A Conjoint Analysis of Japanese Voters' Policy Option Preferences Revisited

Another Case Study of the July 2022 Election

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1. Introduction

This study explores voters' preferences for policy options using conjoint analysis, a technique widely used in the field of marketing. Rao (2014) shows its many empirical examples. It seems to be established as a standard procedure in new product development (Crawford and Di Benedetto, 2008). The underlying assumption is that a product is regarded as a "bundle" of various attributes (color, shape, size, function, etc.). A consumer compares products A and B with different bundles of attributes, and selects the one bringing about higher utility. The survey results of questionnaires asking for such choices are valuable source of information to derive consumers' preference. Note that this marketing method is applicable to voting behavior if "consumer" is replaced with "voter," "attribute" with "policy categories and options therein," and "product" with "manifest or policy alternative." [2)]

I conducted a questionnaire survey on policy alternatives via the Internet during the campaign period of the July 2022 House of Councilors election. This is my second study of voters' preference. The same methodology is employed here as that in Kawagoe (2023), which dealt with the previous election of the House of Representatives in October 2021.

These studies are characterized by the timing of their surveys. These set-ups were inspired by Horiuchi, Smith, and Yamamoto (2018), HSY hereafter, who conducted a survey during the campaign period of the 2014 House of Representatives election. The second feature of our studies is that the preference for policy options is evaluated as the willingness-to-pay (WTP), differentiating my studies from HSY. As a political science study, HSY were interested in a desirable combination of policy options to increase the possibility of winning the election. In contrast, my focus on WTP illustrates voters' perceived benefits of each of policy alternatives, an important element in the government decision making to choose policies after the election. In addition, different WTP estimates depending on financing methods to implement policies, provide new evidence on fiscal illusion that voters pay insufficient attention to the intertemporal budget constraint the government faces (Buchanan and Wagner, 1977, Ch.9) [3)]. Thus, our studies could be informative for those in Prime Minister's office after the election while HSY for those in parties' headquarters before the election.

The rest this paper is structured as follows. In Section 2, the model is outlined, whereas the survey design is explained in Section 3. The survey results are examined in Section 4, and concluding remarks are presented in Section 5.

2. Model

We use a standard model in the discrete choice experiment literature[4]. Random utility theory allows us to decompose utility gained from commodity i into a deterministic part, V_{in}, and a stochastic one, ε_{in} :

$$U_{in} = V_{in} + \varepsilon_{in} \tag{1}$$

The fact that individual n selects commodity i rather than commodity j means:

$$\begin{gathered} U_{in} - U_{jn} = V_{in} - V_{jn} + \varepsilon_{in} - \varepsilon_{jn} > 0, \\ V_{in} - V_{jn} > \varepsilon_{jn} - \varepsilon_{in.} \end{gathered} \tag{2}$$

Further suppose there are k determinants of the deterministic part, V_{in}, which is modeled as below, assuming their linear combination. Here, β_{kn} is the weight an individual n gives an attribute k, or the partial utility they gain from the attribute.

$$V_{in} = \sum_{k=1}^{K} \beta_{kn} x_{ik} = \boldsymbol{X}_i \boldsymbol{\beta}_n \tag{3}$$

The above leads to the following expression of the probability of individual i's choice:

$$\begin{aligned} \Pr(U_{in} > U_{jn}) &= \Pr(V_{in} - V_{jn} > \varepsilon_{jn} - \varepsilon_{in}) = \Pr\left((\boldsymbol{X}_i - \boldsymbol{X}_j)\boldsymbol{\beta}_n > \varepsilon_{jn} - \varepsilon_{in}\right) \\ &= \Pr(\boldsymbol{X}_{ij}\boldsymbol{\beta}_n > -\varepsilon_n) = \Pr(\varepsilon_n < \boldsymbol{X}_{ij}\boldsymbol{\beta}_n) \\ &= \mathrm{F}(\boldsymbol{X}_{ij}\boldsymbol{\beta}_n), \end{aligned} \tag{4}$$

where symmetry of probability distribution function is assumed, and F is a cumulative distribution function.

