Demand for Secondhand Goods and Consumers' Preference in Developing Countries:
An analysis using the field experimental data of Vietnamese consumers

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Abstract

Using the data from a series of field experiments that were carried out in in Hanoi, Thai Ping, and Thai Hong in Vietnam, we examined the relationship between consumers' preference for secondhand products and consumers' and products' attributes. In particular, we extracted their risk, time, and social cooperative preferences through the experiments. In addition, we surveyed their personal attributes and conducted a type of conjoint questionnaire about motorbikes and fridges. Regarding product attributes, we focused on the age, brand, size, quality labeling, origin, and so on. We found that product attributes influence consumer utility as expected. For example, the Honda brand positively influences consumer utility. Moreover, we obtained several important results about the relationship between personal attributes and demand, in particular, about preference for secondhand products. For example, consumers who are more far-sighted and/or older have stronger preference for secondhand goods compared with the less far-sighted and/or younger consumers; the older and/or male consumers have stronger preference for Japanese brands as compared with the younger and/or female consumers. It is also possible that environmental consciousness affects the preference for secondhand products. We also provide policy implications on quality certification and international trade of secondhand goods.

Keywords: Consumer behavior, Field experiment, Secondhand goods, Time preference

JEL classification: C93, Q53, Q56.

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1. Introduction

Consumers often face choices between new and secondhand goods when they purchase durables, such as cars, motorbikes, fridges, TVs, and personal computers. Some consumers always buy new goods, while other consumers often buy secondhand goods. In some countries, people are reluctant to purchase secondhand goods only because the products are secondhand, while in other countries the fact that a product is secondhand is just one of the several product attributes.

In particular, consumers in developing countries are more likely to buy secondhand goods than those in developed countries when we compare their consumption behaviors on a product coming from the same category. As such, the supply of secondhand goods is greater than the demand in developed countries, while the opposite relationship holds in developing countries. This situation has given rise to international trade of secondhand goods from developed countries to developing countries. According to the trade data of the Japan Customs, it is verified that a constant amount of secondhand vehicles has been exported (see Figure 1).[2]

However, many developing countries have been setting trade barriers on secondhand goods. Most countries, in particular Asian countries, ban the import of secondhand vehicles. Moreover, some countries, such as Vietnam ban the import of secondhand home appliances.[3] There are two possible reasons. First, durables are often important products for developing countries. When an industry that produces consumer durables is still in its infancy, and when

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[2] There was a difficulty to estimate Japan's export of secondhand home appliances. The estimation has become possible for the export of secondhand TVs, fridges, air conditioners, and washing machines since 2008 because the categories for secondhand goods were made for these products in the trade statistics of Japan in 2008.

[3] For the import regulation of Vietnam, see the website of Vietnam Customs. The document number is 12/2006/ND-CP issued in January 23rd, 2006.
http://www.customs.gov.vn/home.aspx?language=en-US
See also the website of the Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes for information on the import ban of Asian countries.
http://www.env.go.jp/en/recycle/asian_net/Country_Information/Import_ctrl_on_2ndhand.html

the government wants to develop the industry, one of the ways for the government to achieve such a goal is to call for foreign direct investment (FDI). From this viewpoint, imports of not only new goods but also secondhand goods may be substituted for the domestically produced goods and, accordingly, those imports may discourage FDI. Thus, trade barriers on secondhand goods may decrease the damage caused by the decrease in FDI.

Second, for the past several decades, environmental pollution and health problems generated by imported wastes have been serious problems in developing countries.[4] If the price of wastes reflects externality cost, trade in wastes may be beneficial for both exporting and importing countries. However, in general, prices do not reflect externality costs and, accordingly, the cost of trade can be greater than the benefit for developing countries. Moreover, the stated purpose of import of secondhand goods is generally the use of those products literally as secondhand goods. However, the real purpose sometimes is to dispose them into landfills in the importing country. This type of trade takes place when the import of wastes is banned while the import of secondhand goods is not.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal regulates the international trade of hazardous wastes. The number of parties is 183, and party countries may be able to restrict imports of secondhand products if they include hazardous wastes and if they are useless as consumer goods.[5] On the other hand, in terms of the rule of the World Trade Organization (WTO), party countries are not able to set import regulations on secondhand products in principle unless they include hazardous wastes that clearly cause serious environmental and health problems in importing countries.[6]

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[4] Kellenberg (2010), Ray (2008), Shinkuma and Huong (2009), and Wong et al. (2007), among others, described real-world situations concerning the trade of used goods and wastes.

[5] The data on the number of parties is based on the website of the Basel Convention http://www.basel.int/. When it comes to the Ban Amendment, which aims at restricting trade in hazardous wastes more severely, the number of countries that ratify the amendment is 82.

[6] Even in such a case, the regulation basically has to satisfy the conditions of National Treatment

Thus, the present situation suggests that we have to delve into the demand side of secondhand goods, in particular, in developing countries that may potentially import large amounts of secondhand goods. Important questions are the following: Is demand for secondhand goods large in these countries? What types of consumers have stronger preference for secondhand goods? Is it really conceivable that import of secondhand goods lead to environmental and health problems? The answers to these questions will give us some policy implications. For example, if new and secondhand products are well differentiated in terms of the consumers in developing countries, and if it is not likely that imports of secondhand products cause serious environmental/health problems, import restrictions on secondhand products should be removed. We tackle these questions by shedding light on consumers' preference for secondhand goods.

Many articles have analyzed the market of secondhand products. For example, Anderson and Ginsburgh (1994), Fudenberg and Tirole (1998), Kumar (2001), and Bond and Iizuka (2014) examined price discrimination between brand-new and secondhand products. However, they mainly considered the price setting behavior of firms that supply new products. In terms of trade in secondhand products, Clerides (2008) empirically examined the welfare effect of trade liberalization of secondhand vehicles, and Clerides and Hadjiyiannis (2008) theoretically investigated on the effect of quality standards on trade in secondhand products. Kinnaman and Yokoo (2011) investigated on optimal policy in the presence of trade of secondhand products.[7] However, in their model, demand was assumed to depend on price and age. Thus, other factors that affect consumption behavior on new and secondhand products were not explicitly taken into consideration. As far as we know, few articles dealt with the demand side of secondhand goods in developing/importing countries

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under the WTO rule.

[7] For the empirical analysis of waste trade, see Van Beukering and Bouman (2001) and Higashida and Managi (2014), among others.

in detail.

To achieve our goal, we carried out a type of field experiment in Vietnam that extracted consumers' preferences, such as risk preference, time preference, and social cooperative preference. The participants of the experiment were also asked to answer types of conjoint questions and a basic questionnaire survey. Thus, we obtained the data needed for obtaining consumers' preferences for secondhand goods and the relationship between demand for secondhand goods and personal attributes including not only the basic attributes such as age and education but also preferences and environmental consciousness.

The reasons why we carried out the survey in Vietnam are as follows. First, Gross National Income (GNI) per capita of Vietnam is approximately 1,900 US dollars.[8] Income level is lower than those of the other major Southeast Asian countries such as Singapore, Malaysia, Thailand, Indonesia, and the Philippines. However, the Vietnamese economy has been growing constantly, and consumer demand for durable goods has been strong. In particular, motorbikes are indispensable for the daily lives of the Vietnamese people. It is also natural for them to purchase every kind of home appliance. Thus, we considered that there is a variety of consumers and, accordingly, we are able to obtain a suitable set of samples for our research purpose. Second, Vietnam imported a large amount of motorbikes and home appliances from developed countries. As of 2015, major firms of developed countries that produce motorbikes and home appliances are operating their own factories in Vietnam. Therefore, Vietnamese consumers still keep buying foreign branded products. In particular, Japanese brands are popular among them. Thus, the Vietnamese market is a good target in terms of international trade. Third, as noted above, import of secondhand products sometimes causes environmental and health problems in developing countries. However, as of 2015, the government of Vietnam is enforcing strict trade restrictions on the import of

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[8] According to World Bank data, GNI per capita was US$ 1,890 as of 2014.
http://www.worldbank.org/en/country/vietnam

secondhand motorbikes and home appliances. The demand for secondhand products is considerably large. Thus, the Vietnamese market is also a good target in terms of environmental issues.

We obtained several important results. First, time and risk preferences of consumers influence the demand for secondhand products. For example, far-sighted consumers have stronger preference for secondhand products than near-sighted consumers do, which may imply that time preference is associated with environmental consciousness. Risk averters have weaker preference for secondhand products than risk takers do because the former consumers want to avoid breakdowns. Second, it is possible that environmental consciousness directly influences the preference for secondhand products. Third, other personal attributes also play important roles in determining the demand for durables. For example, male and/or older consumers are more enthusiastic about Japanese brands than female and/or younger consumers; environmentally conscious and/or highly educated consumers are less enthusiastic about imported products than environmentally unconscious and/or low educated consumers.

The structure of the paper is as follows. Section 2 describes the theoretical background. Section 3 explains the details of the field experiment, the questionnaire survey, and the summary of the data. Section 4 demonstrates the results of logit estimations and also enumerates policy implications. Section 5 provides the concluding remarks.

