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Misperception of Consumption: Evidence from a Choice Experiment

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Abstract

We investigate people's different conceptions of the economic term "consumption" when comparing with others. An Internet-based hypothetical discrete choice experiment was conducted with Japanese participants. As in other relative income comparison studies, we found that own consumption and own saving had a positive impact on utility, whereas the consumption and saving of a reference person had a negative impact on utility. However, the results show that the magnitudes of consumption and saving differ in size; saving could affect utility much more than consumption for the Japanese subjects. By using scope tests, we found that the impact of own consumption is not monotonic and so does not necessarily increase utility. This calls into question the conventional assumption of the monotonicity of "the utility of consumption"; consumption could be perceived as a negative good. Our results, therefore, provide some evidence that, in reality, people understand and perceive the economic terms differently from what economists would expect. Furthermore, when considering the consumption of others as well as their own, the size of the discrepancy is even bigger.

JEL Classification: C91 ; A13 ; D91 ; J17

Keywords: Relative Utility; Choice Experiment; Misperception of Economic Terms

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1 Introduction

Consumption is obviously a central notion for economics, as it is one of the essential factors in the optimization of households' utility functions. In theory, we often take it for granted that total income is the sum of consumption and saving in the budget constraint. Therefore, not only theorists but also experimental economists tend to innocuously assume that an increase in consumption would increase utility, as it is well-known that an increase in income does increase utility (general monotonicity assumption of the utility function, Layard et al. (2008)). Our interests lie in how individuals allocate their budgets into savings and consumption in a way that maximizes their utilities. Therefore, unlike other relative income studies, we examine the roles of consumptions and savings separately.

This paper provides some empirical evidence of different perceptions of consumption in economic experiments, suggesting that subjects in experiments may have a different understanding of this important technical term in economics. More specifically, from the results in our situational choice tasks about allocation of consumption and saving under a budget constraint, we point out the possibility that consumption could be perceived as a "bad", which would decrease the utility of the individuals in the Japanese sample. This is different from the standard assumption that an increase in consumption would increase the level of utility.

In this study, we employed a hypothetical discrete choice experiment strategy that Yamada and Sato (2013) exploited to estimate the direction and intensity of social preferences in terms of income comparisons. While Yamada and Sato (2013) provided a variety of results for income comparisons, there remain open questions. Among these issues, one important topic is that researchers are not clear about which measures people use to form comparisons with others. Namely, as Fliessbach et al. (2007) suggested, it may not be all about income comparisons, but it could also be about consumption or saving comparisons, for instance.

Our strategy to measure the importance of relative comparison is to ask subjects hypothetical questions regarding their choices between two different imaginary societies, where their choice reflects their concern for relative positions. Hypothetical discrete choice experiments have been widely used in order to investigate in which dimension people tend to compare themselves to others. Solnick and Hemenway (1998), Johansson-Stenman et al. (2002), Alpizar et al. (2005), Carlsson et al. (2007), and Yamada and Sato (2013) design hypothetical discrete choice experiments in which participants are asked to choose their preference over given alternative situations, where different absolute and relative income attributes are presented. They find that participants consider the relative income as much importantly as the absolute income.[1]

We contribute to this literature by using a similar hypothetical discrete choice experiment except that in this study, subjects are asked to choose from situations defined over sets of consumption and saving, instead of situations defined merely over income levels. In our experiments, the Japanese participants made repeated choices between alternative societies, described by an imaginary consumption and saving level for themselves as well as the consumption and saving level of others, which subjects might use as references to

[1] Mujcic and Frijters (2013) considered income rankings in hypothetical discrete choice questions, showing that ranking matters more than absolute levels of income.

evaluate their own circumstances. For example, in one situation the subject's consumption is given as 3 million yen and the saving as 3 million yen, while the reference person's consumption is given as 4 million yen and the savings as 4 million yen. In the alternative situation the participant's consumption is 2 million yen and the saving is 2 million yen, but the reference person's consumption and saving are both 1 million yen. If the participant cares more about absolute terms, he would prefer the first situation. On the other hand, if he cares about relative terms, he would choose the second situation, where he is richer than the reference person. However, as we split income into consumption and saving, it could be more complicated for a participant to decide in which situation he would be happier. As long as the budget constraints are satisfied, conventionally, economists simply assume that the sum of consumption and saving is the income for the current period so that the distinction between the two components may not be very interesting (except for the associated topic of intertemporal choice and time discounting). However, evidence from our original Internet-based survey showed that things may not be as simple as economists presume.

