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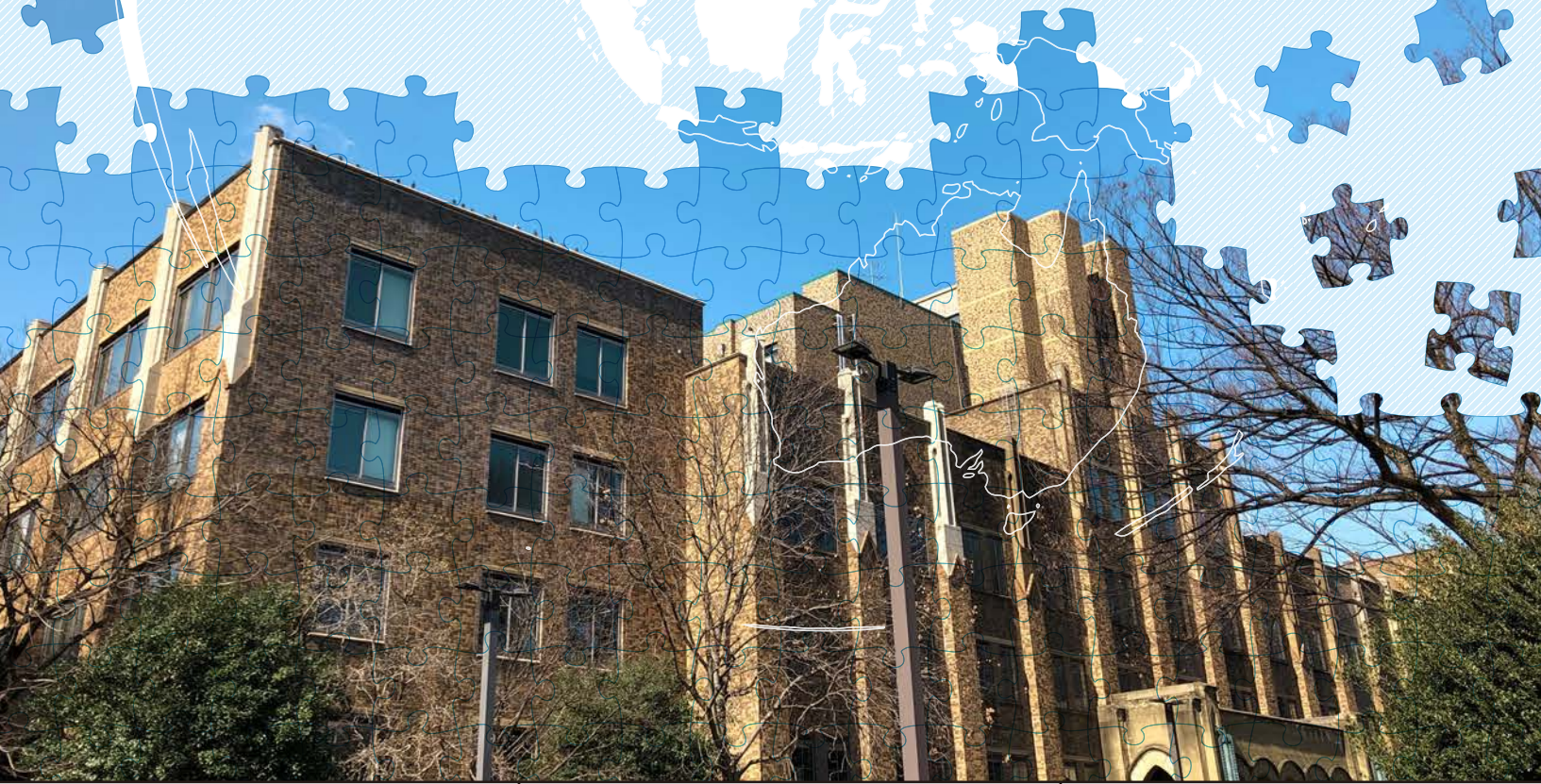
One Nation Restored: The Security-Liberty Trade-off under Uncertainty



No. 22

Date Mar.2022

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One Nation Restored

The Security-Liberty Trade-off under Uncertainty*

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March 19, 2022

Abstract

A rise in uncertainty tends to reveal innate heterogeneous preferences. We use the COVID-19 pandemic to measure how Japanese adults' preferences for policies to combat COVID-19 evolved from July 2020 to February 2021 using an internet panel randomized conjoint experiment where participants chose between hypothetical policy packages intended to combat COVID-19. In July 2020, Japanese adults showed divergent preferences on the critical element of the security-liberty trade-off in terms of the government's tracking of social media/phone communication records as a measure to detect infection routes. In February 2021, after factoring in estimated risks of infections, death tolls, and the progress of vaccination, Japanese adults converged to restore the value to defy the government's tracking of social media/phone communication records.

Keywords Uncertainty; polarized reflex; converging response; security-liberty trade-off; panel fully randomized conjoint experiments; COVID-19; machine learning.

Competing interests The authors declare none.

*This research was funded by JSPS Grant-in-Aid KAKENHI JP18H03630.

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1 Introduction

Individuals differ in their tastes and preferences for social order but must cooperate to harness the complementarity of human inputs. To this aim, we reach an agreement regarding policy choice.

Such accordance, however, might be shaken when uncertainty rises. We have observed associations between an increase in uncertainty and polarization of preferences for policies. Sherman, Hogg and Maitner (2009) and Gaffney, Rast, Hackett and Hogg (2014) among others found that an increase in perceived economic uncertainty tends to associate with political polarization in the US.

