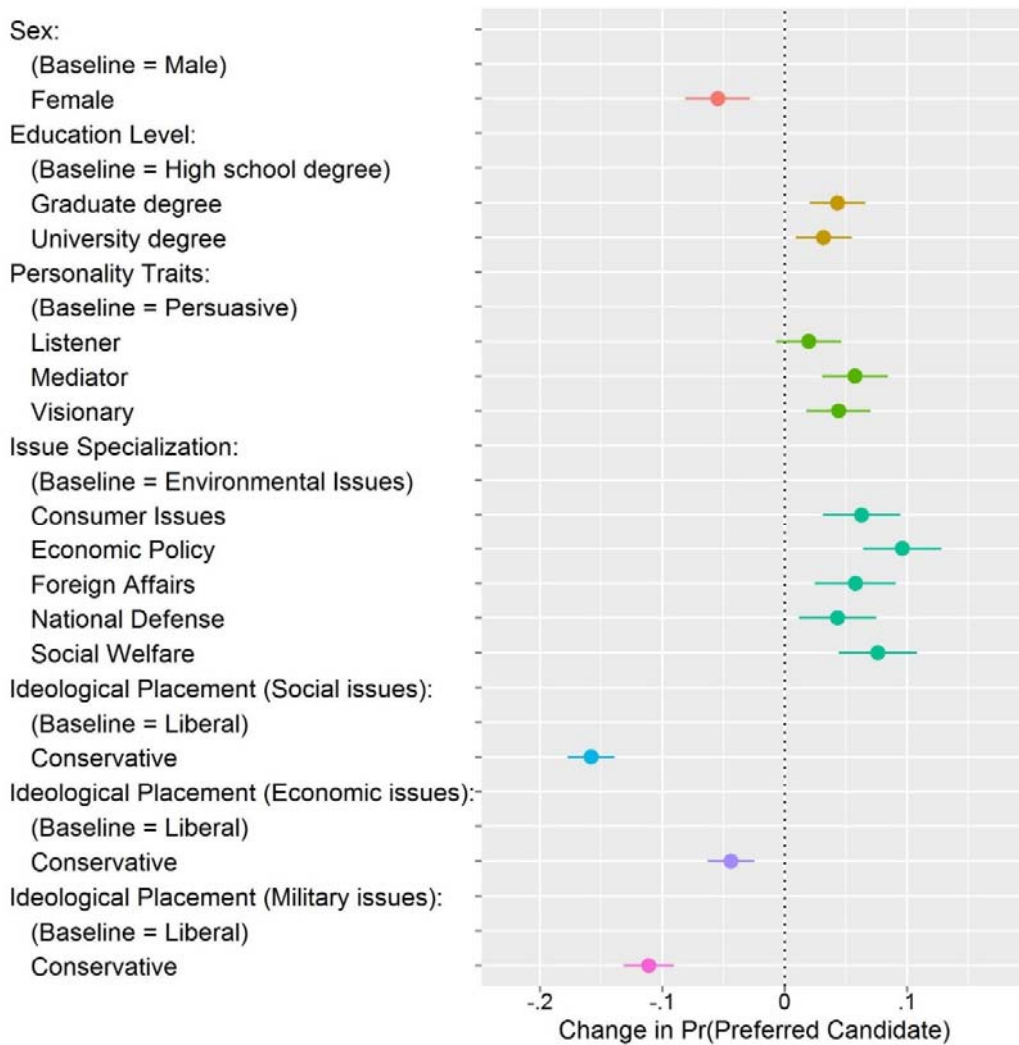
#### 4. Different-sex candidate pairings

Since the candidate profiles shown to our subjects are generated randomly from the set of characteristics, some pairs of candidates have the identical sex between the two candidates.

When two females or two males are paired against each other, the effect of candidate sex becomes zero. Thus, there is a concern that the effect of candidate sex shown in Figure 2 may have been underestimated because this is the average effect including cases in which same-sex candidates are competing. By design, about half of our pairings have the identical sex between

the two candidates. The following figure shows the results after excluding all the same-sex pairings. These results demonstrate that the bias against female candidates almost doubles under such circumstances.

**FIGURE A2 Effects of Candidate Attributes on Probability of Being Preferred for Elected Office (exclusively for different-sex pairings)**





## 5. Inconsistent Combinations of Candidate Policy Positions

In our conjoint experiment, candidates are randomly assigned to take a particular position in each of the following three issue areas: social, economic, and military issues. For each policy issue, there are both liberal and conservative positions. As a result, some combinations of candidate profiles do not have a consistent ideological position across the three issues, which may appear less credible to some of our subjects. Furthermore, this may cause them not to take the experiment task seriously.

In our data, 5,409 out of 21,488 evaluated profiles (25.2%) share an identical ideological position on all of the three policy dimensions. In other words, approximately 75% of evaluated profiles included more or less inconsistent policy positions. To examine whether these inconsistent combinations jeopardize the results by leading our respondents to make less careful judgments without paying much cognitive effort, we compared the length of time respondents spent completing the task between candidate pairs with and without ideologically inconsistent combinations.<sup>1</sup> In the full sample, our subjects on average spent 29.1 seconds to complete each task. While it took 34.7 seconds for subjects to complete the task when they are asked to choose from a pair of candidates whose policy positions are consistent across the three issue domains, it took only 28.7 seconds to complete the task when they evaluate a pair of candidates whose profiles include at least one inconsistent position.<sup>2</sup> However, the difference of response time between them (5.97 seconds) is not statistically significant ( $p > .10$ ). Thus, the results suggest

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<sup>1</sup> Response times have been used in the existing literature to measure effort exerted by respondents (Berinsky, Margolis, and Sances 2013; Malhotra 2008).

