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Empirical Analysis for Impact on Air Travel by COVID-19: Transition of Recognition for Air Travel under the Pandemic in Japan

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No. 2021-2

（March 2022）

RESEARCH INSTITUTE
OF
MANAGEMENT AND ECONOMICS

KAETSU UNIVERSITY

Empirical Analysis for Impact on Air Travel by COVID-19
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Abstract

This is the first comprehensive empirical analysis to reveal the transition of recognition such as an anxiety for safety, infection and social isolation on air travel in Japan under the pandemic, with consideration of various attributes, degree of recognition for risk averseness and air travel experience. This paper presents how the recognition for air travel among Japanese has been affected by COVID-19 and estimates how air travel demand in Japan could be resumed after the pandemic. We built the original dataset by the nationwide online survey that was conducted from 27 – 29 March 2021 to collect the sample of residents in Japan with air travel experiences after 2018. By utilizing the Ordered Logit Model, we examine the recognition of anxiety for safety, infection and social isolation hold by Japanese on air travel under the pandemic and how these recognitions would be changed and affect their travel behavior after the pandemic. The results show that Japanese shows the strong tendency for risk averseness and the respondents with less air travel experience are likely to more anxiety for safety, infection and social isolation on air travel and it could imply that the aviation industry needs to mitigate the anxieties recognized by travelers to ensure safer and more comfortable flight than before pandemic.

1. Introduction

Although the aviation industry in Japan expected a huge demand around the 2020 Olympic/Paralympic Game followed by 2019 Rugby World Cup, the global pandemic of COVID-19 that started in January 2020 has completely changed the situation worldwide and brought huge numbers of suspension and cancellation not only of international flight but also of domestic flight. In February 2020, Japan recognized the threat of COVID-19 by the report of mass infection in a cruise ship arrived in Yokohama and the pandemic has been observed nationwide afterwards as shown on Table-1.

**Table-1: The case of COVID-19 in Japan since February 2020**
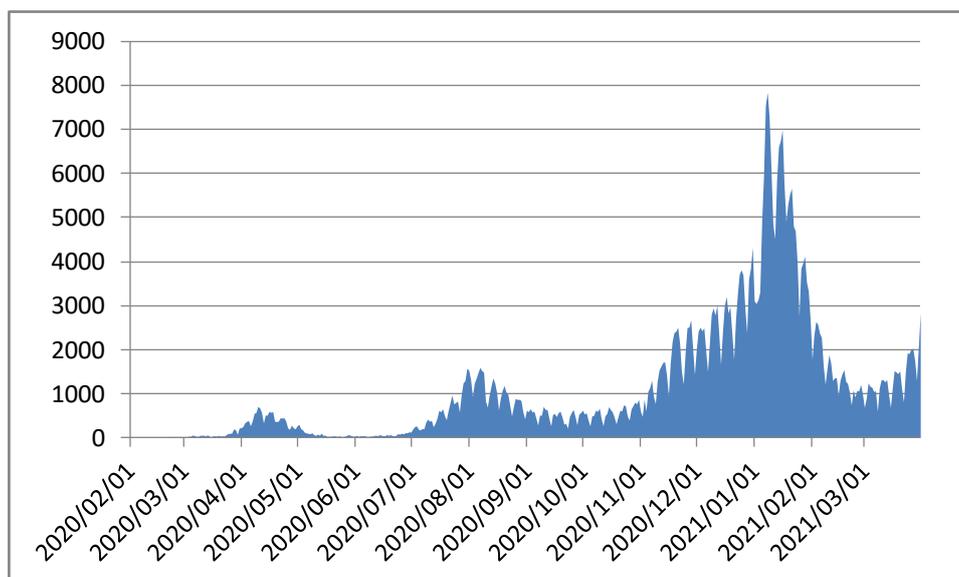
Source: Author – Based on the data of Ministry of Health, Labor and Welfare, Japan

It is said that the number of case of COVID-19 reported in Japan has been relatively smaller than that in major western countries. Also, Japan has never implemented strong restrictions such as "lockdown" by strict law enforcement that is seen in many other countries. However, the number of passenger on domestic flight in Japan started to decline in February 2020 and the situation was getting serious after March when the World Health Organization (WHO) officially announced "the global pandemic" as shown on Table-2. To make matters worse, the government declared "the state of emergency" nationwide in April and strongly requested people to stay at home although it didn't have the legal binding force. This first

declaration had been completely ceased in late May and thereafter the declaration has been issued four times in total by September 2021 mainly applied to large urban areas such as Tokyo Metropolitan Area and Greater Osaka (Kansai) Area. In between the declarations, the government announced the pre-emergency measures for several prefectures to control the infection status, however, it was hard to say that the situation had been improved. Under these circumstances, we are not able to expect the steady recovery of air traffic demand in a short term. .

Table-2: The transition of domestic flight passenger in Japan

before/after the pandemic
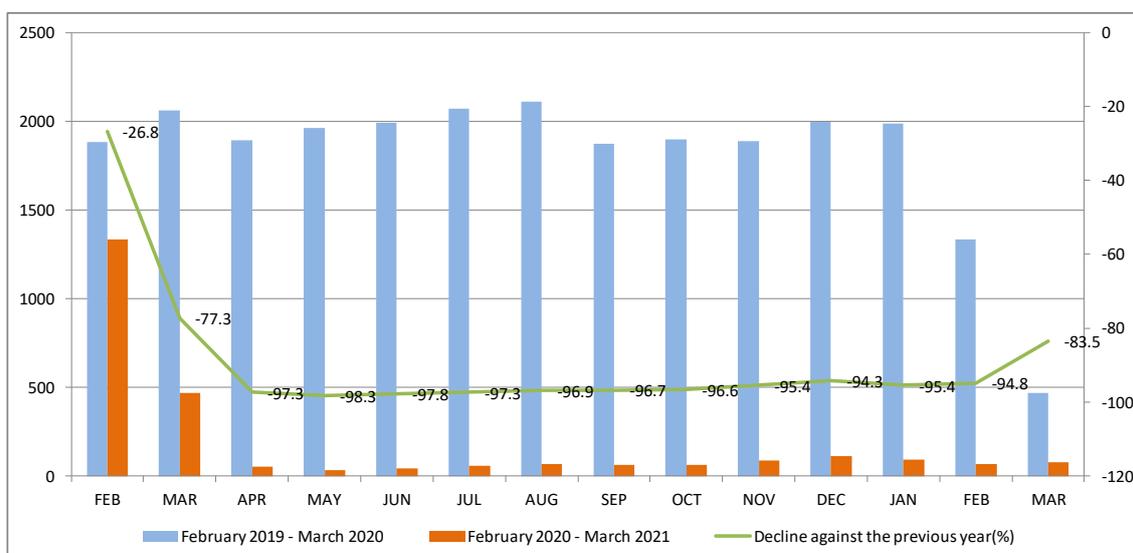
Source: Author – Based on the data of Ministry of Land, Infrastructure, Transport and Tourism, Japan

Similar to other countries, the impact of the pandemic has also extended to all tourism-related industries. Although the restriction of domestic movement with law enforcement has not been implemented in Japan, the demand for domestic flights has showed sharp decline especially since March 2020 as the risk of infection by outing was widely recognized and people voluntarily controlled their movement. This recognition that people should refrain from travelling has been shared in Japan and it has led to a sense of "peer pressure" in the society. Not only leisure traffic, but also business traffic has been seriously affected by the pandemic because remote working was widely introduced and only essential duty travels were allowed to

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mitigate the risk. Even after the pandemic, people might stay discreet for travelling therefore this behavioral change would affect air traffic demand in   a long term. In other words, it is so difficult to estimate air traffic demand in "the New Normal Society" that people would adopt new way of life after the pandemic. We can understand the seriousness caused by the pandemic as shown on Table-3 when we see the traffic result of the two airlines with full service serving major domestic routes in Japan; Japan Airlines and All Nippon Airways.