2. Theoretical Background

In this section, we describe the utility function and clarify the effects of product and personal attributes on the preference for secondhand goods. For simplicity, we used a two-period model, and each consumer i determines her/his consumption schedule for the two periods.[9]

In the beginning of the first period, s/he is able to buy a new product, buy a secondhand

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[9] Our simple two-period model is based on Anderson and Ginsburgh (1994).

product, or buy nothing. When s/he buys a new or secondhand product, her/his utility in the first period is

$$u_{i,j} = x_{i,j}^{\alpha_i}, \quad 0 < \alpha \leq 1, \quad j = N, S, \tag{1}$$

where N and S denote new and secondhand, respectively. α_i can be interpreted as the degree of risk aversion of consumer i. Moreover, $x_{i,j}$ depends on a set of product attributes (such as brands, origins) and a set of personal attributes (such as age and education). Thus, $x_{i,j}$ can be generally written as

$$x_{i,j} = F_j \left(y_1, \cdots, y_l, \cdots, y_L, z_{i,1}, \cdots, z_{i,m}, \cdots, z_{i,M} \right), \tag{2}$$

where y_l and $z_{i,m}$ denote a product attribute and a personal attribute of consumer i, respectively.[10]

A new product can be used for two periods if a consumer wants to, while a secondhand product can be used only for one period. This also implies that after a new product is used for one period, it becomes a secondhand product even if it is not transacted. Thus, in the beginning of the second period, consumers who bought a new product in the first period face the following four choices: sell the product s/he used and buy a new product, sell the product s/he used and buy a secondhand product, keep using the product which s/he bought in the first period, or sell the product s/he used and buy nothing. On the other hand, consumers who bought a secondhand product in the first period have three choices: buy a new product, buy a secondhand product, or buy nothing. The utility of a consumer in the second period is the same as that in the first period.[11]

The prices of both types of products are constant through the periods and are expressed

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[10] Because we used a simple two-period model, we did not include the age of products explicitly. However, if we consider multi-periods, the age of a product also influences utility. In such a case, age can be considered as one of the product attributes.

[11] Consumers who bought nothing in the first period face the same choices as consumers who bought a secondhand product in the first period. However, as noted later, a consumer buys nothing in the beginning of the second period so long as s/he buys nothing in the first period.

by p_j $(j = N, S)$. Observing these prices, each consumer determines her/his consumption schedule for the two periods in the beginning of the first period. For the following analysis, we set up the following assumption.

Assumption: $u_{i,N} > u_{i,S}$, $\quad p_N > p_S$

When s/he buys a new product in each period, the total net surplus is

$$U_{i,NN} = (1 + \beta_i) \cdot (u_{i,N} - p_N + q), \qquad 0 < \beta_i < 1 \tag{3}$$

where β_i and q denote the discount factor of consumer i and the selling price of a secondhand product. It is assumed that the selling price is common to all consumers. Similarly, the total net surpluses when s/he buys a new product in the first period and keeps using it and when s/he buys a secondhand product in each period are

$$U_{i,NO} = u_{i,N} - p_N + \beta_i u_{i,S}, \tag{4}$$

$$U_{i,SS} = (1 + \beta_i) \cdot (u_{i,S} - p_S). \tag{5}$$

It can be verified that the following two types of consumption schedules do not exist. The first one is the schedule in which a consumer buys nothing in the first period and buys either a new or a secondhand product in the second period. In such a case, the total net surplus is

$$U_{i,Oj} = \beta_i (u_{i,j} - p_j). \tag{6}$$

However, it is clear that (6) is smaller than (3) when $j = N$ and that (6) is smaller than (5) when $j = S$. Any consumer will not choose the consumption schedule whose total net surplus is represented as (6).

The second one is the schedule in which a consumer buys a secondhand product in the

first period and buys a new product in the second period. In such a case, the total net surplus is

$$U_{i,SN} = u_{i,S} - p_S + \beta_i (u_{i,N} - p_N + q).$$ (7)

The fact that s/he buys the new product in the second period implies that

$$u_{i,N} - p_N + q > u_{i,S} - p_S .$$

As far as inequality holds, s/he would also choose a new product in the first period. Thus, any consumer will not choose the consumption schedule whose total net surplus is represented as (7).

It was also verified that when the difference between the selling price of a secondhand product (q) and the buying price of a secondhand product (p_S) is small, the consumption schedule in which a consumer buys a new product in the first period and keeps using it in the second period is also excluded. For consumer i to choose this schedule, it must hold that $U_{i,NO} > U_{i,NN}$ and $U_{i,NO} > U_{i,SS}$. From (3), (4), and (5), the following inequality must hold for both conditions above to be held simultaneously:

$$\beta_i u_{i,S} - (1 + \beta)q > u_{i,S} - (1 + \beta)p_S .$$

Thus, if the difference between q and p_S is small, this inequality does not hold because $0 < \beta_i < 1$. This difference is considered small when many dealers of secondhand products enter the secondhand market because this market becomes competitive in such a case. On the other hand, when the difference between q and p_S is relatively large, some consumers may choose the consumption schedule whose total net surplus is represented as (4).

Comparison of (3) and (5) reveals that when the difference between q and p_S is small, time preference does not affect the choice of types of products, new or secondhand, directly. The choice of each consumer depends on the total net surplus by consuming each type of product. However, this does not mean that time preference does not affect the choice at all. It

is possible that time preference influences the evaluation of product attributes of consumers that are factors of F. In such a case, time preference indirectly affects the choice of types of products.

Comparison of (4) and (5) reveals that when the difference between q and p_S is relatively large, time preference directly affects the choice of a consumption schedule. In particular, the greater the discount factor is, the greater the total net surplus given by (4) as compared with that given by (5) is. This implies that the more far-sighted a consumer is, the stronger incentive there is for her/him to buy a new product in the beginning of the first period.

We also introduced the possibility that a secondhand product breaks down and a consumer cannot use it. In this case, the consumer's utility is nil. Let $\gamma\,(0 < \gamma < 1)$ denote the probability that a secondhand product does not break down. Then, from (1), the utility when consumer i buys a secondhand product is

$$u_{i,S} = \gamma\, x_{i,S}^{\alpha_i}. \tag{8}$$

Consider the utility by consuming a new product that is the same as the utility by consuming a second hand product with certain attributes ($\hat{x}_{i,S}^{\alpha_i}$). This means that the condition that

$\gamma\, \hat{x}_{i,S}^{\alpha_i} = x_{i,N}^{\alpha_i}$ is satisfied, which can be rewritten as

$$\ln x_{i,N} = \ln \hat{x}_{i,S} + \frac{\ln \gamma}{\alpha_i}. \tag{9}$$

Because γ is smaller than one, $\ln \gamma < 0$ holds. Thus, the smaller α_i is, the smaller $x_{i,N}$ that satisfies the condition given by (9) is. In other words, the more risk averse a consumer is, the stronger incentive s/he has to buy a new product than a secondhand product.

3. Field Experiment and Questionnaire Survey

We conducted a series of surveys in January, May, and June 2015 in the northern part of

Vietnam. The details of the surveys are described in Table 1. We conducted the survey in Hanoi in January and May, and in Thai Ping and Thai Hong in June.[12] In total, the number of participants is 284, among which male and female subjects are 131 and 153, respectively.[13] Mainly, the targeted people are middle class consumers.

The age distribution of the participants is as follows: 148 participants are younger than 30; 56, 41, and 30 participants are in their thirties, forties, and fifties, respectively; 9 participants are in their sixties or older. We made seven categories for education levels: consumers who did not graduate from elementary school are classified into category 0; 1, 2, and 3 denote elementary, junior high school, high school graduate, respectively; consumers who graduated from vocational school are classified into category 4; 5, 6, and 7 denote junior college, college, and graduate school, respectively. There are 0, 1, 23, 77, 20, 22, 121, and 17 participants who were classified into categories 0, 1, 2, 3, 4, 5, 6, and 7, respectively.

In each session, four or five assistants who speak Vietnamese well conducted the experiment.[14] They gathered the participants in advance through the internet and phone calls.[15] For the operation of the experiment, one of those assistants read the instruction literally. And, when the participants answered the questionnaire, the assistants walked around the room and answered the participants' questions neutrally.

We first conducted the experiment that included six games. Then, when all games were finished, we distributed the sheets of conjoint questions one by one. Finally, we distributed the sheet of the questionnaire.[16] On average, it took three hours and a half to complete one

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[12] The distance between Hanoi and Thai Ping is approximately 100 kilometers, and Thai Ping is in the east of Hanoi. Thai Hong is very close to Thai Ping.

[13] Precisely, we gathered 85, 99, and 100 participants in January, May, and June, respectively.

[14] The names of assistants are Pham Ngoc Hai, Dam Trung Hau, Nguyen Thi Thu Hien, Nguyen Phuong Ngoc, Ha Tuan Anh. The authors acknowledge their assistance.

[15] Because they did not use the random choice of phone numbers, a small degree of sample selection bias may exist. However, observing the results of the experiment and the answers to the conjoint questions and questionnaire, a variety of consumers were included in the sample.

[16] Field experiments have been used widely in economics, including environmental economics. For example, many articles examined willingness-to-pay by using types of field or laboratory experiments. For example, see Jin et al. (2006), Banfi et al. (2012), Hole and Kolstad (2012), Amador

session. We paid VND 300,000 on average. To give participants an incentive to answer the truth, the payment to each participant depended on the outcome of the six games carried out in the experiment.

3.1 Field Experiment

Although we conducted six types of games, we explained three of them in detail whose results are used in the following analysis.[17]

The first one is a game to extract risk preference, which consisted of six questions (see Figure 2). In each question, participants chose between two alternatives: Choice A and Choice B. In each question, by choosing Choice A, a participant gains (or loses) a designated value with certainty, which does not depend on the color of the ball picked from the bag. On the other hand, the gain when choosing Choice B depended on the color of the ball. We chose only one question for real money, and a ball was picked from the lottery bag after the experimental survey was finished. We used the number of choosing Choice B as an explanatory variable in Section 4. This implies that the smaller this explanatory variable is, the more risk averse a participant is.

