



Consumers' Recognition of Multifunctionality in Agriculture and Price Premiums for Environmentally Friendly Agricultural Products: Evidence from a Survey Experiment

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Abstract

We conduct an online survey experiment to determine the influence of multifunctionality recognition in agriculture on the price premiums of environmental-friendly agricultural products. We use the case of fish-friendly rice produced in Shiga prefecture, Japan, which contributes to the conservation of the water and ecosystem in rural areas around Lake Biwa by setting up fish ways and reducing the use of herbicides. We assume two conditions for consumers to pay premiums on environmental-friendly agricultural products. The first is that consumers recognize multifunctionality in agriculture. The second condition is that consumers have a correct understanding of environment-friendly agricultural products. We thus examine the effects of respondents' attributes on their responses to two types of visual stimuli: one associated with the multifunctionality of agriculture and information about environment-friendly agricultural products. In the analysis of the respondents; willingness to pay, the price premium of the group with both the stimulus and information is significantly higher than the price premium of the control group with no interventions. However, the price premium of the group with only the stimulus is not statistically different for the control group. The policy implication of this research is that consumers are more likely to support agri-environmental policies if they recognize both the multifunctionality of agriculture and the properties of environmental-friendly agricultural products. The two types of stimuli have complimentary effects on increasing price premiums. Promoting the recognition of multifunctionality is especially important for those who do not usually access information on agriculture.

Keywords Survey experiment · Multifunctionality in agriculture · Priming · Willingness to pay

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Introduction

One of the main objectives of agricultural policies in Japan is to supply agri-environmental public goods or, in other words, be multifunctionality. This requires measures to provide public goods, such as the maintenance of the rural environment and water quality by promoting positive externalities in agriculture, while also regulating its negative external effects. As such, the need for agri-environmental policy measures to appropriately supply public goods has increased.

However, most current policies are based on border measures and price support. Further, the necessity for agri-environmental policy measures is shown by their dominance of the percentage producer support estimates (% PSE) in the EU in recent years. Many such payments to farmers are based on cross compliance (with environmental requirements). However, in Japan, PSE is dominated by border measures and price-support mechanisms. According to the Producer Support Estimates Database by OECD, the share of environmental payments in agricultural expenditure is only around 0.1% in Japan. In other words, Japan's policy measures have adverse effects on structural adjustment and are inefficient in providing agri-environmental public goods. A desirable policy measure for Japan is an agri-environmental measure similar to the one already implemented in the EU, that of paying farmers on the condition that they comply with specific environmental requirements.

The major obstacle to the transition to a new policy method—whether a fiscal-driven or consumer-supported model—is the lack of public support. For example, consumers must be informed on the public benefits of environmentally friendly agricultural products and encouraged to purchase such products as a precondition for the transition. However, individuals' understanding of multifunctional agriculture—whose characteristics include the production of public goods—remains low in Japan compared to their understanding of food self-sufficiency, which is the backbone of the nation's agricultural protectionism. This is confirmed by Fig. 1, which shows the number of references to the policy concepts of “food self-sufficiency” and “multifunctionality” made by Japan's four major newspapers. Food self-sufficiency occasionally becomes a popular topic in media. By contrast, the media's interest in the multifunctional nature of agriculture is generally low, indicating a marked difference in each concept's penetration levels.

A series of studies demonstrate the public's support for agricultural policy measures, beginning with those conducted by Anderson and Hayami (1986) and Honma and Hayami (1986). However, most of these studies conduct regression analyses of agricultural-protection indicators, mostly aggregated at the national level by using national-level data. While they may provide important insights, such as the existence of a positive correlation between economic development and agricultural protectionism, they often lack a microeconomic perspective, such as the viewpoint of consumers.

In this paper, we address two research questions: (i) what is necessary for the enhanced recognition of multifunctionality in agriculture, and (ii) what type of individuals react in what ways because of such enhanced recognition? We propose two conditions for consumers to pay premiums for environmentally friendly agricultural products. The first is that they must recognize the existence of agri-environmental public goods (multifunctionality) and be informed on this multifunctionality. Another condition is the possession of information regarding such environmentally friendly agricultural products and the efforts being made to protect the environment. This study analyzes the attributes of different groups of individuals and determines the extent to which they would be influenced. It is possible to survey individuals' awareness on “agriculture multifunctionality” and estimate how this awareness may influence

