RIETI Discussion Paper Series 21-E-079

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RIETI Discussion Paper Series, 21-E-079

September 2021

COVID-19, Vaccination, and Consumer Behavior *

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Abstract

With COVID-19's continued spread, vaccination is expected to facilitate the recovery of household consumption; however, a high degree of uncertainty exists regarding vaccination's effectiveness in restoring economic activity. Based on an original survey of individuals in July 2021, this study presents evidence about the relationship between vaccination and consumer behavior. According to the results, a relatively large number of respondents intend to increase consumption after the pandemic ends, but not many will increase consumption after receiving the vaccination. No clear association with health status or individual infection risk was detected, but those who used the 2020 GoTo campaign tended to exhibit higher intention to increase consumption after vaccination.

Keywords: COVID-19, vaccination, consumption, pent-up demand

JEL Codes: D12, E21, I12

* This research is supported by the JSPS Grants-in-Aid for Scientific Research (18H00858, 20H00071, 21H00720). I would like to thank Yoichi Sekizawa and Makoto Yano for their helpful comments and suggestions.

COVID-19, Vaccination, and Consumer Behavior

1. Introduction

With the continuing spread of COVID-19, vaccination represents an avenue towards economic recovery, particularly a rebound in household consumption. Although the situation is changing due to the spread of COVID-19's Delta variant, economies with early vaccination programs have experienced a relatively strong recovery of activity.

Household consumption in Japan after the COVID-19 pandemic has been hovering at around 15 trillion yen (annually) below the pre-COVID-19 level (see **Appendix, Figure A1**). As the infection spreads through person-to-person contact and population movement, the decrease in services expenditures is remarkable (**Appendix Figure A2**). Although vaccination progress in Japan has lagged behind other advanced countries, the majority of the population has been vaccinated at least once, and more than 40% of the population has received the second vaccination as of the end of August, 2021.

The economic outlook of the government and the Bank of Japan predicts economic recovery in parallel with vaccination progress (Cabinet Office, 2021; Bank of Japan, 2021). However, there is great uncertainty regarding vaccination's effectiveness in restoring economic activity. It is natural to expect "revenge consumption" or "pent-up demand" for services such as eating out and travel, but these do not necessarily increase aggregate household consumption. Vaccination progress may only change household expenditure's composition by reducing increased consumption related to home confinement, such as the purchase of home appliances and the use of internet services.

In 2020, many governments took action to transfer income to households, particularly hard-hit low-income ones. In Japan in 2020, the government delivered a special flat-rate benefit of 100 thousand yen per person. The effectiveness of such transfers in boosting consumption has been actively studied (e.g., Baker *et al*., 2020; Chetty *et al.*, 2020; Coibion *et al*., 2020; Unayama *et al.*, 2021; Kaneda *et al*., 2021). However, studies on the impact of vaccination on consumption are rare, despite its practical importance. In Japan, some studies present individual-level evidence about COVID-19 vaccination (e.g., Sasaki *et al*., 2021; Sekizawa *et al*., 2021); however, to the best of our knowledge, there has been no study investigating its impact on consumer behavior.

If data on individual-level vaccination linked with consumption expenditure are available, it is possible to analyze vaccination's quantitative impact on consumption. However, such data are currently unavailable. Under these circumstances, this study, using data from an original survey of Japanese individuals conducted in July 2021, presents new findings on the relationship between the COVID-19 pandemic and vaccination on the one hand, and consumer behavior, on the other.

The remainder of this paper is organized as follows. Section 2 briefly explains the survey design. Section 3 reports the results on the impact of COVID-19's spread on actual consumption as well as the potential impact of the pandemic's end on consumption as expressed by the survey respondents. Section 4 presents results regarding the possible impact of vaccination on consumption. Finally, Section 5 summarizes our conclusions and discusses their implications.