The COVID-19 pandemic unexpectedly provides us with an opportunity to consider this issue. Even to professionals, medical uncertainty was severe at the onset of the pandemic (Koffman, Gross, Etkind and Selman (2020)). The unexpected rise in uncertainty evoked a classic challenge to constitutional democracies: the trade-off between "security and freedom" (Hayek (2007[1944]), p. 155), which typically arises when uncertainty increases, such as during the Second World War, the cold war, terrorist attacks, and pandemics (Cushman (1944); Harris (1956); Davis and Silver (2004); Dragu (2011); Garcia and Geva (2016); Koyama (2021); and Hansen and Dinesen (2022)). Advanced democracies are now faced with this trade-off between liberty, the core value of democracy, and security (Pennington (2021); Koyama (2021); van Vark (2021); and Pereira and Stornelli (2022)). After the 9/11 attacks, the trade-off was represented by monitoring augmented by information and communication technology (Pavone, Gomez and Jaquet-Chifelle (2016)). The challenge faces us again. The severe choice between liberty and security faced by constitutional democracies has thus been whether to allow the government to track social networking services (social media)/phone communication to detect infection routes (Fahey and Hino (2020); Beduschi (2021); and Tran and Nguyen

(2021)).

Such security-liberty trade-off issues arising amid the COVID-19 pandemic include several other dimensions. Whether mandate vaccination was also such an issue (Gostin (2021); Kawata and Nakabayashi (2021); and Bratu and Sabău (2021)). Another was a balance of whether to permit gatherings for freedom of speech or restrict them for security (Grasse, Pavlik, Matfess and Curtice (2021); Martin (2021); and Jung (2022)).

At the same time, associations between uncertainty and polarization outcomes depend on the types and degrees of polarization that have existed, if hidden, prior to an increase in uncertainty. In particular, partisan polarization regarding policies against COVID-19 varies substantially in different nations. For instance, vaccine hesitancy has historically been associated with partisanship in the US (Mesch and Schwirian (2015)). This tendency has been reconfirmed amid the COVID-19 pandemic in the US (Kreps, Prasad, Brownstein, Hswen, Garibaldi, Zhang and Kriner (2020); Liu and Li (2021); and Ye (2021)) and also in France (Ward et al. (2020) and Hacquin, Altay, de Araujo, Chevallier and Mercier (2020)). By contrast, partisanship is relevant to neither general vaccine hesitancy nor preferences for vaccine types, including the origin of development with geopolitical concerns, in Japan (Kawata and Nakabayashi (2021)). Additionally, in Italy, partisanship is irrelevant to vaccine hesitancy amid the COVID-19 pandemic (Baccolini, Renzi, Isonne, Migliara, Massimi, De Vito, Marzuillo and Villari (2021)).

Moreover, if an increase in uncertainty reveals existing polarization, it might not create further polarization. In the US, while preferences for policies against COVID-19 have been polarized by partisanship, Boxell, Conway, Druckman and Gentzkow (2020) presented that affective partisan polarization itself did not increase at the onset of the COVID-19 pandemic.

With the findings described above, it is still worth seeking more evidence to establish

the relationship between uncertainty and polarization, to obtain a hint for possible re-convergence of the divided public. The ongoing COVID-19 pandemic has provided a precious opportunity to investigate how we have polarized and whether we can be consolidated under such challenges.

To take advantage of this opportunity, we implemented a panel randomized conjoint experiment on preferences for hypothetical policies to contain the COVID-19 pandemic in July 2020 and February 2021 in Japan. We find that the preferences of Japanese adults diverged as of July 2020, particularly in terms of whether to allow the government to access social networking services/phone communication records to specify infection routes, but they had converged as of February 2021 to refuse government access to social networking services/phone communication. Japanese society was at the brink of polarization at the onset of the pandemic but had returned to solidarity after one year had passed. One advantage of our study is that we asked the same questions regarding policy preferences to the same people in July 2020 and February 2021. If humans factor in information updated every day, the degree of uncertainty regarding the effects of hypothetical policies would diminish over time. Therefore, we can observe this evolution.

The rest of the paper is organized as follows. Section 2 reviews works on the polarization of preferences for policies against COVID-19. Section 3 introduces the design of our experiment. Section 4 details our results. Section 5 discusses possible channels that delivered our results and concludes the paper.

2 Overview of policy reactions to the pandemic

2.1 Perceived uncertainty at the onset of the pandemic

The technical uncertainty (Koffman et al. (2020)) at the onset implied uncertainty of the effects of various policies deployed to combat COVID-19. Stock markets immediately priced in the uncertainty of the effects and length of social distancing and collapsed after announcements of health interventions by nations (Ashraf (2020) ; Aharon and Siev (2021); and Kanno (2021)). Moreover, the volatility index spiked (Laborda and Olmo (2021) and Apostolakis, Floros, Gkillas and Wohar (2021)). As such, the uncertainty of health policy led to a rise in perceived economic uncertainty (Altig et al. (2020) and Perugini and Vladisavljević (2021)).

Along with stock markets, another sensitive part of our society is mental health. Depressive symptoms rose at the onset of the pandemic, notably among young people (Long, Haagsma, Janssen, Yfantopoulos, Lubetkin and Bonsel (2021) and Van de Velde et al. (2021)). Thus, perceived uncertainty prevailed across aspects of our life (Pileggi (2021)). We had to experiment with stringent lockdowns or violation of privacy by mobile device and communication tracking in some nations in Europe and the US; modest requests by the government for social distancing and constrained economic activities in Japan; and further relaxed regulations in Sweden. Through experiments, we have learned the benefit of decreasing deaths and the economic and privacy costs of such policies.

Ultimately, socioeconomic uncertainty ramified from medical uncertainty has been alleviated by improvements in medical development and the public trust in medicine (Battiston, Kashyap and Rotondi (2021)). Policy responses calmed the financial markets (Zaremba, Kizys, Tzouvanas, Aharon and Demir (2021)). Stringent government poli-

cies also improved mental health (Long et al. (2021)). Furthermore, the prevalence of social distancing stabilized financial markets in the midterm (Bickley, Brumpton, Chan, Colthurst and Torgler (2021)), and the development and rollout of vaccines against COVID-19 stabilized and recovered stock markets (Rouatbi, Demir, Kizys and Zaremba (2021) and Khalfaoui, Nammouri, Labidi and Ben Jabeur (2021)). Being more informed about vaccination and facing the severity of the pandemic led to declines in vaccine hesitancy (Duong and Antriyandarti (2022)). During the learning process, health news was a good predictor of stock market performance (Salisu and Vo (2020)), which indicates a decrease in our perceived uncertainty led to a decrease in stock market volatility and ultimately to stabilization of the real economy.

