Stated Environmental Consciousness and Preferences: Preliminary Analysis using Experimental Data from the Shipbreaking Area of Chittagong*

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Focusing on the shipbreaking area in Chittagong, Bangladesh, we investigate the WTP of local residents for improvement in the environment around the shipbreaking area and for improvement of the cleanliness of public spaces in their own communities. We extend the research of the willingness-to-pay (WTP) in the following two aspects: First, we investigate residents' preferences such as risk preference and time preference using the method of field experiments. Second, we delve into

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the effect of experience. We obtain several significant results on the relationship between the WTP and personal and community attributes and experience. For example, the age has significantly and negatively influences the WTP. It is also verified that female subjects give less contribution as compared with male subjects. In addition, subjects who have experience of working at the shipbreaking yards and/or who live in communities far from the shipbreaking yards give less contribution as compared with subjects who do not have experience of working at the shipbreaking yards and/or who live in communities near the shipbreaking yards. Moreover, for the WTPSY, the number of living year has a positive effect on the contribution. We also provide possible reasons for these results.

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1 Introduction

Some environmental problems are local, while others are global. When focusing on local environmental problems, voluntary management schemes by local people were observed and considered to be effective.[1)] Whether voluntary schemes can be implemented or not depends on not only the willingness-to-pay (WTP) of local people for public benefits but also their behavior for group projects because they actually have to pay costs for the operation of voluntary schemes.

Even if considering mandatory schemes by local and central governments, whether local people willingly pay for protection of the environment is critical for policy implementation and, accordingly, improvement of local environmental conditions. Without willingness to pay for the environment, governments may face objections to strict environmental

1) For example, in the case of coastal fisheries in Japan, fishers operate resource management schemes voluntarily. See Makino and Matsuda (2005) for the details. For the case of Korean fisheries, see Uchida et al. (2010) among others.

policies.

Economic benefits often play a critical role in the acceptance of environmental protection policies. In particular, in developing countries, people often prefer economic development to environmental protection. In terms of basic microeconomic theory, it is natural to consider that marginal utility from economic development is much greater than that from improvement in the environment for those people. However, we are also able to observe serious environmental problems across the world. Without proper enforcement of environmental laws, environmental degradation causes losses for the present and the future. In such cases, governments have to find a balance between economic benefits and environmental protection policies.

Thus, it is important for local and central governments to know residents' preferences, behavior, and WTP. Optimal policies can be designed according to preferences and values. When their preference is considered to be biased because of ignorance, governments may have to pay for education and diffusion of correct information. Currently, even in developing countries, people are often familiar with the negative effect of pollutants and toxic substances. For example, Bangladeshi people are familiar with the negative health effect of arsenic that is contained in ground water.[2)] Thus, it is meaningful to investigate their WTP.

Focusing on the shipbreaking area in Chittagong, Bangladesh, we investigate the WTP of local residents for improvement in the environment around the shipbreaking area and for improvement of the cleanliness of public spaces in their own communities.

We extend the research of WTP in the following two aspects: First, it is reported that stated WTP may be biased. Thus, we also investigate

2) Education by both NGOs and the government has contributed to the diffusion of this knowledge.

residents' preferences such as risk preference and time preference. Usually, as will be explained later, these preferences influence WTP and behavior. For example, intuitively and theoretically, it is considered that the more farsighted a resident is, the more money s/he is likely to pay for protection of the environment because s/he will receive environmental benefits in the future. Then, we can verify whether the stated WTP is consistent with these preferences. Field experiments developed in Economics are powerful tools to investigate these preferences. The measurement of WTP using field experiments has been carried out for the past decade (Comecho-cuena et al. 2004, Bryan and Jowett, 2010, Chowdhury et al., 2011, Buckley et al., 2012, Amador et al., 2013, Disdier and Merette, 2013).[3] We follow this method.

Second, we delve into the importance of experience.[4] Some local residents may have experienced serious health problems caused by pollutants and toxic materials, or may have experienced an injury because of unsafe conditions of their work places. Some residents are migratory while others are sedentary. The former residents have experiences of moving while the latter residents are familiar with local history. These factors relating to experience may influence preferences and WTP.

