Appendix for "Marginal Propensity to Consume and Personal Characteristics: Evidence from Bank Transaction Data and Survey"

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A Survey

I conducted the survey in November and December, 2022. Mizuho bank sent 400,000 bank account users an email to ask them to answer the survey, stating that we would give an Amazon gift card worth 500 JPY to 1,000 respondents. The 400,000 bank account users were selected randomly from those who received their salary regularly. More specifically, with the aim of collecting 5,000 respondents, I conducted the survey twice. The first wave was from November 17 to 21, which was sent to 200,000 users and collected 2,587 responses. The second wave was from November 30 to December 5, which was sent to 200,000 users and collected 2,695 responses. In total, I collected 5,282 responses (the response rate is 1.32%).

A.1 Survey Questions "Questionnaire Survey on Consumer Behavior"

This appendix provides an English translation of the survey questions.

Introduction

Thank you for your continued use of Mizuho Bank. As part of a joint research project with Waseda University, Mizuho Bank is conducting a questionnaire survey. The main purpose of the survey is to analyze the relationship between household consumption/investment behavior and individual characteristics such as household composition, gender, perception of risk, and concerns about the future, based on your responses. The survey will be anonymous and will not be used for any other purpose than the survey. The results of the survey will be published widely as a report and will be used for better policy and social design. We appreciate your understanding of the purpose of this survey and ask for your cooperation.

1,000 winners will be selected by drawing from among those who have answered all items in the survey and will receive an Amazon gift card worth 500 yen. Please complete the survey by 12:00 p.m. on November 21 (December 5 in the second wave), 2022.

Q1 Please tell us your gender.

1. Male
2. Female
3. Do not want to answer

Q2 Please tell us your age.

1. 10s
2. 20s
3. 30s
4. 40s
5. 50s
6. 60s

7. 70s
8. 80s or over

Q3 Which of the following describes the composition of the family you currently live with?

1. Single-person household (living alone, working alone)
2. Married couple (partner-to-partner) only
3. Households consisting of a married couple (or both partners) and their children
4. Households with three generations living together: husband, wife, children, and grandparents (either one or both grandparents)
5. Single-parent households (including households where the spouse is working alone)
6. Households with a single parent, children, and grandparents living together (both or one grandparent)
7. Others (siblings only, friends, grandparents and grandchildren, etc.)
8. Do not want to answer

Q4 Do you own or rent your residence?

1. Own
2. Rent
3. Others
4. Do not know

Q5 Do you have a mortgage or other large borrowings?

1. Yes, I have borrowings.
2. No borrowing
3. Do not know
4. Do not want to answer

Q6 Which of the following schools did you last graduate from? Please choose one that applies. If you dropped out of or are still completing, please consider your answer as graduation.

1. Junior high school
2. High school
3. Vocational school or junior college
4. University
5. Graduate school
6. Others

Q7 Which of the following describes your occupation?

1. Agriculture, forestry, fishing
2. Self-employed
3. Permanent employment (company employee, civil servant, etc. including company director)
4. Temporary or daily employment (part-time job)
5. Others (housewife, student, pensioner, unemployed, etc.)

In the following, we would like to know what you would think about a hypothetical situation. Please answer with your intuition.

Q8 There are 100 lottery tickets, 90 of which are wins and 10 are loses. If you win, you get 100,000 yen, but if you lose, you receive nothing. If a lottery ticket is sold at 10,000 yen per ticket, do you buy one ticket?

1. Yes, I would.
2. No, I would not buy it.

Q9 There are 100 lottery tickets, 50 of which are wins and 50 are loses. If you win, you get 100,000 yen, but if you lose, you receive nothing. If a lottery ticket is sold at 10,000 yen per ticket, do you buy one ticket?

1. Yes, I would.
2. No, I would not buy it.

Q10 There are 100 lottery tickets, 20 of which are wins and 80 are loses. If you win, you get 100,000 yen, but if you lose, you receive nothing. If a lottery ticket is sold at 10,000 yen per ticket, do you buy one ticket?

1. Yes, I would.
2. No, I would not buy it.

Q11 There are 100 lottery tickets, 10 of which are wins and 90 are loses. If you win, you get 100,000 yen, but if you lose, you receive nothing. If a lottery ticket is sold at 10,000 yen per ticket, do you buy one ticket?

1. Yes, I would.
2. No, I would not buy it.

Q12 There are 100 lottery tickets, 5 of which are wins and 95 are loses. If you win, you get 100,000 yen, but if you lose, you receive nothing. If a lottery ticket is sold at 10,000 yen per ticket, do you buy one ticket?

1. Yes, I would.

2. No, I would not buy it.

Q13 There are 100 lottery tickets, 1 of which is a win and 99 are loses. If you win, you get 100,000 yen, but if you lose, you receive nothing. If a lottery ticket is sold at 10,000 yen per ticket, do you buy one ticket?

1. Yes, I would.
2. No, I would not buy it.

Q14 Suppose you are eligible to receive 100,000 yen one week from now. However, if you wait another week (two weeks), you could receive a larger amount. What is the amount of money you are willing to wait one more week to receive? Please choose the one that comes closest.

1. 100,000 yen + 100 yen
2. 100,000 yen + 1,000 yen
3. 100,000 yen + 10,000 yen
4. 100,000 yen + 100,000 yen
5. 100,000 yen + 1,000,000 yen
6. 100,000 yen + 1,000,000 yen
7. Even if I can receive 1,100,000 yen after another week, I would like to receive it now.
8. I do not know or I do not want to answer.

Q15 Similarly, suppose that you will receive 100,000 yen one week from now. But this time, if you wait another year (one year and one week), you will receive a larger amount. What is the amount of money you are willing to wait one more year to receive? Please choose the one that comes closest.

1. 100,000 yen + 100 yen
2. 100,000 yen + 1,000 yen
3. 100,000 yen + 10,000 yen
4. 100,000 yen + 100,000 yen
5. 100,000 yen + 1,000,000 yen
6. 100,000 yen + 1,000,000 yen
7. Even if I can receive 1,100,000 yen in a year, I would like to receive it now.
8. I do not know or I do not want to answer.

Q16 Similarly, suppose that you will receive 100,000 yen one week from now. But this time, if you wait another 10 years (10 years and one week), you will receive a larger amount. What is the amount of money you are willing to wait another 10 years to receive? Please choose the one that comes closest.

1. 100,000 yen + 100 yen

2. 100,000 yen + 1,000 yen
3. 100,000 yen + 10,000 yen
4. 100,000 yen + 100,000 yen
5. 100,000 yen + 1,000,000 yen
6. 100,000 yen + 1,000,000 yen
7. Even if I can receive 1,100,000 yen in 10 years, I would like to receive it now.
8. I do not know or I do not want to answer.

Q17 Let us ask you a hypothetical question. Suppose that you are now forced by sudden circumstances to pay "approximately the same amount of money as your and your family's monthly income". Do you think it is possible for you to pay this amount in full by withdrawing your savings, selling your assets, or borrowing from financial institutions, friends, or relatives?