2.2 Aggregate-level divergence and convergence of policy implementation

Given the medical uncertainty and resulting economic policy uncertainty, nations diverged with respect to the implementation of policies against COVID-19. The divergence was observed even between nations that share cultural and political values. Let us consider the cases of advanced democracies.

While European nations share a culture and democracy, their policies diverged at the onset (Sabat, Neuman-Böhme, Varghese, Barros, Brouwer, van Exel, Schreyögg and Stargardt (2020) and Kuhlmann, Hellström, Ramberg and Reiter (2021)), notably between Sweden and the others (Lindström (2020)). The polarization had symptoms beyond policies against COVID-19 to a general role of the government (Ares, Bürgisser and Häusermann (2021)). However, the regulatory divergence was followed by convergence along with acquired experience (Alemanno (2020) and Alfano, Ercolano and Pinto (2022)).

East Asian democracies, namely, Japan, Taiwan, and South Korea, also share a culture and democracy. However, the divide between Japan and the others was striking. The Taiwanese government adopted stringent policies immediately (Wang, Ng and Brook (2020); Cheng, Li and Yang (2020); Summers, Cheng, Lin, Barnard, Kvalsvig, Wilson and Baker (2020); Lee (2020); and Yang and hung Tsai (2020)). South Korea also implemented such policies, including controversial mobile device tracing (Park, Choi and Ko (2020); Oh, Lee, Schwarz, Ratcliffe, Markuns and Hirschhorn (2020); and Dighe et al. (2020)). By contrast, the Japanese government adopted a modest request for temporarily restrained economic activities in the name of the declaration of the "State of Emergency," which essentially does not allow for enforcement by the government. The Japanese government has never monitored social networking services/phone communication. The key measure to contain the pandemic in Japan has been individual protective behaviors such as social distancing (Machida et al. (2020b, 2020a)). However, as have European democracies, East Asian democracies have shown regulatory convergence with acquired experience: the Taiwanese government shifted to softer regulations as the pandemic was contained (Galvin, Li, Malwade and Syed-Abdul (2020)).

2.3 Microfoundation of divergence and convergence

In democracies, policy implementations are ultimately based on the preferences of constituents. Fan, Orhun and Turjeman (2020) found that partisanship, as well as demographic characteristics, is associated with risk tolerance and actions. Regarding the medical risk, Democrats were more concerned about infection risk than were Republicans (Bruine de Bruin, Saw and Goldman (2020)). Naturally, Democrats and Republicans diverged in protective behaviors such as wearing a mask and social distancing and vaccine hesitancy (Allcott, Boxell, Conway, Gentzkow, Thaler and Yang (2020); Kreps

et al. (2020); Goldstein and Wiedemann (2021); Kerr, Panagopoulos and van der Linden (2021); Milosh, Painter, Sonin, Van Dijcke and Wright (2021); Geana, Rabb and Sloman (2021); Roberts and Utych (2021); Gadarian, Goodman and Pepinsky (2021); Druckman, Klar, Krupnikov, Levendusky and Ryan (2021); Camobreco and He (2022); Dias and Lelkes (forthcoming)).

Associations between uncertainty and polarization in the hesitancy to get vaccinated were not limited to the US. As of January 2021 in Japan, before vaccines were rolled out, uncertainty about vaccination against COVID-19 was so serious that hesitancy was higher among healthcare workers than the general public (Hara, Ishibashi, Nakane, Nakano and Hirota (2021)). Under such uncertainty, vaccine hesitancy was entrenched by geopolitical concerns such that hypothetical vaccines developed by China or Russia were disliked by Americans, French, and Japanese (Kreps et al. (2020); Motta (2021); Schwarzinger, Watson, Arwidson, Alla and Luchini (2021); and Kawata and Nakabayashi (2021)).

A caveat is that affective polarization, if any, might have already existed and was not provoked by the pandemic (Boxell et al. (2020)). Furthermore, attitudes towards the security-liberty trade-off were nuanced even in the US. Zhang, Kreps, McMurry and McCain (2020) showed that the proportions of supporters of contact tracing applications were not significantly different between Democrats and Republicans, while the proportion of opponents was higher among Republicans. Ghose, Li, Macha, Sun and Fout (2022) reported that Democrats are more concerned with privacy so they tend to opt out of the location tracking function of mobile devices. Democrats reduced their opt out rate at the onset of the pandemic, which eventually led to some extent of convergence regarding the trade-off of security against privacy. Though divided, the security-liberty trade-off was not so simple to be classified simply by partisanship, even in the US.

3 Experimental design

3.1 Our interest

We investigate how policy preferences evolved from July 2020 to February 2021 in Japan. In the summer of 2020, vaccines began to be provided to adults in general, not only to old or other high-risk people and health care workers, who had been prioritized under the shortage of vaccines. Throughout the fall of 2020 to the winter of 2021, the authorities and general public learned about how to work and live with COVID-19. By asking the same respondents in July 2020 and February 2021 about the same list of hypothetical policies against COVID-19, we aim to determine how such experiences updated policy preferences.