The main results for the WTP are as follows. The age has significantly and negatively influences the WTP. It is also verified that female subjects give less contribution as compared with male subjects. Subjects who

3) Experimental methods have been applied to other fields of environmental and resource economics. For example, see Anderson (2004), Anderson and Sutinen (2005), Anderson and Sutinen (2006), Anderson et al. (2008), Nguyen and Leung (2009), Velez et al. (2010) for the case of fisheries management.

4) The effect of experience on risk and time preferences has also been focused on for the past few decades. For example, see Becker and Mulligan (1997), Netzer (2009), Dercon (1996), Harbaugh et al. (2002), Voors et al. (2012).

have experience of working at the shipbreaking yards and/or who live in communities far from the shipbreaking yards give less contribution as compared with subjects who do not have experience of working at the shipbreaking yards and/or who live in communities near the shipbreaking yards. In addition, the number of living year has a positive effect on the contribution. We provide possible reasons for these results. Moreover, we examine the preferences and behavior of subjects in experimental games.

The structure of the paper is as follows: Section 2 and 3 describe the history and situation of the shipbreaking industry and our field experimental survey, respectively. Section 4 examines the preferences and behavior of subjects using the results of experimental games. Section 5 investigates the WTP for improvement in both the shipbreaking area and their own communities. Section 6 provides concluding remarks.

2 Background of the Survey

When large-scale ships such as passenger liners, freighters, and tankers become old, they are scrapped. The average lives of ships depend on the economic and market conditions. When the global economic conditions are good, the demand for transportation increases, and the lives of various types of ships become longer. Moreover, new ships are built and introduced to the transportation industry. In this situation, ship owners do not have incentives to dispose of their ships because the profit dominates the cost of ownership. In contrast, when the economy is stagnant, the demand for transportation drops, and ship owners have incentives to scrap their ships even if they can still be used for transportation.

This large demand fluctuation is one of important features of the ship transportation industry. For the scrapping/recycling industry,

the scrapping behavior of ship owners directly influences the supply condition. In other words, the supply fluctuates over time. Until the 1970s, shipbreaking was mainly performed in developed countries such as the United States, EU, and Japan. However, due to the supply variation, it would have been costly for these countries to maintain the facilities for shipbreaking if the process was capital intensive. Moreover, wages were increasing in this period in developed countries. Thus, it would also have been costly to keep the shipbreaking industry in these countries even if the process had been labor intensive.

Thus, the production shift began from those developed countries to developing countries. First, the industry was relocated to Korea and Taiwan. These countries, however, had experienced economic development by the 1990s, and the same situation, such as wage increases, occurred. Then, the next destination for the shipbreaking industry was the South Asian Countries such as India, Bangladesh, and Pakistan.

In these countries, the shipbreaking process is definitely labor intensive. In the case of Chittagong, many shipbreaking yards occupy part of the beach side by side. We can see old ships and wreckages on the coastline. The processes of shipbreaking are as follows:[5] First, a ship operator runs a scrapped ship aground at high tide. Second, when the tide is low, workers are able to access the ship on foot. They dismantle the ship manually with small machines.

There are merits and drawbacks to this shipbreaking industry for these countries. The merits are as follows: First, this industry provides job opportunities for local people.[6] In particular, there are many poor

5) The description of the processes depends on the field survey and interviews to an owner of one of shipbreaking yards, which was carried out by the authors in June, October, and November 2013.

6) Poorer people often migratory in search of jobs. In this respect, it is possible that workers from an entire country are working at shipbreaking yards.

people in these countries. This opportunity itself is important for them. Second, after being dismantled, almost all parts are reused or recycled. For example, kitchen equipment is often used by local restaurants as they are. Moreover, iron parts are recycled and often used for constructing small buildings.[7] Therefore, shipbreaking contributes to the economy of these countries.

