

## **Mental Accounting of Public Goods Payment: Experimental Evidence for its Validity**

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### **Abstract**

This study aims to test the validity of mental accounting in public goods payment. To achieve this goal, an online survey experiment was conducted with two treatments based on the Hometown Tax and Resident Tax reduction in Japan, using an approach similar to Tversky and Kahneman's theater ticket experiment, which revealed the existence of mental accounting. Respondents were asked about their attitudes towards paying the tax from three phrases, including willingness to pay, reluctance to pay, and sense of obligation. The Mann–Whitney U test and multiple regression were applied to examine the differences in distribution between treatments. The results significantly showed the existence of mental accounting for the tax payment, regardless of the tone of the phrases used. Additionally, the results suggest that understanding the tax system may help encourage respondents to pay the tax.

Keywords: Mental accounting, Experiment, Public goods payment, Tax

JEL classification: C91, D90, H26

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## 1. Introduction

### 1.1. Mental accounting and application

Mental accounting is a cognitive operation for people to keep track of their financial activities (Thaler 1999).<sup>1</sup> Existing literature of mental accounting has focused mainly on how mental accounting influences consumption of private goods, including credit card payment would increase consumption (Thomas et al., 2011), flat-rate pricing plans are preferable (Train, 1991), and subsequent risk-taking behavior (Imas, 2016; Merkle et al., 2021).

However, research on public goods payment (tax payment) choice is limited in quantity. Related research showing the existence of mental accounting for tax payment has mainly selected self-employed taxpayers as subjects (Muehlbacher & Kirchler, 2013; Muehlbacher et al., 2017). Compared to wage earners, self-employed individuals indeed have some freedom to arrange their tax payments since they are subject to more taxes and responsible for preparing their tax arrangements (Olsen et al., 2019). But tax payments are a shared obligation among people. Limiting the subjects as self-employed taxpayers may restrict the validity of mental accounting theory on public goods payment, including tax payment. Thus, the general existence of mental accounting regarding public goods payment requires more evidence.

### 1.2. Explanations for the quantity limitation

Several explanations should be considered concerning the small amount of existing mental accounting research in public goods payment. First, mental accounts are diverse in the categorization criteria and frequency, making it hard to directly study. Target of expenditures, mode of payments, and time of payments can be criteria for categorized mental accounts as well as merchandise labels in supermarkets (Thaler, 1999). In terms of frequency, it is possible that some people sum up their account by the week while others by month or year (Read et al., 1999).

Next, compared to a clear connection between payment and private goods, a connection between public goods and their payment are ambiguous. People are usually not informed about what their tax payment is being used for, like income Tax, which embodies unclear object. Besides, the incentive is more complex compared to private goods payment. People purchase private goods to increase their utility, but contribute to public goods for utility, perception of punishment (i.e., a fine) and moral motivations. Therefore, inferring the effect of mental accounting concerning private goods consumption is more straightforward than for public goods.

Lastly, in terms of experimental design, it is difficult to examine mental accounting of public goods payment. Tversky and Kahneman (1981) indicated the existence of mental accounting through a survey experiment targeting the difference of willingness to pay for a theater ticket

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<sup>1</sup> Kahneman and Tversky (1984) proposed a different explanation of mental accounting. They stated that mental accounting is for people to organize the outcomes of transactions.

between treatments. However, it is nearly unrealistic to construct an experiment by simply substituting public goods for a theater ticket. Public goods payments are usually compulsory and involve punishment for non-compliance. Hence, it takes some ingenuity to design experiments to show effect of mental accounting in public goods payment while following representative studies.

## 2. Experiment Design

### 2.1. Kahneman and Tversky's Experiment

To examine the general existence of mental accounting of public goods payment, we conducted an online survey experiment based on that of Tversky and Kahneman (1981). They illustrated the existence of mental accounting via a survey experiment that asked the respondents' willingness to pay for a theater ticket after they lost the ticket they had already paid for or lost the money set aside for the ticket. The original description of the two scenarios and the question corresponding to each scenario is as follows.