When responding to the crisis, adherence to protective measures was substantially heterogeneous (Machida et al. (2020b, 2020a); Muto, Yamamoto, Nagasu, Tanaka and Wada (2020); Nagata, Adachi, Hanibuchi, Amagasa, Inoue and Nakaya (2021); Shoji, Cato, Iida, Ishida, Ito and McElwain (2021a); and Hanibuchi, Yabe and Nakaya (2021)), as in other nations. Overall tension of sentiment seems to have weakened over acquiring experience, and negative impressions of vaccination decreased after vaccines were rolled out (Niu, Liu, Kato, Shinohara, Matsumura, Aoyama and Nagai-Tanima (2022)). Our particular interest is in whether the heterogeneity of policy preferences increased or decreased during the process.

3.2 Grand design of the survey

We conducted a panel internet survey in July 2020 and February 2021 by recruiting 15,000 Japanese adult respondents through a survey company, Rakuten Insight, for

each wave.[1] The first wave was conducted from July 3, 2020, to July 22, 2020, and the median response time was 8 minutes. The second wave was conducted from February 17, 2021, to March 4, 2021, with a median response time of 7 minutes. Out of the 15,000 respondents in the first wave, 4,583 respondents participated in the second wave. The 4,583 respondents constitute our sample.

Our interest is in the degree of heterogeneity about policy preferences, its cause, and its change. Relationships between policy preferences and individual characteristics are unknown. To estimate these relationships, we look into possible channels from as many background characteristics as possible to policy preferences by considering the latter as functions of the former. Thus, we queried respondents' gender; age; educational background; working status, if working, the size of employer, whether a regular or non-regular worker, and job title; income; household income; partisanship; self-perceived degree of right-leaning; dissatisfaction with current politics; and whether having been infected by COVID-19.

We also included in the background characteristics survey questions about preferences for the same hypothetical policies to contain the COVID-19 pandemic as those shown to respondents in our conjoint experimental design described in subsection 3.3 below. By doing so, we are able to find possible associations between preference for a specific policy in the background characteristics survey and preferences for a policy package composed of five dimensions of hypothetical policies in our conjoint experimental design.

[1]Detailed information about Rakuten Insight's respondent pool is available from its website. https://insight.rakuten.co.jp/download/PanelProfile_EN.pdf and https://insight.rakuten.co.jp/download/PanelCharacteristicSurveyEN.pdf.

3.3 Panel randomized conjoint experiments

Our hypothetical policies are generated by a fully randomized conjoint experimental design (Hainmueller, Hopkins and Yamamoto (2014)). Respondents were shown two hypothetical policies and were asked to choose between them. The task was assigned to each respondent five times at each wave.

The hypothetical policies consist of five attributes: 1) Restriction on general adults' going out other than to purchase goods indispensable to life and medications; 2) Restriction on elderly adults' going out other than to purchase goods indispensable to life and medications; 3) Government's inspection of individuals' access to social networking services and telephone logs to specify infection routes; 4) Restriction on operations of stores and other facilities; and 5) Measures to restrict the operations of stores and other facilities. Each attribute has two to four levels, as summarized in Table 1.

Outcomes in our design are preferences for packages for hypothetical policies to contain COVID-19 shown to respondents in our conjoint experimental design described in subsection 3.3. Candidate policies included both ones that were implemented in Japan and those that were more stringent and were never implemented in Japan, such as communication intercepts and penalties for behavior that violated protective measures. Respondents' preferences were collected by means of a panel randomized conjoint experiment. The stated preferences are our outcomes. After the survey, we estimate associations between the background characteristics and policy package preferences by subsampling using a tree algorithm.

Let $\boldsymbol{A}_j$ denote a five-dimensional policy package vector that includes attributes 1) to 5) described above, and let $\boldsymbol{A}_{-j}$ denote an alternative policy package vector. In each round of the conjoint experiment, each respondent is requested to choose her or his preference between randomly generated $\boldsymbol{A}_j$ and $\boldsymbol{A}_{-j}$ packages. We did not allow

Table 1: Conjoint design for hypothetical policy packages to contain the COVID-19 pandemic.

Policies to contain COVID-19 pandemic	Level			
	1	2	3	4
Restriction on general adults' going out other than to purchase goods indispensable to life and medications.	The government neither requests voluntary restriction nor bans going out.	The government does not enforce the ban but requests voluntary restrictions.	The government punishes going out by a fine.	The government punishes going out by imprisonment.
Restriction on elderly adults' going out other than to purchase goods indispensable to life and medications.	The government neither requests voluntary restriction nor bans going out.	The government does not enforce the ban but requests voluntary restriction.	The government punishes going out by a fine.	The government punishes going out by imprisonment.
Government's inspection of individuals' access to social networking services and telephone logs to specify the infection route.	Allow the government to inspect.	Do not allow the government to inspect.		
Restriction on operations of stores and other facilities.	Restrict operations of nightclubs and sex clubs.	Restrict operations of sex clubs, nightclubs, comic book cafes, colleges, and move theaters.	Restrict operations of all stores and facilities other than grocery and drug stores.	
Measures to restrict the operations of stores and other facilities.	The government does not enforce but only requests and does not compensate for losses due to restrictions.	The government does not enforce but only requests and compensates for losses due to restrictions.	The government enforces by fines and does not compensate losses due to restrictions.	The government enforces by fines and compensates losses due to restrictions.

respondents to be indifferent between two hypothetical policy packages. We assigned 5 rounds of this task to each respondent at each wave.