The drawbacks are as follows: A typical problem is environmental pollution. If this industry was located in a developed country, the process would be environmentally friendly because environmental laws have been developed and they are well enforced. Moreover, people are environmentally conscious. Thus, firms are concerned with the environmental effects of their activities. However, environmental laws have not yet been made in many developing countries. Even if they exist, they often do not function effectively. Thus, when ships are dismantled, various types of pollutants are emitted into the sea and the air, which causes serious environmental degradation. Second, health problems are sometimes observed in workers. Toxic materials such as asbestos are often left, as they do not have proper management in those yards. Workers often did not have enough safety tools such as helmets.[8] This situation can lead to health problems and injury of workers.

3 Design of Experimental and Questionnaire Survey

We conducted a series of experimental surveys in February, March, and April in 2014 in the suburban area of Chittagong City, Bangladesh.[9]

7) Because iron deteriorates over time, it is difficult for scrapped iron to be used to construct high-rise up-to-date buildings.

8) The safety tool situations have been improving over the past decade.

9) To be precise, February 23, 24, and 25, March 25 and 26, April 16 and 17. Two sessions were carried out (one in the morning and one in the afternoon) on each day.

Experimental games were conducted by one of the author, Dr. Mohammad Sujauddin, and 5 graduate students of the Chittagong University.[10] The details of the experimental survey are as follows.

3.1 Targeted Area and Subjects

Chittagong City faces the Indian Sea, and has a long-distance beach. Part of the beach has been occupied by shipbreaking yards for the past few decades.[11]

We conducted our experimental and questionnaire survey in 14 communities/subvillages around the shipbreaking area in the suburban area of Chittagong. One session was conducted in each subvillage. 16 subjects participated in each session. In terms of main occupation, residents of 3 subvillages mainly work in trades, those of 8 subvillages are mainly fishers, and those of the other 3 subvillages are mainly farmers. In terms of the distance from the shipbreaking yards, 6 subvillages are far from shipbreaking yards, and the other 8 subvillages are near the shipbreaking yards. See Table 1 for the addresses of those subvillages. In total, 148 male subjects and 76 female subjects participated in our experimental survey.

3.2 Experimental Sessions

We conducted five types of games. In this subsection, we describe four of them which we focus on in this paper: Games 1, 2, 3 and 5. First, we conducted a game (Game 1) to investigate risk preference. We consider that risk preference may be influenced by experience related

10) Dr. Mohammad Sujauddin and the graduate students of the Chittagong University had more than 10 training sessions in June and November 2013 with the authors.

11) For the history and situation of the shipbreaking industry, see Puthucherril (2010) for example.

Table 1. Targeted Communities

ID	Profession	Location
1	Smll scale busiess	Barabkunda, far from ship yard
2	Fishing	Shonaichori, far from ship yard
3	Small scale business	Barabkunda, near ship yard
4	Fishing	Kumira, near ship yard
5	Agriculture	Shonaichori, far from ship yard
6	Small scale business	Bashbaria, far from ship yard
7	Agriculture	Shonaichori, far from ship yard
8	Fishing	Vatiayri, far from ship yard
9	Fishing	Shonaichori, near ship yard
10	Fishing	Shonaichori, near ship yard
11	Fishing	Shonaichori, near ship yard
12	Fishing	Shonaichori, near ship yard
13	Fishing	Kumira, near ship yard
14	Agriculture	Shonaichori, far from ship yard

to environmental and health issues, or risk preference may affect the behavior of people. This game consisted of 3 series of questions: Series 1 consisted of 14 questions, Series 2 consisted of 14 questions, and Series 3 consisted of 7 questions. In total, there were 35 questions. In each question, subjects chose between two alternatives: Choice A and Choice B. Both choices were types of gambles for the subjects. Figure 1(a) shows an example. Consider a situation in which there are 10 balls numbered 1 through 10. If the number 1 ball comes out, those who chose Choice A will receive BDT 200, and those who chose Choice B will receive BDT 340.[12)] If the number 3 ball comes out, those who chose Choice A will receive BDT 200 and those who chose Choice B will receive BDT 25. If the number 6 ball comes out, those who chose Choice A will receive BDT 50 and those who chose Choice B will receive BDT 25. After they completed the record sheet, we drew one numbered card to select 1 question out of 35 questions. We played the game with

12) BDT denotes the Bangladesh currency: Bangladesh Taka. In the period of experiment, 1 US dollar was approximately equal to BDT 75.

the selected question for real money.