2. Survey Data

Our survey data used were retrieved from the "Follow-up Survey of Life and Consumption under the Changing Economic Structure" designed by the author and conducted by Rakuten Insight, Inc. in early July 2021. The survey questionnaire was sent to those who were registered with Rakuten Insight, Inc., who had responded to a survey in June 2020. In parallel, the same questionnaire was sent to additional registered monitors stratified by gender and age in proportion to the composition of the Japanese population. The total number of respondents was 8,909. The composition by gender and age are as follows: male 52.6% and female 47.4%; age 20-29 7.8%, age 30-39 13.2%, age 40-49 19.3%, age 50-59 19.5%, age 60-69 23.1%, and age 70 or older 17.0%.[1]

The main survey items related to this study include the COVID-19 pandemic's impact on realized consumption; the expected impact of the pandemic's end on consumption; vaccination status and intention to be vaccinated; and expected impact of vaccination on consumption. In

[1] The survey covers people aged 20 or older. The 2020 survey was conducted with those who responded to a survey in 2017. In the 2017 survey, the sample individuals were randomly chosen from about 2.3 million registered monitors of Rakuten Insight, Inc., stratified by gender, age, and region, in proportion to the population composition of the 2015 Population Census (Statistics Bureau, Ministry of Internal Affairs and Communications). The reasons for low representation of age 20-29 category in this study is aging over the past 4 years and relatively high depletion rate of young people.

addition to these questions, the survey collects information about individual characteristics such as gender, age, education, prefecture of residence, annual household income (16 categories), subjective assessment of health condition (five categories), subjective risk-taking attitude (five categories), and working status. These individual characteristics were used for cross-tabulation and explanatory variables in the regression analysis.

3. Impacts of COVID-19 on Consumption

This section reports the results of the COVID-19 pandemic's impact on realized consumption and the expected impact of the pandemic's end on consumption. The specific survey question on COVID-19's relationship to actual consumption is: "How has your total consumption expenditure changed because of the spread of COVID-19 and the government's request that people refrain from going out?" The choices are "Decreased by about…%," "No change," and "Increased by about…%."

According to the tabulation, the categories "decrease," "no change," and "increase" were chosen by 17.7%, 78.4%, and 3.9% of the respondents, respectively (row A of **Table 1**). To calculate the simple average, consumption expenditure decreased by 3.7% due to the COVID-19 pandemic and related government actions.[2] Based on individual characteristics (**Appendix Table A1**), differences by gender and age categories are small, but the percentage of respondents choosing "decrease" increases with household income categories.[3] Since high-income people disproportionally reduced consumption, the weighted average using household income as weight decreased by 4.2%.[4]

According to a simple OLS regression used to explain changes in consumption by gender, age, and household income (expressed in log), the estimated coefficient for income is negative and statistically significant at the 1% level (column (1) of **Table 2**).[5] Quantitatively, doubling

[2] In this calculation, the response "no change" is treated as 0%.
[3] Since the numbers of respondents are small in very high household income categories, "20-24.99 million yen," "25-29.99 million," and "30 million yen or higher" are integrated into one category as "20 million yen or higher."
[4] In the survey, annual household income is a choice from 16 categories. In the calculation using household income as weight, the central values of each category are used.
[5] Age 40-49 is used as the reference category. The same treatment is applied hereafter.

household income is associated with an approximately 0.8% greater reduction in consumption expenditure. As the pandemic and related government restrictions severely affected selective expenditures such as leisure and recreational services, the observed difference by household income is a natural result. However, it should be noted that the explanatory power of these observable individual characteristics is very limited, as is evident from the low R-squared.

The next survey question was the expected change in consumption after the COVID-19 pandemic. The specific question is, "What do you think will happen to your total consumption expenditure after the COVID-19 pandemic is completely over?" The choices are 1) "It will be smaller than before the pandemic," 2) "It will be the same as before the pandemic," and 3) "It will be larger than before the pandemic." Notably, the question compares with the pre-COVID-19 consumption level (not with the current level). The tabulation results are presented in row B of **Table 1**. "Increase," "same," and "decrease" were chosen by 10.4% are 17.7%, 71.8%, and 10.4% of the respondents, respectively. More than 70% of the respondents expected the same consumption expenditure as the pre-COVID-19 level, but nearly 20% expected to consume more than during the pre-COVID-19 level.[6]

The result of an ordered probit estimation to explain the expected change in consumption by gender, age, and income is reported in column (2) of **Table 2**. The coefficients for females, age 20-29, and age 30-39 are positive and highly significant, indicating that these people are likely to increase consumption once the pandemic ends. The coefficient for household income is positive but insignificant, suggesting that high-income people do not necessarily plan to increase consumption relative to the pre-pandemic level.