Let us consider the outcome of the choice, $Y_{i,j,r}\left(\boldsymbol{A}_j^{i,r}, \boldsymbol{A}_{-j}^{i,r}\right)$, which takes a value of one if and only if respondent i preferred policy package $\boldsymbol{A}_j^{i,r}$ to $\boldsymbol{A}_{-j}^{i,r}$ in round r, such that

$$Y_{i,j,r}\left(\boldsymbol{A}_j^{i,r}, \boldsymbol{A}_{-j}^{i,r}\right) = \begin{cases} 1 & \text{if} \quad \boldsymbol{A}_j^{i,r} \succ_i \boldsymbol{A}_{-j}^{i,r}, \\ 0 & \text{if} \quad \boldsymbol{A}_j^{i,r} \prec_i \boldsymbol{A}_{-j}^{i,r}. \end{cases} \tag{1}$$

We review policy preferences by estimating the average marginal mean for each policy package such that

$$\tau\left(\boldsymbol{A}_j\right) = E\left[Y_j\left(\boldsymbol{A}_j\right)\right]. \tag{2}$$

Suppose that $a_{j,l}$ is the lth attribute of policy package $\boldsymbol{A}_j$. Then, since we randomly draw $a_{j,l}$, $a_{j,l}$ satisfies the unconfounded assumption,

$$a_{j,l} \perp\!\!\!\perp Y\left(\boldsymbol{A}_j^{i,r}\right).$$

Thus, we identify $\tau\left(\boldsymbol{A}_j\right)$ as causal effects of $\boldsymbol{A}_j$. Since we assigned five tasks to each respondent, we observe 10 pairs of $\boldsymbol{X}_i$, which denotes background characteristics of respondent i and $\boldsymbol{A}_j^{i,r}$, which corresponds to $Y_{i,r} = 1$, and $\boldsymbol{A}_{-j}^{i,r}$, which corresponds to $Y_{i,r} = 0$, for each respondent i. We refer to a response of i in round r on policy package j or $-j$ as an observation.

Let us now provide details about the relationships between our hypothetical policies and the policies that were actually implemented in Japan. Regarding the levels of attribute 1), restrictions on general adults' going out, the government of Japan never penalized violation of restrictions "requested" by the government; thus, level 2 was the actually implemented policy. Regarding attribute 2), restrictions on elderly adults'

going out, the government of Japan never requested "voluntary restraint" specifically for elderly adults. Regarding attribute 3), access and communication tracking, the government of Japan never implemented such measures. Regarding attribute 4), the restriction on operations of stores and other facilities, we classified levels to cover general stores or to limit to sex and related industries. During the pandemic, the government of Tokyo prefecture focused on the sex and related industries and requested them to "voluntarily restrain" operations and partially compensated them for losses due to the restraint. Also, the Tokyo prefectural government requested "voluntary restraint" of bars and partially compensated them for losses due to the restraint. Thus, regarding attribute 5), the measure of operation restriction, the actually implemented policy was level 2.

4 Results

4.1 Estimation strategy

To analyze the survey results, we implement a ramification of the tree model approach (Breiman, Friedman, J. Stone and Olshen (1984) and Breiman (2001)), model-based recursive partitioning (Zeileis, Hothorn and Hornik (2008) and Zeileis and Hothorn (2014, 2015)). The estimation steps suggested by Zeileis et al. (2008) are as follows.

1. Estimate a model to predict the choice of policy attributes using the observations in the current node.

2. Assess the stability of the model parameters with respect to each of the background characteristic variables. If some overall instability is observed, choose the background variable associated with the smallest p value for partitioning; otherwise,

stop.

3. Search for the locally optimal split in the background characteristic variables by minimizing the deviance of the model.

4. Re-estimate the model in both subsamples and repeat from step 2.

The algorithm we deploy is provided as *partykit* (Hothorn and Zeileis (2015b, 2015a)).

4.2 Descriptive statistics

Table 2 presents descriptive statistics of our respondents' demographic characteristics.

Table 2: Descriptive statistics of background characteristics: Demography.

Statistic	N	Mean	St. Dev.	Min	Max
Age	4,583	46.433	13.842	18	79
Gender (1 if female, 0 otherwise)	4,583	0.518			
Unmarried (1 if yes, 0 otherwise)	4,583	0.284			
Married (1 if yes, 0 otherwise)	4,583	0.631			
Divorced or bereaved (1 if yes, 0 otherwise)	4,583	0.085			
Number of children	4,583	1.094	1.120	0	5
Number of siblings	4,583	1.370	1.060	0	22
Number of elder siblings	4,583	0.650	0.983	0	22

Note that the maximum choice for the number of children is "5 or more" so that answer "5" included "5 or more." One respondent indicated a number of siblings of 22. Since the *partykit* we deploy is robust to outliers, we did not exclude the respondent from our sample.

Table 3 shows the highest degree and self-perceived social status of our respondents.

Table 3: Descriptive statistics of background characteristics: Highest degree and self-perceived social status.

Statistic	N	Mean	St. Dev.	Min	Max
Junior high school (1 if yes, 0 otherwise)	4,583	0.016			
High school (1 if yes, 0 otherwise)	4,583	0.226			
Some college (1 if yes, 0 otherwise)	4,583	0.138			
2-year college (1 if yes, 0 otherwise)	4,583	0.093			
Technical 2-year college (1 if yes, 0 otherwise)	4,583	0.013			
4-year college (1 if yes, 0 otherwise)	4,583	0.451			
Graduate school (1 if yes, 0 otherwise)	4,583	0.063			
Self-perceived social status (Highest: 0 to lowest: 10)	4,583	5.551	1.974	0	10

Table 4 presents descriptive statistics of the working status of our respondents.

Table 4: Descriptive statistics of background characteristics: Working status.

Statistic	N	Mean
Working status (1 if at work, 0 otherwise)	4,583	0.737
Regular worker (1 if regular worker, 0 otherwise)	3,379	0.594
Board member (1 if board member, 0 otherwise)	3,379	0.020
Self-employed (1 if self-employed, 0 otherwise)	3,379	0.095
Worker: Non regular (1 if non regular worker, 0 otherwise)	3,379	0.292
Employee: No title (1 if no title, 0 otherwise)	2,945	0.675
Employee: Leader (1 if group leader, 0 otherwise)	2,945	0.048
Employee: Assistant manager (1 if assistant manager, 0 otherwise)	2,945	0.082
Employee: Department chief (1 if department chief, 0 otherwise)	2,945	0.039
Employee: Division manager (1 if division manager, 0 otherwise)	2,945	0.163
Size of employer: 1–4 employees (1 if yes, 0 otherwise)	2,945	0.152
Size of employer: 5–29 employees (1 if yes, 0 otherwise)	2,945	0.217
Size of employer: 30-99 employees (1 if yes, 0 otherwise)	2,945	0.364
Size of employer: 100–499 employees (1 if yes, 0 otherwise)	2,945	0.066

Table 5 presents the income and household income distributions of our respondents.