The results from our hypothetical choice experiment shows that people usually prefer situations with higher own consumption and higher own saving, and lower reference consumption and lower reference saving. If we take this into account in a theoretical model in which we assume that income is the sum of consumption and saving, this result goes in the same direction as the relative income comparison literature, which claims that people become happier when they become richer and become less happy when others become richer, due to envy (Clark et al. (2008), Alesina et al. (2004), Luttmer (2005), Ferrer-i Carbonell and Frijters (2004), Clark et al. (2009)). However, the respective impacts of consumption and saving on utility are found to be very different in terms of magnitude. While own saving has a large positive impact when choosing between situations, own consumption seems to have much less of an effect. To discover the rationale behind this effect, we conducted scope tests using different categories of consumption and saving levels. The results of these scope tests are very interesting: own consumption does not monotonically increase utility, whereas the impacts from other factors, such as own saving, reference consumption and reference saving, remain monotonic. There are two possible explanations for these puzzling results: (1) the subject may perceive the term 'consumption' differently when it comes to themselves, or (2) the term 'consumption' is not correctly interpreted by the respondent.

In the psychological literature, asymmetry in human perception and ratings has been widely studied. People tend to think differently when it comes to themselves. They think more subjectively when a topic concerns themselves and objectivity can be more easily maintained when they judge others. In particular, there is the so-called optimism bias (Smith and Fontaine (1995 Aug)). For example, people tend to have optimistic expectations for their own health. Optimism bias could also explain why people tend to overrate themselves while being accurate when rating others. On average, subjects evaluated their performance slightly more positively than either their peers or observers do, which John and Robins (1994) tried to explain with the term 'narcissism'. Taylor and Brown (1988) suggest that overly positive self-evaluations, exaggerated perceptions of control or mastery, and unrealistic optimism are characteristic of normal human thought. Similarly, some studies showing that self-ratings are more positive than ratings by uninvolved observers have been interpreted as evidence of a harshness bias from observers rather than

an enhancement bias toward the self (Coyne and Gotlib (1983)). Our results also provide evidence of this asymmetrical perception bias when people compare themselves with others. However, the effect is in the opposite direction: whereas in the optimism bias literature people tend to be more generous toward themselves, we found that Japanese subjects tend to be stricter with themselves.

The other possible reason is that in the experiment, the term 'consumption' is not interpreted as economists often assume. Within Japanese social norms, the term 'consumption' can be negatively perceived, as the social virtue is to save and be modest.

The rest of the paper is organized as follows. Section 2 provides a description of our dataset and introduces the choice task, in which respondents make decisions about socio-economic situations. We also provide a brief description of the features of the random utility model that we rely on for empirical analyses. Section 3 provides baseline results from the conditional logit model and additional results from the scope tests. Section 4 concludes the paper.

2 Survey and empirical methods

2.1 Survey

As a pre-test for the work in Yamada and Sato (2013), we took a dataset from an original web-based survey conducted in March 2009. This survey was conducted by a Japanese consumer monitoring company and has a total number of registered people of around 990,000. The company distributed the survey to 2,859 people aged between 18 and 69 who were randomly selected from the population such that the cohort profile mirrored the Japanese census representative statistics. 1,043 surveys were completed.[2] The average time to finish the survey was 18 minutes 30 seconds. Each respondent who completed the survey was paid about 800 yen (about 8 US dollars).

The descriptive statistics of the sample are shown in Table 1. Women account for around 48%of the sample. The mean age of respondents is 44.9 years, and 66% of people in the sample are married. Regarding educational attainment, 3%of the sample completed middle school only, 33%completed high school and 39% pursued more advanced studies. The remaining 25% of the sample holds other degrees, including those from technical and 2-year college programs. We do not see a big demographic difference between men and women, except in the case of college and post-doctoral attainments.

2.2 Hypothetical discrete choice question

We begin by explaining the experimental paradigm in the survey. Before the subjects began responding to repeated choice questions, they were shown an instruction screen displaying the following (although in Japanese):

> *Question: Imagine that for a given period of time you can consume and save certain amounts. In the following figures, pairs of your consumption and saving as well as those of "some representative person in society" are*

[2]For our study we removed observations of respondents who did not provide sufficient information in answers to questions about their demographic backgrounds.

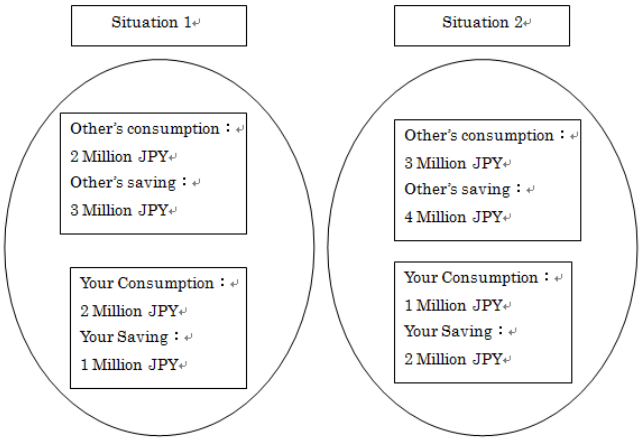

Figure 1: Screenshot of Choice Question

presented. Imagine that each set of your consumption-saving profile and the other's consumption-saving profile are representative of society's socio-economic situation. Which of situation 1 and 2 do you prefer?