However, regarding the pent-up demand hypothesis, we are interested in post-COVID-19 consumption relative to the current level affected by the pandemic. For example, those who reduced their consumption due to COVID-19 and expect the same level of consumption after COVID-19 relative to the pre-pandemic level, should consume more than the current level. On the other hand, those who increased consumption during the pandemic and expect the same level of consumption after COVID-19 should decrease consumption relative to the current level. In this respect, we make such a re-classification and construct an adjusted consumption response to the end of the COVID-19 pandemic relative to the current level of consumption. This adjusted tabulation result is reported in row C of **Table 1**. The percentage of those who expected an increase

[6] Cross-tabulation result by individual characteristics is presented in **Appendix Table A2**.

in consumption was 26.9%.[7] This result confirms that the pandemic's termination is a powerful economic policy for stimulating consumption.

The cross-tabulation results of this adjusted consumption response are presented in **Appendix Table A3**. The relatively strong consumption responses of females and youth are the same as in **Table A2**, but now we can observe a positive association between household income and consumption response. The result from an ordered probit estimation to explain the adjusted consumption response is reported in column (3) of **Table 2**. The positive coefficients for female and younger people are the same as those in column (2), but the coefficient for household income is positive and statistically significant at the 1% level. This result suggests that high-income individuals who reduced consumption due to the COVID-19 pandemic are likely to increase consumption expenditure once the pandemic ends. When the rate of change in consumption after the COVID pandemic (i.e., the dependent variable in column (1)) is included as an explanatory variable, the coefficient for this variable is highly significant and has a large negative value (column (4)). In this specification, R-squared increased substantially. This result is consistent with the pent-up demand hypothesis. However, even in this specification, the coefficient of household income is still positive and highly significant.

4. Impacts of Vaccination on Consumption

The survey asked the respondents' vaccination status: "Have you been vaccinated against COVID-19?" The choices are 1) "Vaccinated," 2) "Intend to be vaccinated," and 3) "Do not intend to be vaccinated." **Table 3** presents the tabulation results. At the time in early July 2021, 33.9% of the respondents had already been vaccinated. The intention to be vaccinated was 52.1 %, and 14.0% did not intend to be vaccinated.[8] Since the Japanese vaccination policy has prioritized the older generation, 80.2% of those aged 70 years or older and 52.2% aged 60-69 had already been vaccinated.

The percentage of respondents selecting "do not intend to be vaccinated" is slightly higher

[7] In the cases of the combination of "decrease" and "decrease," "increase" and "increase," and "same" and "same," we cannot judge the change in consumption relative to the current level. Therefore, we treat these cases as "no change."

[8] The survey did not ask whether the respondents have injected the COVID-19 vaccine once or twice.

among females than males; the difference by age is more pronounced. A relatively large number of young people do not intend to be vaccinated. While it is not this study's focus, we run a probit estimation to explain the hesitancy to be vaccinated (one is assigned to the third choice and zero otherwise). **Appendix Table A4** presents the results. A positive (negative) coefficient indicates a negative (positive) intention to be vaccinated. Women and younger people have a negative attitude toward vaccination. Older, highly educated, and high-income people have positive attitudes. This result is consistent with the results of Sekizawa *et al*. (2021) and studies in foreign countries referred to in their paper. We did not obtain consistent coefficients for the subjective assessment of health status and risk attitudes. [9] Even if the subjective risks of infection and severe illness due to COVID-19 are included in the explanatory variables, the coefficients are insignificant (column (2) of the table). At least from the survey, we did not detect a meaningful relationship between the hesitancy to be vaccinated and the stated health status or risk attitude.

The question on the relationship between vaccination and consumption, which is the main interest of this study, is "Has your consumption behavior changed after vaccination? If you have not yet been vaccinated but plan to be vaccinated in the future, please choose an answer that matches what you expect." The three choices are 1) "Consumption expenditure has increased/is expected to increase," 2) "Consumption expenditure has decreased/is expected to decrease," and 3) "No change/no change is expected." It should be noted that the question concerns the impact of the respondent's own vaccination (not the vaccination rate of the society).