1. Possible
2. Maybe possible
3. Difficult
4. Impossible
5. I do not know or I do not want to answer.

The situations that have appeared in the previous questions (8–17) are only hypothetical, and we do not mean that you can actually win the lottery or receive money. (We let them press the "confirm" button here.)

Q18 In financial matters, do you think that you are a risk taker for high returns? Or are you a person who does not take risks for fear of making losses?

1. I take risks.
2. I take a little risk.
3. Fairly fair
4. I do not take risks much.
5. I do not take risks at all.
6. I do not know or do not want to answer.

Q19 As the proverb says, "Nothing ventured, nothing gained," there is a way of thinking that in order to achieve results, you need to take risks. On the other hand, as another proverb says, "A wise man never courts danger," meaning that you should avoid risks as much as possible. Which way of thinking is closest to your behavior in financial matters, such as consumption, savings, and stock investments? Please evaluate your behavioral patterns and choose the one that best describes your behavior.

1. Completely agree with the "nothing ventured, nothing gained" way of thinking.
2. Somewhat sympathetic with the "nothing ventured, nothing gained" way of thinking
3. Neither
4. Somewhat sympathize with the idea of "wise man"
5. Completely sympathize with the idea of "wise man"
6. I do not know or do not want to answer.

Q20 How much do you value the present and the future in financial matters?

1. Much more important now than in the future
2. Slightly more important now than in the future
3. Slightly more important in the future than now
4. Much more important in the future than now
5. I do not know or do not want to answer.

Q21 By what percentage do you think "prices" have changed today compared with one year ago ("prices" refer to the overall price of goods and services you purchase)? Please choose the one that comes closest to your perception.

1. Prices have gone up about 50% or more.
2. About 10% higher
3. About 5% higher
4. About 2% higher
5. About 1% higher
6. About 0%, i.e., almost the same
7. About lower
8. About 2% lower
9. About 5% or much lower
10. Price changes do not affect my life much, so I do not have a perception.
11. I do not know.

Q22 By what percentage do you think "prices" will change in one year from now? Please choose the one that comes closest to your perception.

1. Prices will go up about 50% or more.
2. About 10% higher
3. About 5% higher
4. About 2% higher
5. About 1% higher

6. About 0%, i.e., almost the same
7. About lower
8. About 2% lower
9. About 5% or much lower
10. I do not have a perception because future prices are uncertain.
11. I do not have a perception because price changes do not affect my life much.
12. I do not know.

Q23 By what percentage do you think your household income will change in one year from now? Please choose the one that comes closest to your perception.

1. My household income will go up about 50% or more.
2. About 10% higher
3. About 5% higher
4. About 2% higher
5. About 1% higher
6. About 0%, i.e., almost the same
7. About lower
8. About 2% lower
9. About 5% or much lower
10. I do not have a perception because future incomes are uncertain.
11. I do not know.]

Q24 Japan's government debt is at a historically very high level compared with other countries. What is your opinion on this issue?

1. I am very concerned about it.
2. I am concerned to some extent.
3. I am concerned slightly.
4. I am not concerned about it.
5. Not at all concerned.
6. I do not know.

Q25 We plan to publish the results of the survey widely in a report. Are you interested in this? If you are interested, we will send you the address of the website where the report will be posted at a later date.

1. I am interested and would like you to send me the report.
2. No, I do not need it.
3. Either one is fine with me.

Thank you for taking the time to complete the survey.

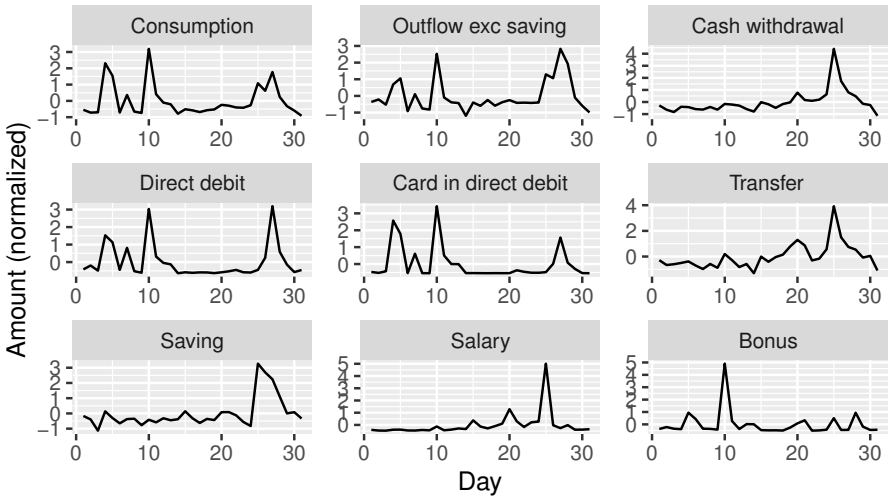

Figure 1: Daily Transaction Patterns in a Month

Note: The horizontal axis represents each day in a month, from 1 to 31. Each series is normalized with a zero mean and unit standard deviation.

B Bank Transaction and Survey Data

B.1 Daily Transaction Patterns

Figure 1 illustrates daily transaction patterns in a month. This shows that salaries tend to be paid on the 25th every month, with smaller peaks on the 15th and 20th. In alignment with salary, cash withdrawals and transfers also peak on the 25th. Bonuses tend to be paid on the 10th. The timing of direct debit is relatively more dispersed, with peaks observed on the 3rd, 10th, and 27th.

B.2 Salary

The third type of income shock is salary. Specifically, I select transactions that are inflows and include the remark of "kyuyo (salary)." The properties of a salary differ considerably from those of SCPs. A salary is paid regularly, and thus, it is not a surprising income shock to individuals who receive it. Further, an unexpected component in the variation of a salary is not necessarily a one-time shock because a certain fraction is likely to be translated into a change in the permanent income. Although structural models are needed to identify a true income shock (e.g., Bodkin 1959; Blundell, Pistaferri, and Preston 2008; Olafsson and Pagel 2018, Gelman 2021, 2022; Crawley and Kuchler 2023), I crudely use observed salary data as an income shock for a comparison purpose. Figure 2 shows the histogram for the timing of salaries for the survey respondents. This suggests monthly cyclicality, where the peak is often the final week of each month.

B.3 Outflows

Outflows are defined as all the transactions that decrease the amount of their deposits. Depending on the type of transaction, each outflow is assigned a classification code by the Mizuho Bank.

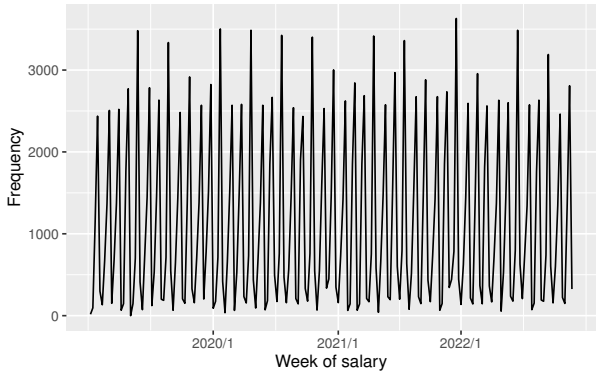

Figure 2: Timing of Salary

The first type of outflow is direct debit (direct withdrawal); in it, an organization withdraws an undetermined amount of money automatically from an individual's account given the pre-authorization of payments at the bank account.[1] A direct debit is often used to pay credit card bills, rent, and utility bills. I further select direct debit outflows that have the remark "card," which include credit card payments. The second type of outflow is a transfer, which is different from direct debit in that payments are one-time occurrences.[2] Third, I select debit card payments from the transactions that have the remark "debit." The fourth type is cash deposit withdrawals from ATMs. Finally, there are outflows related to saving. I calculate outflows that are accompanied by the remark of either "shoken (securities)" or "gohensai (repayment)," which is indicative of transfers to securities companies and loan (mortgage) repayments, respectively.