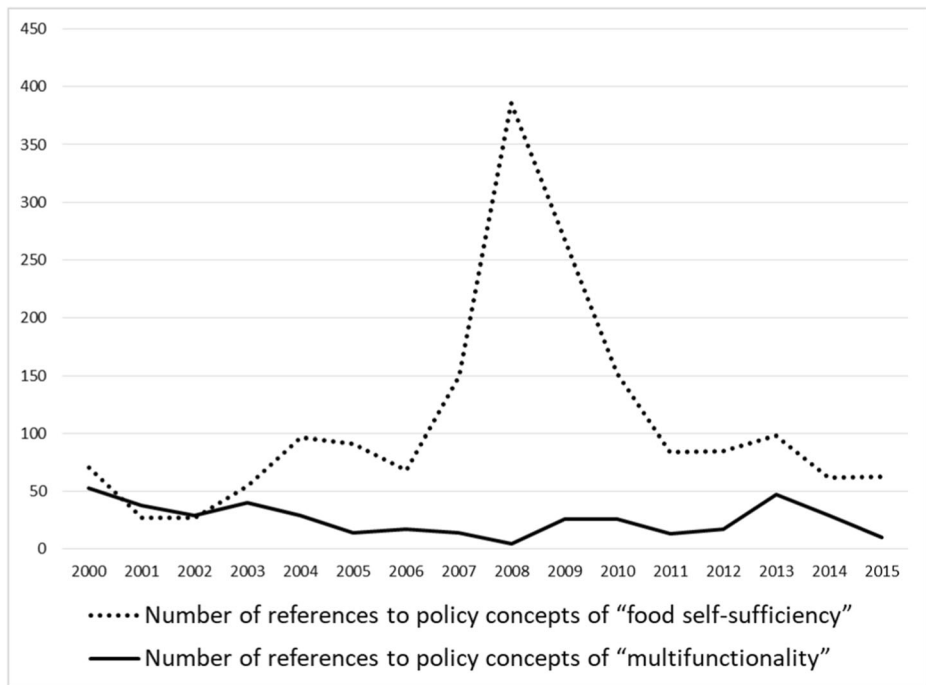


Fig. 1 Number of references to policy concepts of “food self-sufficiency” and “multifunctionality” made by Japan’s four major newspapers (Nikkei, Yomiuri, Mainichi, Asahi)

variables related to the agricultural environment and may translate into support for agri-environmental policy measures. However, this method cannot determine whether such influence is due to awareness of the multifunctionality of agriculture or is, in fact, affected by unobserved attributes. To avoid this endogeneity, it is necessary to conduct exogenous analysis using an experimental method.

There are numerous studies on the condition of paying premiums for environmentally friendly agricultural products. For example, Ujiie (2014) analyzed rice paddies in Japan to assess the impact of providing information on environmentally friendly agricultural products and demonstrated that information on rice paddies on the Sado Island, Niigata Prefecture, where crested ibises live, influences consumers’ willingness to pay (WTP). However, previous studies did not address the first condition, that is, individuals’ awareness of the existence of agri-environmental public goods. Therefore, the existence, or lack thereof, of recognition for multifunctionality may affect consumers’ attitudes toward environmentally friendly agricultural products.

We randomly “prime” the investigation subjects on multifunctionality of agriculture. Priming is a method of activating certain knowledge or concepts and analyzing how this activation may influence the way individuals process information and respond to it (Boush et al. 2009). As empirical analysis on priming has developed in recent years, this article considers it appropriate to conduct a survey experiment to prime the subjects on the policy concept of agri-environmental public goods. However, it is not desirable to frame the question as whether agri-environmental public goods have a positive or negative impact on consumption. Hence, whether multifunctionality is desirable should not be an a priori assumption, but

something that consumers must decide for themselves. In other words, we seek to avoid the framing effect of using photographs to prime subjects into thinking the issue is either negative or positive. We merely direct research participants to certain criteria for evaluating the issue.

Prior studies using survey experiments on this issue include Naoi and Kume's (2011), who measured the effect of providing a "producer stimulus" and a "consumer stimulus" in analyzing individuals' attitudes toward agricultural protection through an online survey on the pros and cons of importing agricultural products. To avoid the framing effect of agricultural protection, the authors primed (providing a stimulus) by showing photographs of producers producing their products and consumers making purchases. This method allows for both the producer and consumer stimuli to exist exogenously. Further, their study classifies subjects into subgroups to examine how individuals with different attributes react to stimuli.

Referring to Naoi and Kume (2011), we examine the changes in the amount of premiums individuals would pay for rice produced in an environmentally friendly manner. Assuming agri-environmental policy measures are applied to the production of environmentally friendly rice, an analysis can be conducted with respect to the penetration of relevant policy concepts. Additionally, when the subject of analysis is not an abstract policy measure but an actual environmentally friendly agricultural product, consumers are more likely to provide intuitive answers and research bias is reduced. As subsidies related to environmental measures are a form of taxation on consumers, it is appropriate to ask consumers the amount they are willing to pay.