Table 4 reports the tabulation results. For all respondents, those who chose increase, no change, and decrease were 13.7%, 75.5%, and 10.7%, respectively. Although the percentage choosing increase is somewhat larger than that choosing decrease, three quarters of respondents do not change (or do not expect to change) their consumption behavior after vaccination. To compare with the expected consumption response to the pandemic's termination (see **Table 1**), the percentage choosing increase after vaccination was low. This result suggests that forced saving under the COVID-19 pandemic will likely bring pent-up demand, but that such an effect from one's own vaccination will be limited.

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[9] The question on health status is "How would you describe your current physical and psychological condition?" The five choices are "Excellent," "Good," "Normal," "Bad," and "Terrible." In the estimations, "normal" is used as the reference category. The question on risk attitude is "In general, do you prefer taking risks or do you avoid them?" The five choices are "I avoid risks," "I tend to avoid risks," "Neither," "I tend to take risks," and "I take risks." In the estimations, "neither" is used as the reference category.

According to individual characteristics, the percentage choosing increase is somewhat higher among female and younger respondents. A relationship with household income is observed: high-income individuals tend to increase consumption expenditure after their own vaccination. The relationships with the subjective risk of infection/serious illness were weak. When the respondents were classified into the subsamples of those who had already been vaccinated and those who wanted to be vaccinated, those who wanted to be vaccinated chose "increase" more than those who had already been vaccinated. However, at the same time, those who wanted to be vaccinated chose "decrease" more. In short, we did not find systematic differences according to vaccination status.

The results of an ordered probit estimation to explain the consumption response to vaccination are reported in **Table 5**. Since the dependent variable is defined as increase=3, no change=2, and decrease=1, the positive coefficient indicates a positive consumption response to vaccination. As shown in column (1), the coefficient for females is positive and highly significant, which is consistent with the simple cross-tabulation result. However, the coefficients for age categories are all insignificant, and the coefficient for household income (expressed in log) is positive but low. The coefficient for the risk of serious illness was negative, but the size was small, and the significance level was low. In any case, the explanatory power of these individual characteristics is limited, as is evident from the very low R-squared.

Column (2) of the table shows the result of using dummies for the use of the "GoTo Travel" and "GoTo Eat" campaigns as explanatory variables. The government implemented the campaign mainly in the latter half of 2020 to stimulate domestic tourism and eating out.[10] Interestingly, the coefficients for the use of campaigns are positive and significant. Those who used the campaign last year tended to increase their consumption expenditure after vaccination. In other words, these people are likely to consume more without policy measures such as the GoTo Travel campaign once they are vaccinated.

Column (3) of the table shows the result of using the rate of change in consumption after the COVID-19 pandemic as an explanatory variable. The coefficient for this variable is positive and significant at the 5% level, meaning that those who reduced consumption do not increase consumption due to being vaccinated. This result is in contrast with the results reported in **Table**

[10] The questions on the use of the campaign are "Did you use the GoTo Travel campaign?" and "Did you use the GoTo Eat campaign?"

2 and suggests that, in contrast to the complete suppression of the pandemic, vaccination's impact on pent-up demand may be limited.

5. Conclusion

It is expected that COVID-19 vaccination progress will realize pent-up demand from forced saving under the pandemic and help economic recovery. However, evidence of vaccination's impact on consumption is limited. Against this background, this study, based on an original survey of Japanese individuals conducted in July, 2021, presents new observations on the relationship between vaccination and consumer behavior.

The main results are summarized as follows: First, a large number of respondents intend to increase their consumption after the pandemic's end, but not so many respondents will increase their consumption after being vaccinated. This result suggests that the macroeconomic impact of pent-up demand arising from vaccination may be limited unless the pandemic is completely suppressed. Second, females, high-income earners, and those who used the last year's GoTo campaign tended to exhibit higher intention to increase consumption after vaccination. This result suggests that once vaccinated, these individuals are likely to increase their consumption without policy support. No clear association with the health status or subjective risk of infection was detected.

Although this study presents novel findings on the relationship between vaccination and consumer behavior, most of the results are not based on actual consumption data but on the intention of survey respondents obtained from hypothetical questions. In addition, it should be noted that vaccines' effectiveness against new variants of COVID-19 is highly uncertain. Considering these limitations, we should be careful in interpreting the results.