Table-3: The transition of domestic flight passenger of JAL & ANA in Japan before/after the pandemic
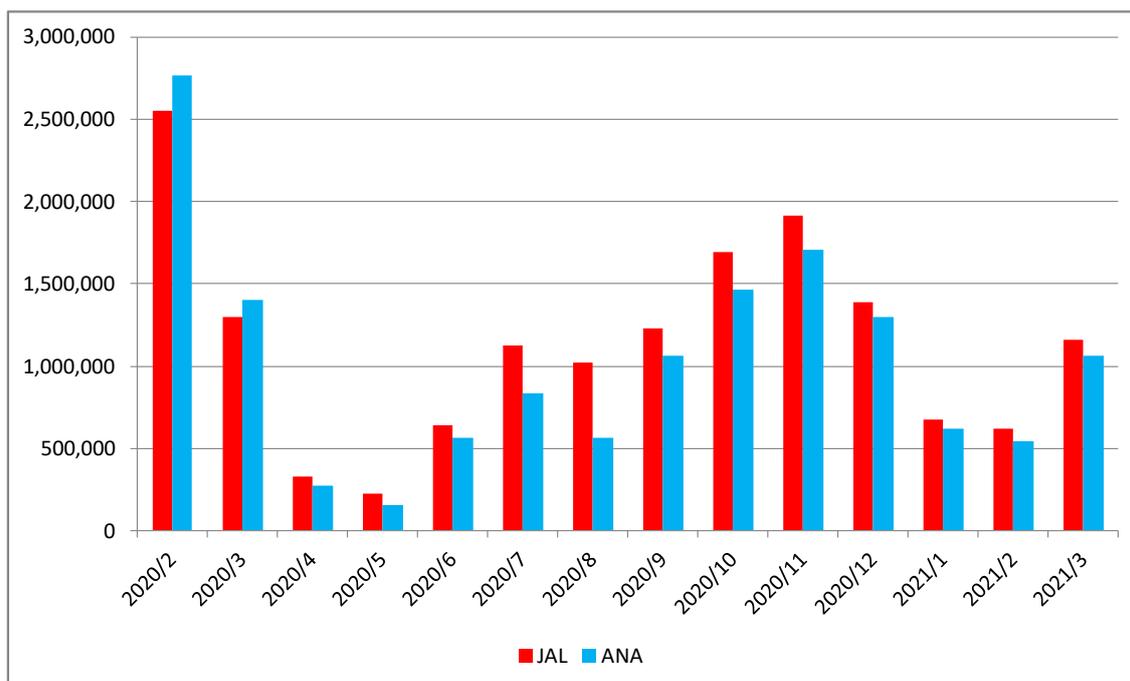
Source: Author – Based on the data released by Japan Airlines and All Nippon Airways

Therefore, when we seek for effective ways to support air traffic demand under and after the pandemic, it is so important to understand peoples' recognition for air travel and find the implications to bring them back to air travel.

2. Previous studies and our contribution

There have been many researches for the impact on the tourism and transport sector since the outbreak of COVID-19 in early 2020. Gössling et al. (2020) presents the fact figures

for the serious disruption in the tourism sector by global travel restrictions and "Stay at Home" initiatives adopted by many countries, and the scale of impact by COVID-19 is tremendously larger than the previous similar pandemics such as the Severe Acute Respiratory Syndrome (SARS) in 2002, the Middle East Respiratory Syndrome (MERS) in 2012 and the Ebola Hemorrhagic Fever (EHF) in 2013-14 as the these previous cases were not necessarily observed worldwide and its impacts were limited in certain regions.

The empirical analysis by Yilmazkuday (2020) presents the fact in the United States that the infection status obviously weakens people's motivation to do inter-country travel. Also, the perception for risk caused by COVID-19 is widely recognized worldwide through previous researches; the survey by Neuburger and Egger (2021) presents the perception of risk for travel in Germany, Switzerland and Austria finds that people with less travel frequency per year may tend to be more nervous for travelling; the empirical analysis by Zenker et al. (2021) shows the perception of risk by various attributes and scenarios and finds that travelling with friends is recognized more risky rather than with partner and children. When we focus on Japan, the empirical analysis by Parady et al. (2021) presents that a sort of self-restriction widely shared by Japanese during the pandemic creates a peer pressure in the community and it leads to be the perception of risk and consequently to refrain from travelling .

As for the previous researches of the impact by COVID-19 specified on the transport sector, Jenelius and Cebecauer (2020) shows the fact figures observed in the public transport in Sweden and finds that train has been the most affected mode after the pandemic as it would reflect the anxiety of infections by people in a closed space. Also, the empirical analysis with panel data by Shakibaei et al. (2021) presents the travel behavior in Istanbul, Turkey after the pandemic and finds that people may have more concerns about hygiene in the public transportation. Dube et al. (2021) discusses the necessity of establishment of health protocol in the aviation industry to mitigate the perception of risk among travelers.

As for the behavioral change by COVID-19, the research in Australia by Beck and Hensher (2020) shows that people working from home generally feel positive, therefore it may imply that this recognition would last even after the pandemic. This also implies that business travel demand may not be resumed to the previous volume.

When considering the perception of risk for traveling and behavioral changes in the pandemic, the difficulties in the tourism-related industries such as transport might be lasting for the time being. Gallego and Font (2021) analyzes the changes in air passenger demand under the pandemic by using big data to find implications for tourism policy. Iacus et al. (2020) conducts the estimation for passenger traffic during the pandemic and its socio-economic impact. For resilience from the pandemic, an effective policy is strongly expected to enable people to enjoy traveling and assist the tourism-related industries. In this context, we conduct a comprehensive empirical analysis to grasp the transition of recognition for air travel precisely as the impact of COVID-19 and draw the implications to boost air traffic demand in terms of resilience from the pandemic.

3. The data and empirical model

This paper conducts the analysis to capture the transition of recognition for air travel in Japan as the impact by the COVID-19 since February 2020. At the same time, we find a sort of blueprint for air travel after the pandemic, whether people's recognition would get back to the previous one or would be transformed to adapt to "the New Normal Society".

3.1 Data

The data was collected through the online survey[1] from 27 to 29 March 2022. The period was just after the second declaration of "State of Emergency" that had been in effect on 8 January 2022 had lifted up nationwide on 21 March 2022 as the infection status was deem to be quieted down. In the survey, respondents are requested to answer the questionnaire for air travel before, under and after the pandemic. The detail of questionnaire can be shown in the Appendix.

The sample size is 1600 which was set as the predetermined target. The respondents have an air travel experience with a scheduled flight since 1 January 2018. Minimizing a sampling bias, the targeted numbers were prorated in accordance with the sex, age, and region to harmonize the actual population ratio. For the region, we divided 47 prefectures into six groups which are commonly recognized in Japan as shown on Chart-1.

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[1] The survey was conducted through the Rakuten Insight, Inc., Tokyo, Japan and the respondents were entitled to receive rewards by completing the questionnaire.