Using these types of outflows, I define consumption as the sum of card payments in direct debit, transfers, debit card payments, and cash withdrawals. Alternatively, I define consumption as (1) outflows excluding saving or (2) cash withdrawals.

B.4 Representativeness

To check the representativeness of the data, I compare the age distribution of survey respondents with that of all the Mizuho bank account users (specifically, salary recipients) and that of employed people based on the representative Labor Force Survey (Statistics Bureau) in 2019.[3] Figure 3 shows the distribution of age, log wealth, and log income. Ages of survey respondents are highly concentrated around 50 compared with Mizuho users and those in the Labor Force Survey. People in their 20s and 30s are relatively less represented in the survey. In terms of wealth and income, survey respondents are more wealthy than Mizuho users. For example, mean wealth is 5,712 thousand yen in the survey, while it is 3,553 thousand yen among Mizuho users. Mean annual income is 4,468 thousand yen in the survey, while it is 3,363 thousand yen among Mizuho users.

[1] Direct debit is called "furikae" in Japanese.

[2] A transfer is called "furikomi" in Japanese.

[3] Age is grouped into bins of 10 years, that is, from 15 to 24, from 25 to 34, $\cdots$, from 55 to 64, and above. I calculate age distribution by dividing the figures by 10 for each age group. See

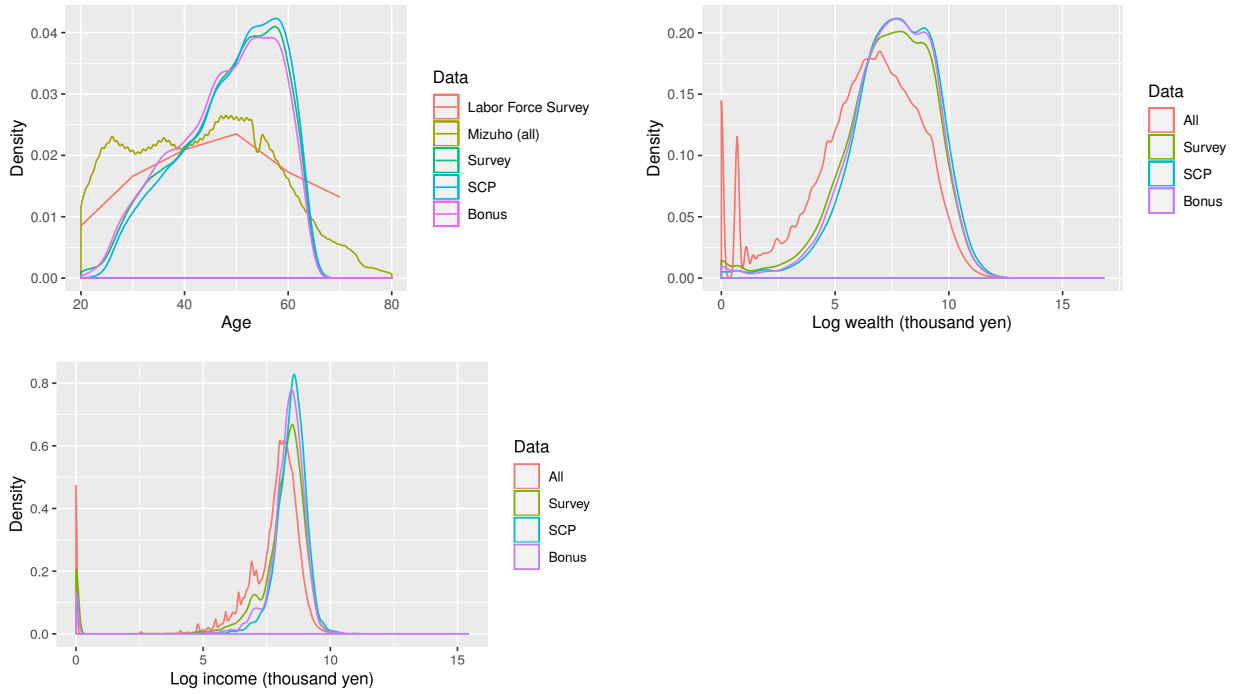

Figure 3: Distribution of Survey Respondents

Note: The Labor Force Survey is compiled by the Statistics Bureau. "Mizuho (all)" or "All" represent the distribution of all the bank account users who regularly receive salary at their accounts ($N = 3,787,003$; a unique identification code is assigned for salary recipients). "Survey" represents the distribution of the survey respondents ($N = 5,264$). "SCP" and "Bonus" represent the distribution of SCP and bonus recipients, respectively, among the survey respondents ($N = 2,445$ and $N = 3,724$).

B.5 Correlations between Variables

In Table 1, I present correlation coefficients. The upper table focuses on the correlations between three measures of risk aversion and two measures of the discount rate, all derived from the survey. The results show that the three measures of risk aversion are significantly positively correlated with each other, indicating internal consistency. On the other hand, the two measures of discount rate are negatively correlated, which is expected since the discount rate (direct) is expressed in an inverse scale. Importantly, risk aversion is not significantly correlated with the discount rate, suggesting that risk preferences and time preferences are distinct dimensions.

The lower table presents the correlation coefficients between the liquidity constraint dummy, log wealth, and log income from the transaction data, along with the liquidity constraint measure from the survey. The transaction-based liquidity constraint dummy is significantly positively correlated with the survey-based measure of liquidity constraint, indicating consistency between these data sources. Additionally, the liquidity constraint dummy, which compares wealth and income, is more strongly correlated with wealth than with income. This suggests that variations in wealth are the dominant factor influencing liquidity constraints.

Table 1: Correlation

	Risk aversion (quant)	Risk aversion A (direct)	Risk aversion B (direct)	Discount rate (quant)	Discount rate (direct)
Risk aversion (quant)	1	0.103	0.112	0.020	0.006
Risk aversion A (direct)		1	0.670	0.040	-0.052
Risk aversion B(direct)			1	0.040	-0.018
Discount rate (quant)				1	-0.156
Discount rate (direct)					1

	Liquidity constraint dummy	Liquidity constraint (survey)	Log wealth	Log income
Liquidity constraint dummy	1	0.221	-0.673	0.108
Liquidity constraint (survey)		1	-0.315	-0.065
Log wealth			1	0.160
Log income				1

https://www.stat.go.jp/data/roudou/sokuhou/nen/ft/pdf/index1.pdf

C Further Estimation Results

C.1 MPC

In this appendix, I examine the robustness of the MPC estimation results.