Some questions included negative rewards. See Figure 1(b) for example. For this question, if the number 1, 2, 3, 4 or 5 ball comes out, those who chose Choice A will receive BDT 125, and those who chose Choice B will receive BDT 150. On the other hand, if the number 6, 7, 8, 9 or 10 ball comes out, those who chose Choice A will lose BDT 20 and those who chose Choice B will lose BDT 105. Other sample questions are shown in Figure 1(c).

Second, we conducted a question-based game to investigate time preference. Time preference can also be critical for people's environmental behavior because they will receive environmental benefits in the future whereas they have to pay for protection of the environment today. This game consisted of 9 series of questions: each series consisted of 5 questions, which means that there were 45 questions in total. These questions were also simple pairwise choices between two alternatives: receiving an amount of money today (or tomorrow), or receiving a larger amount of money in the future. Figure 2(a) shows a sample question. For this question, if you choose Choice A, you will receive BDT 300 one month from now. If you choose Choice B, you will receive BDT 50 today. Other sample questions are shown in Figure 2(b).

After all subjects completed all of the questions, we put 45 cards in a bingo bag and drew one card to determine which question would be played for real money.[13)]

The third was a type of dictator game. In this game, 8 pairs were made randomly. Each subject did not know who was the partner exactly. One of the pair was a sender of the money, and the other one was a

13) When future payments were incurred, Dr. Sujauddin carried it out. For each of the subjects who met the condition, the contract for the future payment was made among the subject, Dr. Sujauddin, and one of the authors.

	Choice **A**		Choice **B**	
1	Ball Number	Payoff	Ball Number	Payoff
	①、②、③	BDT 200	①	BDT 340
	④、⑤、⑥、⑦、⑧、⑨、⑩	BDT 50	②、③、④、⑤、⑥、⑦、⑧、⑨、⑩	BDT 25

Figure 1 (a). A sample question in Game 1

	Choice **A**		Choice **B**	
29	Ball Number	Payoff	Ball Number	Payoff
	①、②、③、④、⑤	BDT 125	①、②、③、④、⑤	BDT 150
	⑥、⑦、⑧、⑨、⑩	BDT −20	⑥、⑦、⑧、⑨、⑩	BDT −105

Figure 1 (b). A sample question in Game 1

	Choice **A**		Choice **B**	
15	Ball Number	Payoff	Ball Number	Payoff
	①、②、③、④、⑤、⑥、⑦、⑧、⑨	BDT 200	①、②、③、④、⑤、⑥、⑦	BDT 270
	⑩	BDT 150	⑧、⑨、⑩	BDT 25

	Choice **A**		Choice **B**	
16	Ball Number	Payoff	Ball Number	Payoff
	①、②、③、④、⑤、⑥、⑦、⑧、⑨	BDT 200	①、②、③、④、⑤、⑥、⑦	BDT 280
	⑩	BDT 150	⑧、⑨、⑩	BDT 25

	Choice **A**		Choice **B**	
17	Ball Number	Payoff	Ball Number	Payoff
	①、②、③、④、⑤、⑥、⑦、⑧、⑨	BDT 200	①、②、③、④、⑤、⑥、⑦	BDT 290
	⑩	BDT 150	⑧、⑨、⑩	BDT 25

	Choice **A**		Choice **B**	
18	Ball Number	Payoff	Ball Number	Payoff
	①、②、③、④、⑤、⑥、⑦、⑧、⑨	BDT 200	①、②、③、④、⑤、⑥、⑦	BDT 300
	⑩	BDT 150	⑧、⑨、⑩	BDT 25

Figure 1 (c). Other sample questions in Game 1

receiver of the money. Whether each subject is a sender or a receiver was determined randomly after the game was finished. Each subject was given BDT 1500, and played this game as a sender of the money. Each subject decided how much s/he sends to her/his partner, and how much s/he keeps for herself/himself. In other words, in this game,

each subject divided her/his money into two different purposes: for herself/himself and her/his partner.