This article has chosen rice produced on fish cradle rice paddies (Sakana-no-yurikago-suiden rice, hereafter fish cradle rice), produced in Shiga Prefecture, as an example of an environmentally friendly agricultural product. This crop is the product of an effort to protect water quality and the ecosystem in the region by installing a fish passage and reducing the use of herbicides. However, it has low recognition among the public. Fish cradle rice does not actually meet the criteria for "specially cultivated rice" (i.e., rice produced with fewer pesticides and chemical fertilizers). Therefore, a distinction can be made between environmental and product-safety premiums for this product to a certain extent. Prior studies concerning individuals' WTP premiums for fish cradle rice include Nishimura et al. (2012), who show that consumers who are aware of fish cradle rice are more willing to pay a premium for this product than others.

Survey Experiment Design

The survey for this study was conducted in early February 2017 over the internet, with the help of a survey company, Macromill, Inc., targeting 432 individuals each, in Shiga and Kyoto Prefectures. It was conducted for individuals who registered as potential respondents. We excluded the respondents who produce and sell agricultural products or did not buy rice at all over the past year. An equal number of men and women were contacted for the survey. The survey was conducted until the required number of respondents (216 men and 216 women in Shiga and Kyoto, respectively) was met. The rationale for allocating an equal number of observations to location and gender is that the answers to the survey questions may depend on living location and gender. We used a double-bound dichotomous-choice method with an open-ended follow-up question format. The contingent valuation method (CVM) was used to ask questions regarding WTP premiums for fish cradle rice compared to similar products grown in Shiga Prefecture under conventional agricultural methods.

As a condition for paying premiums for environmentally friendly agricultural products, this study assumes consumers must be given a stimulus associated with agri-environmental public goods (multifunctionality), as well as information regarding farmers' efforts to protect the environment. To this end, the survey randomly classified respondents into four groups, with 216 individuals in each, and then asked them how large a premium they were willing to pay for environmentally friendly agricultural products. Of these four groups, one was given neither a stimulus nor information, another was given only a stimulus, another only information, and the fourth both a stimulus and information. However, one person in the group given only the stimulus provided inconsistent answers. Therefore, the number of participants for this group was reduced to 215. Additionally, at the sample-selection stage, considerations were made so that the gender and places of residence of the 216 individuals in each group would not differ between the experimental and control groups, meaning individuals were assigned so that each group had the same number of men and women and of individuals living in Shiga (the rice-producing region) and Kyoto Prefectures (close to the rice-producing region). The assignment was random otherwise.

The group to be given a stimulus associated with the multifunctionality of agriculture was shown the three photographs in Fig. 2 (taken from the website of the Ministry of Agriculture, Forestry and Fisheries). One of these photographs featured the educational aspect of agriculture, while another pointed to biodiversity. A third photograph was of a rice paddy. These photographs were shown to increase the participants' awareness of the multifunctionality of agriculture. To ensure that this visual stimulus affected the participants adequately, we asked follow-up questions after the stimulus was provided, such as "Have you ever seen this type of scenery?" after showing the picture of a rice paddy. We then asked the subjects to choose from a list how many times they had seen such a landscape. This experiment was not intended to determine whether these participants identified the image "correctly" but to encourage them to view these photographs from the multifunctionality standpoint. The control group was not shown any photographs.

The group to be given information regarding the efforts to protect the environment was shown three photographs related to fish cradle rice (taken from the website of Shiga Prefectural Government). This group was first shown the following passage from the prefecture website: "In Shiga Prefecture, a fishway was created so that fish can go up to the paddy field. This way, we can observe fish laying eggs and breeding in the paddy field. We certify rice produced in fish-friendly paddies, such as those that use chemicals that have less impact on fish, such as fish cradle rice. Rice cultivated in a paddy that meets the fish cradle rice criteria established by Shiga Prefecture can use the following logo. Buying and eating fish cradle rice may lead to the protection of fish and Lake Biwa." Then, the group was shown the logo and three photographs in Fig. 3.