The second one is a game to extract time preference, which consisted of eight questions, which are shown in Figure 3.[18] Similar to the first game, participants chose between two alternatives for each question: Choice A and Choice B. Participants were paid based on one of their choices, which they chose after the experimental survey was finished. Choice B for each question says that a participant will receive the designated amount of money in the future. Then, when a participant chooses Choice B in the picked question, s/he actually receives the money after the designated period. We use the number of choosing Choice B as an explanatory variable in Section 4. This implies that the smaller this explanatory variable

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et al. (2013), Disdier and Marette (2013), and Tarfasa and Brouwer (2013) among others.

[17] The other games were the game of the dictator, ultimatum, and public goods game.

[18] Basically, these questions are similar to those used by Voors et al. (2012).

is, the more myopic a participant is.

The third one is a game to extract social (cooperative) preferences. In this game, eight pairs were made randomly. Each participant did not know who exactly her/his partner was. Following Offerman (1996) and Park (2000), we used the method of value orientation, which has been used not only in economics but also in other fields such as social psychology. This game consisted of 24 questions, some of which are shown in Figure 4. For each question, the participants had a choice between two alternatives: Choice A and Choice B. Each option specified an amount of points to the participant (x) and an amount to the partner (y). We set up the pairs of amounts of points so that $x^2 + y^2 = 15^2$. Each participant was told that her/his total points would be the sum of the amount s/he kept for her/himself and the amount her/his partner gave to her/him. For example, in the case of Question 3, i) if a participant chooses Choice A and her/his partner chooses Choice A, both s/he and her/his partner receive 20.5 points, ii) if a participant chooses Choice A and her/his partner chooses Choice B, s/he receives 18.1 points and her/his partner receives 23.6 points, iii) if s/he chooses Choice B and her/his partner chooses Choice A, s/he receives 23.6 points and her/his partner receives 18.1 points, and iv) if s/he chooses Choice B and her/his partner chooses Choice B, both s/he and her/her partner receive 21.2 points.

We used each participant's allocation of points to her/himself and her/his partner, calculated the tangent/vector, and classified her/him into one of seven groups. In Figure 5, the horizontal axis measures the total points of 24 questions for herself/himself, while the vertical axis measures the total points of 24 questions for her/his partner. In general, participants with observed vectors lying between degrees −112.5 and −67.5 are classified as *aggressive* (or *Type 1*), participants with vectors between −67.5 and −22.5 are classified as *competitive* (or *Type 2*), participants with vectors between −22.5 and 22.5 are classified as *individualistic* (or *Type 3*), participants with vectors between 22.5 and 67.5 are classified as

13

cooperative (or *Type 4*), and participants with vectors between 67.5 and 112.5 are classified as *altruistic* (or *Type 5*). We added 2 more categories: participants with observed vectors lying between degrees −157.5 and −112.5 are classified as *Type 0*; participants with observed vectors lying between degrees 112.5 and 157.5 are classified as *Type 6*. We used the number of the type directly as an explanatory variable in Section 4. The larger this number is, the more cooperative a participant is.

Figure 6 shows the distribution of participants in Games 1, 2, and 3. The distributions seem to be ordinary ones. In Game 3, the numbers of types 3 and 4 are clearly larger than those of other types. However, this type of distribution is usually observed with this value orientation test.

3.2 Conjoint Questionnaire

After the experiment, we adopted the conjoint analysis method to extract the preferences of Vietnamese consumers for secondhand products. We chose motorbikes and fridges as products.

Most Vietnamese people own motorbikes. Even if a consumer does not own a motorbike today, motorbikes are undeniably one of the important means to commute and, accordingly, a motorbike is a realistic candidate of what s/he will purchase in the near future. Vietnamese consumers are familiar with the prices, quality, and brands of motorbikes. In addition, lots of dealers who sell secondhand motorbikes can be observed, and secondhand motorbikes are a good option for consumers. Thus, we adopted motorbikes as one of the products for our research. We also considered clarifying the relationship between environmental consciousness and preference for secondhand products: whether a consumer cares about saving electric bills may represent environmental consciousness. When we searched for the electrical appliance stores in Hanoi in October 2014 in our pre-experimental survey, we saw

14

secondhand fridges. In addition, the Vietnamese government started a labeling scheme with *stars* that represent the degree of energy saving, which is similar to *energy stars*.[19] As of fall in 2014, this label was attached to almost all of the new fridges in stores, and there is a variety in the number of stars. Thus, we adopted fridges as the second product for our research.

We choose five product attributes for motorbikes: price, product age, mileage, brand, type, and origin. In general, price is definitely an important factor for consumers to determine whether they will purchase a product. According to our pre-experimental survey, the prices of new motorbikes ranged from VND 20 to 100 million, and the prices of new motorbikes for the majority of consumers ranged from VND 30 to 50 million. Thus, we adopted 10, 30, 50, and 70 million as the price levels for a conjoint analysis.[20]

Product age is the most important attribute for our purpose. A positive product age (non-zero) implies that the product is secondhand. We adopted 0, 2, 4, 6 as product ages. We also considered that instead of product age, mileage may play a key role when consumers purchase motorbikes. Thus, we conducted another series of conjoint questions for mileages. The following four levels are chosen: 0, 20,000, 40,000, and 60,000 kilometers.

Sometimes, brand is a key factor when buying a product. In particular, for older Vietnamese people, Honda was a synonym for a motorbike. Whether a motorbike is a scooter or an underbone is also an important factor. In particular, when a woman wears a skirt, it is difficult for her to get on an underbone motorbike. Moreover, some consumers believe that the quality of motorbikes made in Vietnam (or the production skill of domestic workers) is lower than those from foreign (developed) countries. Thus, we also added the place of production in the list of product attributes. We choose Honda and SYM as brands, scooter and underbone as product types, and domestic and imported as origins.

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[19] The maximum number of stars is 5.
[20] The price of 70 million may seem to be too high for secondhand motorbikes. However, some virtual motorbikes in the conjoint questions are new ones. Thus, we adopted these price levels.

We choose six product categories for fridges: price, product age, brand, size, the number of energy stars, and origin. The reasons for choosing price, product age, brand, and origin are similar to the case of motorbikes. We choose 4, 8, 15, and 25 million as price levels, 0, 2, 4, and 6 as product ages. We also choose Hitachi and LG as brands, and domestic and imported as origins.

In the case of motorbikes, consumers usually have a relatively small size of motorbike (125 cc displacement) in mind when they think of using one in their daily lives.[21] This fact does not depend on gender or age. Thus, we did not include the size of motorbikes as product attributes. However, when it comes to fridges, the size or the number of doors matters. In the pre-experimental survey, we asked a type of conjoint questions to consumers by designating the number of doors. However, we found that the number of doors is sometimes confusing, because there are big fridges with few doors and relatively small fridges with relatively many doors. Thus, for accuracy, we adopted the sizes (litter) of fridges as a product attribute and choose 140 and 450 litters as levels. Moreover, as noted above, the Vietnamese government started a labeling scheme with *stars* that represent the degree of energy saving. Thus, we also adopted the number of stars as a product attribute and choose 2 and 5 stars as levels.

The product attributes and levels are summarized in Table 2.

We conducted three series of questions: motorbikes with product ages, motorbikes with mileages, and fridges. For each series, we produced 16 virtual product profiles so that the orthogonality condition is satisfied, and randomly made 8 pairs of profiles. We also chose pairs for participants for each series. In each question, a participant had three choices: buy either product or buy nothing. In total, each participant answered 24 questions. Examples of conjoint questions are shown in Table 3.[22]

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[21] We explained about this point briefly before we began the conjoint survey.
[22] We used the AlgDesign package of R to make these profiles satisfy the orthogonality condition.

3.3 Other Personal Attributes

Finally, participants were asked to answer questions about their personal attributes such as age, gender, education, and so on. For the purpose of this research, we added several important questions that are classified into two categories.

The questions in the first category relate to environmental consciousness. For the analysis in Section 4, we made three variables. The first one is environmental consciousness about general environmental problems. Participants were asked if they were interested in air pollution, water/marine pollution, and global warming, and were given four choices for each environmental problem: (i) I know about it, and am interested in it very much; (ii) I know about it, but I am not very much interested in it; (iii) I do not know much about it, and I am not interested in it; (iv) I have never heard about it. Almost all participants chose (i) or (ii). Thus, we add one point when a participant chooses (i). Because there were three questions, this variable ranged from zero to three. There were 23, 42, 72, and 147 participants with the scores of 0, 1, 2, and 3, respectively.

The second variable is related to disposing behavior in which environmental consciousness may be reflected. Participants were asked if they throw away garbage anywhere other than the trash box when they are outside, and were given five choices: always, often, sometimes, rarely, and never. We add 1, 2, 3, 4, and 5 points for always, often, sometimes, rarely, and never, respectively. 14, 10, 35, 111, and 114 participants got 1, 2, 3, 4, and 5 scores, respectively.

The third variable is related to contribution to environment through cost-saving activities.