In the questions, each situation is defined by four *attributes*: one's own saving, one's own consumption, the reference saving and the reference consumption. The choice scenario also provided the option "Don't know / Cannot answer."[3] Section 4 explains how we estimate parameters for a utility function by using observations of discrete choices on preferred saving and consumption scenarios. Next, we explain how we constructed our choice questions.

The levels of the four attributes (own saving and own consumption and reference saving and consumption) were set to one of four values: 1 million JPY, 2 million JPY, 3 million JPY and 4 million JPY. Note that we did not specify a time span in the experiment because doing so may make the choice tasks less real for some subjects. Instead, given the levels of attributes, the respondents could adjust the time span for consumption and saving in accordance with their real lives. In the example shown above, if a subject is concerned about his own consumption–saving levels and if he inclines to saving, he will choose Situation 2. He may also choose Situation 2 if he has altruistic preferences. However, if the subject is jealous or envious of the reference person's consumption–saving level, he may choose Situation 1, despite his preferences for his own economic activity, to prevent the reference person from having the much higher level of saving in Situation 2. Four possible levels for each attribute provide 256 potential variations in the situation scenario. In the literature, these scenarios are called *alternatives*.

Researchers have to make their own choices about which alternatives to use in survey questions and which ones to discard. Following Louviere et al. (2000), we conducted *orthogonal planning* in choosing the alternatives to be used in choice questions. This

[3]We provided this no-choice option because of the suggestion by Arrow et al. (1993) and Haaijer and Wedel (2001), who pointed out the importance of including a no-choice option in hypothetical choice experiments. We then removed from our regressions those observations in which the no-choice option was selected. An alternative way of coping with these observations is to interpret them as showing indifference between the two situations, rather than a failure to understand the survey question. Unfortunately, we have no information about the true reason why the no-choice option was chosen in individual cases.

method effectively pairs multi-dimensional and multiple-level attributes in alternatives, and provides an experimental plan providing the greatest amount of information using the fewest observations. Further, employing orthogonal planning, we can avoid multi-collinearity problems in the regressions of the random utility model explained in Section 2.3, because the independent variables in the regressions are orthogonal. We used SPSS Conjoint (ver. 11.0) for the orthogonal design of alternatives in this study.

Next, we constructed *choice sets* consisting of pairs of alternatives and the no-choice option. To meet the requirements of orthogonal design, 16 alternatives out of 256 potential variations *had to be used*. Thus, we generated two different alternative vectors, each of which consists of 16 pairs of own saving and own consumption levels and reference saving and consumption levels. Finally, choice sets, with a no-choice option, are created by pairing two alternatives, one of which is taken from an alternative vector and the other of which is chosen from the other alternative vector. Because orthogonality of the alternative matrix is maintained under row permutations, we can arbitrarily pair alternatives. Thus, the pairing strategy is at the discretion of the researchers, but all the variations must be chosen and the same alternative cannot be used twice. As documented in Huber and Zwerina (1996) and Viscusi et al. (2008), it is ideal if the choice design can be paired so as to balance the utility of each alternative. Finally, we avoided dominant options or easy choices. With all these devices, we could efficiently obtain parameter estimates.

Each respondent answered eight randomly assigned questions out of the 16 total questions given in the following table.[4] We removed observations in which the no-choice option (3) was selected, leaving us with 6,872 observations out of the total 8,344 (82.3%).

	Situation 1				Situation 2			
	SC	SS	OC	OS	SC	SS	OC	OS
Q1	1	1	1	1	2	1	2	2
Q2	1	2	2	4	1	1	1	1
Q3	2	1	2	3	1	2	3	4
Q4	2	2	1	2	4	1	4	4
Q5	1	3	3	2	2	2	4	3
Q6	3	1	3	4	1	4	2	3
Q7	1	4	4	3	3	1	3	3
Q8	4	1	4	2	1	3	4	2
Q9	3	2	4	1	3	3	2	4
Q10	2	3	4	4	3	2	1	2
Q11	3	3	1	3	3	4	4	1
Q12	4	3	2	1	4	4	3	2
Q13	4	4	1	4	4	3	1	3
Q14	2	4	3	1	4	2	2	1
Q15	3	4	2	2	2	4	1	4
Q16	4	2	3	3	2	3	3	1