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Table 1. COVID-19, End of the Pandemic, and Change in Consumption

	(1) Decrease	(2) No change	(3) Increase
A. Impact of COVID-19 on current consumption	17.7%	78.4%	3.9%
B. Expected consumption after COVID-19 (comparison with pre-pandemic level)	10.4%	71.8%	17.7%
C. Expected consumption after COVID-19 (comparison with current level)	8.2%	64.9%	26.9%

Note: N=8,909.

Table 2. Change in Consumption by Individual Characteristics

	(1) Impact of COVID-19 on consumption			(2) Expected consumption after COVID-19 (comparison with the pre-COVID level)			(3) Expected consumption after COVID-19 (comparison with the current level)			(4) Expected consumption after COVID-19 (comparison with the current level)		
	OLS			Ordered probit			Ordered probit			Ordered probit		
	Coef.	Robust S.E.		Coef.	Robust S.E.		Coef.	Robust S.E.		Coef.	Robust S.E.	
Female	0.1192	0.2930		0.0809	0.0255	***	0.0536	0.0249	**	0.0704	0.0260	***
Age 20-29	-1.7903	0.7186	**	0.1672	0.0578	***	0.1904	0.0556	***	0.1615	0.0590	***
30-39	-0.1664	0.5017		0.1179	0.0457	**	0.0795	0.0450	*	0.0873	0.0467	*
50-59	-0.5241	0.4592		-0.1183	0.0405	***	-0.0555	0.0397		-0.0852	0.0416	**
60-69	-1.3502	0.4271	***	-0.0632	0.0388		0.0425	0.0380		-0.0027	0.0395	
70 or older	-1.4214	0.4617	***	-0.0237	0.0417		0.0878	0.0411	**	0.0415	0.0427	
ln income	-1.1230	0.1966	***	0.0131	0.0168		0.1068	0.0161	***	0.0717	0.0172	***
Change in consumption by COVID-19										-0.0426	0.0020	***
Cons.	3.9492	1.2822	***									
Nobs.	8,909			8,909			8,909			8,909		
R^2/ pseudo R^2	0.0054			0.0042			0.0048			0.1191		

Notes: OLS and ordered probit estimations ***: p<0.01, **: p<0.05. The dependent variable in (1) is the rate of change in consumption expenditure due to the COVID-19 pandemic. The dependent variable in (2), (3), and (4) is the change in consumption (increase=3, no change=2, and decrease=1). (3) and (4) use the expected consumption relative to the current consumption level. The reference categories are male and age 40-49.

Table 3. Vaccination and Intention to be Vaccinated

	N	Vaccinated	Want to be vaccinated	Do not want to be vaccinated
All	8,909	33.9%	52.1%	14.0%
Male	4,688	33.5%	54.1%	12.4%
Female	4,221	34.3%	49.9%	15.8%
Age 20-29	699	14.9%	61.9%	23.2%
30-39	1,178	13.7%	64.4%	21.9%
40-49	1,720	13.1%	67.8%	19.1%
50-59	1,735	13.5%	71.8%	14.7%
60-69	2,059	52.2%	40.3%	7.5%
70 or older	1,518	80.2%	13.6%	6.1%

Note: The survey was conducted in early July 2021.