Furthermore, assume that the stochastic part, ε_{in}, independently and identically follows a Gumbel distribution, and that utility from commodity i is the largest among more than three commodities belonging to the commodity set, $S = \{1, 2, \ldots, I\}$. The probability that commodity i is selected is modeled by a conditional logit model as follows:

$$P_n(i) = \frac{\exp(\boldsymbol{X}_i \boldsymbol{\beta}_n)}{\sum_{i=1}^{I} \exp(\boldsymbol{X}_i \boldsymbol{\beta}_n)}. \tag{5}$$

For example, let $K - 1$ variables be dummies with values of unity for excellent quality and null for normal quality. The last K-th, x_{iK}, stands for a continuum variable representing price. This set-up enables us to estimate how much one will pay for the characteristics the k-th dummy stands for with its unity value, that is, WTP, by the following formula:

$$WTP_n = -\frac{\beta_{kn}}{\beta_{Kn}}, \qquad \mathrm{k} = 1, \ldots, \mathrm{K} - 1. \tag{6}$$

Although WTP could be individually different, a unique value for all the participants is gained if the commonality assumption is adopted. A less stringent case is that the commonality assumption is limited to a group classified by personal characteristics. It would do to include in Eq. (3) the interaction terms $\boldsymbol{D}_g \cdot \boldsymbol{X}_i$, where $\boldsymbol{D}_g$ $(g = 1, \ldots, G)$ show whether respondents belong to specific groups. These modifications could produce a group specific WTP, WTP_g.

3. Outline of the Survey

This section will outline the survey used here, the basic design of which is kept the same in my first study, Kawagoe (2023).

3.1 Survey period

The survey was conducted during the campaign period of the House of Councilors election in 2022 to know how voters evaluated policy options when each party made a pledge and competed for policy alternatives in the election. Specifically, the 26th House of Councilors election was announced on Wednesday, June 22, and the voting and ballot counting was scheduled on Sunday, July 10. The questionnaire was delivered to the monitors on the Friday evening, July 1, and the collection was completed on Monday, July 4. In other words, the respondents answered the questionnaire over the first weekend in the middle of the campaign period. This was likely when they gained much information, judging from media coverage of the election.

3.2 Survey participants

Implementation of the survey was entrusted to a research company. Individuals registered as monitors with the research company participated if they were interested in the questionnaire contained in the questionnaire package. The total number of respondents was set to 1000 each for men and women. The age group compositions of each sex were adjusted to be equal to their census counterpart. After answering the policy option questions, the participants were requested information about their personal attributes. An overview of participants' personal characteristics is presented in Table 1.

Interestingly, in response to the question asking whether to vote in the coming election, about 70% of the respondents answered that they "will or have done," that is, have cast an early vote. Notably, this is considerably higher than the turnout of 52.05% announced by the Ministry of Internal Affairs and Communications[5].

3.3 Survey items

Regarding the questions in the survey[6], two or three options (or "levels" according to conjoint analysis terminology) are provided for each of the seven policy areas (or "attributes"), as presented in Table 2. Six of the seven attributes concern campaign promises announced by political parties. It is necessary to focus on those that may divide opinions and are likely to attract much attention in the election. Remember the first attribute, counter-COVID-19 measures, might not be a major issues at the election campaign any more[7], but was kept on the questionnaire to keep conformity with survey at the previous election. For each attribute, we set up different levels of whether to continue a conventional policy or to strengthen it in a specified direction.

Participants were asked to answer five questions by choosing one of the three alternatives (Table 3). Two of the three are campaign promises of candidate A and B, and are created by randomly combining the levels of the seven attributes of Table 2, whereas the last one is for those who will not choose either.

To obtain WTP, it is necessary to set a variable representing "price" in the case of marketing, or x_{iK} in the previous section, that is, the seventh attribute in our analysis. However, the appropriateness of the variable is not obvious because it is not always clear at the time of policy selection how the costs of implementing a particular