Because the package chooses pairs randomly, we sometimes obtain meaningless pairs, which means that every respondent is expected to choose the same alternative. For example, consider the case in which the price of Product A is lower than Product B, and Product A is newer than Product B. Then, it is likely that every respondent will choose Product A than Product B. Only for the survey in June, 2015, we observed some obviously meaningless pairs. Therefore, we excluded those meaningless pairs.

Participants were asked if they care about saving electricity/water, and were given four choices: very much, often, not very much, and not at all. Almost all participants chose very much or often. Therefore, we added 1 point for very much, and 0 point for other choices. 101 participants were given 0 point, while 183 participants were given 1 point.

The questions in the second category are related to experience or knowledge. We made three variables for this category. The first one is experience of selling used goods and wastes. Participants were asked if they sell PET bottles, glass bottles, and cans (steel, aluminum, etcetera) to junk buyers, and were given five choices: always, often, sometimes, rarely, and never. We added 1, 2, 3, 4, and 5 points for never, rarely, sometimes, often, and always, respectively. 10, 33, 113, 79, and 49 participants got 1, 2, 3, 4, and 5 scores, respectively.

The second variable is related to experience of owning secondhand motorbikes, which can be used only for the analysis of preference for secondhand motorbikes. Of the participants, 67 were owners of secondhand bikes, while 216 were owners of new bikes.[23]

The third variable is knowledge about labeling schemes of home appliances, which can be used only for the analysis of preference for secondhand fridges. Participants were asked if they knew about this labelling enforced in Vietnam. We added 1 point for participants who knew this label, while 0 point for participants who did not know this label. 100 participants did not know the label, while 99 participants had knowledge about the label before they came to the survey. The number of participants who answered this question is 199, which was much less than the total number of participants described above. In the sessions carried out in January, we did not include this question in the questionnaire sheet. Thus, participants who participated in the sessions carried out in May and June answered this question.

The details on the indices of variables used in the following analysis and expected signs are described in Table 4.

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[23] The total number is 283 which is smaller than the number of participants. One participant did not answer this question.

4. Results

4.1 Estimation Method

We used multinomial logit to estimate the preference of consumers for motorbikes and fridges.[24] Basic multinomial models used for conjoint analyses assume that the condition of independent of irrelevant alternatives (IIA condition) is satisfied. This condition requires that the choice between certain two profiles/products is not influenced by any other profiles/products. Because it is often indicated that IIA condition is difficult to satisfy, we first conducted estimations of the effects of product attributes using both multinomial logit model and random parameters logit models.[25] We adopted normal and uniform distributions for random parameters as possible approximations of the true coefficient distributions.[26] We used 100 Halton draws in the estimation of the random parameters logit models. First, we assumed that the coefficients of all variables, except for the alternative specific constant (ASC) and price, are randomly distributed. Second, we assumed that only the coefficients of variables that obtained significant results in the first step are randomly distributed.

The results are shown in Tables 5(a), 5(b), and 5(c). In all cases, the results of the basic multinomial logit model are almost the same as those of the random parameters logit models. For almost all estimations, the coefficients of the standard deviation are not significant in the second step. Thus, in the following analysis, we show the estimation results of the basic multinomial logit models.[27]

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[24] We do not provide the basic description of multinomial logit estimation. For example, see Train (2009) for details among others.

[25] For example, Hole and Kolstad (2012) estimated willingness-to-pay for health service jobs by using mixed logit estimation methods.

[26] In fact, we also conducted lognormal distribution because this type of distribution is sometimes used in the literature. However, we obtained no significant results on the distributions.

[27] The fact that the results are almost the same does not mean that there is no heterogeneity among consumers on the coefficients of product attributes. It is considered that normal and uniform distributions do not reflect the true coefficient distributions.

4.2 Results

Let us again focus on Tables 5(a), 5(b), and 5(c) to examine the basic results of only the estimations with product attributes. For all three estimations, we obtained the expected signs for all explanatory variables. The coefficient of *price* is significantly negative, which is intuitive, because higher price is considered to affect consumer net surplus negatively. On the other hand, the coefficients of other variables are significantly positive, which are also intuitive or fit for real situations. As described in Table 4, the variable *P-age/mileage* is larger as the age of a virtual product is younger, or as the mileage of a virtual product is fewer. Thus, the positive coefficient of P-age/mileage implies that consumers prefer newer products to older products. In Vietnam, Japanese brands are popular and, accordingly, the coefficient of *Honda/Hitachi* is considered to be positive. Vietnamese consumers, in particular, female consumers are likely to consider that scooters are stylish than underbone motorbikes. The positive sign of the coefficient of *scooter* suggests this fact. Also, they sometimes consider that the quality of motorbikes made in foreign (developed) countries is higher than those made in Vietnam, which may lead to a positive sign for the coefficient of *import*. The results on the size and number of stars for the estimation of demand for fridges are also natural.

The negative result on alternative specific constants (ASC) is unexpected. This sign implies that the number of consumers who chose to buy neither of the motorbikes lined up in conjoint questions is not negligible. The possible reasons for this result are as follows. First, the production of motorbikes has been increasing for the past few decades, and the import of secondhand motorbikes has been banned, which implies that the supply of new motorbikes has been increasing, while that of secondhand bikes has been relatively small. Then, the price difference between new and secondhand motorbikes has become smaller. In addition,

the disposable income of the middle class has been increasing. Although we included new motorbikes as one of the levels of product age/mileage, many choices were made between two secondhand motorbikes. Thus, participants who have a strong preference for newness might choose "Buy neither of the motorbikes." The same situation holds for fridges. The second possible reason is our price setting. Because new motorbikes can exist in profiles, we set price levels so that VND 70 million is the maximum. However, 70 million (and possibly 50 million) may be too expensive for ordinary secondhand motorbikes.

Next, we examine the results of estimations with time, risk, and social cooperative preferences, which are shown in Table 6. All possible cross terms of a product attribute and a preference are taken into consideration. Several interesting results are obtained. First, the coefficients of *time-P-age/mileage* are negative, and some of them are significant. This sign implies that the more far-sighted a participant is, the stronger preference for aged or secondhand products s/he has, which may seem to be counter intuitive. Far-sighted consumers are likely to choose new products because they can be used for longer periods compared to secondhand products. One interpretation is that far-sighted consumers care not only about their own long-term surplus but also for the long-term social benefits. They may consider that their society becomes more sustainable by using secondhand products.

Second, almost all of the coefficients of *risk-P-age/mileage* are negative, and some of them are significant. This implies that the more risk-averting a participant is, the weaker preference s/he has for secondhand products. This result is intuitive and consistent with the theoretical result. Third, the coefficients of *time-Honda/Hitachi* are significantly positive. Far-sighted consumers are likely to care more about the quality of products than short-sighted consumers are. Thus, the positive coefficient implies that the former consumers have an incentive to pay more for products of established brands. Fourth, the coefficients of type-import are significantly negative. This result suggests that the more cooperative a

21

participant is, the less loyalty s/he feels for imported products. Fifth, the coefficient of risk-star is significantly negative, which implies that the more risk averse a participant is, the more seriously s/he cares about the labelling (the number of stars). This result is intuitive, although the labelling may play the role of an index of high quality instead of conveying information on cost saving.

Finally, we examined the results of estimations with other personal attributes, which are shown in Tables 7 and 8. All possible cross terms of a product attribute and a preference are taken into consideration. Several interesting results are obtained.

There are five significant coefficients that are common to both motorbikes and fridges. The coefficients of *year-P-age* are significantly negative. This result implies that the younger a participant is, the weaker preference s/he has for secondhand products. In other words, secondhand is not a serious negative factor for older consumers. The coefficients of *sex-Honda/Hitachi* and *year-Honda/Hitachi* are positive, which is common to both motorbikes and fridges. These results imply that male and/or older consumers are more enthusiastic about Japanese brands than female and/or young consumers are. Moreover, the coefficients of *environ-import* and *education-import* are negative. The results imply that the more environmentally conscious a participant is, and the more educated a participant is, the lower opinion s/he has of imported products. Environmentally conscious consumers may care about the distance of transportation that may be directly proportional to environmental pollution. Moreover, highly educated consumers are likely to take into consideration the true quality of products. Thus, they may not think highly of foreign products only because they are produced in foreign countries. Or, they may be less reluctant to purchase domestically produced products because they are able to evaluate domestic products accurately.

Focusing on the results of the estimations of motorbikes, three additional significant results are observed. The first two coefficients are related to gender difference. The

coefficients of *sex-P-age* and *sex-import* are significantly negative, which implies that male consumers pay less attention to whether a product is new or secondhand and whether a product is imported than female consumers are. The third coefficient is *education-Honda*, which is significantly negative. The more highly educated a participant is, the less attention s/he pays to the Honda brand. This result is consistent with the effect of education on the enthusiasm for Japanese brands. Highly educated consumers may not think highly of Honda motorbikes only because they are produced by Honda.

Focusing on the results of the estimations of fridges, two additional significant results are observed. The coefficient of *Starinfo-P-age* is negative, which implies that a consumer who is familiar with the labeling scheme before s/he came to the venue of the experimental survey considers the age of the product less carefully than does a consumer who did not know about the labeling scheme. If environmentally conscious consumers know the existence of the labeling scheme better than environmentally unconscious consumers do, this result also indicates that environmentally conscious consumers are more likely to prefer secondhand products than environmentally unconscious consumers. The coefficient of Custom-star is significantly positive, which implies that consumers who are familiar with the secondhand markets care about the information of labeling. This result may also suggest that labelling may play the role of an index of high quality.