Table 4. Vaccination and Consumption by Individual Characteristics

		N	Decrease	No change	Increase
All		8,909	10.7%	75.5%	13.7%
Gender	Male	4,105	12.5%	74.8%	12.6%
	Female	3,553	8.6%	76.4%	15.0%
Age	20-29	537	15.3%	66.5%	18.2%
	30-39	920	12.4%	72.5%	15.1%
	40-49	1,392	11.1%	74.0%	14.9%
	50-59	1,480	11.8%	73.7%	14.5%
	60-69	1,904	10.5%	76.7%	12.8%
	70-79	1,425	6.7%	82.7%	10.5%
Education	High school	2,258	9.0%	78.4%	12.5%
	Vocational school	772	9.6%	75.5%	14.9%
	Junior (2-year) college	939	10.9%	74.1%	15.0%
	4-year university	3,237	12.0%	74.3%	13.8%
	Graduate school	444	12.2%	73.2%	14.6%
Household income	Less than 1 million yen	353	11.3%	78.8%	9.9%
	1-1.99	426	8.2%	80.5%	11.3%
	2-2.99	880	8.6%	78.1%	13.3%
	3-3.99	1,165	8.9%	79.1%	12.0%
	4-4.99	1,024	12.6%	73.7%	13.7%
	5-5.99	769	10.8%	76.2%	13.0%
	6-6.99	629	10.5%	73.8%	15.7%
	7-7.99	598	11.0%	75.9%	13.0%
	8-8.99	454	11.7%	71.1%	17.2%
	9-9.99	373	13.4%	71.6%	15.0%
	10-12.49	506	13.4%	72.7%	13.8%
	12.5-14.99	208	11.5%	71.6%	16.8%
	15-19.99	150	10.0%	70.7%	19.3%
	20 million yen or higher	123	10.6%	68.3%	21.1%
Vaccinated	Done	3,018	7.7%	80.6%	11.6%
	Want to	4,640	12.7%	72.2%	15.1%
GoTo Travel	Not used	5,041	10.5%	78.4%	11.1%
	Used	2,617	11.1%	70.1%	18.8%
GoTo Eat	Not used	5,213	10.5%	77.8%	11.7%
	Used	2,445	11.3%	70.6%	18.1%

Note: The sample excludes those who responded “Do not intend to be vaccinated.”

Table 5. Change in Consumption by Vaccination: Estimation Results

	(1)			(2)			(3)		
	Coef.	Robust S.E.		Coef.	Robust S.E.		Coef.	Robust S.E.	
Female	0.1622	0.0282	***	0.1601	0.0281	***	0.1611	0.0281	***
Age 20-29	-0.0228	0.0689		-0.0533	0.0692		-0.0107	0.0689	
30-39	-0.0233	0.0542		-0.0360	0.0543		-0.0188	0.0542	
50-59	-0.0236	0.0470		-0.0225	0.0469		-0.0224	0.0469	
60-69	-0.0265	0.0443		-0.0320	0.0439		-0.0207	0.0439	
70 or older	0.0163	0.0451		0.0218	0.0444		0.0239	0.0444	
ln income	0.0361	0.0185	*	0.0176	0.0185		0.0425	0.0185	**
Subjective infection risk	0.0018	0.0014							
Subjective serious illness risk	-0.0033	0.0017	*						
Used GoTo Travel				0.1459	0.0323	***			
Used GoTo Eat				0.0840	0.0328	**			
Change in consumption by COVID-19							0.0033	0.0013	**
Nobs.	7,658			7,658			7,658		
Pseudo R^2	0.0037			0.0069			0.0043		

Notes: Ordered probit estimations ***: p<0.01, **: p<0.05, *: p<0.10. The reference categories are male, age 40-49, and those who did not use the GoTo campaign in 2020.

Appendix

Table A1. Impact of COVID-19 on Consumption by Individual Characteristics

		N	Decrease	No change	Increase
All		8,909	17.7%	78.4%	3.9%
Gender	Male	4,688	17.3%	79.7%	3.0%
	Female	4,221	18.2%	76.9%	4.9%
Age	20-29	699	18.6%	76.5%	4.9%
	30-39	1,178	15.9%	80.1%	4.1%
	40-49	1,720	16.5%	79.1%	4.4%
	50-59	1,735	18.1%	77.6%	4.3%
	60-69	2,059	18.6%	78.2%	3.2%
	70-79	1,518	18.6%	78.2%	3.2%
Household income	Less than 1 million yen	471	9.1%	86.2%	4.7%
	1-1.99	527	13.3%	82.5%	4.2%
	2-2.99	1,007	14.8%	80.4%	4.8%
	3-3.99	1,318	15.9%	80.0%	4.0%
	4-4.99	1,191	17.2%	78.8%	3.9%
	5-5.99	905	16.8%	79.3%	3.9%
	6-6.99	721	21.2%	74.8%	4.0%
	7-7.99	686	19.0%	77.1%	3.9%
	8-8.99	518	23.4%	73.0%	3.7%
	9-9.99	418	21.5%	76.1%	2.4%
	10-12.49	580	22.1%	75.2%	2.8%
	12.5-14.99	244	19.3%	78.3%	2.5%
	15-19.99	173	31.2%	65.9%	2.9%
	20 million yen or higher	150	19.3%	76.7%	4.0%