Chart-1: Description of Region in Japan

Region Group	Prefectures
Hokkaido/Tohoku	Hokkaido, Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima
Kanto	Ibaraki, Tochigi, Gumma, Saitama, Chiba, Tokyo, Kanagawa
Chubu	Niigata, Toyama, Ishikawa, Fukui, Yamanashi, Nagano, Gifu, Shizuoka, Aichi, Mie
Kansai	Shiga, Kyoto, Osaka, Hyogo, Nara, Wakayama
Chugoku/Shikoku	Tottori, Shimane, Okayama, Hiroshima, Yamaguchi, Tokushima, Kagawa, Ehime, Kochi
Kyushu/Okinawa	Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa
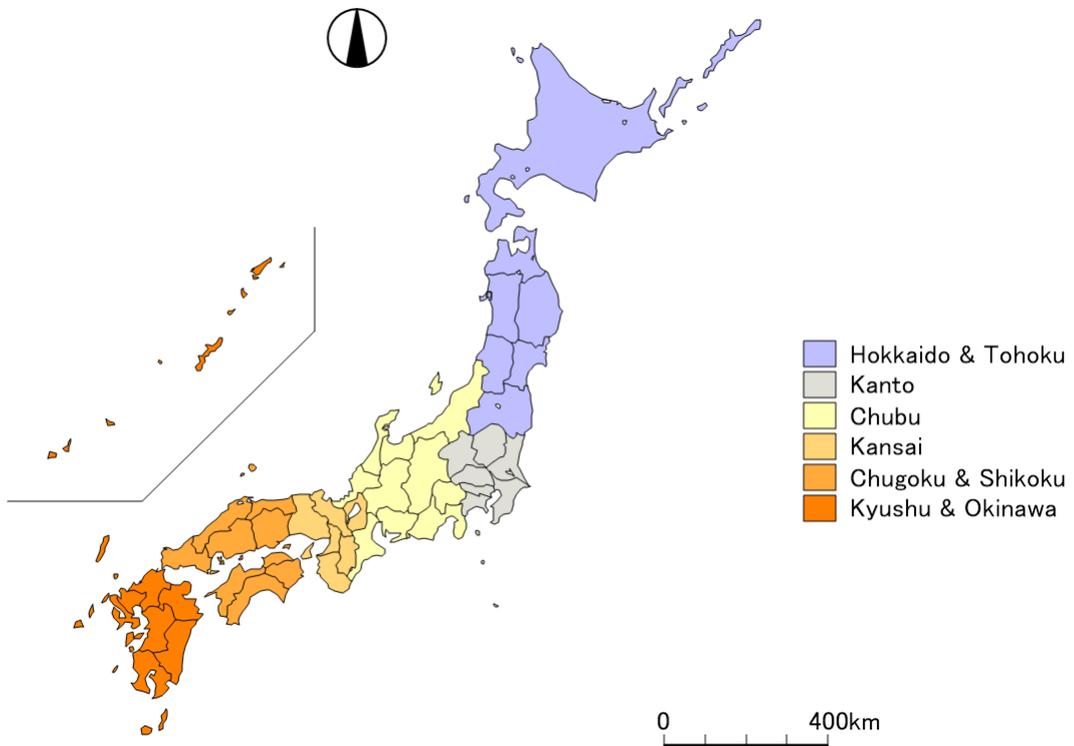
3.2 Empirical Model

We interpret that the index presented as individual degree of anxiety is explained by his unique attributes and characteristics. The detail of variables to be utilized in the estimation is shown on Table-4 and the descriptive statistics is also on Table-5.

We conduct the analysis with the Ordered Logit Mofel estimation with the following models. The following premises were analyzed using an econometric index utility model. When U_i^m is the index for individual respondent (i), and when (i) chooses an answer for the degree of anxiety (m), the relationship can be denoted as follows:

$$U_i^m = \boldsymbol{x}_i^m \boldsymbol{\beta} + \epsilon_i^m$$

where $\boldsymbol{x}_i^m$ denotes a vector of characteristics that influences the degree of anxiety, β denotes the coefficient vector, and ϵ_i^m denotes the random disturbance term. The index of an alternative depends on its attributes, including individual characteristics. Theoretically, we can say that an individual presents his index more precisely when choosing an alternative from a given choice set. Therefore, (i) chooses (m) to express his degree of anxiety (m) rather than another degree of anxiety (n). This implies the following:

$$P_i^m = \text{Prob}[U_i^m \geq U_i^n; \ m \neq n] = \text{Prob}[\boldsymbol{x}_i^m \boldsymbol{\beta} + \epsilon_i^m \geq \boldsymbol{x}_i^n \boldsymbol{\beta} + \epsilon_i^n; \ m \neq n]$$

The conditional probability of the degree of anxiety (P_i^m), given its attributes and individual characteristics, can be represented by the probability of the index greater than the alternative.

We examine the degree of anxiety on air travel under and after the pandemic with three angles; (1) Fear for infection with COVID-19 on a flight, (2) Fear for operational safety of flight and (3) Fear for criticism or isolation in community by air travel. Regarding fear for infection with COVID-19, people might have become nervous as it has been pointed out through media that there would have a possibility of transmission of virus in a confined cabin. At the same time, the pandemic might have caused a psychological fear against flight operation although the two things are completely indifferent. Moreover, an unique social trend in Japan that is called as "Peer Pressure" to refrain from travelling to prevent the infection with COVID-19 might have not only diminished motivation for travel but also caused a fear to people that he must be criticized or even isolated in a community if travelled and infected with COVID-19 in the worst case of scenario. So we estimate the degree of these anxieties under the pandemic and how it

would be affected in the future as a result of change of social norms and recognitions. The empirical models are shown as follows;

Model-1

$$y = \beta_0 + \beta_1 Risk\ Averseness\ + \beta_2 Flight\ Experience\ + \beta_3 Contract\ + \beta_4 Urban$$
$$+ \beta_5 Income + \beta_6 University\ + \beta_7 Sex + \ + \beta_8 Age\ + \beta_9 Spouse$$
$$+ \beta_{10} Children + \beta_{11} Elderly + u_i$$

Model-2

$$y = \beta_0 + \beta_1 Risk\ Averseness\ + \beta_2 Flight\ Experience\ + \beta_3 Permanent$$
$$+ \beta_4 Urban\ + \beta_5 Income + \beta_6 University\ + \beta_7 Sex + \ + \beta_8 Age$$
$$+ \beta_9 Spouse + \beta_{10} Children + \beta_{11} Elderly + u_i$$

where i represents each individual sample (i=1,...,n) and β and θ are unknown parameters to be estimated.

We conduct the estimations by group; one is by all samples and the other is by the sample of respondents with hired or self-employed job. It is intended to pursue the accurate results and figure out whether there would be any differences inbetween the groups.

Table-4: Detail of Variables

	Variable	Description
Explained Variable	Anxiety for Infection (Present)	Degree of anxierty for a respondent to get infected with COVID-19 on a flight under the current situation
	Anxiety for Infection (Future)	Degree of anxierty for a respondent to get infected with COVID-19 on a flight after the pandemic
	Anxiety for Safety (Present)	Degree of anxierty for a respondent to be assured of safety of flight operation under the current situation
	Anxiety for Safety (Future)	Degree of anxierty for a respondent to be assured of safety of flight operation after the pandemic
	Anxiety for Isolation (Present)	Degree of anxiety for a respondent to be criticized or isolated in his community by using a flight under the current situation
	Anxiety for Isolation (Future)	Degree of anxiety for a respondent to be criticized or isolated in his community by using a flight after the pandemic
Explanatory Variable	Risk Averseness	Degree of risk averseness for a respondent by his self-assessment
	Flight Experience	Number of flight experience for a respondent since January 2018 (A round-trip flight is counted as one time)
	Contract	Dummy variable to identify a respondent's occupational status: 1 if an employee of contracted position
	Permanent	Dummy variable to identify a respondent's occupational status: 1 if an employee of permanent position
	Urban	Dummy variable to identify a respondent's residential place; 1 if a resident in Metropolitan Tokyo Area
	Income	Respondent's approximate annual income
	University	Dummy variable to identify a respondent's educational history; 1 if above undergraduate level
	Sex	Dummy variable to identify a respondent's sex; 1 if male
	Age	Respondent's age
	Spouse	Dummy variable to identify a respondent's marital status; 1 if having spouse/partner to share household
	Children	Dummy variable to identify a respondent's family status; 1 if living with children under the age of 12
	Elderly	Dummy variable to identify a respondent's family status; 1 if living with aged members

Table-5: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Anxiety for Infection (Present)	1600	3.2863	1.1990	1	5
Anxiety for Infection (Future)	1600	2.5450	1.1011	1	5
Anxiety for Safety (Present)	1600	3.0063	1.2358	1	5
Anxiety for Safety (Future)	1600	2.4881	1.1048	1	5
Anxiety for Isolation (Present)	1600	3.0194	1.2093	1	5
Anxiety for Isolation (Future)	1600	2.4069	1.0809	1	5
Risk Averseness	1600	3.2613	1.1297	1	5
Flight Experience	1600	2.2488	5.5706	0	100
Contract	1600	0.1625	0.3690	0	1
Permanent	1600	0.5188	0.4998	0	1
Urban	1600	0.4588	0.4985	0	1
Income	1600	3.3594	1.7123	1	9
University	1600	0.5481	0.4978	0	1
Sex	1600	0.4981	0.5002	0	1
Age	1600	47.8956	15.3824	15	79
Partner	1600	0.6750	0.4685	0	1
Children	1600	0.4163	0.4931	0	1
Elderly	1600	0.0881	0.2836	0	1

4. Results and Discussions

The results of estimation are shown on Table-6.