One caveat should be noted. For some coefficients, the signs vary across estimation equations depending on independent variables. This unstable result may arise because of correlations among independent variables. However, we did not observe any strong correlations among personal attributes. In addition, we focused only on the significant results. Therefore, the results described in this subsection are considered to be the true.[28]

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[28] As noted in footnote 21, we excluded meaningless pairs in the survey carried out in June, 2015. This exclusion weakens the correlations among product attributes.

4.3. Discussion

Having looked at the results of the estimations, we now consider policy implications.

First, we focused on the behavior of far-sighted, environmentally conscious, and/or highly educated consumers. What is common among these three types of consumers is that they increase with economic development in general. From the review of the results, we saw that far-sighted and/or environmentally conscious consumers have stronger preference for secondhand products. And, environmentally conscious and highly educated consumers are less enthusiastic about imported products compared to environmentally unconscious and low educated consumers. In general, consumers classified into these three categories are easily able to access information on quality and environmental aspects of products. Combining these points, it can be said that the removal of import restrictions itself does not lead to serious environmental pollution because the users of those secondhand products are likely to care about the environmental aspects of products in the consumption stage.

Second, we focused on the strong preference for new products. As noted above, ASC is negatively significant, which suggests the possibility that ordinary Vietnamese consumers basically think about purchasing new products. And, younger consumers are verified to be more enthusiastic about newness than older consumers are. Combining these results with the results on the coefficients relating to origin/import, even if trade in secondhand products is liberalized, domestically produced new motorbikes will not lose market share. It is likely that new and secondhand products are well-differentiated.

Third, we investigated the importance of the labeling scheme on secondhand products. As noted in the previous subsection, the results of the coefficients relating to the labeling scheme on fridges/home appliances suggest that consumers consider labeling as an index of high quality. However, this type of labeling should also convey information on environmental and health problems. In general, prices are unlikely to reflect the

environmental values of products, because environmental values include external benefits. It is also unlikely that prices reflect the value of good health because of the asymmetric information between producers and consumers. Introduction of information transmission systems through the markets mitigates the degree of the problem.

According to the result of the coefficient on risk preference, risk averters do not like secondhand products. One important reason for this situation is that Vietnamese consumers do not trust the quality of secondhand products. Thus, it is important to introduce reliable labeling or information transmission schemes on secondhand products. Introduction of these schemes enhances the value of branded secondhand products, because labeling can play a role in guaranteeing quality. It is also important for this type of labeling to convey environmental information. Then, an increase in imports of secondhand products is not directly connected to serious environmental pollution. Consequently, trade liberalization of secondhand products consorts with environmental protection.

5. Conclusion

In this paper, we delved into the demand side of secondhand products by using field experimental data carried out in the northern part of Vietnam. In particular, we examined if the demand for secondhand products is large in Vietnam, what types of consumers have stronger preference for secondhand goods, and if imports of secondhand goods are directly connected to environmental and health problems.

We obtained a set of interesting results on (i) the relationship between product attributes and demand and (ii) the relationship between product and personal attributes. Those results provide important policy implication on trade and the environmental aspects of secondhand products. Although it is possible that the situation on preference for secondhand products varies across countries, we believe that the importance of investigating the issue of

secondhand products in terms of both demand and supply is verified.

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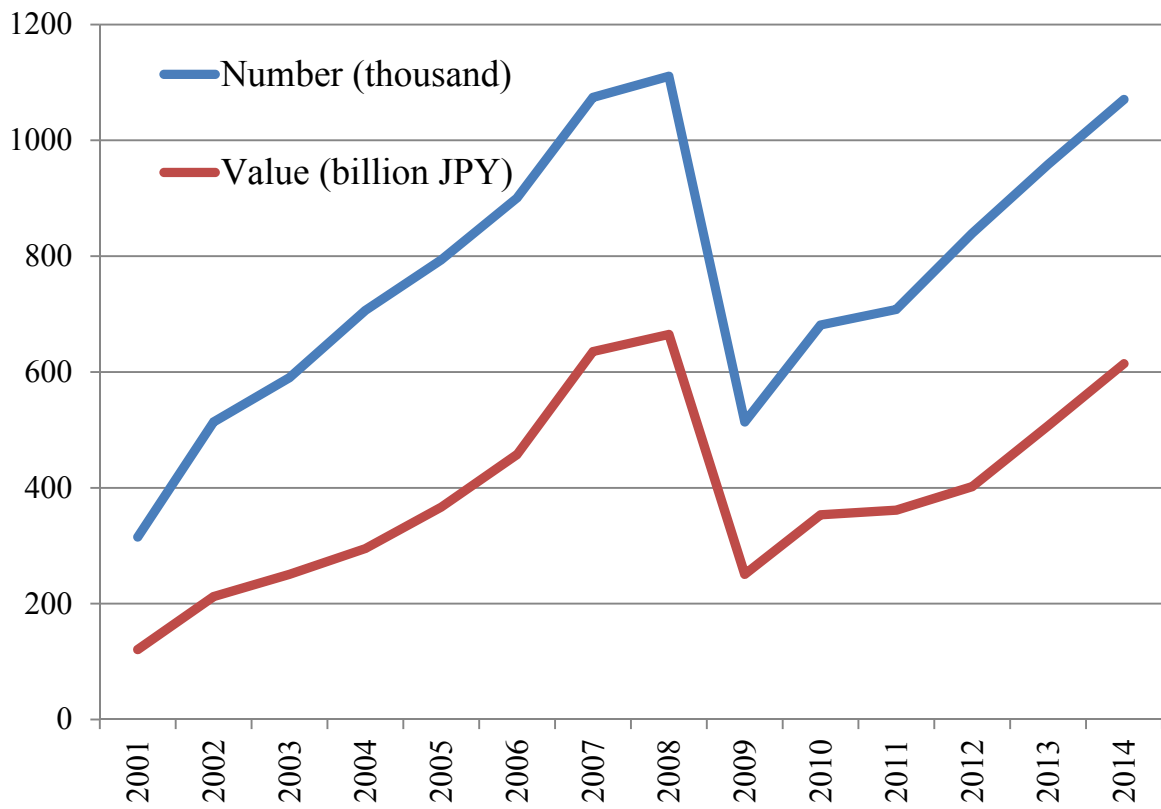
Figure 1. Japan's export amount of secondhand vehicles.
Source: Trade statistics, the Japan Customs

Game 1

****

ID Number _____

Date: _____ Time: ☐ Morning ☐ Afternoon

Choose Option A or Option B for each of the following questions.

1

Choice A		Choice B	
Payoff		Color of the ball	Payoff
		●●●	VND 60,000 + VND 60,000
VND 60,000 + VND 15,000		○○○○○○○	VND 60,000 + VND 0

2

Choice A		Choice B	
Payoff		Color of the ball	Payoff
		●●●	VND 60,000 + VND 60,000
VND 60,000 + VND 18,000		○○○○○○○	VND 60,000 + VND 0

3

Choice A		Choice B	
Payoff		Color of the ball	Payoff
		●●●	VND 60,000 + VND 60,000
VND 60,000 + VND 21,000		○○○○○○○	VND 60,000 + VND 0

4

Choice A		Choice B	
Payoff		Color of the ball	Payoff
		●●●	VND 60,000 − VND 60,000
VND 60,000 − VND 15,000		○○○○○○○	VND 60,000 − VND 0

5

Choice A		Choice B	
Payoff		Color of the ball	Payoff
		●●●	VND 60,000 − VND 60,000
VND 60,000 − VND 18,000		○○○○○○○	VND 60,000 − VND 0

6

Choice A		Choice B	
Payoff		Color of the ball	Payoff
		●●●	VND 60,000 − VND 60,000
VND 60,000 − VND 21,000		○○○○○○○	VND 60,000 − VND 0

Figure 2.   Questions of the game of risk preference

1	A	B
	Receive VND 40,000 today	Receive VND 40,000 two weeks from now

2	A	B
	Receive VND 40,000 today	Receive VND 40,400 two weeks from now

3	A	B
	Receive VND 40,000 today	Receive VND 40,800 two weeks from now

4	A	B
	Receive VND 40,000 today	Receive VND 42,000 two weeks from now

5	A	B
	Receive VND 40,000 today	Receive VND 44,000 two weeks from now

6	A	B
	Receive VND 40,000 today	Receive VND 56,000 two weeks from now

7	A	B
	Receive VND 40,000 today	Receive VND 68,000 two weeksfrom now

8	A	B
	Receive VND 40,000 today	Receive VND 80,000 two weeks from now

Figure 3. Questions of the game of the time preference.

31

Game 3

****

ID Number _____

Date: _____ Time: ☐ Morning   ☐ Afternoon

Choose Option A or Option B for each of the following questions.