***The situation of lost money:** Imagine that you have decided to see a play where admission is \$10 per ticket. As you enter the theater you discover that you have lost a \$10 bill. Would you still pay \$10 for a ticket for the play?*

***The situation of lost ticket:** Imagine that you have decided to see a play and paid the admission price of \$10 per ticket. As you enter the theater you discover that you have lost the ticket. The seat was not marked and the ticket cannot be recovered. Would you pay \$10 for another ticket?*

Three hundred and eighty-three students responded to the questionnaires. The percentage of selecting the answer "Yes" to the lost money situation and the lost ticket situation is 88% and 46%, respectively. The difference in the distribution of the answers in these two situations illustrates the existence of mental accounting. In the lost ticket situation, the price of the lost ticket had already entered the mental account of the play. Another ticket would make the respondents more likely to consider the ticket price to be doubled. However, the ticket price would remain unchanged from the respondents' consideration in the lost money situation since the lost money had yet not been specifically linked to the ticket.

### 2.2. Treatment

To apply the theater ticket experiment in the public goods payment, the Hometown Tax and the Resident Tax system in Japan provide a possibility. The Resident Tax in Japan requires residents to broadly share the expenses necessary for administrative services at a rate of 10% based on their annual income. The Hometown Tax in Japan is a tax system that allows taxpayers to voluntarily contribute to rural areas of their choice. In return, taxpayers who contribute to the Hometown Tax are entitled to a reduction in the Resident Tax by submitting the paper certification of the Hometown Tax payment within the time limit. It is possible that people lost

the receipt of the Hometown Tax payment or the money prepared for the Hometown Tax, hence losing the chance to apply for the Resident Tax reduction. Thus, the two situations in the theater ticket experiment can be substituted with the lost receipt treatment and the lost money treatment in this study.<sup>2</sup>

**Lost receipt treatment:** Respondents were asked to imagine that they had already paid 30,000 yen for the Hometown Tax through a printed application, and they had received the receipt. However, on the last day of the period allowed to apply for the Resident Tax reduction, on the way to the tax office, they found that they lost the receipt which is indispensable for the application for the Resident Tax reduction. As it was the last day for the tax reduction application, there is no time left to reapply with the receipt.

**Lost tax money treatment:** Respondents were faced with a similar predicament to those with the lost receipt treatment except for one element. The respondents wanted to pay the Hometown Tax of 30,000 yen through a printed application but lost the money on their way to the bank. As it was the last day for sending the money and the time for the tax office to close was approaching, they have insufficient time to prepare another 30,000 yen to pay for the Hometown Tax.

In both treatments, the respondents needed to answer their attitudes toward paying the Resident Tax from three phrases: **willingness to pay, reluctance to pay, and sense of obligation.**

### 2.3. Procedure

Respondents anonymously filled out the survey for a monetary reward. The survey is composed of three parts in Japanese. The first part involved the explanation of the tax system and we added a question about calculating the reduction amount. The next is the treatment part where respondents randomly assigned in one treatment. The last section contained demographic items.

### 2.4. Hypotheses

If mental accounting applies to public goods payment, the attitude towards the Resident Tax payment would be more positive in the lost tax money treatment than in the lost receipt treatment. Thus, we generated the following hypotheses:

**Hypothesis I: Respondents in the lost receipt treatment are less willing to pay the Resident Tax.**

**Hypothesis II: Respondents are more reluctant to pay the Resident Tax in the lost receipt treatment than in the lost tax money treatment.**

Furthermore, it is possible that any mental accounting effect might be weakened or disappear

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<sup>2</sup> A 10% discovery rate of tax evasion and a 100% penalty of the evasion amount were assumed for both treatments, corresponding to the setting in Muehlbacher et al. (2017).