2.3 Random utility model and empirical method

In this section, we introduce the econometric foundation for how subjects' choice data can be used to estimate their utility functions.[5] We start by describing a discrete choice model with a general utility function. To analyze decisions in hypothetical choice experiments, we use a random utility model framework. The model deals with data on repeated choices over available alternatives. It is assumed that subjects choose an alternative because they obtain a higher utility from that alternative than from the other available alternatives. When there are two alternatives available (A and B, for example), and if they chose A rather than B, then the choice data is recorded as 1 for alternative A and 0 for alternative

[4]Every number is millions of JPY. OC = Own Consumption; OS = Own Saving; RC = Reference consumption; RS = Reference Saving.

[5]This section repeats the discussion in Yamada and Sato (2013).

B, along with the levels of the explanatory variables (attributes) in alternatives A and B, respectively. These pieces of information comprise the observation for regression analyses.

Now, more specifically, suppose there are N subjects and they answer $T(\geq 1)$ repeated choice questions. The utility of subject n when s/he chooses alternative i at question $t \in T$, U_{itn}, consists of experimentally observable components V_{itn} and unobservable components ϵ_{itn} so that utility can be viewed as $U_{itn} = V_{itn} + \epsilon_{itn}$. Utilities from observable components are assumed to be linear combinations of each attribute: $V_{itn} = \sum_{k=1}^{K} \beta_k X_{ik}$, where $k = 1, \cdots, K(K \geq 2)$ indexes the attributes, X_k denotes the levels of the kth attribute and β_k measures the marginal utility of each attribute. In the following analysis, the vector $\beta \equiv (\beta_1, \cdots, \beta_K)$ that maximizes the log likelihood function of observed choice patterns by a subject is the estimator of conditional logit model regressions. Following McFadden (1974), ϵ_{itn} follow independent and identical distributions of extreme value type 1 (IIDEV1) with variance σ^2.

The logit formula of the probability P_{itn} that subject n chooses alternative i from the set of alternatives S_t (choice set) in question $t \in T$ can be written as

$$P_{itn} = \text{Prob}(U_{itn} > U_{jtn}, \forall j \neq i \in S_t) = \text{Prob}(\epsilon_{jtn} - \epsilon_{itn} < V_{itn} - V_{jtn}, \forall j \neq i \in S_t).$$

McFadden (1974) showed that $P_{itn} = \exp(\lambda V_{itn}) / \sum_{j \in S} \exp(\lambda V_{jtn})$, where $\lambda = \pi / \sqrt{6}\sigma$ is the scale parameter.

Finally, a dummy variable d_{itn} is defined, taking a value of 1 if subject n choose alternative i for question $t \in T$, and 0 otherwise. Together with the logit formula of choice probability P_{itn}, the log likelihood function of repeated choices observed in experiments can be written as

$$LL(\beta) = \sum_{n} \sum_{t} \sum_{i \in S_t} d_{itn} \ln P_{itn}.$$

In the conditional logit model, the parameters of utility function, β, can be obtained from the first-order conditions $\partial LL(\beta)/\partial \beta_k = 0$ (McFadden 1974). To be more specific, when we estimate the model parameters assuming that the independence of irrelevant alternatives (IIA) holds, we obtain a conditional logit model where all of N subjects share the same set of parameters in β.

Next, we specify the shape of the utility function for our own purposes. Individuals derive utility not only from their own consumption $X_1 = c$ and saving $X_2 = s$, but also from the socially representative consumption $X_3 = C$ and saving $X_4 = S$. We use the following utility function in which each component is described by an exponential form:

$$U = c^{\alpha} s^{\beta} C^{\chi} S^{\psi}, \tag{1}$$

where α, β, χ and ψ are parameters.[6] We presume that α and β are positive. We do not impose restrictions on χ and ψ a priori, because they are regulated by social norms. If their signs are positive, then the social norm of social comparison will be of admiration or cooperation as a result of altruism, egalitarianism (Fehr et al. (2008), Bartling et al. (2009)) or of the influence of public goods to which others contribute with taxes; if they are negative, the social norm of envy or rivalry dominates admiration or altruism.

[6] It is also possible to address the constant relative risk aversion (CRRA) type of utility function. The implications obtained below remain unchanged.