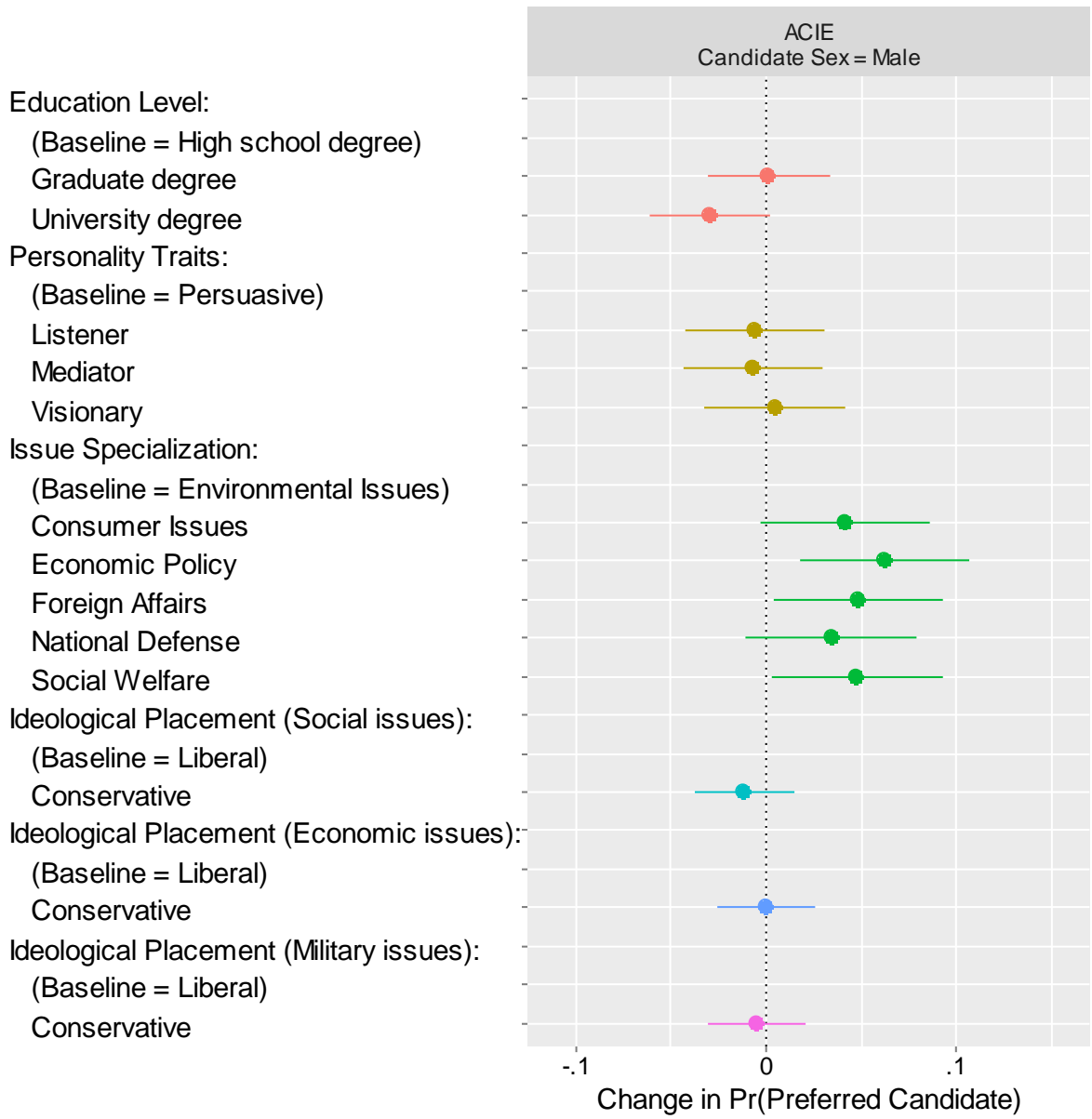
<sup>2</sup> On average, our subjects spent 30.3 seconds to evaluate a pair of candidates when both candidates exhibited inconsistent policy positions.

that our subjects do not necessarily make artificial judgments to save cognitive effort when they are exposed to candidate pairs with inconsistent policy positions.

## **6. Effects of Deviations from Gender-based Expectations for Male Candidates**

Figure A3 shows the plots of average component interaction effect (ACIE) estimators with 95% confidence intervals when the candidate is male. These estimates for male candidates are all symmetric to those for female candidates shown in Figure 4. The results show that our respondents evaluate a candidate's issue specialization differently depending on candidate sex. Contrary to female candidates, male candidates who specialize in foreign affairs or economic policies perform better at the polls than those who emphasize competence in environmental issues. However, having masculine traits on policy expertise does not always boost their vote prospects. In addition, male candidates do not get punished by our respondents even when they break with masculine stereotypical expectations on personality traits and issue attitudes.

**Figure A3 Effects of Candidate Attributes on Vote Choice Conditional on Candidate Sex**



Note: Plots show the difference between male and female candidates in their estimated average effects of the randomly assigned candidate attributes on the probability of being supported by respondents. Bars represent 95% confidence intervals.

## **7. Gender Differences in Voter Turnout**

Between 1969 and 2005, women turned out at slightly higher rates than men in lower house elections in Japan (Martin 2011). The average gender gap in turnout rates was 1.38 percentage points. This pattern, however, has been reversed since the 2009 lower house election (for the last four elections consecutively). For instance, the turnout rate for the 2014 lower house election was 53.7 percent among male voters, while it was only about 51.7 percent among female voters ([http://www.soumu.go.jp/main\\_content/000328867.pdf](http://www.soumu.go.jp/main_content/000328867.pdf), last accessed on April 13, 2018).

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