when the respondents are aware of their responsibility to pay the Resident Tax due to the law. As we could not predict if their sense of such obligation is strong enough to negate the existence of mental accounting, Hypothesis III should be considered as explanatory:

**Hypothesis III: In the normative phrase (sense of obligation), respondents may show the existence of mental accounting.**

### 3. Results

651 respondents participated in the online survey experiment of this study on Qualtrics in February 2022.<sup>3</sup> Mann–Whitney U test was conducted and the results showed that the distribution of answers significantly differed between the two treatments. Compared to the lost tax money treatment, the willingness to pay was significantly less in the lost receipt treatment ( $W = 25,850$ ,  $N_{Receipt} = 256$ ,  $N_{Taxmoney} = 241$ ,  $P < 0.001$ , *one-sided*); the reluctance to pay was significantly stronger in the lost receipt treatment ( $W = 35,344$ ,  $N_{Receipt} = 256$ ,  $N_{Taxmoney} = 241$ ,  $P = 0.002$ , *one-sided*); and the sense of obligation was significantly less in the lost receipt treatment ( $W = 25,892$ ,  $N_{Receipt} = 256$ ,  $N_{Taxmoney} = 241$ ,  $P < 0.001$ , *one-sided*). Hence, all hypothesis were supported and the existence of mental accounting for the Resident Tax was robust across phrases.

In addition, multiple regression verified the existence of mental accounting in a more rigorous manner. The regression results are given in Table 1.

**Table 1: Regression Results**

Predictors	Willingness to pay			Reluctance to pay			Sense of obligation		
	Estimates	Std. Error	P-Value	Estimates	Std. Error	P-Value	Estimates	Std. Error	P-Value
(Intercept)	64.479	12.579	<0.001***	47.226	10.075	<0.001***	65.79	9.994	<0.001***
<b>Don't understand</b>	-22.974	5.603	<0.001***	14.269	4.488	<b>0.002**</b>	-15.814	4.452	<0.001***
<b>Treatment</b>	-15.156	5.572	<b>0.007**</b>	13.877	4.463	<b>0.002**</b>	-9.709	4.427	<b>0.029*</b>
Don't understand × Treatment	6.085	7.713	0.431	-8.68	6.178	0.161	-1.563	6.128	0.799
Gender Male	0.277	4.384	0.95	-3.446	3.511	0.327	-4.374	3.483	0.21
Age	2.098	1.818	0.249	-2.726	1.456	0.062	2.375	1.445	0.101
Annual household income	-0.632	0.796	0.428	0.696	0.637	0.275	-0.703	0.632	0.267
Highest education level	0.842	1.905	0.659	-1.608	1.526	0.293	1.591	1.514	0.294
Frequency	0.622	4.047	0.878	-2.548	3.241	0.432	0.234	3.215	0.942
Observations	414			414			414		
R <sup>2</sup> / R <sup>2</sup> adjusted	0.092 / 0.075			0.073 / 0.054			0.114 / 0.096		
AIC	4215.584			4031.796			4025.127		

Note. 1. Treatment, Don't understand, and Frequency are dummy variables, where 1 denotes the lost receipt treatment, the respondents incorrectly calculated the reduction amount, the respondents had paid the Hometown Tax at least once, respectively.

2. \*p < .05, \*\*p < .01, \*\*\*p < .001.

Compared to the lost tax money treatment, the respondents in the lost receipt treatment had 15.16% less willingness to pay, 13.88% more reluctance to pay, and 9.71% less sense of obligation. Furthermore, it indicated that the respondents who did not understand the tax system had less willingness to pay, less sense of obligation, and greater reluctance to pay. In other words,

<sup>3</sup> Valid data are less than 651 due to some respondents dropped out before completing the survey.

understanding of the tax system could help the respondents become more tax compliant.

In conclusion, this study provides experimental evidence of how mental accounting affects people's attitudes toward public goods payment, and thus making it a step forward in examining the mental accounting of public goods payment.

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