MPC to Salary Table 2 shows the estimation results of the MPC when I include salary as an income shock as well as SCP and bonuses. When the dependent variable is consumption based on my definition, the estimated γ_j^0 to the three types of income shock is similar: 0.16, 0.18, and 0.14 for SCP, bonus, and salary, respectively.

This similarity of the MPC to the three types of income shock may be surprising, considering that they have quite different intrinsic natures. SCP payments are transitory and unexpected. The Ricardian equivalence may decrease the MPC to SCP because SCP is a governmental transfer, which may increase tax in the future. By contrast, a salary is regular and anticipated in terms of both the timing and amount. Thus, if households are rational and not tightly liquidity constrained, they would smooth consumption so that γ_j^k is likely positive for a wide range of k with a smooth change peaked at $k = 0$ and the size of γ_j^0 for salary is likely smaller than that for SCP. Furthermore, to the extent that a change in an individual's salary alters their permanent income, an unexpected change in salary may increase γ_j^k for $k \geq 0$ compared with γ_j^k for $k < 0$. Bonus is intermediate between SCP and salary. It resembles SCP in that the bonus is paid only twice a year and the amount of the bonus is largely unknown to individuals, although the Ricardian equivalence does not exist. However, my estimation results show that MPCs to SCP, bonus, and salary are similar. Particularly, the similarity between SCP and salary may be surprising, implying the possibility that households are not highly rational (bounded rational) or are tightly liquidity constrained.[4]

[4]Another observation for salary is that the MPC for outflows excluding saving is higher than the MPC for consumption. This suggests a possibility that salary is positively correlated with automatic payments using direct debit, which is included in outflows excluding saving but not in my consumption measure.

Table 2: MPC Estimation Results for Salary

	(1)			(2)		
Dependent variable	Consumption			Cash withdrawals		
Income shock	SCP	Bonus	Salary	SCP	Bonus	Salary
Explanatory variables						
Income^{-9}	-0.031	0.000	-0.014	-0.0305***	0.001	0.0086***
	(0.042)	(0.005)	(0.012)	(0.006)	(0.002)	(0.003)
Income^{-8}	-0.030	-0.004	0.007	-0.0248***	-0.001	0.0039**
	(0.069)	(0.004)	(0.006)	(0.009)	(0.001)	(0.002)
Income^{-7}	-0.018	-0.0095**	0.008	-0.012	-0.001	-0.0042***
	(0.044)	(0.004)	(0.008)	(0.012)	(0.001)	(0.001)
Income^{-6}	-0.020	-0.0141***	0.001	0.008	-0.0038***	-0.0077***
	(0.031)	(0.003)	(0.006)	(0.015)	(0.001)	(0.002)
Income^{-5}	-0.1007***	-0.004	-0.0137***	-0.007	-0.002	-0.002
	(0.020)	(0.004)	(0.005)	(0.012)	(0.001)	(0.002)
Income^{-4}	0.041	-0.002	0.005	-0.016	-0.002	0.0109***
	(0.067)	(0.004)	(0.007)	(0.011)	(0.002)	(0.002)
Income^{-3}	-0.0856***	-0.013***	-0.004	-0.010	-0.0032***	-0.003
	(0.016)	(0.003)	(0.006)	(0.009)	(0.001)	(0.002)
Income^{-2}	-0.023	-0.0083***	0.012	0.001	-0.001	-0.0025*
	(0.043)	(0.003)	(0.007)	(0.011)	(0.001)	(0.001)
Income^{-1}		-0.004	-0.013		0.002	-0.0081***
		(0.005)	(0.010)		(0.002)	(0.002)
Income	0.1633***	0.1839***	0.1412***	0.1632***	0.0534***	0.0487***
	(0.023)	(0.018)	(0.048)	(0.016)	(0.004)	(0.009)
Income^{1}	0.013	0.0777***	0.0218**	0.0697***	0.0268***	0.003
	(0.019)	(0.017)	(0.009)	(0.012)	(0.003)	(0.003)
Income^{2}	-0.026	0.027***	0.0529**	0.0197*	0.0139***	0.000
	(0.022)	(0.005)	(0.022)	(0.010)	(0.002)	(0.002)
Income^{3}	-0.016	0.010	0.0243**	0.000	0.0046***	0.001
	(0.041)	(0.006)	(0.010)	(0.008)	(0.001)	(0.003)
Income^{4}	0.000	0.0133*	0.031	0.004	0.003	0.0075**
	(0.031)	(0.008)	(0.021)	(0.009)	(0.002)	(0.003)
Income^{5}	-0.0647***	0.005	0.0316***	0.000	0.002	0.0054**
	(0.018)	(0.004)	(0.011)	(0.009)	(0.002)	(0.002)
Income^{6}	-0.041	0.003	0.009	-0.010	0.001	0.000
	(0.028)	(0.005)	(0.008)	(0.015)	(0.002)	(0.002)
Income^{7}	-0.0766***	0.011	0.005	-0.0194***	0.002	-0.0029**
	(0.017)	(0.008)	(0.005)	(0.006)	(0.002)	(0.001)
Income^{8}	-0.018	0.007	-0.0142***	-0.0153**	-0.001	-0.0034***
	(0.029)	(0.005)	(0.004)	(0.007)	(0.001)	(0.001)
Income^{9}	-0.0575***	0.006	0.005	-0.0208***	-0.002	0.0102***
	(0.021)	(0.005)	(0.009)	(0.006)	(0.001)	(0.002)
Fixed effects	individual, week*prefecture					
No. of observations		974,298			974,298	
No. of individuals		5,239			5,239	
R^2		0.053			0.062	

Note: Consumption (dependent variable) equals the sum of card payments in direct debit, debit card payments, transfers, and cash withdrawals. Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Another Dependent Variable: Outflows Excluding Saving Table 3 shows the estimation results of the MPC when the dependent variable is outflows excluding saving.

Table 3: MPC Estimation Results when the Dependent Variable is Outflows Excluding Saving