Fig. 2 Stimulus for multifunctionality

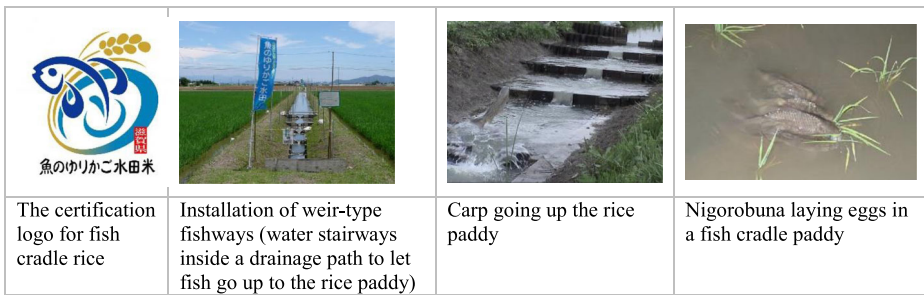


Fig. 3 Information on fish cradle rice

Then, we presented the following hypothetical situation to the participants: “You went to a neighborhood store to buy rice and saw Koshihikari rice produced in Shiga Prefecture under a conventional method. It was sold for 2,000 yen (tax inclusive) per 5 kilograms. Alongside it, you also saw a different type of Koshihikari rice—also produced in Shiga Prefecture. It was fish cradle rice with the following certification logo.”

Results

This study used CVM, which allowed us to identify how much individuals are willing to pay or receive on a hypothetical market or how much money consumers would pay for environmentally friendly rice. The survey, using the double-bound dichotomous-choice method with an open-ended follow-up format as advocated by Hanemann et al. (1991), asked the following question: “Suppose that the price difference between conventional Koshihikari rice from Shiga Prefecture and fish cradle rice is up to X yen per 5 kilograms. Would you buy fish cradle rice?” We provided two sets of prices—1.5X and 0.5X—next to price X along with “Yes” and “No” choices. At the end of the survey, we also asked the participants to identify the actual price they were willing to pay. In the questionnaire, four different starting prices, X, were given: 100, 250, 500, and 750 yen, as shown in Table 1. Estimates were made using a double-bounded dichotomous-choice method (Lopez-

Table 1 Survey results on the price for 5 kg of fish cradle rice

Price	#Yes		#No	
1st Question				
2,100	111	(53%)	97	(47%)
2,250	101	(45%)	123	(55%)
2,500	73	(35%)	135	(65%)
2,750	60	(27%)	163	(73%)
2nd Question				
2,050	13	(13%)	84	(87%)
2,150	71	(64%)	40	(36%)
2,125	21	(17%)	102	(83%)
2,375	53	(52%)	48	(48%)
2,250	28	(21%)	107	(79%)
2,750	33	(45%)	40	(55%)
2,375	29	(18%)	134	(82%)
3,125	23	(38%)	37	(62%)

Table 2 Overview of other attribute data (arranged so that variables increase in accordance with numerical values)

Item	Breakdown	Mean	Std. Dev.
Photographs of multifunctionality to provide stimulus = <i>Stimulus</i> associated with multifunctionality	Saw photos = 1/No = 0	0.25	0.43
Photos and text content of Sakamano-yurigago for information = <i>Information</i> on fish cradle rice	Saw photos and text content = 1/No = 0	0.25	0.43
Both <i>stimulus</i> and <i>information</i>	Saw both of above = 1/No = 0	0.25	0.43
Prefecture	Shiga = 1; Kyoto = 0	0.50	0.50
Gender	Female = 1/No = 0	0.50	0.50
Children	Have child/children = 1/No = 0	0.64	0.48
Marital status	Married = 1/No = 0	0.70	0.46
Knew about fish cradle rice before the survey	Yes = 1/No = 0	0.07	0.25
Saw fish cradle rice at a store before the survey	Yes = 1/No = 0	0.03	0.16
Bought fish cradle rice before the survey (fish cradle bought)	Yes = 1/No = 0	0.02	0.12
Saw fish cradle paddies before the survey	Yes = 1/No = 0	0.02	0.15
You do most of the household grocery shopping (Primary shopper)	Yes = 1/No = 0	0.68	0.47
You do most of the household cooking (Primary cook)	Yes = 1/No = 0	0.64	0.48
How much rice does your family per person consume in a month	Higher than 7 kg = 1/ No = 0	0.39	0.49
Usually pay at least 2000 yen/5 kg for rice (tax inclusive)	Higher than 2000 yen = 1/ No = 0	0.22	0.41
Experience of buying "specially cultivated rice"	Yes = 1/No = 0	0.40	0.49
Experience of consumption of rice bought from a farmers' market	Yes = 1/No = 0	0.37	0.48
Do you get rice from a relative or friend	Yes = 1/No = 0	0.45	0.50
You subscribe to a newspaper	Yes = 1/No = 0	0.55	0.50
On average, how many hours a day do you spend watching TV in a week.	Higher than 4 h = 1/ No = 0	0.38	0.49
Use of SNS	everyday = 1/ No = 0	0.46	0.50
You have a relative who is a farmer	Yes = 1/No = 0	0.17	0.38
You have a friend who is a farmer	Yes = 1/No = 0	0.18	0.39
Instead of receiving 1 million yen right now, you would be willing to wait for one year to receive this amount	Higher than 1.5 million yen = 1/ No = 0	0.35	0.48
If you were to receive 1 million yen now, you would get the same satisfaction if you had a 50% chance of receiving this amount	Higher than 3 million yen = 1 / No = 0	0.40	0.49
Education	Higher than university = 1 / No = 0	0.46	0.50
Aged over 65	Yes = 0 / No = 0	0.12	0.32
Household annual income	Higher than 6 million yen = 1 / No = 0	0.35	0.48
Personal annual income	Higher than 6 million yen = 1 / No = 0	0.14	0.34