The fourth game was a public-goods game. It is important to investigate the relationship between preferences and behavior.[14] In this game, each subject became a member of a group that consisted of 4 subjects. Each member decided how much s/he would contribute for a public/group project and how much s/he would use for herself/himself. In other words, in this game, s/he divided her/his money for two different purposes. The members were chosen randomly. In addition, each member did not

1	A	B
	Receive BDT 300 **one** month from now	Receive BDT 50 today

Figure 2 (a). A sample question in Game 2

11	A	B
	Receive BDT 300 **six** months from now	Receive BDT 50 today
12	A	B
	Receive BDT 300 **six** months from now	Receive BDT 100 today
13	A	B
	Receive BDT 300 **six** months from now	Receive BDT 150 today
14	A	B
	Receive BDT 300 **six** months from now	Receive BDT 200 today
15	A	B
	Receive BDT 300 **six** months from now	Receive BDT 250 today

Figure 2 (b). Other sample questions in Game 2

14) As noted above, we conducted the other game that is called *the ultimatum game*. However, because we do not focus on the game in this paper, we omit its description.

know the other members of the group exactly. The contribution became twice as much as the sum of the contribution by 4 members. Then, the doubled contribution was divided equally into each member of the group. This game was repeated 5 times/rounds in total in each session. They could not carry over the payoff to the next round.

3.3 Questionnaire Survey

After the experimental games were finished, we performed a questionnaire survey. We investigated (i) personal attributes, such as age, gender, occupation, and income, (ii) subjects' experiences, such as those of working at shipbreaking yards, (iii) their knowledge on sanitation, asbestos, arsenic, and accidents in shipbreaking yards, and (iv) their WTP for improving the environment around the shipbreaking area and for improving the cleanliness of the public spaces in the communities where they lived (See Table 2). As noted above, we investigated a few community attributes in advance such as main occupations and the distance from the shipbreaking yards.

Table 2. Summary Statistis of Questionnaire Survey

	Maximum	Minimum	Averge	Median	Stdev
Age	80	18	32	35.99	13.99
Income (BDT)	50000	1000	9894.87	8250	6258.19
Living Years	70	0	20.94	20	14.89
Gender	1	0	0.34		
Fisher	1	0	0.25		
SY work	1	0	0.03		
Hearinjury	1	0	0.90		
Near	1	0	0.50		
WTPSY	12000	0	710.47	100	1770.91
WTPC	20000	0	683.10	200	2016.39

4 Preferences and Behavior

In this section, we review the results of the four types of games. In actual, we are able to obtain the shape of utility function related to risk preference of each subject using the answers of Game 1.[15] However, we have not completed the full analysis yet. Thus, we use the number of "more risky answers" for each subject. From Figures 1(c), it is verified that Choice B is riskier than Choice A. Thus, in general, the more frequently a subject chooses Choice A, the more risk aversive s/he is. The maximum number of choosing Choice B is 35, the minimum is 0, the average is 22.44, and the standard deviation is 9.60. Although we examined whether factors such as personal and community attributes influence the risk preference, we could not find significant results except for one factor: Fishers are more risk aversive than other subjects. This result is intuitive.[16]

Similarly, we are able to estimate time discounting parameters using the answers of Game 2. However, we have not completed the full analysis yet. Thus, we use the number of "more present-oriented answers" for each subject. From 2(b), it is verified that Choice B is more present-oriented (myopic) than Choice A. The maximum number of choosing Choice B is 45, the minimum is 0, the average is 31.26, and the standard deviation is 13.05.

The result of Game 3 is as follows. The maximum amount is 150, the minimum amount is 0, the average is 48.62, and the standard deviation is 39.68. For this amount of money determined by each subject as a sender, we obtain significant results on the relationship between this

15) See Tanaka et al. (2010) for the details.