	Choice A		Choice B
1	You get 0 point		You get 3.9 point
	Your partner get 15 point		Your partner get 14.5 point

	Choice A		Choice B
2	You get 3.9 point		You get 7.5 point
	Your partner get 14.5 point		Your partner get 13 point

	Choice A		Choice B
3	You get 7.5 point		You get 10.6 point
	Your partner get 13 point		Your partner get 10.6 point

	Choice A		Choice B
4	You get 10.6 point		You get 13 point
	Your partner get 10.6 point		Your partner get 7.5 point

Figure 4. Sample questions of the game of social cooperative preference.
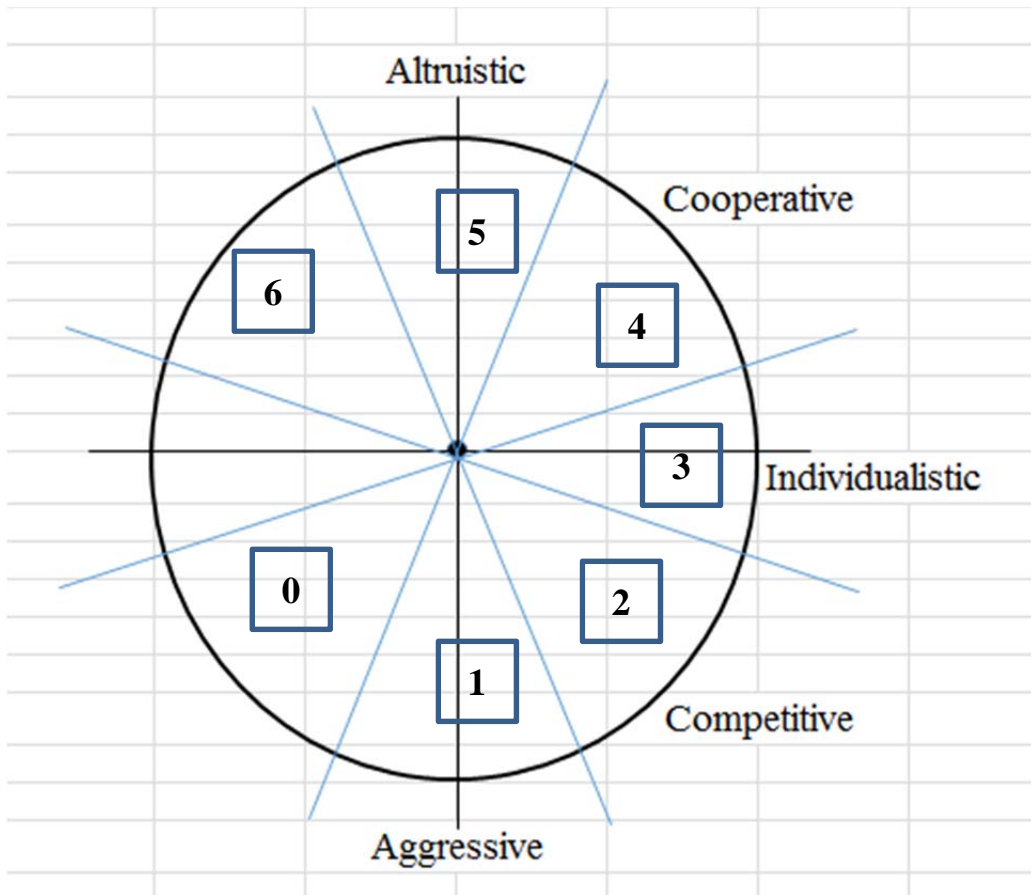
Figure 5. Allocation of points and type classification.

*Horizontal axis measures the total points for herself/himself, while vertical axis measures the total points for her/his partner.
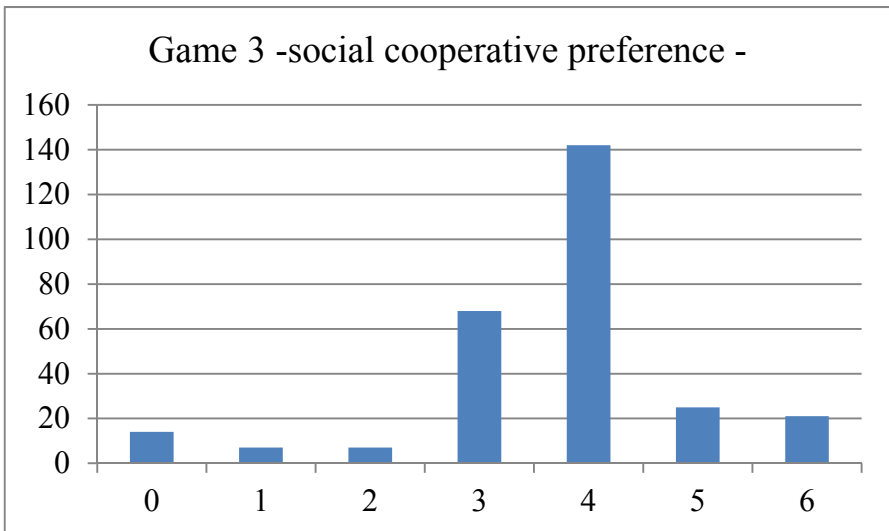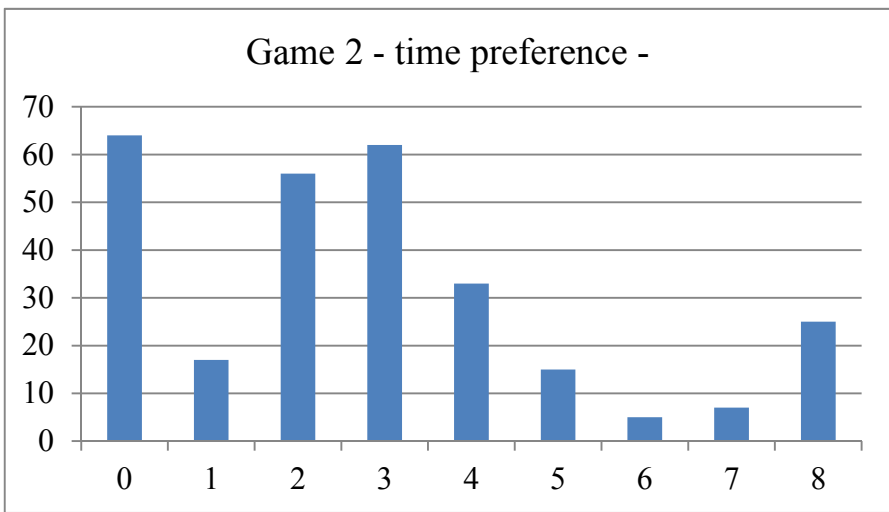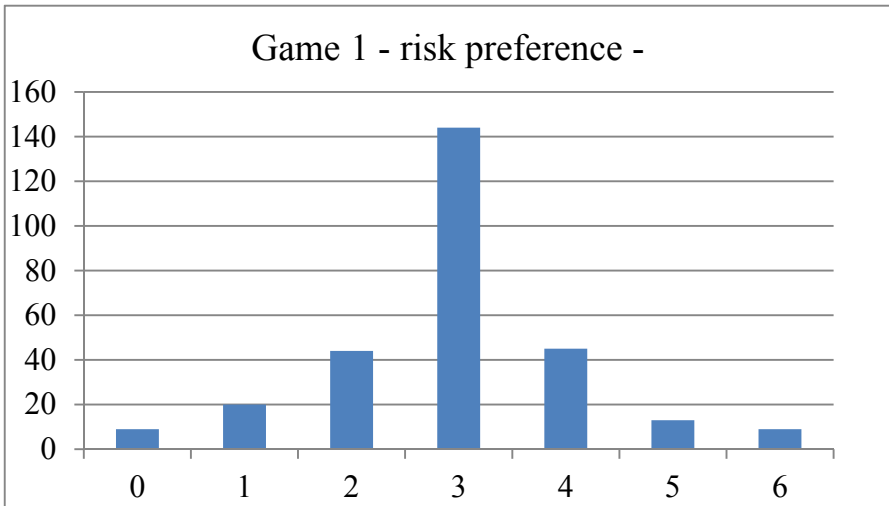
Figure 6. Distribution of subjects in games 1, 2, and 3.

*In Games 1 and 2, the horizontal axis is the number of choosing Choice B.

In Game 3, the horizontal axis is type.

Table 1. Details of Survey

Dates	City	Venue	Number of Sessions	Number of Subjects
January 9, 10, 11, 2015	Hanoi	Hanoi Foreign Trade University	5	17, 15, 18, 21, 14
May 9, 10, 11, 2015	Hanoi	NIIT-ICT Hanoi	5	11, 19, 15, 20, 16, 18
June 6, 2015	Thai Ping	Le Hong Phong Secondary School	2	18, 18
June 7, 8, 2015	Thai Hong	Thai Hong Commune People's Committee Meeting Hall	4	17, 16, 15, 16

Table 2. Product Attributes and Levels

Motorbike

Product Attribute	Level 1	Level 2	Level 3	Level 4
Price (1 million)	10	30	50	70
Prouct age (Mileage km)	0 (0)	2 (20000)	4 (40000)	6 (60000)
Brand	Honda	SYM		
Type	Scooter	Underbone		
Origin	Imported	Domestic		

Fridge

Product Attribute	Level 1	Level 2	Level 3	Level 4
Price (1 million)	4	8	15	25
Product age	0	2	4	6
Brand	Hitachi	LG		
Size (litter)	140	450		
Energy star	☆☆☆☆☆	☆☆		
Origin	Imported	Domestic		

Table 3. Sample questions

Q1

Motorbike A

Price	30
Product age	0
Brand	Honda
Type	Underbone
Origin	Domestic

Motorbike B

Price	10
Product Age	6
Brand	SYM
Type	Scooter
Origin	Domestic

1. Buy motorbike A
2. Buy motorbike B
3. Do not want to buy either A or B

Q1

Motorbike A

Price	30
Mileage	40,000
Brand	Honda
Type	Underbone
Origin	Domestic

Motorbike B

Price	30
Mileage	20,000
Brand	SYM
Type	Scooter
Origin	Imported

1. Buy motorbike A
2. Buy motorbike B
3. Do not want to buy either A or B

Q1

Fridge A

Price	800
Product age	0
Brand	LG
Size	140
Energy star	☆☆
Origin	Imported

Fridge B

Price	1,500
Product age	2
Brand	Hitachi
Size	450
Energy star	☆☆☆☆☆
Origin	Domestic