	(1)		(2)		
Dependent variable	Outflow exc saving		Outflow exc saving		
Income shock	SCP	Bonus	SCP	Bonus	Salary
Explanatory variables					
Income^{-9}	-0.045	0.028	-0.057	0.025	-0.044***
	(0.098)	(0.024)	(0.098)	(0.024)	(0.016)
Income^{-8}	-0.085	-0.002	-0.093	0.005	0.014
	(0.086)	(0.017)	(0.087)	(0.017)	(0.019)
Income^{-7}	-0.064	0.010	-0.077	0.011	-0.0339**
	(0.118)	(0.021)	(0.119)	(0.021)	(0.017)
Income^{-6}	-0.028	-0.0257*	-0.031	-0.0277*	-0.016
	(0.098)	(0.015)	(0.097)	(0.015)	(0.015)
Income^{-5}	-0.1959***	-0.012	-0.2143***	-0.017	-0.0584***
	(0.055)	(0.014)	(0.056)	(0.014)	(0.011)
Income^{-4}	-0.066	-0.004	-0.068	0.002	0.010
	(0.090)	(0.021)	(0.090)	(0.021)	(0.013)
Income^{-3}	-0.2095***	-0.0328***	-0.2164***	-0.0283**	-0.015
	(0.051)	(0.013)	(0.051)	(0.012)	(0.019)
Income^{-2}	-0.1769**	-0.0327**	-0.1798**	-0.0351***	0.0248*
	(0.082)	(0.013)	(0.082)	(0.013)	(0.014)
Income^{-1}		-0.009		-0.012	-0.035**
		(0.017)		(0.016)	(0.015)
Income	0.067	0.2195***	0.058	0.2176***	0.1731***
	(0.054)	(0.028)	(0.054)	(0.028)	(0.051)
Income^{1}	-0.022	0.1492**	-0.030	0.1556**	0.0825**
	(0.070)	(0.064)	(0.069)	(0.064)	(0.041)
Income^{2}	-0.084	0.0512**	-(0.087)	0.0471**	0.071***
	(0.088)	(0.023)	(0.088)	(0.023)	(0.024)
Income^{3}	-0.101	-0.005	-0.106	-0.010	0.007
	(0.074)	(0.014)	(0.074)	(0.014)	(0.016)
Income^{4}	0.089	0.004	0.075	-0.002	0.035
	(0.171)	(0.017)	(0.171)	(0.017)	(0.024)
Income^{5}	-0.1591***	-0.022	-0.157***	-0.014	0.0392**
	(0.058)	(0.014)	(0.058)	(0.014)	(0.017)
Income^{6}	-0.1826***	0.018	-0.1753***	0.020	0.024
	(0.055)	(0.035)	(0.055)	(0.035)	(0.020)
Income^{7}	-0.1836***	0.097	-0.1753**	0.095	-0.007
	(0.068)	(0.068)	(0.068)	(0.069)	(0.016)
Income^{8}	-0.1471***	0.023	-0.1489***	0.018	-0.0354***
	(0.056)	(0.017)	(0.056)	(0.017)	(0.010)
Income^{9}	-0.106	0.023	-0.104	0.028	0.024
	(0.068)	(0.021)	(0.068)	(0.021)	(0.016)
Fixed effects	individual, week*prefecture				
No. of observations	974,298			974,298	
No. of individuals	5,239			5,239	
R^2	0.040			0.041	

Note: Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Standardized Variables In the baseline regression, both income and consumption variables are expressed in levels, which lead to coefficient γ_j^k that can be interpreted as the MPC. Another plausible method would be to use log income and log consumption to draw the consumption elasticity to the income shock. However, a simple logarithm cannot be taken, because both income and consumption in my data register zero frequently on a weekly basis. I may add a positive constant before taking a logarithm, but there is no consensus as to the choice of the value of the constant. Further, another challenge remains primarily because income is not stable around a certain positive value. I often encounter the following cases: income increases (i) from zero to 10,000 JPY and (ii) from 10,000 JPY to 20,000 JPY. When I use income in its level, these changes are the same, that is, 10,000 JPY. By contrast, when I take a logarithm after adding a constant, for example, 1, the former increase is transformed to $log(10001) - log(1) = 9.2$, whereas the latter increase is $log(20001) - log(10001) = 0.69$, which is considerably different.

In this appendix, I use an alternative method, which is standardizing a variable using its time mean. Specifically, I divide the dependent variable (e.g., consumption) by its time mean, while the income shock is divided by the time mean of inflows (salary + bonus + SCP payments). Then, coefficient γ_j^k conveys how much a 1% change in income relative to average income changes consumption, measured in percent.

Table 4 shows the estimation results of the MPC.

Table 4: Estimation Results when Standardized Variables are Used

	(1)		(2)		(3)	
Dependent variable	Consumption		Cash withdrawals		Outflows exc saving	
Income shock	SCP	Bonus	SCP	Bonus	SCP	Bonus
Explanatory variables						
Income^{-9}	-0.0037*	0.001	-0.0094***	-0.005*	-0.001	0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Income^{-8}	-0.003	-0.004	-0.005	-0.0078***	-0.003	-0.0051**
	(0.005)	(0.002)	(0.006)	(0.003)	(0.004)	(0.002)
Income^{-7}	-0.003	-0.0054**	-0.0049*	-0.002	-0.003	-0.0075***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
Income^{-6}	0.006	-0.002	0.007	0.006	0.006	0.002
	(0.011)	(0.002)	(0.012)	(0.004)	(0.010)	(0.003)
Income^{-5}	0.007	0.0084**	0.010	0.001	0.004	0.004
	(0.008)	(0.004)	(0.008)	(0.004)	(0.006)	(0.003)
Income^{-4}	-0.002	-0.003	-0.001	-0.006	-0.003	0.003
	(0.003)	(0.002)	(0.005)	(0.004)	(0.003)	(0.005)
Income^{-3}	0.003	-0.0131***	0.009	-0.004	-0.001	-0.0123***
	(0.008)	(0.002)	(0.012)	(0.003)	(0.005)	(0.003)
Income^{-2}	-0.004	0.002	-0.002	0.0049*	-0.005**	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Income^{-1}		0.003		0.0088**		0.004
		(0.002)		(0.003)		(0.003)
Income	0.0466***	0.1307***	0.0653***	0.106***	0.0212***	0.094***
	(0.017)	(0.009)	(0.017)	(0.008)	(0.005)	(0.007)
Income^{1}	0.0397*	0.0445***	0.0461***	0.0551***	0.019*	0.0309***
	(0.020)	(0.004)	(0.017)	(0.006)	(0.011)	(0.004)
Income^{2}	0.002	0.0301***	0.024	0.0475***	0.003	0.0244***
	(0.004)	(0.003)	(0.018)	(0.005)	(0.004)	(0.004)
Income^{3}	-0.0039**	0.0155***	-0.0045**	0.0254***	-0.0058***	0.015***
	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)
Income^{4}	0.004	0.017***	0.008	0.0098**	0.003	0.0178***
	(0.004)	(0.003)	(0.008)	(0.004)	(0.004)	(0.003)
Income^{5}	-0.0064***	0.004	-0.004	-0.003	0.002	0.001
	(0.002)	(0.003)	(0.003)	(0.004)	(0.007)	(0.003)
Income^{6}	-0.001	0.001	0.000	0.0082**	-0.002	-0.003
	(0.003)	(0.003)	(0.006)	(0.004)	(0.003)	(0.003)
Income^{7}	-0.0046**	0.0096***	-0.001	0.0087**	-0.0041*	0.0183***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.002)	(0.006)
Income^{8}	0.011	0.0093***	0.002	0.000	0.005	0.0139***
	(0.012)	(0.003)	(0.005)	(0.003)	(0.007)	(0.004)
Income^{9}	0.013	0.004	0.001	-0.003	0.002	0.0087**
	(0.015)	(0.002)	(0.006)	(0.003)	(0.004)	(0.004)
Fixed effects	individual, week*prefecture					
No. of observations	969,834		956,070		972,996	
No. of individuals	5,215		5,141		5,232	
R^2	0.005		0.003		0.002	

Note: Consumption equals the sum of card payments in direct debit, debit card payments, transfers, and cash withdrawals. The dependent variable is a consumption measure divided by its time mean. The income shock is SCP or bonus divided by the time mean of salary, bonus, and SCP payments. Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