Table 1　Overview of Participants' Personal Characteristics

Personal characteristics, N=2,000							
Sex	male	female					
number	1000	1000					
share	50.0%	50.0%					
Age	18 to 30	31 to 60	61 and above				
number	296	941	763				
share	14.8%	47.1%	38.2%				
Job	self-employed	regular worker	non-regular	housework	student	not working	
number	151	613	275	434	73	454	
share	7.6%	30.7%	13.8%	21.7%	3.7%	22.7%	
Education	JH or H	PTC or JC	college or graduate school				
number	633	396	971				
share	31.7%	19.8%	48.6%				
individual annual revenu	up to ¥3 mil.	¥3 to 6 mil.	¥6 mil. or more	no answer			
number	1044	481	246	229			
share	52.2%	24.1%	12.3%	11.5%			
household annual revenue	up to ¥4 mil.	¥4 to 8 mil.	¥8 to 1.2 mil.	¥1.2 mil. or more	no answer		
number	692	643	262	86	317		
share	34.6%	32.2%	13.1%	4.3%	15.9%		
Kishida Administration	support	not support					
number	813	1187					
share	40.7%	59.4%					
Supporting Political Party	LDP	Komei	CDP (1)	Communist Party	JIP (2)	others	No party
number	469	40	108	49	174	155	1005
share	23.5%	2.0%	5.4%	2.5%	8.7%	7.8%	50.3%
Voting	will go or have done	will not go	have not decided				
number	1384	231	385				
share	69.2%	11.6%	19.3%				
A priority in voting	policies	characters	party	others			
number	861	353	389	166			
share	48.7%	20.0%	22.0%	9.4%			
volunteer in a year	yes	no					
number	291	1709					
share	14.6%	85.5%					

Note 1: JH or H = Junior High School or High School
2: PTC or JC = Professional Training College or Junior College
3: CDP = Constitutional Party in Japan
4: JIP = Japan Innovation Party

policy are expected to be financed. Therefore, we set two types for the seventh attribute: "an increase in tax burden" and "an increase in budget deficit," as shown in the last two rows of Table 2. One of them was randomly included in the questions posed to our 2000 participants.

4. Results

4.1 Overview

First, we estimate Eq.(6) assuming homogeneous preference among the participants. Applying the conditional logit model of Eq.(5) to the survey answers revealed the results shown on the left side of the Reference Table in Appendix[8]. The resulting WTP estimates on the right side of the table are also shown in Fig. 1 (1), together with

Table 2 Outline of the Questionnaire: Attributes and Levels

Policy category (attribute)	Option (level)		
1) Counter-COVID-19 measures (to reduce human contacts and reinforce medical care supply systems)	a. grant the central government stronger authority	b. remain unchanged	
2) Measures aiming at a higher economic growth rate	a. encourage economic growth	b. remain unchanged	
3) Measures aiming at more equitable income distribution (by reducing poverty and income disparities)	a. reduce poverty and income disparities, thereby increasing the number of middle-income people	b. remain unchanged	
4) Measures for next generations (such as support for pregnancy, childbirth, infant care, and education)	a. stronger support for pregnancy, childbirth, infant care, and education	b. remain unchanged	
5) Measures for secure elderly lives (with pension, medical, and nursing care)	a. secure pension systems	b. secure medical and nursing care	c. remain unchanged
6) Measures for energy transition (by reducing dependency on nuclear power plants)	a. aim at zero dependency in the future	b. remain unchanged (restarting to use safe nuclear power plants)	
7-1) Increase in tax burden (measured by tax burden in total)	a. remain unchanged	b. 5 percent increase	c. 10 percent increase
7-2) Increase in fiscal deficits (an increase in new debt)	a. remain unchanged	b. an increase in deficits (equal to 5 percent of tax burden)	c. further increase in deficits (equal to 10 percent of tax burden)

Table 3 An Example of Questions Posed to the Participants

Attribute	1)	2)	3)	4)	5)	6)	7-1) or 7-2)
Candidate A	a.	a.	a.	b.	a.	b.	a.
Candidate B	a.	b.	b.	a.	c.	a.	b.
Vote for neither							

their 95% confidence intervals. The change in energy from significantly positive to virtually zero is remarkable, predicting a shift in energy policy at the Kishida administration after the July 2022 election[9].

According to Figure 1 (1), WTP estimates are significantly positive in all but two attributes, or policy categories, counter COVID-19 and energy. While counter-COVID-19 shows significantly large WTP estimate at the previous election, its diminished significance this time may meet our expectation.