Table 5: Descriptive statistics of background characteristics: Income.

Statistic	N	Mean
Income: Less than 0.5 million yen (1 if yes, 0 otherwise)	4,583	0.166
Income: 0.5–0.99 million yen (1 if yes, 0 otherwise)	4,583	0.081
Income: 1–1.49 million yen (1 if yes, 0 otherwise)	4,583	0.074
Income: 1.5–1.99 million yen (1 if yes, 0 otherwise)	4,583	0.056
Income: 2–2.49 million yen (1 if yes, 0 otherwise)	4,583	0.086
Income: 2.5–2.99 million yen (1 if yes, 0 otherwise)	4,583	0.064
Income: 3–3.99 million yen (1 if yes, 0 otherwise)	4,583	0.116
Income: 4–4.99 million yen (1 if yes, 0 otherwise)	4,583	0.108
Income: 5 million or over (1 if yes, 0 otherwise)	4,583	0.250
Household income: Less than 0.5 million yen (1 if yes, 0 otherwise)	4,583	0.027
Household income: 0.5–0.99 million yen (1 if yes, 0 otherwise	4,583	0.013
Household income: 1–1.49 million yen (1 if yes, 0 otherwise)	4,583	0.017
Household income: 1.5–1.99 million yen (1 if yes, 0 otherwise)	4,583	0.033
Household income: 2–2.49 million yen (1 if yes, 0 otherwise)	4,583	0.048
Household income: 2.5–2.99 million yen (1 if yes, 0 otherwise)	4,583	0.052
Household income: 3–3.99 million yen (1 if yes, 0 otherwise)	4,583	0.117
Household income:4–4.99 million yen (1 if yes, 0 otherwise	4,583	0.121
Household income: 5–5.99 million yen (1 if yes, 0 otherwise)	4,583	0.128
Household income: 6–6.99 million yen (1 if yes, 0 otherwise)	4,583	0.094
Household income: 7–7.99 million yen (1 if yes, 0 otherwise)	4,583	0.084
Household income: 8–8.99 million yen (1 if yes, 0 otherwise)	4,583	0.072
Household income: 9–9.99 million yen (1 if yes, 0 otherwise)	4,583	0.052
Household income: 10 million or over (1 if yes, 0 otherwise)	4,583	0.140

For comparison, Table A1 in the appendix shows the income distribution of the National Livelihood Survey of the Ministry of Health, Labour and Welfare, the government of Japan. While our sample shows a slightly denser distribution of the highest income level, the samples do not differ substantially.

Table 6 presents the descriptive statistics of our respondents' political position.

Table 6: Descriptive statistics of background characteristics: Political position.

Statistic	N	Mean	St. Dev.	Min	Max
Support Liberal Democratic Party (1 if yes, 0 otherwise)	4,583	0.244			
Support Constitutional Democratic Party (1 if yes, 0 otherwise)	4,583	0.047			
Support National Democratic Party (1 if yes, 0 otherwise)	4,583	0.010			
Support Clean Government Party	4,583	0.027			
Support Party for Restoration (1 if yes, 0 otherwise)	4,583	0.072			
Support Japanese Communist Party (1 if yes, 0 otherwise)	4,583	0.026			
Independent	4,583	0.529			
Degree of dissatisfaction with current politics (5: most to 1: satisfied)	4,583	3.804	1.068	1	5
Self-perceived degree of right-leaning (10: most to 0: least)	4,583	5.144	1.506	0	10

Table 7 presents descriptive statistics of our respondents' preferences for policies to contain the COVID-19 pandemic about which we asked in the background characteristics survey, in addition to our randomized conjoint experiment on policies against COVID-19, and the respondents' recognition of the government's compensation for losses due to the pandemic.