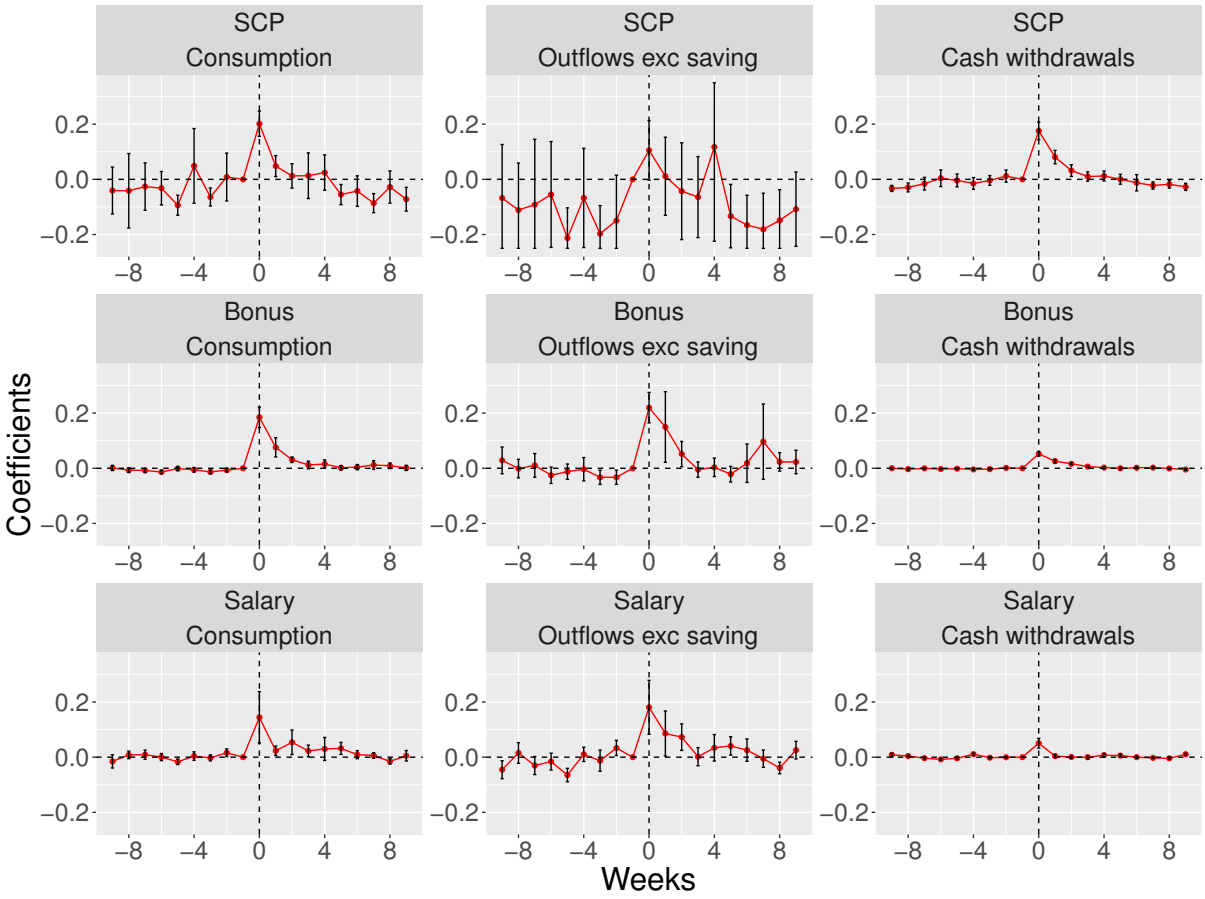

Figure 4: Consumption Responses to Income Shocks: Separate Regression for Each Income Shock

Note: The figure shows estimated coefficients γ^k for $k = -9, -8, \cdots, 8, 9$, which suggests consumption responses in week $|k|$ before/after income shocks. Bars indicate 95% confidence intervals.

Separate Regression for Each Income Shock I run the following two-way fixed effect regression:

$$C_{it} = \alpha_i + \alpha_{tr} + \sum_{k=a}^{b} \gamma^k X_{it}^k + \varepsilon_{it}, \tag{1}$$

where the income shock X_{it}^k is entered separately from SCP, bonus, or salary incomes. Tables 5 and 6 and Figure 4 show the estimation results.

Table 5: MPC Estimation Results: Separate Regression for Each Income Shock

	(1)	(2)	(3)	(4)	(5)
			Dependent variable		
			Consumption		
	All survey respondents	SCP recipients in 2020	All survey respondents	Bonus recipients	All survey respondents
Income shock	SCP	SCP	Bonus	Bonus	Salary
Explanatory variables					
Income^{-9}	-0.041	-0.039	0.001	0.001	-0.015
	(0.042)	(0.043)	(0.005)	(0.005)	(0.012)
Income^{-8}	-0.041	-0.040	-0.0069*	-0.0069*	0.008
	(0.068)	(0.068)	(0.004)	(0.004)	(0.007)
Income^{-7}	-0.026	-0.025	-0.008**	-0.0079**	0.009
	(0.043)	(0.043)	(0.004)	(0.004)	(0.008)
Income^{-6}	-0.032	-0.035	-0.0136***	-0.0136***	0.000
	(0.030)	(0.030)	(0.003)	(0.003)	(0.006)
Income^{-5}	-0.0938***	-0.0932***	-0.001	-0.001	-0.0169***
	(0.018)	(0.018)	(0.004)	(0.004)	(0.005)
Income^{-4}	0.049	0.050	-0.006	-0.006	0.004
	(0.068)	(0.068)	(0.004)	(0.004)	(0.008)
Income^{-3}	-0.064***	-0.0661***	-0.0134***	-0.0133***	-0.003
	(0.016)	(0.016)	(0.003)	(0.003)	(0.005)
Income^{-2}	0.008	0.005	-0.0068**	-0.0068**	0.0162**
	(0.043)	(0.043)	(0.003)	(0.003)	(0.007)
Income	0.2015***	0.2029***	0.1846***	0.1846***	0.1445***
	(0.023)	(0.023)	(0.018)	(0.018)	(0.046)
Income^{1}	0.0481**	0.048**	0.0759***	0.0759***	0.0232***
	(0.019)	(0.019)	(0.017)	(0.017)	(0.008)
Income^{2}	0.012	0.013	0.0309***	0.0309***	0.0541**
	(0.022)	(0.022)	(0.005)	(0.005)	(0.022)
Income^{3}	0.013	-0.024	0.0119*	0.012*	0.0226**
	(0.041)	(0.020)	(0.007)	(0.007)	(0.011)
Income^{4}	0.025	0.025	0.0154**	0.0154**	0.030
	(0.032)	(0.032)	(0.007)	(0.007)	(0.021)
Income^{5}	-0.0552***	-0.0562***	0.002	0.002	0.0318***
	(0.018)	(0.018)	(0.004)	(0.004)	(0.011)
Income^{6}	-0.042	-0.042	0.004	0.004	0.009
	(0.028)	(0.028)	(0.005)	(0.005)	(0.007)
Income^{7}	-0.0863***	-0.0889***	0.012	0.012	0.006
	(0.017)	(0.017)	(0.008)	(0.008)	(0.005)
Income^{8}	-0.028	-0.026	0.0091*	0.0091*	-0.0153***
	(0.029)	(0.029)	(0.005)	(0.005)	(0.005)
Income^{9}	-0.0721***	-0.0726***	0.001	0.001	0.005
	(0.021)	(0.022)	(0.005)	(0.005)	(0.009)
Fixed effects			individual, week*prefecture		
No. of observations	974,298	453,057	974,298	688,485	974,298
No. of individuals	5,239	2,436	5,239	3,702	5,239
R^2	0.044	0.042	0.048	0.043	0.049