Note that these WTP estimates vary significantly, depending not only on the policy categories but also on their financing methods. In general, the policies are more highly evaluated if they are financed by budget deficit or bond issuance rather than by tax increase. This evaluation difference is a new piece of evidence on fiscal illusion[10].

Figure 1 (2) lines up policies along X-axis in descending order of the tax-financed WTP estimates. This shows there is no inconsistency in ordering of policy priorities owing to different financing methods. This is not the case in the previous election. While tax financing evaluates policies for next generations slightly higher than those for older people (such as pension, medical and nursing care) and for more equitable income distribution, the bond issuance financing method more than double the WTP estimates of the latter groups of policies, dwarfing the former (Kawagoe, 2023).

4.2 Differences owing to personal characteristics

Here, we focus on a personal characteristic, voting behavior. Figure 2 shows clearly different evaluations among the three categories: those who “will go or have done,” “will not go,” and “not decided.” The WTP estimates of the second category are negative for almost all policy categories. This may reflect their indifference to policy issues, or rather objections to policy actions, especially owing to bond finance. Finally, those with the indeterminate attitude show their support for the policies for the next generation, but provide no clear messages for other attributes. Thus, there seems to remain wide disagreement about evaluations of policy alternatives. As a result, a third of the voters may not support the policy the government will implement following the outcome of the election.

5. Conclusion

This study examines voters’ preferences for policy options using conjoint analysis. As a follow-up study of Kawagoe (2023), an online survey was conducted during the campaign period of the 26th House of Councilors election held in Japan in July 2022. Based on the results, we estimated discrete choice models and obtained WTP estimates for policy options.

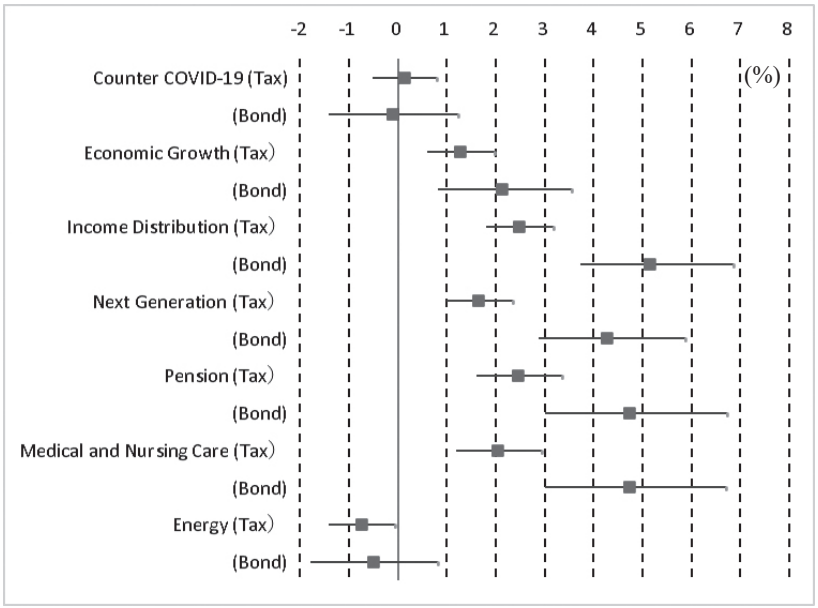
The findings of this study are summarized in the following three points. First, based on the survey results, voters’ preferences for policy options are exemplified as their WTP. The use of monetary values expressed as WTP enables us to compare preferences of policy options across participants and policy categories, thereby clarifying voters’ priorities.

Second, voters’ evaluations differ significantly depending on whether the policies are to be financed by tax increase or fiscal deficit, that is, future tax increase. This is a new direct indication of fiscal illusion. Third, their WTPs are heavily dependent on personal characteristics, such as voting behavior. This evaluation heterogeneity may imply possible difficulties to build consensus in the policy-making process.