4.1 Anxiety for Infection with COVID-19

We find that "Risk Averseness" shows statistically significant with 1 % level in the all estimation regardless of time frame and sampling group. Therefore we confirm that it is likely for people with risk averseness to recognize more anxiety for infection with COVID-19 on air travel. "Flight Experience" also shows statistically significant with 5% level except for the estimation by all samples for the anxiety after the pandemic with 10% level. This implies that it is likely for people with less flight experience to get more anxious for air travel.

As for the occupational status of respondents, we can find that only "Permanent" shows statistically significant with 1% level in the estimation by the samples with hired/self-employed job for the anxiety after the pandemic. When we consider the trend in Japan that people working in non-permanent position are more likely to experience pay-cut or lose his job under the pandemic, it is possible that they would be still anxious for infection with COVID-19 on air travel even after the pandemic.

When we see the other explanatory variables for personal attributes, we can't find any significant results for "Urban", "Income" and "University" in the all estimations. However, when we see "Sex", it shows statistically significant with 1% level in the all estimation. This means that female is and will be likely to be more anxious for infection with COVID-19 on air travel regardless of the sampling group. We can say that the result reflects the general tendency that female is more conscious about hygiene than male. As for "Age", although we can't observe any significant results for the present anxiety, it shows statistically significant with 1% or 5% level. This result implies that the anxiety is widely shared by all generations under the pandemic. However, younger people would be more anxious for the infection with COVID-19 on air travel even after the pandemic.

As for the explanatory variables for respondent's family status, "Spouse" shows statistically significant with 1% and 5% level for the present anxiety in the both group. For the future anxiety, it shows statistically significant with 10% level only in the estimations by all samples. It is likely for people to be more anxious for the infection with COVID-19 on air travel if he or she has a spouse to take care under the pandemic. However, when we see the results for the future anxiety, it shows statistically significant with 10% level only in the estimation by the all samples. It is possible that the result might be brought by the composition of sample because there are a certain number of respondent who lives with pension. On the contrary, "Children" doesn't show any significant results for the present anxiety, but it shows statistically significant with 5% or 10% level for the future anxiety. This result implies that it would be likely for people with children to get more anxious for the infection with COVID-19 on air travel even after the pandemic.

Considering the argument that there would cause serious aftereffects by COVID-19, it is quite reasonable to understand the result that it is difficult for a respondent living with children to remove the future anxiety quickly. We may be able to interpret similarly for "Elderly" that shows statistically significant with 1% level in the all estimation for the future anxiety when we consider the fact that elderly people may get serious immediately if infected. As for the present anxiety, it shows statistically significant with 10% level only in the estimation by the samples with hired/self-employed job. This may reflects that a respondent living with elderly people

must be more cautious and anxious to prevent the infection as he has more times or opportunities to be outside home.

4.2 Anxiety for safety

As for "Risk Averseness" and "Flight Experience", we find the coincidence with the results found in the estimations of the anxiety for infection with COVID-19 on air travel. As for the explanatory variables for the occupational status, we can't find any significant results in the all estimations, neither for the present nor the future anxiety. Also, among the personal attributes, "Urban" and "University" don't show any significant results just same as the occupational status. We find that "Income" in the Model-1 shows statistically significant with 10% level in the estimation by the all samples for the future anxiety. It is possible to assume that a respondent with lower income is inclined to be more anxious for flight safety as he might have had less opportunities to travel by air, but we can't say for sure when we consider the robustness of estimation result.

As for "Sex," it shows statistically significant with 1% level in the all estimation. The result is exactly same as the estimation of anxiety for infection with COVID-19, so that female is and will be likely to be more anxious for safety on air travel regardless of the sampling group. On the contrary, "Age" doesn't show any significant results in the all estimations, neither for the present nor the future anxiety.

As for the explanatory variables for family status, "Spouse" shows statistically significant with 10% level only in the estimation by the all samples for the future anxiety. "Children" shows statistically significant with 10% level only in the estimation by the samples with hired/self-employed job for the present anxiety."Elderly" shows statistically significant with 5% level in the all estimations for the present anxiety and in the estimation by the samples with hired/self-employed job for the future anxiety. In addition, we obtain the significant result with 1% level in the estimation by all samples for the future anxiety.

When we see these results, we can say that people living with elderly people would be much more anxious for the safety. It is quite obvious that the flight safety is indifferent from the pandemic but various unverified information about COVID-19 might have inflate people's

anxiety to lead a strange recognition that air travel isn't safe. Above all, a respondent living with elderly people might be affected by this direction of thinking.

4.3 Anxiety for isolation

As for "Risk Averseness", it shows statistically significant with 10% level in the all estimations for the present anxiety. On the contrary, we don't see any significant results for the future anxiety. Based on this result, we can see the unique tendency that Japanese are extremely nervous to be criticized or isolated in community by the infection with COVID-19 and it may lead to the peer pressure to refrain from travelling under the pandemic.

As for "Flight Experience", it shows statistically significant with 10% level in the all estimation for the present anxiety. However, it shows statistically significant with 5% level only by the samples with hired/self-employed job for the future anxiety. We may have assumptions that a respondent with hired/self-employed job as well as with less flight experiences recognizes stronger anxiety for social isolation by the infection with COVID-19 and it would last even after the pandemic. When we see the coefficient, it is possible that people with hired/self-employed job are more afraid of criticism or isolation in community by the infection with COVID-19 as they may face a risk of disadvantage such as pay-cut or unemployment.

As for the explanatory variables for the occupational status, "Contract" shows statistically significant with 10% level in the estimation by the samples with hired/self-employed job for the present anxiety and "Permanent" shows statistically significant with 10% level in the estimation by the samples with hired/self-employed job for the future anxiety. It is difficult to say that we find the sufficient robustness for these variables, but it would be possible that people working in unstable position are more likely to be vulnerable therefore he gets more anxious for the social disadvantage as a result of criticism or isolation in community. Similarily, the result that "Income" as a personal attribute shows statistically significant with 10% level only in the Model-1 of estimation by the all samples for the future anxiety also would be led to the implication.

As for the other personal attributes, "Urban" shows statistically significant with 5% level in the all estimations for the present anxiety and 10% level in the estimation by the samples with hired/self-employed job for the future anxiety. This means that the peer pressure

mentioned previously is more recognized in the rural area where community size is relatively small and close so that people are easily criticized or isolated by the infection with COVID-19.

As for "University", we can't find any significant results in the all estimations, neither for the present nor the future anxiety. As for "Sex", it shows statistically significant with 1% level in the all estimations for the present, but with 5% level only in the Model-1 in the estimation by the all samples for the future anxiety. Just same as the anxiety for the infection with COVID-19 and flight safety, we can say that females are more likely to be anxious for the criticism and isolation in community. As for "Age", we can't find any significant results in the all estimations for the present anxiety. On the contrary, it shows statistically significant with 5% level in Model-2 and 10% level in Model-1 in the estimation for the future anxiety. We can assume that the younger generation is generally more vulnerable by criticism and isolation and they are afraid to be outstanding by the infection with COVID-19 after the pandemic. There are a lot of infection cases under the pandemic so that an individual impact on community can be diluted but the situation would be different after the pandemic.

As for the variables of family status, "Spouse" shows statistically significant with 5% level in the estimations by the samples for the present anxiety and with 10% level only in Model-1 of the estimation by the all samples for the future anxiety. "Children" shows statistically significant with 10% level in the all estimations for the present anxiety. On the contrary, we can't find any significant results in the all estimations for the future anxiety. "Elderly" shows statistically significant with 1% level in the all estimations. The anxiety for criticism and isolation in community is widely recognized among people living with children under the pandemic, but we can assume that it would be diminished or removed after the pandemic. On the other hand, the anxiety recognized by people living with elderly members would remain even after the pandemic. Therefore, we can be optimistic to consider that the air travel demand by family with children would be resumed easily after the pandemic. However, it would take a time for the demand by family with elderly members.