16) For example, see Nguyen and Leung (2009). In addition, when we derive the shape of utlity function, we may be able to obtain clearer relationships between the risk preference and personal/community attributes.

amount of money determined by each subject as a sender and the personal and community attributes.

First, female subjects send less money than male subjects do. The possible reason is that females do not have power to determine how to use their disposable income. Second, subjects who are living near shipbreaking yards send more money than those who are living far from shipbreaking yards. Further survey and analysis are needed to clarify the reason of this relationship. There are other interesting results, although they are not significant. For example, far-sighted subjects are likely to send less money as compared with myopic subjects. Subjects with high income send less money as compared with subjects with low income. There is a possible common reason for these results. Subjects will receive no return by sending money to their partners. Far-sighted and/or high income people are likely to be rational. Thus, they sends less money to their partners as compared with myopic and/or low income people.

The results of Game 5 are interesting. We conducted regression of the amount of money in Game 5 on personal attributes, experience, and a community attribute. The result is shown in Table 3. We use natural logarithm values for the answers of games and income. There are five dummy variables in this estimation: *Gender* is equal to one when a subject is female, *Fisher* is equal to one when a subject is a fisher, *SYwork* is equal to one when a subject has an experience of working at a shipbreaking yard, *Hearinjury* is equal to one when s subject has heard of injury and/or death accidents at shipbreaking yards, and *Near* is equal to one when the community of a subject is near shipbreaking yards. Moreover, *Living* represents the residence number of years. In terms of clearness of the results, we adopt the fourth and fifth rounds for dependent variables.[17)]

17) We did not observe significant terminal effects.

Table 3. Estmation Results for Game 5

	Game 5-3	Game 5-3	Game5-3	Game5-5	Game 5-5
Age			−0.000		0.000
			(−0.172)		(0.075)
Gender			−0.029		0.005
			(−0.838)		(0.128)
Income	0.046*		0.039		0.003
	(1.968)		(1.581)		(0.124)
Fisher	−0.132***	−0.123***	−0.150***	−0.106***	−0.114***
	(−4.144)	(−3.892)	(−3.861)	(−2.780)	(−2.769)
SY work			0.001		−0.123
			(0.010)		(−1.339)
Hearinjury			0.019		0.056
			(0.387)		(1.099)
Living			0.001		0.000
			(0.580)		(0.105)
Near			0.006	−0.061*	−0.061*
			(0.192)	(−1.824)	(−1.779)
G1	0.038**	0.038**	0.040**		0.008
	(2.200)	(2.180)	(2.210)		(0.437)
G2			−0.007		−0.006
			(−0.471)		(−0.406)
G3		−0.025*	−0.027	−0.045***	−0.044***
		(−1.662)	(−1.731)	(−2.820)	(−2.642)
Constant	4.914***	5.418***	5.113***	5.597***	5.504***
	(22.325)	(74.292)	(18.457)	(98.677)	(18.840)
Adjusted R-squared	0.081	0.077	0.065	0.116	0.098
Observations	224	224	224	224	224

The numbers in parentheses are t values. The superscripts ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

First, fishers got less payoff than other subjects. Usually, fishers are poorer than other people on average in rural areas of Bangladesh. Thus, it is possible that they are not used to predict other members' strategy and behave rationally. Second, subjects who send a large amount of money to their partners in Game 3 got less payoff than those who send a small amount of money in Game 3. The possible reason is the same as that for fishers. Third, higher income subjects were likely to get more payoff than lower income subjects. The possible reason is that

higher income people are likely to be good at understanding strategic behavior of other members and, accordingly, predicting their responses. Finally, the risk lovers got more payoff than the risk averters.

5 Stated Willingness-to-Pay

Let us turn now to the WTP of the subjects. Different from the analysis of the payoff of Game 5, we have many zero observed values both types of the WTP. Hence, we adopt Tobit estimation for examining the relationship between the WTP and personal and community attributes and experience. The result is shown in Table 4. In Table 4, WTPSY and WTPC denote the subjects' WTP for improving the environment around the shipbreaking area and that for improving the cleanliness of the public spaces in the communities where they live.