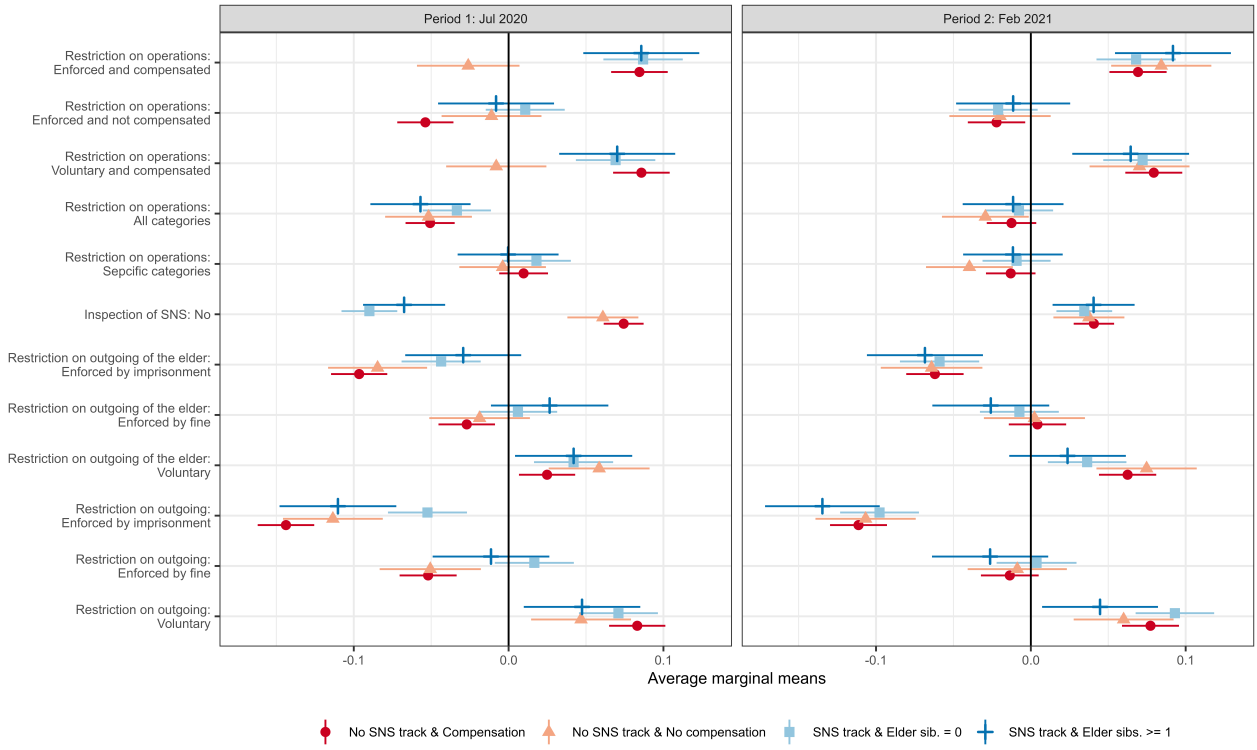
4.3 Results

Figure 1 presents our results. Not only did we query policy preferences by means of a fully randomized conjoint experiment, we also asked about policy preferences in the background characteristics survey, as presented by Table 7. The estimation steps described above detected the factor of the background characteristics that was the most strongly associated with policy preferences observed by the conjoint experiment: Whether to agree or disagree with the government's tracking records of social networking services or phone communication. Within subsamples given the preference for the government's tracking social networking services or phone records, the estimation steps detected two factors that were the most associated with policy preferences observed by the conjoint experiment: 1) Whether agreeing or disagreeing with the government's subsidy to compensate losses due to the pandemic; and 2) Whether having an elder sibling(s) or not.

Table 7: Descriptive statistics of background characteristics: Recognition of COVID-19 pandemic and preferences for policies against COVID-19.

Statistic	N	Mean	St. Dev.	Min	Max
Whether to raise compensation for care workers engaged in combating COVID-19 (1 if Yes, 0 otherwise)	4,583	0.842			
Whether the government should provide benefits for income loss due to COVID-19 (1 if Yes, 0 otherwise)	4,583	0.751			
Whether the government should provide benefits for equipment for telework and home study (1 if Yes, 0 otherwise)	4,583	0.589			
Whether the government should designate health institutes in charge of COVID-19 patients and order necessary equipment and health care workers to be allocated to them (1 if Yes, 0 otherwise)	4,583	0.763			
Whether the government has implemented effective policies against COVID-19 (1 if Yes, 0 otherwise)	4,583	0.386			
Whether the government should be allowed to review communication records of social networking services or phones as a policy against COVID-19 (1 if Yes, 0 otherwise)	4,583	0.369			
Whether the government should impose specific behavioral restrictions on those whose infection risk is higher due to their age or occupation (1 if Yes, 0 otherwise)	4,583	0.689			
The perceived cumulative death toll due to COVID-19 in Japan	4,583	955.268	1,119.297	1	9,999
The perceived percentage of individuals 70 years or older of the cumulative death toll due to COVID-19 in Japan (%)	4,583	6.683	2.365	1	11

Figure 1: Convergence of preferences for policies against COVID-19, July 2020 to February 2021.



Notes: Confidence intervals are for 95%. Subsamples of respondents indicated in the legend are:

- "No SNS track": Disagree with the government's access to social networking services (social media) or phone records in the background characteristics survey.
- "Compensation": Agree with government subsidies to compensate for losses due to the pandemic in the background characteristics survey.
- "No compensation": Disagree with government subsidies to compensate for losses due to the pandemic in the background characteristics survey.
- "Elder sib.=0": Do not have an elder sibling in the background characteristics survey.
- "Elder sibs. >=1": Have one or more elder siblings in the background characteristics survey.

Therefore, Figure 1 presents the average marginal means of preferences for each policy of 4 subsamples: 1) Those who "disagree with government's tracking social networking services or phone records" and "agree with government subsidies to compensate losses due to the pandemic"; 2) those who "disagree with government's tracking social networking services or phone records" and "disagree with government subsidies to compensate losses due to the pandemic"; 3) those who "agree with government's tracking social networking services or phone records" and "do not have an elder sibling"; and 4) those who "agree with government's tracking social networking services or phone records" and "have one or more elder siblings."

In July 2020, respondents' policy preferences were more divergent across policy dimensions than they were in February 2021. Notably, a stark divide was observed for whether to agree or disagree with the government's inspection of social networking services or phone communication records to specify routes of infection. The negative territory of the policy dimension "Inspection of SNS: No" means agreement with the government's inspection of social networking services or phone records. In reality, the Japanese government has never tracked or accessed social networking services or phone communication records to specify infection routes. However, as of July 2020, the public was polarized regarding this point. The trade-off between "public health and liberty" (Koyama (2021)) was a keen issue that divided the nation. An intriguing feature of the divergence is that it was not associated with having elder siblings. The divergence was not related to the observable objective risk of infection; it might have been rooted deeper.

However, half a year later, in February 2021, responses converged across policy dimensions. In particular, responses converged to "No" against the government's inspec-

tion of social networking services or phone communication records. In practice, the Japanese government has not adopted communication monitoring in any form to track infection routes. However, the national consensus was challenged as of July 2020. Since then, after acquiring experience and updated information, the Japanese public converged to supporting privacy of communication as of February 2021.