Note: Consumption (dependent variable) equals the sum of card payments in direct debit, debit card payments, transfers, and cash withdrawals. Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: MPC Estimation Results 2: Separate Regression for Each Income Shock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Dependent variable					
	Consumption			Outflows exc saving			Cash withdrwals		
Income shock	SCP	Bonus	Salary	SCP	Bonus	Salary	SCP	Bonus	Salary
Explanatory variables									
Income^{-9}	-0.041	0.001	-0.015	-0.068	0.029	-0.0453***	-0.0329***	0.000	0.0084***
	(0.042)	(0.005)	(0.012)	(0.097)	(0.024)	(0.016)	(0.005)	(0.002)	(0.003)
Income^{-8}	-0.041	-0.0069*	0.008	-0.111	-0.001	0.015	-0.0293***	-0.0033**	0.0044***
	(0.068)	(0.004)	(0.007)	(0.085)	(0.017)	(0.019)	(0.008)	(0.001)	(0.002)
Income^{-7}	-0.026	-0.008**	0.009	-0.092	0.011	-0.0303*	-0.016	0.000	-0.0037***
	(0.043)	(0.004)	(0.008)	(0.118)	(0.022)	(0.016)	(0.011)	(0.001)	(0.001)
Income^{-6}	-0.032	-0.0136***	0.000	-0.055	-0.0255*	-0.016	0.004	-0.003***	-0.008***
	(0.030)	(0.003)	(0.006)	(0.096)	(0.015)	(0.015)	(0.015)	(0.001)	(0.002)
Income^{-5}	-0.0938***	-0.001	-0.0169***	-0.2129***	-0.012	-0.0648***	-0.004	-0.002	-0.0041**
	(0.018)	(0.004)	(0.005)	(0.055)	(0.014)	(0.012)	(0.012)	(0.001)	(0.002)
Income^{-4}	0.049	-0.006	0.004	-0.067	-0.004	0.010	-0.015	-0.0042***	0.0108***
	(0.068)	(0.004)	(0.008)	(0.090)	(0.021)	(0.013)	(0.011)	(0.002)	(0.002)
Income^{-3}	-0.064***	-0.0134***	-0.003	-0.197***	-0.0328**	-0.013	-0.004	-0.0032***	-0.002
	(0.016)	(0.003)	(0.005)	(0.051)	(0.013)	(0.019)	(0.009)	(0.001)	(0.002)
Income^{-2}	0.008	-0.0068**	0.0162**	-0.1496*	-0.0326**	0.0333**	0.012	0.001	0.000
	(0.043)	(0.003)	(0.007)	(0.082)	(0.013)	(0.014)	(0.011)	(0.001)	(0.001)
Income	0.2015***	0.1846***	0.1445***	0.1052*	0.2197***	0.1807***	0.1759***	0.0522***	0.0506***
	(0.023)	(0.018)	(0.046)	(0.054)	(0.028)	(0.049)	(0.016)	(0.004)	(0.009)
Income^{1}	0.0481**	0.0759***	0.0232***	0.011	0.1495**	0.0857**	0.0807***	0.0256***	0.004
	(0.019)	(0.017)	(0.008)	(0.071)	(0.064)	(0.041)	(0.012)	(0.003)	(0.003)
Income^{2}	0.012	0.0309***	0.0541**	-0.043	0.0515**	0.0726***	0.0318***	0.0163***	0.001
	(0.022)	(0.005)	(0.022)	(0.088)	(0.023)	(0.024)	(0.011)	(0.002)	(0.002)
Income^{3}	0.013	0.0119*	0.0226**	-0.064	-0.005	0.002	0.010	0.0061***	0.000
	(0.041)	(0.007)	(0.011)	(0.073)	(0.014)	(0.016)	(0.008)	(0.002)	(0.003)
Income^{4}	0.025	0.0154**	0.030	0.118	0.004	0.034	0.012	0.003	0.0073**
	(0.032)	(0.007)	(0.021)	(0.171)	(0.017)	(0.024)	(0.009)	(0.002)	(0.003)
Income^{5}	-0.0552***	0.002	0.0318***	-0.1332**	-0.022	0.0408**	0.000	0.000	0.0057**
	(0.018)	(0.004)	(0.011)	(0.057)	(0.014)	(0.017)	(0.009)	(0.002)	(0.002)
Income^{6}	-0.042	0.004	0.009	-0.1658***	0.018	0.026	-0.012	0.002	0.000
	(0.028)	(0.005)	(0.007)	(0.054)	(0.035)	(0.020)	(0.015)	(0.002)	(0.002)
Income^{7}	-0.0863***	0.012	0.006	-0.181***	0.097	-0.005	-0.0223***	0.002	-0.0026**
	(0.017)	(0.008)	(0.005)	(0.065)	(0.068)	(0.016)	(0.006)	(0.002)	(0.001)
Income^{8}	-0.028	0.0091*	-0.0153***	-0.1488***	0.023	-0.0391***	-0.018***	-0.001	-0.0042***
	(0.029)	(0.005)	(0.005)	(0.056)	(0.017)	(0.010)	(0.007)	(0.001)	(0.001)
Income^{9}	-0.0721***	0.001	0.005	-0.108	0.023	0.026	-0.0273***	-0.0045***	0.0106***
	(0.021)	(0.005)	(0.009)	(0.067)	(0.021)	(0.016)	(0.006)	(0.001)	(0.002)
Fixed effects				individual, week*prefecture					
No. of observations	974,298	974,298	974,298	974,298	974,298	974,298	974,298	974,298	974,298
No. of individuals	5,239	5,239	5,239	5,239	5,239	5,239	5,239	5,239	5,239
R^2	0.044	0.048	0.049	0.040	0.040	0.040	0.052	0.054	0.059

Note: Consumption equals the sum of card payments in direct debit, debit card payments, transfers, and cash withdrawals. Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