Table 3 Factor analysis using double-bounded dichotomous choice model

Variable	Result 1: only the random variables			Result 2: all factors including the individual characteristics		
	Coef.	Std. err.	P > z	Coef.	Std. err.	P > z
Starting price X yen	0.44***	0.08	0.00	0.43***	0.09	0.00
Stimulus associated with multifunctionality	28.66	54.57	0.60	51.52	64.89	0.43
Information on fish cradle rice	64.40	53.99	0.23	86.28	62.30	0.17
Both stimulus and information	101.55**	54.06	0.06	124.84**	64.11	0.05
Those who do most of the household cooking (primary cook)				156.54*	86.58	0.07
Experience of buying "specially cultivated rice"				223.63***	51.06	0.00
Experience of consumption of rice bought from a farmers' market				90.78*	50.73	0.07
Those who do most of the household grocery shopping (primary shopper)				-36.08	86.55	-0.42
Prefecture				38.12	45.89	0.41
Gender				-44.04	59.22	0.46
Child				46.16	55.28	0.40
Marital status				-55.29	57.67	0.34
Knew about fish cradle rice before the survey				227.94**	106.57	0.03
Saw fish cradle rice at a store before the survey				-361.18**	180.75	0.05
Bought fish cradle rice before the survey				503.58*	270.46	0.06
Usually pays at least 2000 yen/5 kg for rice				52.28	56.82	0.92
(Other characteristics)				(included)		
_cons	1103.11***	192.12	0.00	810.43***	236.45	0.00
Obs.	863			664		

Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4 Domicile results

Variable	Coef.	Std. err.	<i>P</i> > <i>z</i>
Starting price X yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	89.75	78.01	0.25
Information on fish cradle rice	69.76	76.86	0.36
Both stimulus and information	114.86	77.03	0.14
Shiga Prefecture x stimulus associated with multifunctionality	-120.08	109.34	0.27
Shiga Prefecture x information on fish cradle rice	-8.85	107.92	0.94
Shiga Prefecture x stimulus and information	-25.20	107.80	0.82
Shiga Prefecture	62.31	77.40	0.42
Constant term	1071.28***	195.57	0.00

Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Feldman 2010) based solely on the information in Table 1. The estimates using a probit model indicated that participants were willing to pay an average of 2180 yen for 5 kg of fish cradle rice. The standard margin of error was 23.3 yen.

Effects of Priming and Information

We estimated consumers' willingness to buy fish cradle rice using a probit model (Lopez-Feldman 2010), based on data obtained by a double-bound dichotomous-choice method with an open-ended follow-up question format. The goal was to clarify the effects of priming and information regarding fish cradle rice, as well as the determinants of consumers' WTP premiums for this product. Table 2 shows the definitions of the variables used in the estimates and their descriptive statistics. This includes the individual attributes of survey participants, personal data, their knowledge about agriculture and attitude toward imported agricultural products, time preferences, and degree of risk aversion. The estimates are shown in Table 3.