1. Buy fridge A
2. Buy fridge B
3. Do not want to buy either A or B

Table 4. Details of Variables

Attribute	Variable	Details	Expected Sign
Product Attributes	Price	unit - VND 10,000	—
	P-age/Product age	old - 1, 2, 3, 4 - new	+
	Mileage (motorbike)	long - 1, 2, 3, 4 - short	+
	Honda (motorbike)	SYM=1, Honda=2	+
	Hitachi (fridge)	LG=1, Hitachi=2	+
	Size (fridge)	140L=1, 450L=2	+
	Scooter (motorbike)	Underbone=1, Scooter=2	+
	Star (fridge)	energy star, 2-star(☆☆)=1, 5-star (☆☆☆☆☆)=2	+
	Import	origin, Domestically produced=1, Imported=2	+
Personal Attribute - Preference -	Time	time preference, the number of choosing Choice B	
	Risk	risk preference, the number of choosing Choice B	—
	Type	social cooperative preference, type -0,1,2,3,4,5,6-	
Personal Attribute - Environmental Consciousness -	Environ (motorbike)	environmental consciousness, behavior of disposing cans/bottles	
	Environ (fridge)	environmental consciousness, attitude to environmental issues	—
	Saving	attitude to saving	+
Personal Attribute - Experience -	Custom	experience of selling used cans and bottles to junk buyers	
	Owner	owner of a secondhand motorbike	
	Starinfo	knowledge about the labeling scheme for home appliances	
Personal Attribute	Sex	Female=0, Male=1	
	Year	Age	
	Education	Education level,	

Table 5(a): Basic Results on Product Attributes (Moterbike with Age)

	Bike-Age	Bike-Age	Bike-Age	Bike-Age	Bike-Age
ASC	-2.982***	-3.022***	-2.994***	-3.036***	-2.981***
	(0.209)	(0.218)	(0.211)	(0.222)	(0.210)
price	-1.176e-04***	-1.208e-04***	-1.181e-04***	-1.225e-04***	-1.170e-04***
	(1.506e-05)	(1.592e-05)	(1.536e-05)	(1.633e-05)	(1.538e-05)
product age (P-age, newness)	0.584***	0.608***	0.589***	0.624***	0.580***
	(0.032)	(0.039)	(0.035)	(0.043)	(0.035)
honda	0.783***	0.827***	0.790***	0.848***	0.778***
	(0.066)	(0.073)	(0.068)	(0.077)	(0.068)
scooter	0.194***	0.186***	0.194***	0.165***	0.198***
	(0.067)	(0.067)	(0.064)	(0.073)	(0.067)
import	0.340***	0.341***	0.340***	0.351***	0.337***
	(0.070)	(0.073)	(0.069)	(0.075)	(0.070)
SD age		-0.014		-0.010	
		(0.168)		(0.300)	
SD honda		0.097		0.189	
		(0.270)		(0.484)	
SD scooter		0.101		0.618**	-0.348
		(0.272)		(0.300)	(0.351)
SD import		0.410**	0.189	0.690**	0.014
		(0.163)	(0.216)	(0.282)	(0.489)
Distribution		Normal	Normal	Uniform	Uniform
Number of Events	2272	2272	2272	2272	2272
Log-likelihood	-2188.6	-2187.3	-2188.4	-2186.9	-2187.4
AIC	4389.188	4394.695	4390.766	4393.844	4390.849

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

Table 5(b): Basic Results on Product Attributes (Moterbike with Mileage)

	Bike-Mileage	Bike-Mileage	Bike-Mileage
ASC	-3.137***	-3.177***	-3.176***
	(0.217)	(0.222)	(0.222)
price	-1.355e-04***	-1.400e-04***	-1.398e-04***
	(1.534e-05)	(1.539e-05)	(1.536e-05)
mileage (newness)	0.550***	0.578***	0.575***
	(0.032)	(0.038)	(0.038)
honda	0.950***	0.991***	0.991***
	(0.074)	(0.083)	(0.083)
scooter	0.268***	0.267***	0.268***
	(0.069)	(0.073)	(0.073)
import	0.380***	0.375***	0.375***
	(0.067)	(0.073)	(0.073)
SD mileage		-0.042	-0.081
		(0.158)	(0.272)
SD honda		0.213	0.340
		(0.227)	(0.406)
SD scooter		0.142	0.249
		(0.252)	(0.432)
SD import		0.308	0.523
		(0.202)	(0.337)
Distribution		Normal	Uniform
Number of Events	2182	2182	2182
Log-likelihood	-2110.8	-2108.6	-2108.9
AIC	4233.665	4237.272	4237.728

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

Table 5(c): Basic Results on Product Attributes (Fridge)

	Fridge	Fridge	Fridge	Fridge	Fridge
ASC	-4.450***	-4.586***	-4.476***	-4.601***	-4.453***
	(0.297)	(0.325)	(0.308)	(0.325)	(0.301)
price	-5.254e-04***	-5.867e-04***	-5.333e-04***	-5.904e-04***	-5.265e-04***
	(4.697e-05)	(5.172e-05)	(4.810e-05)	(5.193e-05)	(4.621e-05)
product age (P-age, newness)	0.600***	0.645***	0.609***	0.648***	0.602***
	(0.036)	(0.042)	(0.038)	(0.042)	(0.036)
hitachi	0.225***	0.255***	0.227***	0.259***	0.225***
	(0.069)	(0.081)	(0.073)	(0.081)	(0.071)
size	0.732***	0.803***	0.743***	0.810***	0.734***
	(0.075)	(0.086)	(0.080)	(0.086)	(0.077)
star	1.390***	1.514***	1.407***	1.530***	1.392***
	(0.076)	(0.086)	(0.084)	(0.099)	(0.079)
import	0.138**	0.131*	0.139*	0.129	0.138**
	(0.068)	(0.078)	(0.072)	(0.079)	(0.070)
SD age		0.001		0.011	
		(0.182)		(0.311)	
SD hitachi		0.285		0.462	
		(0.254)		(0.447)	
SD size		0.000		0.071	
		(0.320)		(0.547)	
SD star		0.689***	0.362**	1.207***	0.190
		(0.141)	(0.153)	(0.217)	(0.417)
SD import		0.091		0.203	
		(0.296)		(0.499)	
Distribution		Normal	Normal	Uniform	Uniform
Number of Events	2269	2269	2269	2269	2269
Log-likelihood	-2077.6	-2068.6	-2075.4	-2067.5	-2077.5
AIC	4169.109	4161.265	4166.857	4158.900	4170.996

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

Table 6. Results with Risk, Time, and Social Cooperative Preferences

	Bike-Age	Bike-Age	Bike-Age	Bike-Mileage	Bike-Mileage	Bike-Mileage	Fridge	Fridge	Fridge
ASC	-2.985***	-2.986***	-3.000***	-3.140***	-3.134***	-3.137***	-4.450***	-4.453***	-4.452***
	(0.210)	(0.210)	(0.211)	(0.218)	(0.218)	(0.218)	(0.296)	(0.297)	(0.297)
price	-1.118e-04***	-1.184e-04***	-1.186e-04***	-1.355e-04***	-1.370e-04***	-1.371e-04***	-5.291e-04***	-5.275e-04***	-5.299e-04***
	(1.508e-05)	(1.511e-05)	(1.515e-05)	(1.535e-05)	(1.539e-05)	(1.541e-05)	(4.706e-05)	(4.704e-05)	(4.725e-05)
P-age/mileage (newness)	0.751***	0.709***	0.640***	0.709***	0.635***	0.603***	0.689***	0.716***	0.501***
	(0.072)	(0.107)	(0.122)	(0.073)	(0.100)	(0.114)	(0.075)	(0.106)	(0.122)
honda/hitachi	0.784***	0.886***	0.807***	0.953***	1.151***	1.039***	0.227***	0.169	-0.302
	(0.066)	(0.190)	(0.228)	(0.075)	(0.191)	(0.249)	(0.069)	(0.190)	(0.235)
size							0.734***	0.734***	0.395*
							(0.075)	(0.075)	(0.233)
scooter	0.195***	0.193***	-0.248	0.266***	0.268***	0.170			
	(0.067)	(0.067)	(0.242)	(0.069)	(0.069)	(0.254)			
star							1.390***	1.390***	1.890***
							(0.076)	(0.076)	(0.264)
import	0.340***	0.341***	1.021***	0.382***	0.380***	0.666***	0.139**	0.138**	0.891***
	(0.070)	(0.070)	(0.256)	(0.067)	(0.067)	(0.233)	(0.068)	(0.069)	(0.266)
time-P-age/mileage	-0.002	-0.025**	-0.034***	-0.005	-0.015	-0.016	0.003	-0.013	-0.008
	(0.007)	(0.011)	(0.012)	(0.007)	(0.018)	(0.012)	(0.007)	(0.011)	(0.013)
risk-P-age/mileage	-0.041***	-0.043*	-0.030	-0.016	-0.008	0.002	-0.023	-0.020	0.007
	(0.014)	(0.022)	(0.026)	(0.014)	(0.021)	(0.024)	(0.014)	(0.022)	(0.026)
type-P-age/mileage	-0.010	0.021	0.037	-0.026**	-0.005	-0.003	-0.009	-0.005	0.028
	(0.013)	(0.020)	(0.023)	(0.013)	(0.018)	(0.021)	(0.013)	(0.019)	(0.023)
time-honda/hitachi		0.052***	0.029		0.025	0.020		0.039**	0.051**
		(0.019)	(0.023)		(0.020)	(0.026)		(0.019)	(0.024)
risk-honda/hitachi		0.006	0.021		-0.021	0.010		-0.006	0.050
		(0.040)	(0.048)		(0.039)	(0.053)		(0.039)	(0.050)
type-honda/hitachi		-0.072**	-0.044		-0.057*	-0.047		-0.010	0.064
		(0.035)	(0.042)		(0.034)	(0.045)		(0.034)	(0.044)
time-size									0.003
									(0.023)
risk-size									0.067
									(0.048)
type-size									0.033
									(0.044)
time-scooter			0.041			0.013			
			(0.025)			(0.027)			
risk-scooter			0.062			0.008			
			(0.052)			(0.054)			
type-scooter			0.037			0.011			
			(0.044)			(0.047)			
time-star									-0.034
									(0.026)
risk-star									-0.130**
									(0.055)
type-star									-0.003
									(0.048)
time-import			0.003			-0.006			0.009
			(0.026)			(0.025)			(0.027)
risk-import			-0.010*			-0.061			-0.048
			(0.054)			(0.048)			(0.054)
type-import			-0.103**			-0.025			-0.172***
			(0.048)			(0.044)			(0.052)
Number of Events	2272	2272	2272	2182	2182	2182	2269	2269	2269
McFadden Pseudo R-squared	0.088	0.089	0.091	0.085	0.085	0.086	0.115	0.116	0.119
Log-likelihood	-2183.505	-2176.977	-2170.692	-2107.766	-2105.224	-2104.082	-2075.927	-2073.722	-2061.827
AIC	4385.01	4377.954	4377.385	4233.533	4234.447	4244.163	4171.854	4173.444	4167.655