Table-6: Summary of results

1. Anxiety for Infection with COVID-19

1.1 Present - Under the pandemic

	ALL sample		Sample with hired/self-employed job	
	Model-1	Model-2	Model-1	Model-2
Risk Averseness	0.317***	0.318***	0.289***	0.288***
	(0.0437)	(0.0437)	(0.0507)	(0.0507)
Flight Experience	-0.0234**	-0.0234**	-0.0270**	-0.0272***
	(0.01000)	(0.01000)	(0.0105)	(0.0105)
Contract	-0.0369		0.0313	
	(0.125)		(0.140)	
Permanent		0.0250		0.0615
		(0.109)		(0.128)
Urban	-0.0160	-0.0161	0.00803	0.0102
	(0.0922)	(0.0922)	(0.106)	(0.106)
Income	-0.0142	-0.0151	0.00693	0.00142
	(0.0291)	(0.0299)	(0.0350)	(0.0353)
University	0.0953	0.0958	0.105	0.0979
	(0.0968)	(0.0968)	(0.112)	(0.112)
Sex	-0.616***	-0.620***	-0.597***	-0.618***
	(0.0980)	(0.102)	(0.117)	(0.117)
Age	0.00225	0.00244	0.000994	0.00175
	(0.00335)	(0.00351)	(0.00422)	(0.00430)
Spouse	0.316***	0.317***	0.254**	0.256**
	(0.109)	(0.109)	(0.124)	(0.124)
Children	0.123	0.123	0.157	0.151
	(0.102)	(0.102)	(0.116)	(0.116)
Elderly	0.252	0.252	0.357*	0.353*
	(0.160)	(0.160)	(0.185)	(0.184)
Constant cut1	-1.531***	-1.504***	-1.585***	-1.556***
	(0.278)	(0.282)	(0.318)	(0.325)
Constant cut2	0.202	0.229	0.141	0.171
	(0.270)	(0.275)	(0.309)	(0.317)
Constant cut3	0.971***	0.998***	0.965***	0.995***
	(0.271)	(0.275)	(0.310)	(0.317)
Constant cut4	2.872***	2.899***	2.824***	2.854***
	(0.280)	(0.284)	(0.320)	(0.328)
Observations	1,600	1,600	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.2 Future – After the pandemic

	ALL sample		Sample with hired/self-employed job	
	Model-1	Model-2	Model-1	Model-2
Risk Averseness	0.152***	0.150***	0.158***	0.158***
	(0.0430)	(0.0429)	(0.0502)	(0.0502)
Flight Experience	-0.0180*	-0.0178*	-0.0285**	-0.0283**
	(0.0100)	(0.0100)	(0.0112)	(0.0112)
Contract	0.0518		0.139	
	(0.123)		(0.138)	
Permanent		-0.142		-0.273**
		(0.109)		(0.127)
Urban	-0.0559	-0.0536	-0.0919	-0.0882
	(0.0918)	(0.0918)	(0.106)	(0.106)
Income	-0.0434	-0.0345	0.00510	0.0163
	(0.0292)	(0.0301)	(0.0350)	(0.0354)
University	-0.0244	-0.0160	0.0189	0.0304
	(0.0962)	(0.0963)	(0.112)	(0.112)
Sex	-0.336***	-0.300***	-0.307***	-0.278**
	(0.0967)	(0.101)	(0.116)	(0.115)
Age	-0.00565*	-0.00696**	-0.00749*	-0.00921**
	(0.00333)	(0.00349)	(0.00420)	(0.00429)
Spouse	0.206*	0.203*	0.0751	0.0798
	(0.109)	(0.109)	(0.125)	(0.125)
Children	0.182**	0.189*	0.270**	0.280**
	(0.103)	(0.103)	(0.116)	(0.116)
Elderly	0.446***	0.451***	0.505***	0.513***
	(0.159)	(0.159)	(0.183)	(0.184)
Constant cut1	-1.426***	-1.523***	-1.352***	-1.580***
	(0.274)	(0.277)	(0.313)	(0.320)
Constant cut2	0.235	0.139	0.299	0.0739
	(0.270)	(0.273)	(0.310)	(0.316)
Constant cut3	1.331***	1.236***	1.481***	1.260***
	(0.272)	(0.274)	(0.312)	(0.318)
Constant cut4	3.501***	3.407***	3.690***	3.471***
	(0.300)	(0.302)	(0.349)	(0.353)
Observations	1,600	1,600	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. Anxiety for Flight Safety

2.1 Present - Under the pandemic

	ALL sample		Sample with hired/self-employed job	
	Model-1	Model-2	Model-1	Model-2
Risk Averseness	0.225***	0.226***	0.235***	0.235***
	(0.0432)	(0.0432)	(0.0505)	(0.0504)
Flight Experience	-0.0329***	-0.0327***	-0.0387***	-0.0387***
	(0.00999)	(0.00998)	(0.0110)	(0.0110)
Contract	-0.0649		0.0458	
	(0.124)		(0.140)	
Permanent		-0.0505		-0.0350
		(0.109)		(0.127)
Urban	-0.140	-0.142	-0.148	-0.147
	(0.0915)	(0.0915)	(0.105)	(0.105)
Income	-0.0268	-0.0219	0.00149	0.00146
	(0.0291)	(0.0300)	(0.0347)	(0.0350)
University	-0.0257	-0.0181	0.0140	0.0126
	(0.0957)	(0.0956)	(0.111)	(0.111)
Sex	-0.503***	-0.479***	-0.396***	-0.399***
	(0.0968)	(0.101)	(0.117)	(0.116)
Age	0.00524	0.00467	0.00533	0.00527
	(0.00330)	(0.00346)	(0.00416)	(0.00425)
Spouse	0.137	0.135	-0.0119	-0.0104
	(0.108)	(0.108)	(0.123)	(0.123)
Children	0.138	0.145	0.197*	0.196*
	(0.102)	(0.102)	(0.115)	(0.115)
Elderly	0.378**	0.380**	0.409**	0.408**
	(0.162)	(0.162)	(0.186)	(0.186)
Constant cut1	-1.378***	-1.383***	-1.202***	-1.241***
	(0.272)	(0.276)	(0.311)	(0.318)
Constant cut2	0.233	0.227	0.393	0.354
	(0.268)	(0.271)	(0.306)	(0.313)
Constant cut3	1.038***	1.033***	1.252***	1.213***
	(0.268)	(0.272)	(0.307)	(0.314)
Constant cut4	2.780***	2.774***	2.953***	2.914***
	(0.278)	(0.281)	(0.319)	(0.326)
Observations	1,600	1,600	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2.2 Future – After the pandemic

	Model-1	Model-2	Model-1	Model-2
Risk Averseness	0.131***	0.132***	0.144***	0.144***
	(0.0430)	(0.0430)	(0.0502)	(0.0501)
Flight Experience	-0.0245**	-0.0243**	-0.0326***	-0.0325***
	(0.00981)	(0.00980)	(0.0110)	(0.0110)
Contract	-0.0927		0.0119	
	(0.125)		(0.141)	
Permanent		-0.0234		-0.0853
		(0.110)		(0.129)
Urban	0.0186	0.0165	-0.0641	-0.0652
	(0.0922)	(0.0922)	(0.106)	(0.106)
Income	-0.0494*	-0.0457	-0.00349	0.00162
	(0.0295)	(0.0304)	(0.0352)	(0.0355)
University	-0.114	-0.105	-0.0454	-0.0377
	(0.0963)	(0.0964)	(0.112)	(0.112)
Sex	-0.278***	-0.261***	-0.195*	-0.179
	(0.0967)	(0.101)	(0.117)	(0.115)
Age	-0.00292	-0.00327	-0.00414	-0.00488
	(0.00334)	(0.00350)	(0.00418)	(0.00427)
Spouse	0.212*	0.214*	0.0360	0.0358
	(0.110)	(0.110)	(0.125)	(0.125)
Children	0.107	0.113	0.177	0.182
	(0.103)	(0.103)	(0.116)	(0.116)
Elderly	0.466***	0.468***	0.445**	0.450**
	(0.160)	(0.160)	(0.182)	(0.182)
Constant cut1	-1.357***	-1.338***	-1.231***	-1.292***
	(0.275)	(0.278)	(0.312)	(0.320)
Constant cut2	0.395	0.413	0.496	0.435
	(0.272)	(0.276)	(0.311)	(0.318)
Constant cut3	1.370***	1.388***	1.519***	1.458***
	(0.274)	(0.278)	(0.313)	(0.320)
Constant cut4	3.492***	3.510***	3.736***	3.676***
	(0.301)	(0.305)	(0.351)	(0.357)
Observations	1,600	1,600	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3. Anxiety for Criticism/Isolation in Community