In Table 3, the positive coefficients have a positive impact on consumers' WTP, while negative ones have a negative impact. First, a comparison between estimates 1 and 2 shows there are no statistically significant differences in terms of the effects of the information and stimulus, regardless whether individuals' attributes were considered, since the information and stimulus were given randomly. Second, regarding the change in the price premium for the experimental group that was provided the stimulus alone, the group that was given information alone, and the group that was given both, their reactions were compared with that of the control group, which was given neither the stimulus nor information. After analyzing the differences between the control and experimental

Table 5 Gender results

Variable	Coef.	Std. err.	<i>P</i> > <i>z</i>
Starting price X yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	56.83	77.38	0.46
Information on fish cradle rice	79.99	76.15	0.29
Both stimulus and information	108.88	76.62	0.16
Female x stimulus associated with multifunctionality	-56.54	108.88	0.60
Female x information on fish cradle rice	-33.30	107.60	0.76
Female x stimulus and information	-15.31	107.46	0.89
Female	-42.89	77.07	0.58
Constant term	1,126.83***	196.11	0.00

Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

groups, the group that was given both the stimulus and information showed a higher WTP premium than the control one. The groups given either a stimulus or information also showed a higher WTP, but the amount of the increase was not statistically significant. In other words, the price premium showed a statistically significant increase for groups that had been primed regarding the multifunctionality of agriculture and, at the same time, had been given adequate information about environmentally friendly agricultural products. This indicates that priming and information effects are complementary.

Meanwhile, the second estimate in Table 3 shows the effects of participants' attributes, such as them doing most of the household cooking (primary chefs in the household), consuming "specially cultivated rice" at home, for those who were used to buying rice directly from a farmland or at a farmers' market. These attributes had a significant positive impact on their WTP with respect to fish cradle rice. This means those cautious about pesticides and about where they buy their rice may be more willing to pay environmental premiums. There were also individuals who had known about fish cradle rice, and those who had even bought it before the survey was taken. Their WTP premiums for fish cradle rice were also significantly high. Additionally, respondents familiar with rice in general had high evaluations of fish cradle rice. In fact, most respondents provided their answers based on their own experience of purchasing and tasting rice. Domicile, gender, income, educational background, use of social networking service, risk attitudes, and time preferences did not have a significant impact on the evaluation of fish cradle rice. However, those who had seen fish cradle rice at a store before the survey had low evaluations of the rice, probably because they were negatively influenced by the price.

Subgroup Analysis on Priming and Information Effect

We analyze how consumers with different attributes would respond to a stimulus associated with the multifunctionality of agriculture and to information on agriculture. The following discussion deals with the way various subgroups with differing attributes respond to randomly provided stimuli and information. The subgroup analysis was conducted by introducing interaction terms between the dummy variables representing the subgroups (e.g., gender) and the dummy variables of stimulus and information. If the interaction terms are statistically significant, it shows the *difference* that priming and information have between subgroups. The *level* of priming and information effect for the subgroups can be obtained by summing the effect on the base group and the difference between subgroups. Note there could be a difference in the level of WTP between subgroups without the effects of priming and information.

Table 6 Marital status results

Variable	Coef.	Std. err.	$P > z$
Starting price X yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	145.85	98.55	0.14
Information on fish cradle rice	111.78	98.97	0.26
Both stimulus and information	171.47*	102.40	0.09
Married x stimulus regarding multifunctionality	-171.00	118.39	0.15
Married x information on fish cradle rice	-67.04	117.89	0.57
Married x stimulus and information	-97.31	120.21	0.42
Married	55.75	85.24	0.51
Constant term	1,067.12***	200.63	0.00

Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Children results

Variable	Coef.	Std. err.	<i>P</i> > <i>z</i>
Starting price X yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	-93.75	91.03	0.30
Information on fish cradle rice	27.50	88.36	0.76
Both stimulus and information	-8.24	92.22	0.93
Child x stimulus regarding multifunctionality	190.98*	113.94	0.09
Child x information on fish cradle rice	55.65	111.51	0.62
Child x stimulus and information	166.90	113.86	0.14
Have child/children	-98.13	80.49	0.22
Constant term	1,169.51***	199.97	0.00

Significance level: * *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01

We first analyze the places of domicile in Table 4 by using the interaction term of the stimulus and prefecture. The survey data are from respondents living in Shiga Prefecture, where fish cradle rice is grown, and Kyoto Prefecture, a major urban area located nearby. The hypothesis is that the residents in Shiga Prefecture are sensitive to the priming and information because the public goods supplied by producing cradle rice is supplied locally. However, no significant differences were found between the residents in the two prefectures.

There is also a possibility that gender (Table 5), as well as marital status (Table 6), may lead to different responses to a certain stimulus. However, the survey results indicated no significant differences between men and women in their responses to the stimulus and information. Those who were not married responded more strongly to the stimulus and information, but their responses were not statistically significant.