Again, let i denote the alternative and n denote the subject. We take the logarithms of both sides in Equation 1 to obtain

$$\ln V_{ni} = \alpha \ln c_{in} + \beta \ln s_{in} + \chi \ln C_{in} + \psi \ln S_{in}. \tag{2}$$

With an error term ϵ_n, the probability P_{in} that respondent n prefers alternative i to alternative j is given by

$$\begin{aligned} P_{in} = \text{Prob}\big(&\alpha \ln c_{in} + \beta \ln s_{in} + \chi \ln C_{in} + \psi \ln S_{in} + \epsilon_{in} \\ &> \alpha \ln c_{jn} + \beta \ln s_{jn} + \chi \ln C_{jn} + \psi \ln S_{jn} + \epsilon_{jn}\big), \quad \text{for all} \quad j \neq i. \end{aligned}$$

Using maximum-likelihood estimation we obtain coefficients $\beta_1 = \hat{\alpha}$ and so forth. These estimates are regarded as marginal utilities in the random utility model framework.

3 Empirical results

Results from the conditional logit model are shown in Column (1) in Table 2. We see that both own consumption and own saving affect utility positively and significantly. These results confirm the textbook assumptions, and validate the structure of our questionnaire. In contrast, the effects of reference consumption and saving on utility are estimated to be significantly negative. This result of social preference in the form of envy is the same as that found in Yamada and Sato (2013) who used similar Internet-based choice survey data and found 'keeping up with the Joneses' effects associated with income. All of the above effects are significant at the 5% level, and are as expected. Hence, the dominating social norm of pecuniary comparison in the Japanese economy will not be admiration but envy. This finding is in line with the relative income comparison and happiness literature.

Next, we examined the different impacts of interaction with being female, being rich, having high education, urban living and being young.[7] We found that women tend to be less happy than men when own consumption increases. Rich people tend to be more sensitive to reference consumption and feel unhappy when it increases. Also, young people are more envious about reference saving.

There are, however, some reasons for caution. From Table 2 we can see that the effect on utility of saving is dominant over that of consumption. In fact, the ratio of the elasticity of the utility of own consumption to that of own saving is equal to 0.186. The same dominating role of saving can be found with respect to a rival's consumption and saving levels. This inclination toward saving as a determinant of utility may be derived from the fact that the survey was conducted in the midst of the recent financial recession in 2009. The severe market conditions might have induced in subjects a mood of refraining from consumption so that they increase saving in readiness for uncertain future economic situations.[8] But Japan is well-known for its high saving rate. This may represent the Japanese social norm: abstaining from consumption and saving more could be considered as resulting from the social virtues of modesty and self-control, as well as the preparation for the uncertain events in the future (Lebra (1976), Baba (1996),and

[7] Columns (2) - (6), respectively.

[8] However, given the fact that the saving rate for Japan is around 20%, it is rather difficult to ascribe the bias toward saving just to precautionary saving motives during the recession.

Shimizu and LeVine (2001)). In this social environment, people might be happier when they can save more than when they can spend more. However, this possible Japan-specific reason is not tested in our study. Instead, we try to investigate whether (or not) different ways of perceiving saving and consumption exist in reality by using scope tests.

Given that the estimate for own consumption shown in Table 2 seems too small in comparison with own saving to validate the current saving behavior in Japan, we suspect that our subjects did not perceive the term 'consumption' in the way economists normally suppose or that they have their own way of weighting consumption and saving allocations in terms of utility. Hence, following Heberlein et al. (2005) we tried scope tests to see if the increase in consumption actually provides a monotonic increase in utility to the subjects.[9] Table 3 shows the results of the scope tests. First of all, in Column (1), with respect to Own Saving terms, estimates for higher saving levels (omitted category is Own Saving 1) indicate that as the saving level increases, one obtains higher utility. This is as expected by the conventional theory. It is similar for the reference saving. An increase in reference saving would gradually decrease subjects' utility. What is puzzling is the behavior of consumption. An increase in reference consumption decreases a subject's utility as expected, but with lower significance. Own Consumption is even more puzzling. Estimates for dummies related to Own Consumption 2-4 (here, the omitted category is the lowest level of consumption; Own Consumption 1) are very small and even negative. This observation differs from textbook assumptions that the marginal utility of consumption is always positive (monotonicity) and could indicate that the conventional definition of 'consumption' is not well understood by subjects compared to the term 'saving'. The results remain similar when we allow for interactions in Columns (2)-(6). However, it should be noted that none of the Own Consumption coefficients are significantly different from zero, so the hypothesis of monotonicity cannot be rejected statistically.

There are several possible explanations for this phenomenon. One possibility is the "moral purchase property" suggested by Kahneman and Knetsch (1992). In this survey, subjects were found to try to exhibit humbleness. As explained above, under Japanese social norms, spending less and saving more do represent higher social virtues in society. Thus, while people could still envy another's ability to consume more, when it comes to themselves, their feelings toward consumption might be a little bit more complex. This virtue of abstinence from consumption can be also found in some religions or philosophies, such as Buddhism and Confucianism, which are also locally found in Japanese society. This idea could well explain the first positive and significant sign of the consumption effect, which we could set up as the basic reference point. Then, when people think consumption exceeds their basic needs (above the reference point, category 2-4), it does not increase their happiness any longer.