The age has significantly and negatively influences both types of the WTP. This result seems to be consistent with the basic economic theory. In general, the older is a subject, the less far-sighted is s/he. Thus, older people have less incentive to pay for the environment than younger people.

For the WTPC, it is verified that female subjects give less contribution as compared wth male subjects. The same reason for the result of Game 3 can be considered to exist. In addition, subjects who live in communities far from the shipbreaking yards give less contribution as compared with subjects who live in communities near the shipbreaking yards. It is interesting that distance between their living places and the shipbreaking yard has a significant effect on the environmental consciousness. Moreover, for the WTPSY, the number of living year has a positive effect on the contribution. This result suggests that a situation in which poor people migrate frequently for their job search should be improved for environmental policies to work effectively. Although the

Table 4. Estmation Results for WTP

	WTPSY	WTPSY	WTPC	WTPC	WTPC
Age	−0.076***	−0.079***	−0.021**	−0.021**	−0.027**
	(−4.085)	(−4.125)	(−1.963)	(−1.987)	(2.283)
Gender			−0.935***	−1.125***	−0.886**
			(−2.828)	(−3.463)	(−2.541)
Income		−0.262	0.485*		0.491*
		(−0.678)	(1.907)		(1.929)
Fisher		0.257			0.191
		(0.472)			(0.474)
SY work		−1.205		−1.190	−1.155
		(−0.848)		(−1.313)	(−1.276)
Living	0.046***	0.050***			0.013
	(2.602)	(2.793)			(1.171)
Near	0.495		0.879***	0.877***	0.729**
	(1.071)		(2.895)	(2.878)	(2.159)
G1		−0.201			−0.019
		(−0.703)			(−0.106)
G2		−0.116			−0.063
		(−0.4765)			(−0.405)
G3		−0.008			−0.104
		(−0.033)			(0.644)
Constant	5.325***	8.928**	1.996	6.676***	1.793
	(8.357)	(2.249)	(0.798)	(9.961)	(0.637)
Log-likelihood	−505.096	−504.678	−473.933	−474.881	−472.038
Observations	224	224	224	224	224

The numbers in parentheses are z values. The superscripts ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

result is not significant, it is possible that subjects who have experience of working at the shipbreaking yard give less contribution as compared with subjects who do not have such experience.

6 Conclusion

Focusing on the shipbreaking area in Chittagong, Bangladesh, we have investigated the WTP of local residents for improvement in the environment around the shipbreaking area and for improvement of the cleanliness of public spaces in their own communities. We have extended

the research of the WTP in the two aspects: First, we also investigated residents' preferences such as risk preference and time preference using the method of field experiments. Second, we delved into the effect of experience.

As explained in the previous sections, we obtain several significant results (i) on the relationship between behavior of subjects and personal and community attributes and (ii) on the WTP and personal/community attributes and experience. Some of these results are interesting in terms of pure economic theory, while other results are interesting in terms or policy implication.

Implementation of proper environmental policies is important not only for the local environment but also in international aspect. For example, improper environmental policies distort the market prices, which leads to a situation in which the industrial structure based on comparative advantage cannot be achieved.

The results demonstrated in this paper are preliminary. In particular, following the literature, we have to delve into the data of games such as those of risk and time preferences.

References

[1] Amador, F. J., Gonzalez, R. M., Ramos-Real, F. J., 2013. Supplier choice and WTP for electricity attributes in an emerging market: The role of perceived past experience, environmental concern and energy saving behavior, *Energy Economics* 40, 953-966.

[2] Anderson, C. M., Freeman, M. A., Sutinen, J. G., 2008. A laboratory analysis of industry consolidation and diffusion under tradable fishing allowance management. In: Todd, C. L., Kroll, S. and, Shogren, L, J. (eds) *Environmental Economics, Experimental Methods*, pp.29-46. Routledge.