Table A2. Impact of the End of the COVID-19 Pandemic on Expected Consumption by Individual Characteristics

		N	Decrease	No change	Increase
All		8,909	10.4%	71.8%	17.7%
Gender	Male	4,688	10.7%	73.0%	16.3%
	Female	4,221	10.2%	70.6%	19.3%
Age	20-29	699	11.0%	62.5%	26.5%
	30-39	1,178	9.0%	68.9%	22.1%
	40-49	1,720	9.9%	72.3%	17.8%
	50-59	1,735	12.4%	72.6%	15.0%
	60-69	2,059	10.5%	73.9%	15.5%
	70-79	1,518	9.6%	74.2%	16.2%
Household income	Less than 1 million yen	471	14.2%	66.2%	19.5%
	1-1.99	527	10.2%	76.9%	12.9%
	2-2.99	1,007	9.2%	73.4%	17.4%
	3-3.99	1,318	9.6%	71.5%	18.9%
	4-4.99	1,191	11.3%	71.8%	17.0%
	5-5.99	905	10.1%	71.5%	18.5%
	6-6.99	721	10.8%	69.9%	19.3%
	7-7.99	686	9.5%	72.6%	17.9%
	8-8.99	518	10.0%	73.2%	16.8%
	9-9.99	418	10.8%	69.6%	19.6%
	10-12.49	580	10.7%	72.6%	16.7%
	12.5-14.99	244	9.8%	73.8%	16.4%
	15-19.99	173	12.7%	68.2%	19.1%
	20 million yen or higher	150	11.3%	72.7%	16.0%

Table A3. Impact of the End of the COVID-19 Pandemic on Expected Consumption Relative to the Current Level by Individual Characteristics

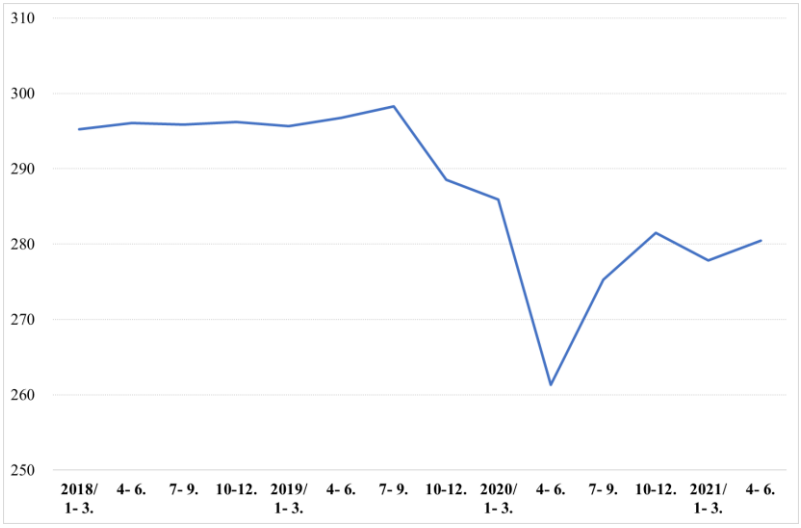
		N	Decrease	No change	Increase
All		8,909	8.2%	64.9%	26.9%
Gender	Male	4,688	7.8%	66.6%	25.5%
	Female	4,221	8.6%	63.0%	28.4%
Age	20-29	699	8.7%	56.4%	34.9%
	30-39	1,178	8.5%	61.7%	29.8%
	40-49	1,720	8.3%	65.9%	25.8%
	50-59	1,735	9.5%	66.3%	24.3%
	60-69	2,059	7.5%	66.9%	25.6%
	70-79	1,518	7.2%	66.0%	26.8%
Household income	Less than 1 million yen	471	12.5%	65.4%	22.1%
	1-1.99	527	9.5%	70.6%	19.9%
	2-2.99	1,007	8.7%	66.5%	24.7%
	3-3.99	1,318	7.7%	66.5%	25.9%
	4-4.99	1,191	8.0%	67.2%	24.9%
	5-5.99	905	8.0%	64.8%	27.3%
	6-6.99	721	9.4%	58.7%	31.9%
	7-7.99	686	7.9%	63.0%	29.2%
	8-8.99	518	6.9%	62.7%	30.3%
	9-9.99	418	6.0%	65.3%	28.7%
	10-12.49	580	8.1%	61.4%	30.5%
	12.5-14.99	244	6.6%	65.2%	28.3%
	15-19.99	173	4.0%	61.3%	34.7%
	20 million yen or higher	150	8.0%	66.0%	26.0%