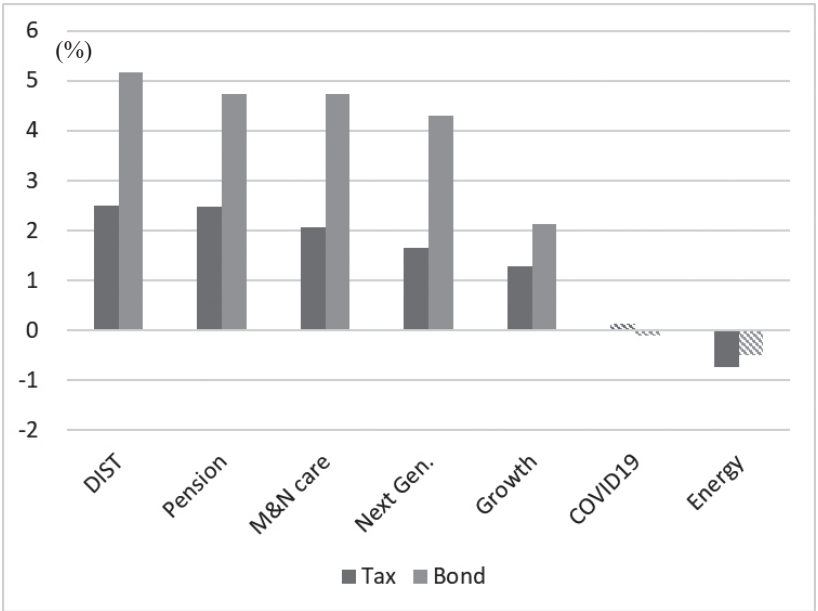
These are broadly consistent with what Kawagoe (2023) obtained in the previous 2021 election data. Detailed comparison should be a next step to deepen our understanding of voters’ preferences.

Figure 1 WTP estimates

(1) Overview



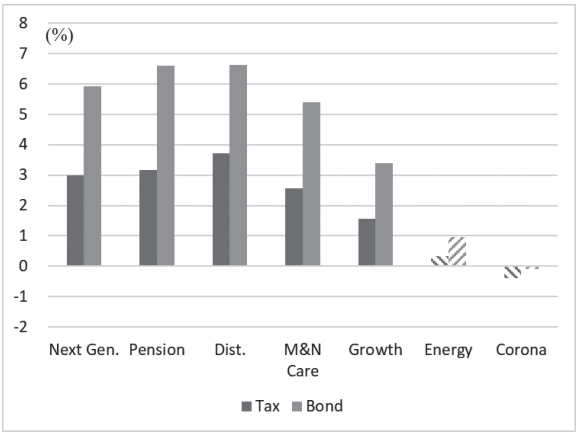
(2) Different Priorities



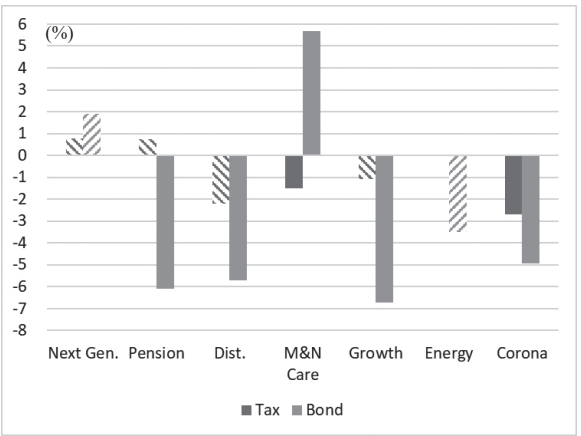
Notes ■ represent point estimates with line segments of their 95% confidence intervals. Bars are filled if the estimates are significant at 5%, but not otherwise.

Figure 2 WTP estimates by voting behavior

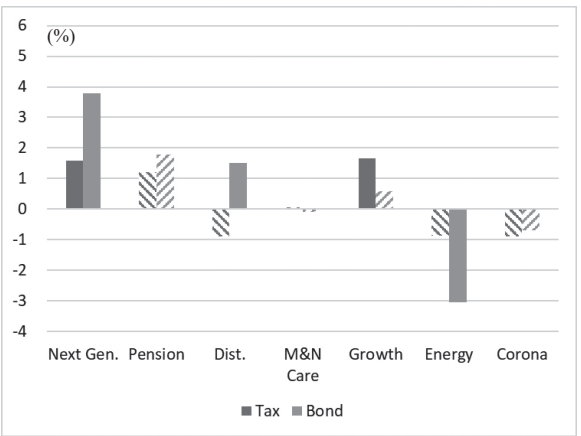
(1) “Will go to vote or have done”



(2) “Will not go”



(3) “Have not decided”



Note: Bars are filled if the estimates are significant at 5%, but not otherwise.