One other possibility is subjects' misperception of the technical term 'consumption'. Total consumption consists of various types of consumption in reality and, as DeLeire and Kalil (2010) showed in the literature of happiness economics, it is possible that only specific types of consumption can increase the welfare of subjects and that the other types of consumption are taken as negatives instead; in general, only one component of consumption is positively related to happiness — leisure consumption. Moreover, the

[9]The scope tests use dummies for each input of own saving, own consumption, reference saving and reference consumption. Our alternatives for different situations vary over 4 different amounts: 1, 2, 3 and 4 million yen. We treat each amount as a dummy variable, with the reference amount 1 million yen.

term 'consumption' might confuse a subject with two different perspectives. One is the consumption that is often found in economics, which is just the part of income increasing the utility monotonically, whereas the other is related to expenditure. Subjects might perceive consumption not only as their capability to spend and richness to show off, but also as the expenditure that they *must* make, with the lack of choice driving the negative feeling toward it. However, the tricky part is that the rival's status in the experiment does not coincide with this explanation.

The effects of the status of others on utility were estimated as follows. We can see that when the reference consumption level is very large, people feel jealous; this can be seen from the estimate of Reference Consumption 4. While the effects of Reference Consumption 2 and Reference Consumption 3 are not significant, the sign is in the right direction. This means that the relative utility gained by the reference consumption and saving is consistent with monotonicity. The estimates of Reference Saving 3 and Reference Saving 4 seem to be acceptable, but the magnitudes of the point estimates are reversed. Note, however, that there is an overlap for those two estimates in the 95% confidence intervals (not shown).

From this result, we can see that people perceive the term 'consumption' differently when it comes to themselves and others: they have more mixed and complex feelings toward the term when applied to themselves, while they take it with simple envy in the case of others. This could be explained by the self-perception bias in psychology which is supported by empirical evidence that people tend to think differently when it comes to themselves. Our result also supports that idea. Yet, one finding of our study differs from the literature: while in the literature, people are optimistic in terms of self-rating or expectation (optimism bias), in our study, Japanese people are found to be harsher on their own consumption.[10]

Table 4 presents the within and between comparison. In this analysis, we treat the data as a panel, taking the repeated choices as periods. Each subject has 8 periods of time. In this setting, we are able to compare the difference choices across time as well as across individuals. The first two columns allow dummies for the comparison between the current situation at t and the previous situation at $t-1$. Individuals may remember historical situations, and tend to compare the current situation with the past. Clark (1999) suggested that employees would compare their current pay with their past pay, and found that job satisfaction is strongly correlated with the change in pay. In our setting, we follow the order of 8 repeated situations. We add dummies for (1) choosing a smaller current own consumption than past own consumption $1_{OC_t<OC^*_{t-1}}$, and (2) choosing a smaller current own saving than the past own saving ($1_{OS_t>OS^*_{t-1}}$). If the current given situations for own saving are smaller than the past own saving chosen, subjects tend to decrease their utility level significantly. However, for consumption, the estimate is positive, though it is not statistically significant. Here again, it shows that an increase in own consumption does not necessarily increase the utility level.

In Column (2), we show the estimates for between comparisons. We add dummies for (1) smaller own consumption level given in the situation compared to others($1_{OC_t<RC_t}$), and (2) smaller own saving level given in the situation compared to others ($1_{OS_t<RS_t}$). This analysis is to allow different marginal impacts when the subject is richer or poorer

[10]This could be explained by the Japanese social norm, as we described above. Also, Xie et al. (2006) investigated cultural differences in terms of self-perception bias.

than others, and therefore capture the 'envy' factor. The amount by which one increases his happiness when he is richer than others may not be the same as the one by which he decreases his happiness when he poorer than others. Subjects tend to decrease their utility level when the choice sets give lower levels of both own consumption and own saving in comparison to those of others. However, if we look at the main estimates for own consumption and reference consumption, the result is interesting. The coefficient of own consumption is no longer significant, and the coefficient of reference consumption become strongly positive. Basically, subjects care more for reference consumption than own consumption level. If subjects' consumption levels are lower than those of others, then subjects decrease their utility level. Here, indeed, the result shows the mixed effect of perceived 'consumption'. Consumption per se contributes negatively to the utility level. Yet, a direct comparison between yourself and others switches the effect of perceived 'consumption'.