3.1 Present - Under the pandemic

	ALL sample		Sample with hired/self-employed job	
	Model-1	**Model-2**	**Model-1**	**Model-2**
Risk Averseness	0.236***	0.233***	0.191***	0.189***
	(0.0428)	(0.0428)	(0.0499)	(0.0499)
Flight Experience	-0.0252***	-0.0252***	-0.0317***	-0.0318***
	(0.00922)	(0.00922)	(0.0100)	(0.0100)
Contract	0.154		0.250*	
	(0.124)		(0.139)	
Permanent		-0.0917		-0.155
		(0.107)		(0.126)
Urban	-0.212**	-0.211**	-0.213**	-0.207**
	(0.0911)	(0.0911)	(0.105)	(0.105)
Income	-0.00396	-0.000926	0.0280	0.0252
	(0.0287)	(0.0296)	(0.0349)	(0.0352)
University	0.0382	0.0352	0.0905	0.0804
	(0.0954)	(0.0954)	(0.111)	(0.111)
Sex	-0.534***	-0.524***	-0.438***	-0.461***
	(0.0965)	(0.101)	(0.116)	(0.115)
Age	-0.00282	-0.00349	-0.00210	-0.00217
	(0.00331)	(0.00346)	(0.00416)	(0.00427)
Spouse	0.249**	0.244**	0.0950	0.103
	(0.108)	(0.108)	(0.124)	(0.124)
Children	0.169*	0.168*	0.200*	0.192*
	(0.102)	(0.102)	(0.115)	(0.115)
Elderly	0.509***	0.509***	0.549***	0.546***
	(0.158)	(0.158)	(0.181)	(0.181)
Constant cut1	-1.541***	-1.644***	-1.534***	-1.727***
	(0.270)	(0.275)	(0.312)	(0.320)
Constant cut2	-0.0629	-0.167	-0.0338	-0.228
	(0.266)	(0.270)	(0.307)	(0.315)
Constant cut3	1.044***	0.940***	1.101***	0.905***
	(0.267)	(0.270)	(0.300)	(0.315)
Constant cut4	2.605***	2.501***	2.567***	2.370***
	(0.274)	(0.277)	(0.316)	(0.323)
Observations	1,600	1,600	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.2 Future – After the pandemic

	ALL sample		Sample with hired/self-employed job	
	Model-1	**Model-2**	**Model-1**	**Model-2**
Risk Averseness	0.0618	0.0600	0.0396	0.0385
	(0.0422)	(0.0422)	(0.0497)	(0.0497)
Flight Experience	-0.0148	-0.0146	-0.0246**	-0.0243**
	(0.00918)	(0.00918)	(0.0104)	(0.0104)
Contract	0.0496		0.133	
	(0.123)		(0.138)	
Permanent		-0.128		-0.248*
		(0.109)		(0.127)
Urban	-0.123	-0.122	-0.177*	-0.174*
	(0.0919)	(0.0919)	(0.106)	(0.106)
Income	-0.0559*	-0.0479	-0.0114	-0.00184
	(0.0289)	(0.0298)	(0.0350)	(0.0353)
University	-0.133	-0.125	-0.119	-0.108
	(0.0962)	(0.0962)	(0.112)	(0.112)
Sex	-0.189**	-0.158	-0.123	-0.100
	(0.0965)	(0.100)	(0.116)	(0.115)
Age	-0.00602*	-0.00720**	-0.00794*	-0.00952**
	(0.00333)	(0.00349)	(0.00420)	(0.00430)
Spouse	0.183*	0.179	0.0527	0.0566
	(0.110)	(0.110)	(0.126)	(0.126)
Children	0.124	0.130	0.161	0.168
	(0.103)	(0.103)	(0.117)	(0.117)
Elderly	0.612***	0.616***	0.655***	0.663***
	(0.163)	(0.163)	(0.187)	(0.187)
Constant cut1	-1.527***	-1.617***	-1.591***	-1.808***
	(0.274)	(0.278)	(0.316)	(0.324)
Constant cut2	-0.0250	-0.115	-0.0745	-0.289
	(0.271)	(0.274)	(0.313)	(0.320)
Constant cut3	1.316***	1.228***	1.313***	1.101***
	(0.273)	(0.276)	(0.316)	(0.322)
Constant cut4	3.158***	3.071***	3.128***	2.917***
	(0.300)	(0.303)	(0.347)	(0.352)
Observations	1,600	1,600	1,200	1,200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Implication and Conclusion

Considering the estimation results, we find that people with less flight experience are likely to be more anxious for air travel under and also after the pandemic. As discussed in the previous section, the risk for infection with COVID-19 and that for flight safety are obviously indifferent. However, it is possible that false and negative information that there would be a certain risk to be infected with COVID-19 on a flight and consequently it may lead to the anxiety for flight safety. In addition, the peer pressure widely shared by Japanese society might urge people to refrain from travelling under the pandemic and consequently it leads to the anxiety for the criticism and isolation in community. Now we assume that the infection status in Japan is better than before so that travel demand by air is resumed gradually. However, the demand is still weak comparing with the previous level as Before-Pandemic period. It is true that the peer pressure mentioned above is still remained in the society but airlines can do more to resume the air demand. For example, airlines have developed a lot of hygiene measures such as sanitalization, ventilation and health control of staff to ensure safe and comfort environment. This would help people to have a correct view that it is unlikely to get infected with COVID-19 on air travel. Therefore, airlines should spend their efforts for advocacy that air travel is almost risk-free. At the same time, when we see the situation in the Western countries that have already lifted up most of the restrictions regarding COVID-19, the government of Japan should launch an effective policy to recover travel demand such as "Go To Travel Campaign" that was implemented in 2020. It is said that the campaign showed a certain effect as an incentive for travel and at the same time, it helped people to change their mind. So it is so crucial for the recovery of air travel demand to create a sort of social consensus that travelling is no more risky. It is also effective for the whole recovery of Japanese economy after the pandemic.

Appendix: Questionnaire of Online Survey[2]

1. Section of screening

SC1. Sex

1. Male   2. Female

SC2. Age

SC3. Place of Residence

1. Hokkaido	2. Aomori	3. Iwate	4. Miyagi	5. Akita
6. Yamagata	7. Fukushima	8. Ibaraki	9. Tochigi	10. Gunma
11. Saitama	12. Chiba	13. Tokyo	14. Kanagawa	15. Niigata
16. Toyama	17. Ishikawa	18. Fukui	19. Yamanashi	20. Nagano
21. Gifu	22. Shizuoka	23. Aichi	24. Mie	25. Shiga
26. Kyoto	27. Osaka	28. Hyogo	29. Nara	30. Wakayama
31. Tottori	32. Shimane	33. Okayama	34. Hiroshima	35. Yamaguchi
36. Tokushima	37. Kagawa	38. Ehime	39. Kochi	40. Fukuoka
41. Saga	42. Nagasaki	43. Kumamoto	44. Oita	45. Miyazaki
46. Kagoshima	47. Okinawa	48. Overseas		

SC4. Did you use a regular operation flight after 1 January 2018 ?

 (Either or both domestic/international)

1. Yes   2. No   3.Not Sure

2. Section of questionnaire

Q1. Number of people living or staying together to share household expense (Including yourself):

 __person(s)

Q2 . Total annual household income (Approximately)

1. Less than JPY 2.5Millions	2. JPY 2.5 – 5Millions	3. JPY 5 – 7.5Millions
4. JPY 7.5 – 10Millions	5. JPY 10 – 12.5Millions	6. JPY 12.5 – 15Millions
7. JPY 15 – 17.5Millions	8. JPY 17.5 – 20Millions	9. Above JPY 20Millions

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[2] The online survey was created and conducted only in Japanese.