1) Nihon University College of Economics. I would like to appreciate the Institute of Economic Sciences, Nihon University College of Economics for funding again the questionnaire survey used here, following the survey used in Kawagoe (2023).
2) This method is applicable in different contexts. See Kawagoe (2024) and Kawagoe and Kojima (2024) for evaluation of privacy and CSR (corporate social responsibility), respectively, for example.
3) See also Buchanan (1967, Ch.10) and Wagner (1976).
4) This section is based on Greene (2003) and Aizaki et al. (2015).
5) In general, the percentage of respondents who say they will "vote" in the preliminary polls conducted by the media exceeds the turnout. For example, according to surveys conducted by NHK two weeks before the polling date for the five 21st to 25th House of Councilors elections from 2007 to 2019 (Masaki and Aramaki, 2019), the average of the answer of "definitely go to vote (plus cast an early vote)" stands at 63%, about 8.5 percentage points higher than the average official outcomes, 54.53%.
6) Kawagoe (2021, 2022) used a similar, but simpler questionnaire survey, which included only tax burden as a price. These studies are outcomes from researches conducted at the Institute of Economic and Social Systems (IESS) in July 2021. My experience at the IESS benefited this study.
7) The number of the newly confirmed cases hit the bottom in June 2022 after a big wave with its peak with 2.2 million cases in February. In hindsight, July, when the election, was held was the first month of the next wave with a much higher peak with 6.2 million cases in August. Covid-19 was formally reclassified into a less serious category in May 2023.
8) We used R programs based on Aizaki et al. (2015), among others.
9) The Kishida administration set up a new body, the GX implementation Council, in late July 2022 and compiled the Basic Policy for Realization of GX in February 2023, which included the administration's new initiatives of utilizing nuclear power.
10) Dollery and Worthington (1996) provides with a survey of empirical evidence of fiscal illusion.

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Appendix. Estimation Results

Here we will provide estimation results of Eq. (4) using conditional logit models, and resulting WTP estimates based on Eq. (6).

Reference Table. Estimation Results

	coeff. Est.	exp(coeff)	coeff.SE.	z value	WTP	conf. int.
			K=T			
Const.	-0.175	0.840	0.068	-2.567 *		%
Corona dummy	0.017	1.017	0.041	0.417	0.14	[-0.52, 0.81]
Growth dummy	0.156	1.169	0.042	3.750 **	1.28	[0.61, 1.97]
Dist. dummy	0.303	1.354	0.042	7.286 **	2.49	[1.81, 3.19]
Next Gen. dummy	0.201	1.222	0.042	4.807 **	1.65	[0.98, 2.35]
Pension dummy	0.301	1.351	0.053	5.634 **	2.47	[1.62, 3.35]
M&N care dummy	0.250	1.284	0.054	4.668 **	2.05	[1.19, 2.95]
Energy dummy	-0.089	0.915	0.042	-2.146 **	-0.73	[-1.41, -0.06]
Tax increase	-0.122	0.885	0.006	-22.103 **		
			LR test	608.6 **		
			K=B			
Const.	-0.382	0.682	0.067	-5.664 **		%
Corona dummy	-0.006	0.994	0.040	-0.148 **	-0.10	[-1.41, 1.24]
Growth dummy	0.127	1.136	0.040	3.198 **	2.13	[0.83, 3.57]
Dist. dummy	0.309	1.362	0.040	7.728 **	5.16	[3.73, 6.87]
Next Gen. dummy	0.257	1.293	0.040	6.397 **	4.29	[2.87, 5.88]
Pension dummy	0.283	1.328	0.052	5.501 **	4.73	[3.01, 6.72]
M&N care dummy	0.284	1.328	0.052	5.504 **	4.74	[3.01, 6.72]
Energy dummy	-0.029	0.971	0.040	-0.736 **	-0.49	[-1.78, 0.81]
Deficit increase	-0.060	0.942	0.005	-11.585 **		
			LR test	332.0 **		

note：　n= 15,000, Q # = 5,000 , *=significant at 5%, **=significant at 1%.