We analyzed the differences in the priming and information effects between those who have children and those who do not. Generally, those concerned about future generations tended to be more concerned about the environment. Hence, we assumed that the group with children would respond more strongly to a stimulus associated with the multifunctionality of agriculture and information about environmentally friendly agricultural products (Table 7). The results show that those who have children react to a visual stimulus associated with the multifunctionality of agriculture in a significant way. This could be interpreted as a response to priming as an educational aspect of the multifunctionality seen in the photographs in Fig. 2.

Next, we analyzed how individuals with different lifestyles would respond to a stimulus associated with agriculture multifunctionality and information regarding fish cradle rice. We asked the participants whether they were the primary grocery shoppers in their household. The

Table 8 Primary shopper results

Variable	Coef.	Std. err.	<i>P</i> > <i>z</i>
Starting price X yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	250.81***	99.41	0.01
Information on fish cradle rice	188.12	101.35	0.06
Both stimulus and information	254.61***	97.29	0.01
Primary shopper x stimulus associated with multifunctionality	-317.07***	119.06	0.01
Primary shopper x information on fish cradle rice	-170.77	119.49	0.15
Primary shopper x stimulus and information	-213.61*	116.72	0.07
Primary shopper	205.17**	87.14	0.02
Constant term	942.74***	201.81	0.00

Significance level: * *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01

Table 9 Primary cook results

Variable	Coef.	Std. err.	$P > z$
Starting price X yen	0.43***	0.08	0.00
Stimulus associated with multifunctionality	168.89	93.03	0.07
Information on fish cradle rice	82.14	95.91	0.39
Both stimulus and information	207.03	91.00	0.02
Primary cook x stimulus associated with multifunctionality	-212.72	114.95	0.06
Primary cook x information on fish cradle rice	-24.38	115.86	0.83
Primary cook x stimulus and information	-157.75	112.93	0.16
Primary cook	132.01	83.52	0.11
Constant term	1,021.70***	200.22	0.00

Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

primary shoppers provided a significantly lower response to the visual stimulus and information than the non-primary shoppers. (Table 8). The level of the response to the stimulus and information for primary shoppers is small. For example, the response to both the stimulus and information is 41.0 yen for primary shoppers (254.61 minus 213.61) and 254.61 yen for non-primary shoppers. On the other hand, primary shoppers showed a statistically higher evaluation for fish cradle rice (205.17 yen) than non-primary shoppers. Our survey also asked individuals whether they were doing most of the household cooking (primary household cooks). Similarly, the primary cooks provided a significantly lower response to the visual stimulus and information than non-primary cooks (Table 9). The level of the response to the stimulus and information for primary cooks is small. For example, the response to both the stimulus and information is 49.3 for primary cooks (207.03 minus 157.75) and 207.03 for non-primary cooks. On the other hand, primary cooks have a statistically higher evaluation of fish cradle rice (132.01) than non-primary shoppers. This lower response to the stimulus and information by primary shoppers and cooks could be because individuals with enough information about rice or those familiar with the multifunctionality of rice production would have a weaker response when stimulus is provided. According to Lee (2002), individuals tend to develop more positive feelings toward unfamiliar brands after they are primed, since priming can improve the way they process information. However, such a reaction cannot be expected with brands they are already familiar with.

Table 10 Specially cultivated rice consumption results

Variable	Coef.	Std. err.	$P > z$
Starting price X yen	0.46***	0.08	0.00
Stimulus associated with multifunctionality	97.34	71.11	0.17
Information on fish cradle rice	128.72*	69.78	0.07
Both stimulus and information	207.35***	70.95	0.00
Experience of buying "specially cultivated rice" x stimulus associated with multifunctionality	-127.91	107.71	0.24
Experience of buying "specially cultivated rice" x information on fish cradle rice	-103.29	106.93	0.33
Experience of buying "specially cultivated rice" x stimulus and information	-233.29**	106.02	0.03
Experience of buying "specially cultivated rice"	389.44***	77.82	0.00
Constant term	866.62***	189.05	0.00

Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11 Rice buying location results

Variable	Coef.	Std. err.	<i>P</i> > <i>z</i>
Starting price <i>X</i> yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	64.04	69.98	0.36
Information on fish cradle rice	122.81*	68.37	0.07
Both stimulus and information	176.57***	70.12	0.01
Consumption of rice bought from a farmers' market x stimulus associated with multifunctionality	-58.05	109.57	0.60
Consumption of rice bought from a farmers' market x information on fish cradle rice	-103.63	109.46	0.34
Consumption of rice bought from a farmers' market x stimulus and information	-175.62*	107.59	0.10
Consumption of rice bought from a farmers' market	282.93***	77.89	0.00
Constant term	979.30***	190.61	0.00