Although more modest compared with the security-privacy trade-off, preferences for enforcement of restrictions on economic activity by fines or imprisonment were observed in July 2020. Again, no enforcement of restrictions on social and economic activities by means of criminal penalties has been implemented by the Japanese government. The Japanese public was also divided regarding whether the government should request or enforce restrictions. However, they converged to refusal of enforcement by fines and imprisonment in February 2021. Japanese citizens came back to one nation to refuse communication monitoring and enforced restriction of activity, i.e., to refuse to trade off security against liberty, notably the privacy of communication.

Sabat et al. (2020) presented, based on surveys in Germany, France, the UK, the Netherlands, and Denmark, that the government's use of mobile data for tracking COVID-19 cases was particularly disliked in Denmark, the Netherlands, and Germany. Japanese individuals lean in this direction, but were not monolithic in the summer of 2020. Then, they returned to solidarity to prioritize the privacy of communications over security.

5 Discussion

As of July 2020, when the impact of COVID-19 was still uncertain, Japanese adults showed substantial divergence of preferences for policies against the COVID-19 pandemic. Particularly striking was the divide of whether to allow the government to track

social networking services/phone communication records to detect infection routes. However, in February 2021, respondents converged to defy government monitoring of social networking services/phone records. We tentatively interpret this result as occurring because the public had learned the nature of the pandemic and the uncertainty was transformed into estimable risk. However, since our survey did not ask the same question regarding the trade-off between security and the privacy of communications before the pandemic, we cannot identify whether the divergence as of July 2020 was because the pandemic widened the divide of the core valuation of the privacy of communications or simply because the pandemic revealed innate differences in the valuation of the privacy of communications.

In June 2020, the Japanese government released a contact-tracing application by which the government promised not to access communication, contacting, and location records in June 2020.[2] Shoji, Ito, Cato, Iida, Ishida, Katsumata and McElwain (2021b) showed that the rate of downloading and installing was only 17.6%, and the rate of having ever used was just 14.6% as of December 2020. According to Shoji et al. (2021b), one reason for usage was trust in government, which might indicate that the large majority who have refused to use the application suspect government monitoring. Another reason for usage was fear of infection. If a large majority of Japanese refused to trade off privacy against security, the result would be consistent with ours, which showed convergence to defy trading off privacy for security as uncertainty seemed to decrease.

Regarding European divergence, Engler, Brunner, Loviat, Abou-Chadi, Leemann, Glaser and Kübler (2021) showed that the prepandemic variation in power concentration was negatively correlated with the stringency of policies against COVID-19, such

[2]Ministry of Health, Labour and Welfare, government of Japan. https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/kenkou_iryou/covid19_qa_kanrenkigyou_00009.html Accessed February 3, 2022.

as whether to enforce restrictions on mobility or operations by means of legal penalties or whether to track mobile phone communications, and classified Denmark, the Netherlands, and Germany, whose antipathy to mobile phone tracking Sabat et al. (2020) found, as decentralized nations. Thus, the pandemic might have revealed prepandemic institutional heterogeneity.

Our empirical results demonstrate that the valuation of the privacy of communication converged by February 2021, and we cannot argue beyond this finding. However, the convergence was across background characteristics, including partisanship, subjective self-perceived social status, and educational backgrounds. Our results were not sensitive to whether the respondent supported the ruling Liberal Democratic Party or the Japanese Communist Party. Thus, if the innate valuation of the privacy of communication is related to background characteristics such as demographic characteristics, party support, education, or self-perceived social status, which barely changed before and after the pandemic, our results are not driven by the divergence of core valuation of the privacy of communications. A conservative interpretation of our results is that the uncertainty of the COVID-19 pandemic might not have widened the divide of the nation but revealed the innate divide of the nation, as presented by Boxell et al. (2020) for the US and Sabat et al. (2020) and Engler et al. (2021) for Europe.

Investigation of how uncertainty declined and solidarity returned is left for future research. However, the findings by Bisbee and Lee (forthcoming) are informative. In the US, either political messages or objective facts had diminished impacts over time during the pandemic. They interpret the results as Bayesian updates. Similarly, VanDusky-Allen, Utych and Catalano (2021) found that Democrats tended to be sensitive to policy contents as well as partisan positions.

Also, as shown by the hesitancy about tracing applications without government cen-

sorship (Zhang et al. (2020); Ghose et al. (2022); and Shoji et al. (2021b)), information tracking by platformers might not warrant privacy. Concerns about privacy violation by platformers, not necessarily by the government, casts a shadow on policies against COVID-19. Better regulation of platformers is beyond our scope and is left for future research (Munger (2019); Culpepper and Thelen (2020); Basu, Caspi and Hockett (2021); Forestal (2021); and McKay and Tenove (2021)).

Appendix

To provide a comparison of the income levels of our respondents, Table A1 shows the household income distribution surveyed by the Ministry of Health, Labour and Welfare.

Table A1: Distribution of household income in the National Livelihood Survey

Income level	N	Share
Total	10,000	100.00%
Less than 0.5 million yen	120	1.20%
0.5–1 million yen	519	5.19%
1–1.5 million yen	631	6.31%
1.5–2 million yen	632	6.32%
2–2.5 million yen	689	6.89%
2.5–3 million yen	666	6.66%
3–3.5 million yen	711	7.11%
3.5–4 million yen	574	5.74%
4–4.5 million yen	555	5.55%
4.5–5 million yen	491	4.91%
5–5.5 million yen	488	4.88%
5.5–6 million yen	380	3.80%
6–6.5 million yen	463	4.63%
6.5–7 million yen	344	3.44%
7–7.5 million yen	329	3.29%
7.5–8 million yen	288	2.88%
8–8.5 million yen	260	2.60%
8.5–9 million yen	232	2.32%
9–9.5 million yen	216	2.16%
9.5–10 million yen	185	1.85%
10 million or over	1,225	12.25%

Source: National Livelihood Survey 2019 by the Ministry of Health, Labour and Welfare, the government of Japan https://www.e-stat.go.jp/stat-search/file-download?statInfId=000031957851&fileKind=1 (Accessed on September 10, 2021).

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