Q3. Tenure of dwelling

1. Owned houses

2. Owned apartment

3. Rented house owned by private company

4. Housing for company employee and civil servant

5. Rented houses owned by the urban renaissance agency and housing corporations

6. Rented rooms and others

Q4. Place of your residence

City: _____ Ward: _____ Town: _____ Village:

Q5. Breakdown of your household to share living expenses

Before school age: __person(s)

Elementary/Junior-high school student: __person(s)

High school student: __person(s)

Your or your spouse's father/mother to require assistance or care: __person(s)

Q6. Do you have spouse, children or parents (includes spouse's parents) living in another place?

1. Yes   2. No

Q7-1. Identify your family members living in another place.

(Nominate maximum 6 persons - Based on frequency of interaction)

	Spouse	Children	Parents (Including your spouse's parents)	Nobody to live in another place
1st person				
2nd person				
3rd person				
4th person				
5th person				
6th person				

Q7-2. Identify the place of residence and reason to live in another place

(Nominate maximum 6 persons - Based on frequency of interaction)

	Hokkaido	Aomori	Iwate····	Kagoshima	Okinawa	Overseas
1st person						
2nd person						
3rd person						
4th person						
5th person						
6th person						

Q8.Marital status (Includes Common Law couple)

1. Married or Have spouse/partner   2. Never Married

3. Widowed   4. Divorced

Q9.Highest level of education completed

1. Junior high school   2. High school   3. Vocational school

4. College   5. University-undergraduate level

6. University-graduate school   7. Others

Q10. Identify the closest answer to show your working status

1. （Holding Paid Job）Primary engaged in a paid job

2. （Holding Paid Job） Primary engaged in a housework, occasionally engaged in a paid job

3. （Holding Paid Job） Primary attending school, occasionally engaged in a paid job

4. （Holding Paid Job） Others

5. （No Paid Job） Dedicate to housework

6. （No Paid Job） Dedicate to studying

7. （No Paid Job） Others

Q11. Principal place of your work

1. Hokkaido	2. Aomori	3. Iwate	4. Miyagi	5. Akita
6. Yamagata	7. Fukushima	8. Ibaraki	9. Tochigi	10. Gunma
11. Saitama	12. Chiba	13. Tokyo	14. Kanagawa	15. Niigata
16. Toyama	17. Ishikawa	18. Fukui	19. Yamanashi	20. Nagano
21. Gifu	22. Shizuoka	23. Aichi	24. Mie	25. Shiga
26. Kyoto	27. Osaka	28. Hyogo	29. Nara	30. Wakayama
31. Tottori	32. Shimane	33. Okayama	34. Hiroshima	35. Yamaguchi
36. Tokushima	37. Kagawa	38. Ehime	39. Kochi	40. Fukuoka
41. Saga	42. Nagasaki	43. Kumamoto	44. Oita	45. Miyazaki
46. Kagoshima	47. Okinawa	48. Overseas		

Q12. Identify the closest answer to show the category of your occupation

1. Administrative /Managerial	2. Professional/Engineering	3. Clerical
4. Sales	5. Services	6. Security
7. Agriculture/Forestry/Fishery	8. Manufacturing/Processing	
9. Vehicle/machine operation	10. Construction/Mining	
11. Delivery, cleaning, packaging etc.	12. Miscellaneous	

Q13.Occupational Status

1. Permanent employee in private company/institution

2. Executive member in private company/institution	3. Public servant
4. Part-time job	5.Contracted/Temporary employee
6. Self-Employed (With paid staff)	7. Self-Employed (Without paid staff)
8. Staff of Family business	9. Others

Q14.Working status of your spouse

1. （Holding Paid Job）Primary engaged in a paid job

2. （Holding Paid Job） Primary engaged in a housework, occasionally engaged in a paid job

3. （Holding Paid Job） Primary attending school, occasionally engaged in a paid job

4. （Holding Paid Job） Others

5. （No Paid Job） Dedicate to housework

6. （No Paid Job） Dedicate to studying

7. （No Paid Job） Others

Q15. Principal place of your spouse's work

1. Hokkaido	2. Aomori	3. Iwate	4. Miyagi	5. Akita
6. Yamagata	7. Fukushima	8. Ibaraki	9. Tochigi	10. Gunma
11. Saitama	12. Chiba	13. Tokyo	14. Kanagawa	15. Niigata
16. Toyama	17. Ishikawa	18. Fukui	19. Yamanashi	20. Nagano
21. Gifu	22. Shizuoka	23. Aichi	24. Mie	25. Shiga
26. Kyoto	27. Osaka	28. Hyogo	29. Nara	30. Wakayama
31. Tottori	32. Shimane	33. Okayama	34. Hiroshima	35. Yamaguchi
36. Tokushima	37. Kagawa	38. Ehime	39. Kochi	40. Fukuoka
41. Saga	42. Nagasaki	43. Kumamoto	44. Oita	45. Miyazaki
46. Kagoshima	47. Okinawa	48. Overseas		

Q16. Category of occupation of your spouse

1. Administrative /Managerial	2. Professional/Engineering	3. Clerical
4. Sales	5. Services	6. Security
7. Agriculture/Forestry/Fishery	8. Manufacturing/Processing	
9. Vehicle/machine operation	10. Construction/Mining	
11. Delivery, cleaning, packaging etc.	12. Miscellaneous	

Q17.Occupational Status of your spouse

1. Permanent employee in private company/institution

2. Executive member in private company/institution   3. Public servant

4. Part-time job   5.Contracted/Temporary employee

6. Self-Employed (With paid staff)   7. Self-Employed (Without paid staff)

8. Staff of Family business   9. Others

Q18. Approximately how many times did you use domestic flights in 2019 ?

(Count one time for one round trip)

___Times

Q19. Regarding the above number of usage, approximately how many times did you use domestic flights for business purpose ?

___Times

Q20. Regarding the above number of usage, approximately how many times did you use domestic flights for leisure purpose ?

___Times

Q21. Regarding the above number of usage, approximately how many times did you use domestic flights for visiting friends/relatives purpose ?

___Times

Q22.After the pandemic of COVID-19, approximately how many times will you use domestic flights per one year ? (Count one time for one round trip)

Note: *"After the pandemic"* indicates the situation which there would be a certain number of patients but vaccination has been almost completed nationwide and medical methodologies are put in place. Nor subsidy for promoting consumption in the tourism-related industry wouldn't be provided.

___Times

Q23. Regarding the above number of usage, approximately how many times will you use domestic flights for business purpose ?

___Times

Q24. Regarding the above number of usage, approximately how many times will you use domestic flights for leisure purpose ?

___Times

Q25. Regarding the above number of usage, approximately how many times will you use domestic flights for visiting friends/relatives purpose ?