With our results, we re-validate the relative income comparison literature: (1) individuals compare their own consumption and saving with those of others, and (2) a person's utility level is positively correlated with their own consumption and saving while being negatively correlated with reference consumption and saving. But the term 'consumption' is not always perceived in the same way as saving (and, therefore, potential 'income' in general) for the Japanese subjects, showing a possible negative relationship with utility. These results call into question the general assumption that consumption has the same effects as income in terms of the utility level, as the Japanese subjects tend to perceive the term 'consumption' rather negatively.

4 Conclusions

The economic assumption of monotonicity of consumption on utility has been taken for granted without validation in the empirical analyses of various studies. Moreover, often we believe that economic terms will be perceived in the same way no matter whether they are associated with oneself or others. However, the real situation might be more complicated than we have assumed. While others' consumption could be seen as representing others' richness and as a reflection of their income, a person's attitude to their own consumption could be more complicated and have mixed effects. That is, consumption may have (1) a positive effect as a part of income, and (2) a negative effect as expenditure that you have make, or because of feelings of guilt for over-consuming due to the specifically Japanese social norm of being modest. This suggests the possibility that consumption may be seen as a negative good in individual perceptions.

In our study, we investigated whether these assumptions hold in reality by conducting a hypothetical choice experiment, which explored how individuals allocate their given income to consumption and saving in order to maximize their utilities.

Our major findings can be summarized as follows. In accordance with the theory that utility is determined also by relative income, not only by absolute income (Alpizar et al. (2005), Clark et al. (2008)), our results show that my consumption and saving can increase my utility, whereas others' consumption and saving might decrease my utility. However, this interpretation is based on the assumption that the income is the sum of saving and consumption. When we look at the size of the impacts on saving and consumption, the

magnitude of the effect of saving is much larger than that of consumption. To figure out the reason for this in more detail, we conducted scope tests and found indications that the impact of own consumption is not monotonic in the consumption level. That means an increase in own consumption does not necessarily increase utility. This calls into question the general assumption of the monotonicity of the utility function and also gives a hint that people may not think that income is the simple sum of consumption and saving. Our results could, therefore, provide some evidence that, in reality, people understand and perceive economic terms differently from what economists would expect, and when considering the consumption of others as well as their own the size of the discrepancy is even bigger. There are two possible explanations for this puzzling result. One is the possible existence of self-perception bias which could explain the different ways of thinking about oneself and others. The other is the negative connotation of the term 'consumption' for a society in which saving is a great virtue and, therefore, people feel guilty about their purchasing habits.

The final thing that this paper suggests is that we need to examine carefully how best to interpret the responses of subjects when using survey data or experimental data. Terms that people use and see could be understood in a very different way from what we economists want to measure.

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Table 1: Descriptive Statistics

	Whole sample		Male		Female	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Variable						
Female [0,1]	0.48	0.50				
Age in years	44.86	14.62	44.69	14.33	45.04	14.95
Middle School [0,1]	0.03	0.18	0.03	0.18	0.03	0.17
High School [0,1]	0.33	0.47	0.30	0.46	0.36	0.48
College/ Post Grad [0,1]	0.39	0.49	0.50	0.50	0.27	0.45
Married [0,1]	0.65	0.48	0.65	0.48	0.66	0.48
N	1043		547		496	

Table 2: Determinant of Choice related to Own Situation and Others' Situation

	(1)	(2)	(3)	(4)	(5)	(6)
Own Consumption	0.377***	0.572***	0.347**	0.279*	0.381***	0.373**
	(3.81)	(4.33)	(3.17)	(2.19)	(3.35)	(2.94)
Own Saving	2.023***	1.901***	2.016***	1.994***	1.920***	1.954***
	(19.11)	(13.70)	(17.19)	(14.37)	(15.82)	(14.47)
Reference Consumption	-0.110**	-0.085	-0.066	-0.138**	-0.090*	-0.158**
	(-2.77)	(-1.61)	(-1.51)	(-2.67)	(-1.97)	(-3.07)
Reference Saving	-0.438***	-0.404***	-0.437***	-0.421***	-0.442***	-0.370***
	(-11.01)	(-7.63)	(-10.00)	(-8.24)	(-9.62)	(-7.25)
Interaction		*Female*	*Rich*	*High Edu*	*Urban*	*Young*
× Self Consumption		-0.424*	0.180	0.250	-0.010	0.020
		(-2.13)	(0.71)	(1.24)	(-0.05)	(0.10)
× Self Saving		0.334	0.057	0.085	0.435	0.182
		(1.55)	(0.21)	(0.40)	(1.76)	(0.83)
× Reference Consumption		-0.065	-0.253*	0.069	-0.083	0.126
		(-0.81)	(-2.36)	(0.85)	(-0.90)	(1.55)
× Reference Saving		-0.087	-0.006	-0.046	0.009	-0.178*
		(-1.08)	(-0.06)	(-0.56)	(0.10)	(-2.18)
Observation	13744	13744	13744	13744	13744	13744
BIC	7854.522	7835.134	7885.425	7887.474	7877.881	7881.889
AIC	7824.408	7774.907	7825.198	7827.247	7817.654	7821.662

Notes: * 10%, ** 5% and *** 1% significance level.
Notes: Conditional logit estimation, grouped by choice sets. Robust Standard Error.