Table A4. Individual Characteristics Related to Hesitancy to be Vaccinated

		(1)			(2)		
		dF/dx	Robust S.E.		dF/dx	Robust S.E.	
Female		0.0373	0.0075	***	0.0359	0.0074	***
Age	20-29	0.0281	0.0148	**	0.0321	0.0151	**
	30-39	0.0229	0.0122	**	0.0255	0.0123	**
	50-59	-0.0333	0.0093	***	-0.0351	0.0092	***
	60-69	-0.1029	0.0076	***	-0.1060	0.0076	***
	70 or older	-0.1124	0.0070	***	-0.1169	0.0069	***
Education	Vocational school	-0.0173	0.0114		-0.0190	0.0113	
	Junior (2-year) college	-0.0289	0.0107	**	-0.0314	0.0106	***
	4-year university	-0.0230	0.0084	***	-0.0249	0.0084	***
	Graduate school	-0.0317	0.0139	**	-0.0320	0.0141	**
Health	Excellent	0.0038	0.0099		0.0047	0.0099	
	Good	-0.0194	0.0087	**	-0.0238	0.0086	***
	Bad	-0.0155	0.0106		-0.0140	0.0107	
	Terrible	0.0444	0.0216	**	0.0722	0.0229	***
Risk	Risk averter	0.0061	0.0109				
attitude	Somewhat risk averter	-0.0299	0.0090	***			
	Somewhat risk lover	0.0142	0.0144				
	Risk lover	0.1054	0.0321	***			
COVID-19	Risk of infection				-0.0003	0.0004	
risk	Risk of severe illness				-0.0003	0.0004	
ln income		-0.0286	0.0046	***	-0.0304	0.0047	***
	Nobs.	8,898			8,898		
	Pseudo R^2	0.0676			0.0629		

Notes: Probit estimations. ***: p<0.01, **: p<0.05, *: p<0.10. The reference categories of the dummy variables are male, age 40-49, high school graduates, normal health, and risk neutral.

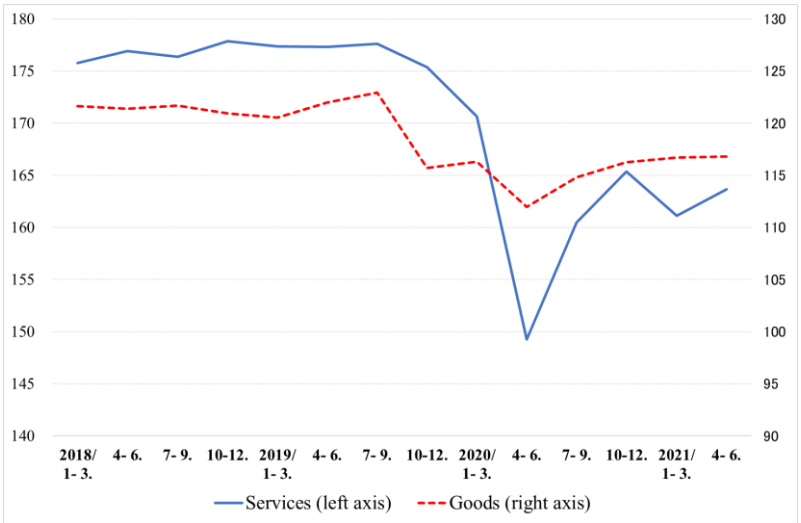
Figure A1. Trend in Household Consumption



Source: Quarterly Estimates of GDP for April-June 2021, the Second Preliminary Estimates (Cabinet Office).

Note: Seasonally-adjusted real series, trillion yen.

Figure A2. Household Consumption Expenditure by Goods/Services



Source: Quarterly Estimates of GDP for April-June 2021, the Second Preliminary Estimates (Cabinet Office).

Note: Seasonally-adjusted real series, trillion yen.