___Times

Q26. For the respondent who is likely to fly less for business purpose, please tell us the reason

	Strongly disagree	Partially disagree	Neutral	Partially agree	Strongly agree
1. Even after the pandemic, I would be sensitive for the infectious risk by using flights					
2. Even after the pandemic, I might put my family into the infectious risk by using flights					
3. Even after the pandemic, I would have less travel budget for business comparing to Before-Pandemic					
4. Even after the pandemic, I am afraid that my business partners/customers might be sensitive for the infectious risk by using flights					
5. I would use other travel modes					
6. I would use digital/online communication tools					

Q27. For the respondent who is likely to fly less for leisure purpose, please tell us the reason

	Strongly disagree	Partially disagree	Neutral	Partially agree	Strongly agree
1. Even after the pandemic, I would be sensitive for the infectious risk by using flights					
2. Even after the pandemic, I might put my family into the infectious risk by using flights					
3. Even after the pandemic, I would be sensitive for the various social disadvantages (ie. Isolation or discrimination from community, Unemployment)					
4. It is hard to travel for leisure by financial difficulties caused by the pandemic					
5. I am less interested in leisure travel comparing to Before-Pandemic					
6. I would use other travel modes					
7. I would shift to online/virtual travel experience					

Q28. For the respondent who is likely to fly less for visiting friends/relatives purpose, please tell us the reason

	Strongly disagree	Partially disagree	Neutral	Partially agree	Strongly agree
1. Even after the pandemic, I would be sensitive for the infectious risk by using flights					
2. Even after the pandemic, I might put my family into the infectious risk by using flights					
3. Even after the pandemic, I would be sensitive for the various social disadvantages (ie. Isolation or discrimination from community, Unemployment)					
4. It is hard to travel for leisure by financial difficulties caused by the pandemic					
5. I am less interested in leisure travel comparing to Before-Pandemic					
6. I would use other travel modes					

Q29. Choose one for the closet answer to reflect your working style after the pandemic

1. Entirely shift to telework/remote work

2. Almost shift to telework/remote work (Commute to office approx. 0-1 time /week)

3. Hybrid - almost equal frequency for telework/remote work & commute to office

4. Almost commute to office (Telework/remote work approx. 0-1 time/week)

5. Entirely commute to office

6. Telework/remote work is not applicable

Q30. Choose one for the closet answer to reflect your spouse's working style after the pandemic

1. Entirely shift to telework/remote work

2. Almost shift to telework/remote work (Commute to office approx. 0-1 time /week)

3. Hybrid - almost equal frequency for telework/remote work & commute to office

4. Almost commute to office (Telework/remote work approx. 0-1 time/week)

5. Entirely commute to office

6. Telework/remote work is not applicable

Q31. (Please answer this question if you marked 1-4 in Q.29)

Do you consider relocation due to implementation of telework/remote work ?

1. Yes   2. No   3. Already relocated

Q32.(Please answer this question if you marked 1 or 3 in Q.31)

Choose the closest answers (up to 3) to identify the images to show your place of relocation

1. Familiar or Originated area

2. Area to meet my/my family's preferences (ie. Food, Culture and Sport)

3. Area in warm weather

4. Area in cool weather

5. Area in a good residential environment

6. Area where high quality of service for education, childcare, medical care and nursery provided

7. Area to enjoy economical benefits (ie. Low living cost)

8. Others

Q33. (Please answer this question if you marked 1 or 3 in Q.31)

Choose the closest answer to identify the images to show your place of relocation

1. The place where my spouse lives separately

2. The same prefecture where my parents live separately

3. The same prefecture where my child/children live separately

4. Another area with good living environment

5. Others

Q34. (Please answer this question if you marked 1 or 3 in Q.31)

Choose the closest answer to identify the images to show your place of relocation

1. The same prefecture as my working place

2. The different prefecture within 100km from my working place

   (Commuting time = approx. 2hrs)

3. The different prefecture above 100km below 300km from my working place

   (Commuting time = approx. 1-2hrs by Shinkansen)

4. The different prefecture above 300km below 600km from my working place

   (Commuting time = approx. 2-4hrs by Shinkansen)

5. The different prefecture above 600km from my working place

6. Others

Q35. (Please answer this question if you marked 2 in Q.31) Please identify the reasons.

1. Due to my/family members' work

2. Due to my/family members' school/childcare

3. Due to my/family members' medical/nursery care

4. Others

Q36.Do you consider the relocation if you had no restrictions?

(ie. Job, School, Childcare, Medical care or Nursing)

1. Yes   2. No

Q37. (Please answer this question if you marked 1 in Q.36)

Choose the closest answers (up to 3) to identify the images to show your place of relocation

1. Familiar or Originated area

2. Area to meet my/my family's preferences (ie. Food, Culture and Sport)

3. Area in warm weather

4. Area in cool weather

5. Area in a good residential environment

6. Area where high quality of service for education, childcare, medical care and nursery provided

7. Area to enjoy economical benefits (ie. Low living cost)

8. Others

Q38. (Please answer this question if you marked 1 in Q.36)

Choose the closest answer to identify the images to show your place of relocation

1. The place where my spouse lives separately

2. The same prefecture where my parents live separately

3. The same prefecture where my child/children live separately

4. Another area with good living environment

5. Others

Q39. (Please answer this question if you marked 1 in Q.36)

Choose the closest answer to identify the images to show your place of relocation

1. The same prefecture as my working place

2. The different prefecture within 100km from my working place

   (Commuting time = approx. 2hrs)

3. The different prefecture above 100km below 300km from my working place

   (Commuting time = approx. 1-2hrs by Shinkansen)

4. The different prefecture above 300km below 600km from my working place

   (Commuting time = approx. 2-4hrs by Shinkansen)

5. The different prefecture above 600km from my working place

6. Others

Q40. (Please answer this question if you marked 2 in Q.36) Please identify all applicable reasons.

1. Fond of my property

2. Fond of the current community

3. Afraid of settlement in a relocated place

4. Now living in area to meet my/my familiy's preferences (ie. Food, Culture and Sport)

5. Due to economic reasons (ie. Income, Assets)

6. Others

Q41. (Please answer this question if you marked 5 in Q.40)

Which kind of public subsidies will drive you to consider relocation?

● Cash payment at the time of relocation (Non-recurring)

   Amount: JPY

● Cash payment after the settlement

   Amount: JPY ____per month

   Duration for the entitlement:___months

Q42. How do you define "the end of pandemic" ? (Choose all situations to meet the criteria)

1. The number of infectious cases is under control, such as a situation that medical service is not constrained

2. Almost zero infections case

3. Medicines/Remedies are available as same as a seasonal flu

4. The rate of completion of vaccination is approximately 50%

5. The rate of completion of vaccination is approximately 70%

6. The rate of completion of vaccination is approximately 90%

7. No restrictions for commercial activities

8. Wearing mask is not requested

9. Social distance is not requested

10. No restrictions for congested places

11. No restrictions for close contacts

12. No restrictions for confined spaces

13. Others

14. None of above

Q43. There are two ways of thinking or behavior for a risk as shown in the following proverbs;
(1)""Nothing ventured, nothing gained."" or (2)""A wise man keeps away from danger"".
How do you evaluate yourself? Mark 1 if you completely agree with the notion of (1) and mark 5 if you completely agree with the notion of (2).

5	4	3	2	1

Q44. Are you afraid of the symptoms of COVID-19 (ie. Death, Aftereffects) ?

1. Strongly disagree   2. Partially disagree   3. Neither disagree nor agree

4, Partially agree   5. Strongly agree

Q45. Are you afraid of the social disadvantages caused by infection of COVID-19 (ie.
unemployment, decrease of income, isolation from community) ?

1. Strongly disagree   2. Partially disagree   3. Neither disagree nor agree

4, Partially agree   5. Strongly agree

Q46. Please choose the closest answer to express your recognition for usage of flight <u>before the</u> <u>pandemic of COVID-19</u>?

	Strongly disagree	Partially disagree	Neutral	Partially agree	Strongly agree
1. Were you generally afraid of safety when using flights?					
2. Were you afraid of infectious diseases on using flights?					
3. Were you afraid of social disadvantages (ie. Unemployment, decrease of income, isolation from community) ?					

Q47. Please choose the closest answer to express your recognition for usage of flight <u>under the</u> <u>pandemic of COVID-19</u>?

	Strongly disagree	Partially disagree	Neutral	Partially agree	Strongly agree
1. Are you generally afraid of safety when using flights?					
2. Are you afraid of infectious diseases on using flights?					
3. Are you afraid of social disadvantages (ie. Unemployment, decrease of income, isolation from community) ?					

Q48. Please choose the closest answer to express your recognition for usage of flight <u>after the</u> <u>pandemic of COVID-19</u>?

Note: *"The end of pandemic"* means the situation that there would be a certain number of infections, however, vaccination is generally available and preventive measures or remedies are established.

	Strongly disagree	Partially disagree	Neutral	Partially agree	Strongly agree
1. Will you be generally afraid of safety when using flights?					
2. Will you be afraid of infectious diseases on using flights?					
3. Will you be afraid of social disadvantages (ie. Unemployment, decrease of income, isolation from community) ?					

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