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

Table 7. Results with Personal Attributes

	Bike-Age	Bike-Age	Bike-Mileage	Bike-Mileage
ASC	-3.050***	-3.028***	-3.155***	-3.172***
	(0.215)	(0.214)	(0.022)	(0.219)
price	-1.183e-04***	-1.172e-04***	-1.458e-04***	-1.433e-04***
	(1.540e-05)	(1.530e-05)	(1.556e-05)	(1.540e-05)
P-age/mileage (newness)	0.829***	0.980***	0.655***	0.770***
	(0.214)	(0.086)	(0.197)	(0.081)
honda	0.261	0.339**	1.048**	1.201***
	(0.399)	(0.168)	(0.440)	(0.180)
scooter	-0.591	-0.463***	0.460	0.278***
	(0.438)	(0.168)	(0.457)	(0.070)
import	1.395***	1.138***	0.649	0.395***
	(0.449)	(0.173)	(0.412)	(0.068)
environ-P-age	0.026		-0.012	-0.045***
	(0.028)		(0.026)	(0.017)
owner-P-age	0.028		0.063	0.133***
	(0.070)		(0.066)	(0.041)
custom-P-age	0.004		0.015	
	(0.029)		(0.027)	
sex-P-age	-0.008		-0.047	-0.119**
	(0.061)		(0.056)	(0.048)
year-P-age	-0.011***	-0.011***	-0.003	
	(0.003)	(0.002)	(0.003)	
education-P-age	0.006		0.006	
	(0.020)		(0.018)	
environ-honda	-0.040		-0.006	
	(0.050)		(0.055)	
owner-honda	0.072		0.168	
	(0.128)		(0.145)	
custom-honda	0.019		-0.002	
	(0.053)		(0.058)	
sex-honda	0.336***	0.250***	0.317**	0.193**
	(0.112)	(0.094)	(0.124)	(0.090)
year-honda	0.011**	0.011**	0.007	0.006**
	(0.005)	(0.004)	(0.005)	(0.003)
education-honda	0.026		-0.102**	-0.112***
	(0.036)		(0.040)	(0.021)
environ-scooter	0.071		-0.038	
	(0.056)		(0.060)	
owner-scooter	-0.035		-0.101	
	(0.143)		(0.152)	
custom-scooter	-0.028		-0.019	
	(0.058)		(0.061)	
sex-scooter	-0.184		-0.102	
	(0.124)		(0.130)	
year-scooter	0.018***	0.018***	0.000	
	(0.005)	(0.004)	(0.006)	
education-scooter	0.009		0.022	
	(0.040)		(0.042)	
environ-import	-0.117**	-0.054*	-0.032	
	(0.060)	(0.030)	(0.060)	
owner-import	0.096		0.125	
	(0.144)		(0.138)	
custom-import	0.018		-0.006	
	(0.060)		(0.058)	
sex-import	-0.256**	-0.348***	-0.175	
	(0.126)	(0.100)	(0.120)	
year-import	0.001		0.004	
	(0.005)		(0.005)	
education-import	-0.121***	-0.087***	-0.042	
	(0.040)	(0.019)	(0.038)	
Number of events	2272	2272	2182	2182
McFadden Pseudo R-squared	0.102	0.099	0.096	0.094
Log-likelihood	-2131.114	-2139.337	-2066.886	-2073.95
AIC	4322.228	4304.673	4193.771	4171.901

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

Table 8. Results with Personal Attributes (Fridge)

	Fridge	Fridge	Fridge	Fridge
ASC	-4.444***	-4.436***	-4.046***	-4.040***
	(0.301)	(0.300)	(0.364)	(0.358)
price	-4.990e-04***	-4.947e-04***	-5.113e-04***	-5.340e-04***
	(4.846e-05)	(4.786e-05)	(5.626e-05)	(5.401e-05)
P-age (newness)	0.412**	0.622***	0.530**	0.668***
	(0.201)	(0.147)	(0.237)	(0.056)
hitachi	-0.975**	-0.865***	-1.303***	0.091
	(0.381)	(0.164)	(0.457)	(0.109)
size	1.257***	1.092***	1.274***	0.653***
	(0.368)	(0.152)	(0.450)	(0.116)
star	1.197***	1.390***	0.686	1.341***
	(0.406)	(0.076)	(0.494)	(0.120)
import	1.392***	0.809***	1.681***	0.077
	(0.411)	(0.174)	(0.511)	(0.113)
environ-P-age	0.016		0.028	
	(0.036)		(0.048)	
saving-P-age	-0.017		0.043	
	(0.071)		(0.087)	
custom-P-age	0.050*	0.025	0.050	
	(0.030)	(0.017)	(0.036)	
sex-P-age	0.042		0.155**	
	(0.062)		(0.076)	
year-P-age	-0.005*	-0.005**	-0.008**	
	(0.003)	(0.002)	(0.003)	
education-P-age	0.034*	0.017	0.025	
	(0.02)	(0.017)	(0.024)	
starinfo-P-age			-0.126*	-0.149**
			(0.076)	(0.070)
environ-hitachi	0.038		0.126	
	(0.067)		(0.091)	
saving-hitachi	0.058		-0.050	
	(0.134)		(0.165)	
custom-hitachi	-0.022		0.002	
	(0.056)		(0.069)	
sex-hitachi	0.256**	0.125**	0.169	
	(0.016)	(0.060)	(0.145)	
year-hitachi	0.030***	0.030***	0.035***	
	(0.005)	(0.004)	(0.006)	
education-hitachi	0.005		-0.020	
	(0.038)		(0.047)	
starinfo-hitachi			-0.146	0.085
			(0.147)	(0.134)
environ-size	-0.018		-0.007	
	(0.064)		(0.090)	
saving-size	0.026		0.074	
	(0.129)		(0.166)	
custom-size	0.001		-0.006	
	(0.055)		(0.070)	
sex-size	-0.126		-0.076	
	(0.113)		(0.146)	
year-size	-0.011**	-0.011***	-0.012*	
	(0.005)	(0.004)	(0.006)	
education-size	-0.015		-0.046	
	(0.037)		(0.047)	
starinfo-size			-0.023	-0.084
			(0.147)	(0.136)
environ-star	0.034		-0.049	
	(0.070)		(0.098)	
saving-star	0.127		0.171	
	(0.144)		(0.184)	
custom-star	0.031		0.151**	
	(0.061)		(0.075)	
sex-star	-0.042		-0.051	
	(0.125)		(0.159)	
year-star	0.004		0.006	
	(0.006)		(0.007)	
education-star	-0.042		-0.012	
	(0.041)		(0.052)	
starinfo-star			0.227	0.239
			(0.162)	(0.150)
environ-import	-0.124*	-0.076**	-0.176*	
	(0.070)	(0.031)	(0.101)	
saving-import	-0.218		-0.226	
	(0.143)		(0.188)	
custom-import	-0.071		-0.170**	
	(0.062)		(0.082)	
sex-import	-0.070		-0.088	
	(0.126)		(0.167)	
year-import	-0.004		-0.007	
	(0.006)		(0.007)	
education-import	-0.092**	-0.107***	-0.059	
	(0.041)	(0.030)	(0.054)	
starinfo-import			0.230	0.081
			(0.170)	(0.156)
Number of events	2269	2269	1589	1589
McFadden Pseudo R-squared	0.129	0.127	0.143	0.122
Log-likelihood	-2021.880	-2030.793	-1377.683	-1436.05
AIC	4117.761	4091.586	2839.365	2896.099

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