Significance level: * *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01

Further, we also study how the individuals that consume special rice would respond to a stimulus associated with agriculture multifunctionality and information regarding fish cradle rice. We asked the participants whether they consumed “specially cultivated rice” to determine whether different attitudes on rice safety would impact their responses to a stimulus associated with environmentally friendly production method (Table 10). “Specially cultivated rice” refers to rice produced with at least 50% less chemosynthetic agrichemicals and chemical fertilizers. At the same time, we asked whether participants had bought rice either directly from a farmer or at a farmer’s market over the past year. Rice bought at a farmer’s market or directly from a farmland allows the purchaser to identify the producer more easily, which ensures food safety and satisfaction. The results showed that those who consistently purchased specially cultivated rice or bought rice directly from a farmland or at a farmer’s market, when provided simultaneously with a stimulus and information had a significantly lower response to the stimulus (Table 11). Finally, individuals who buy expensive rice tend to be careful about food safety and taste preferences and react differently to a stimulus associated with an environmentally friendly production method. For this reason, participants were asked whether they were regularly buying rice that cost at least 2000 yen per kilogram (i.e., paying an above-average price for rice). The results showed that participants regularly buying expensive rice, when given a stimulus associated with agriculture multifunctionality and information about environmentally friendly rice production, showed a significantly lower response to the stimulus (Table 12).

These findings can be interpreted similar to the argument on the effect of different lifestyles in Tables 8 and 9. When subjected to a stimulus and information associated with an environmentally

Table 12 Rice price results

Variable	Coef.	Std. err.	<i>P</i> > <i>z</i>
Starting price <i>X</i> yen	0.44***	0.08	0.00
Stimulus associated with multifunctionality	64.04	69.98	0.36
Information on fish cradle rice	122.81*	68.37	0.07
Both stimulus and information	176.57***	70.12	0.01
Usually pays at least 2000 yen/5 kg for rice x stimulus associated with multifunctionality	-58.05	109.57	0.60
Usually pays at least 2000 yen/5 kg for rice x information on fish cradle rice	-103.63	109.46	0.34
Usually pays at least 2000 yen/5 kg for rice x stimulus and information	-175.62*	107.59	0.10
Usually pays at least 2000 yen/5 kg for rice	282.93***	77.89	0.00
Constant term	979.30***	190.61	0.00

Significance level: * *p* < 0.1, ** *p* < 0.05, *** *p* < 0.01

friendly production method, those individuals who think information about rice production and safety is important show a weaker response than those who not. The results may also indicate a strong affinity between safe and environmentally friendly agricultural products. On the other hand, WTP is higher for those who consume special rice. For example, from Table 11, the effect of both the stimulus and information is 1.0 yen for those who buy at farmers' market and 176.57 yen for those who do not, while the WTP for the former group is higher than that of the latter group by 282.93 yen.

Conclusions

This study demonstrated the complementarity between a stimulus associated with agriculture multifunctionality and information concerning environmentally friendly agriculture and also identified the groups more likely to be influenced by such a stimulus and information. Different subgroups showed different responses to the stimulus and information, underscoring the importance of placing subgroups in an environment where they are subjected to both the stimulus and information. The stimulus associated with agriculture multifunctionality greatly influences those who have children and are not the primary grocery shoppers or primary chefs in their households. This stimulus can also be associated with information on environmentally friendly agriculture to influence those who do not purchase specially cultivated rice, or rice directly from the farmers' market, and usually buy cheaper rice.

The main policy implication of this research is that consumers would become more willing to support measures to provide subsidies to environmentally friendly agricultural methods if they recognize the multifunctionality of agriculture and, at the same time, possess information about environmentally friendly farm products. This study also demonstrated the importance of promoting knowledge regarding the multifunctionality of agriculture among individuals who do not have such information to ensure the future development of environmentally friendly agriculture.

This study has implications for the increased consumption of broader range of goods that are beneficial from ethical perspectives such as fair trade. Past studies on ethical consumption, such as Bray et al.'s (2011) pointed to the significant differences between consumers' intentions to consume ethically and their actual purchase behaviors or the "ethical purchasing gap." These past studies identified several impeding factors for ethical consumption. Based on the above findings, we argue that a determinant of ethical consumption is complimentary effect of recognition and appropriate information. Lack of information could impede ethical consumption but mere information may be ineffective if it is not accompanied by enhanced recognition. The survey experimental method introduced by Naoi and Kume (2011) and used in this study, should be useful in improving our understanding of the ethical purchase gap.

Compliance with Ethical Standards

Conflict of Interest The authors declare no conflict of interest.

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