Table 3: Scope Test

	(1)	(2)	(3)	(4)	(5)	(6)
Own Consumption (Ref = 100)						
= 200	-0.103	0.015	-0.127	-0.184	-0.096	-0.116
	(-0.43)	(0.06)	(-0.52)	(-0.74)	(-0.39)	(-0.47)
= 300	0.019	0.214	-0.017	-0.105	0.032	-0.003
	(0.05)	(0.51)	(-0.04)	(-0.25)	(0.08)	(-0.01)
= 400	-0.117	0.116	-0.165	-0.276	-0.100	-0.146
	(-0.22)	(0.22)	(-0.31)	(-0.52)	(-0.19)	(-0.27)
Own Saving (Ref = 100)						
= 200	0.776**	0.684**	0.767**	0.739**	0.714**	0.712**
	(3.28)	(2.81)	(3.21)	(3.05)	(2.98)	(2.95)
= 300	1.311**	1.173*	1.297**	1.252**	1.216**	1.212**
	(2.86)	(2.51)	(2.81)	(2.69)	(2.63)	(2.61)
= 400	2.367***	2.199***	2.350***	2.293***	2.248***	2.245***
	(5.16)	(4.65)	(5.06)	(4.85)	(4.83)	(4.78)
Reference Consumption (Ref = 100)						
= 200	-0.132	-0.122	-0.101	-0.146	-0.122	-0.165
	(-0.77)	(-0.70)	(-0.59)	(-0.85)	(-0.71)	(-0.95)
= 300	-0.064	-0.063	-0.017	-0.088	-0.048	-0.117
	(-0.41)	(-0.39)	(-0.11)	(-0.56)	(-0.31)	(-0.73)
= 400	-0.286**	-0.254*	-0.221*	-0.317**	-0.265**	-0.357***
	(-3.22)	(-2.51)	(-2.40)	(-3.19)	(-2.81)	(-3.60)
Reference Saving (Ref = 100)						
= 200	-0.041	-0.004	-0.038	-0.026	-0.047	0.002
	(-0.27)	(-0.03)	(-0.25)	(-0.17)	(-0.31)	(0.01)
= 300	-0.421***	-0.374***	-0.421***	-0.396***	-0.426***	-0.345***
	(-4.32)	(-3.57)	(-4.23)	(-3.84)	(-4.24)	(-3.33)
= 400	-0.288*	-0.238	-0.286*	-0.258	-0.300*	-0.192
	(-2.17)	(-1.68)	(-2.10)	(-1.84)	(-2.19)	(-1.37)
Interaction	*X*	*Female*	*Rich*	*High Edu*	*Urban*	*Young*
Observation	13744	13744	13744	13744	13744	13744
BIC	7721.108	7705.490	7751.907	7754.327	7745.280	7747.749
AIC	7630.768	7585.037	7631.453	7633.874	7624.826	7627.295

Notes: * 10%, ** 5% and *** 1% significance level.

Notes: Conditional logit estimation, grouped by choice sets. Robust Standard Error.

Table 4: Within and Between Comparison

	(1)	(2)
Own Consumption	0.430***	0.080
	(4.16)	(0.62)
Own Saving	1.787***	2.255***
	(17.02)	(20.66)
Reference Consumption	-0.155***	0.519***
	(-3.48)	(6.36)
Reference Saving	-0.443***	-0.341***
	(-10.93)	(-4.33)
Within Comparison		
Current Consumption < Previous Consumption Chosen (= 1)	0.015	
	(0.23)	
Current Saving < Previous Saving Chosen (= 1)	-0.991***	
	(-11.75)	
Between Comparison		
Reference Consumption > Own Consumption (= 1)		-0.788***
		(-8.00)
Reference Saving > Own Saving (= 1)		-0.348***
		(-3.30)
Observations	13744	13744
BIC	7793.233	7869.220
AIC	7748.063	7824.049

Notes: * 10%, ** 5% and *** 1% significance level.
Notes: Conditional logit estimation, grouped by choice sets. Robust Standard Error.