[3] Anderson, C. M., 2004. How institutions affect outcomes in laboratory tradable fishing allowance systems. *Agricultural and Resource Economics Review* 33, 193-208.

[4] Anderson, C. M. and Sutinen, J. G., 2005. A laboratory assessment of tradable fishing allowances. *Marine Resource Economics* 20, 1-23.

[5] Anderson, C. M. and Sutinen, J. G., 2006. The effect of initial lease periods on price discovery in laboratory tradable fishing allowance markets. *Journal of Economic Behavior and Organization* 61, 164-180.

[6] Becker, G. S., Mulligan, C. B., 1997. The endogenous determination of time preference, *Quarterly Journal of Economics* 112, 729-758.

[7] Bryan, S., Jowett, S., 2010. Hypothetical versus real preferences: results from an opportunistic field experiment, *Health Economics* 19, 1502-1509.

[8] Buckley, N. J., Cuff, K., Hurley, J., McLeod, L., Nuscheler, R., Cameron, D., 2012. Willingness-to-pay for parallel private health insurance: evidence from a laboratory experiment, *Canadian Journal of Economics* 45, 137-166.

[9] Camecho-cuena, E., Garcia-gallego, A., Georgantzis, N., Sabater-grande, G., 2004. An experimental validation of hypothetical WTP for a recyclable product, *Environmental and Resource Economics* 27, 313-335.

[10] Chowdhury, S., Meenakshi, J. V., Tomolins, K. I., Owori, C., 2011. Are consumers in developing countries willing to pay more for micronutrient-dense biofortified foods? Evidence from a field experiment in Uganda, *American Journal of Agricultural Economics* 93, 83-97.

[11] Dercon, S., 1996. Risk, crop choice, and savings: Evidence from Tanzania, *Economic Development and Cultural Change* 44, 485-513.

[12] Disdier, A., Marette, S., 2013. Globalisation issues and consumers' purchase decisions for food products: Evidence from a laboratory experiment, *European Review of Agricultural Economics* 40, 23-44.

[13] Harbaugh, W. T., Krause, K., Lise, V., 2002. Risk attitudes of children and adults: Choices over small and large probability gains and losses, *Experimental Economics* 5, 53-84.

[14] Makino, M., Matsuda, H. 2005. Co-management in Japanese coastal fisheries: institutional features and transaction costs, *Marine Policy* 29, 441-450.

[15] Netzer, N., 2009. Evolution of time preferences and attitudes toward risk, *American Economic Review* 99, 937-955.

[16] Nguyen, Q., Leung, P. S., 2009. Do fishermen have different attitudes toward risk? An application of prospect theory to the study of Vietnamese fishermen, *Journal of Agricultural and Resource Economics* 34, 518-538.

[17] Puthucherril, T. G., 2010. *From Shipbreaking to Sustainable Ship Recycling — Evolution of a Legal regime —*, Martinus Nijhoff Publishers.

[18] Tanaka, K., Higashida, K., Managi, S., 2014. A laboratory assessment of the choice of vessel size under individual transferable quota regimes, *Australian Journal of Agricultural and Resource Economics* 58, 353-373.

[19] Tanaka T., Camerer, C. F., Nguyen, Q., 2010. Risk and time preferences: Linking experimental and household survey data from Vietnam, *American Economic Review* 100, 557-571.

[20] Uchida, E., Uchida, H., Lee, J., Ryu, J., Kim, D., 2011. TURFs and clubs: empirical evidence of the effect of self-governance on profitability in South Korea's inshore (maul) fisheries, *Environment and Development Economics* 17, 41-65.

[21] Velez, M. A., Murphy, J. J., Stranlund, J. K., 2010. Centralized and decentralized management of local common pool resources in the developing world: Experimental evidence from fishing communities in Colombia, *Economic Inquiry* 48, 254-265.

[22] Voors, M. J., Nillesen, E. E. M., Verwimp, P., Bulte, e. H., Lensink, R., Van Soest, D. P., 2012. Violent conflict and behavior: A field experiment in Burundi, *American Economic Review* 102, 941-964.