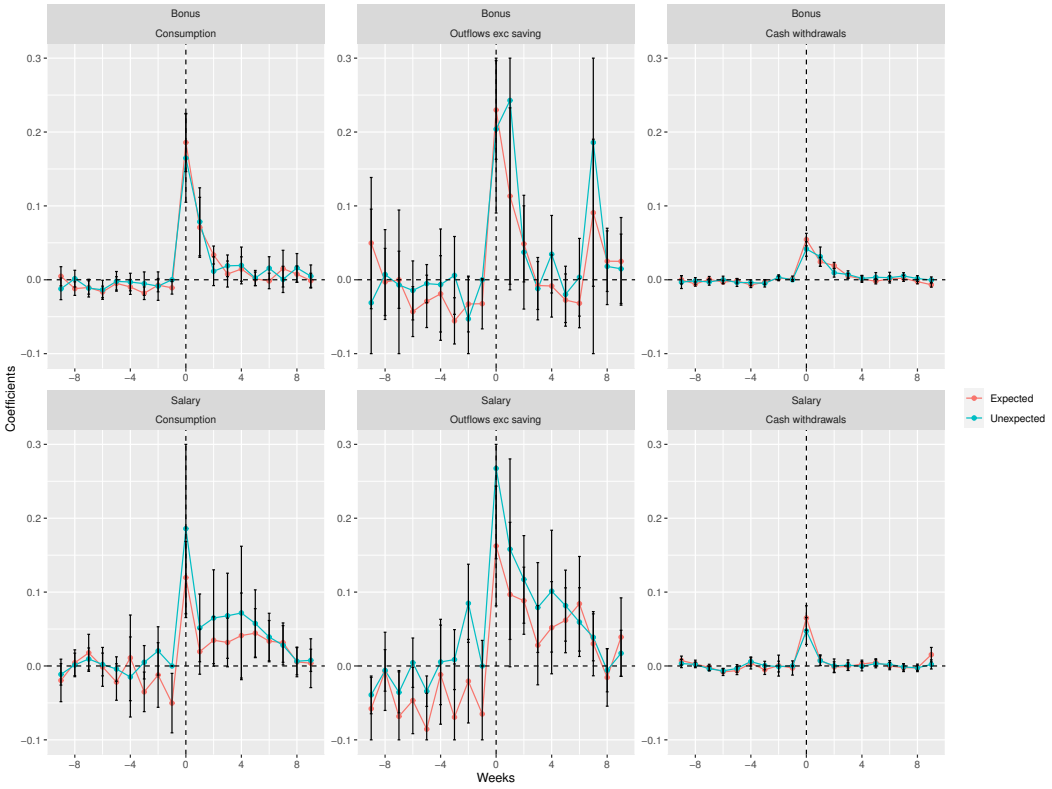

Figure 5: Consumption Responses to Expected and Unexpected Income Shocks

Note: The figure shows estimated coefficients γ^k for $k = -9, -8, \cdots, 8, 9$, which suggests consumption responses in week $|k|$ before/after income shocks. Bars indicate 95% confidence intervals.

Responses to Expected and Unexpected Income Shocks Figure 5 shows the MPC in response to expected and unexpected income shocks. Because bonuses and salaries are repeatedly paid, a considerable fraction of the income shocks are likely expected components. Specifically, I calculate expected and unexpected components when a positive income shock is recorded. An expected shock is defined as an income shock in the latest period, whereas an unexpected shock is defined as the difference between the shock and expected shock. I find that consumption responses to expected income shocks are similar to those to unexpected income shocks.

Robustness to Different Fixed Effects Table 7 shows the robustness of the estimation results of the MPC by using different fixed effects or including week k dummy. Week k dummy is a variable that takes one for individual i in week t when an income shock occurs for individual i in week $t+k$. I include the week k dummy for $k = -9, -8, \cdots, 9$. It should be noted that this week k dummy is different from the income shock given by X_{it}^k in that X_{it}^k captures not only the timing but also the amount of the income shock.

Table 7: Robustness to Fixed Effects

	(1)	(2)	(3)	(4)
	Dependent variable			
	Consumption			
Income shock	SCP			
Explanatory variables				
Income^{-9}	-0.041	-0.0284***	-0.0477***	-0.0393***
	(0.042)	(0.008)	(0.007)	(0.014)
Income^{-8}	-0.041	-0.0233**	-0.0493***	-0.0456**
	(0.068)	(0.009)	(0.009)	(0.021)
Income^{-7}	-0.026	-0.005	-0.0305**	-0.0425*
	(0.043)	(0.012)	(0.012)	(0.023)
Income^{-6}	-0.032	0.019	-0.010	0.028
	(0.030)	(0.016)	(0.016)	(0.025)
Income^{-5}	-0.0938***	-0.001	-0.0251**	-0.012
	(0.018)	(0.012)	(0.012)	(0.017)
Income^{-4}	0.049	-0.011	-0.0325***	-0.023
	(0.068)	(0.012)	(0.012)	(0.020)
Income^{-3}	-0.064***	0.005	-0.011	-0.012
	(0.016)	(0.011)	(0.011)	(0.021)
Income^{-2}	0.008	-0.001	-0.018	-0.0408*
	(0.043)	(0.012)	(0.012)	(0.021)
Income	0.2015***	0.1595***	0.1535***	0.1697***
	(0.023)	(0.016)	(0.017)	(0.030)
Income^{1}	0.0481**	0.0693***	0.0645***	0.0632**
	(0.019)	(0.013)	(0.013)	(0.027)
Income^{2}	0.012	0.0252**	0.017	0.001
	(0.022)	(0.012)	(0.012)	(0.020)
Income^{3}	0.013	0.005	-0.005	-0.001
	(0.041)	(0.010)	(0.010)	(0.024)
Income^{4}	0.025	0.009	0.004	-0.015
	(0.032)	(0.010)	(0.010)	(0.019)
Income^{5}	-0.0552***	0.002	-0.008	0.013
	(0.018)	(0.011)	(0.011)	(0.019)
Income^{6}	-0.042	-0.008	-0.019	-0.023
	(0.028)	(0.016)	(0.015)	(0.034)
Income^{7}	-0.0863***	-0.008	-0.0259***	-0.006
	(0.017)	(0.009)	(0.009)	(0.016)
Income^{8}	-0.028	-0.0146*	-0.0305***	-0.018
	(0.029)	(0.009)	(0.008)	(0.017)
Income^{9}	-0.0721***	-0.0188**	-0.0343***	-0.0329*
	(0.021)	(0.009)	(0.009)	(0.019)
Fixed effects				
individual	yes	yes	yes	yes
week*prefecture	yes	no	no	yes
week	–	yes	no	–
Week k dummy	no	no	no	yes
No. of observations	974,298	982,452	982,452	974,298
No. of individuals	5,239	5,282	5,282	5,239
R^2	0.044	0.079	0.068	0.067

Note: Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Estimation on a Monthly Basis Table 8 shows the estimation results of the MPC when a period is shown on a monthly basis.

Table 8: Robustness to Time Horizon: Monthly Basis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable						
	Consumption				Outflows exc saving		
Income shock	SCP	Bonus	Salary	SCP	SCP	Bonus	Salary
Explanatory variables							
Income^{-3}	0.095	0.006	-0.0211**	-0.016	0.012	0.090	0.0222
	(0.079)	(0.009)	(0.010)	(0.081)	(0.202)	(0.064)	(0.057)
Income^{-2}	-0.111	-0.0272**	-0.012	0.041	-0.357	0.043	-0.067*
	(0.105)	(0.011)	(0.011)	(0.105)	(0.241)	(0.048)	(0.038)
Income	0.319***	0.2692***	0.1997***	0.3052***	-0.043	0.328***	0.3034***
	(0.048)	(0.030)	(0.068)	(0.055)	(0.143)	(0.058)	(0.084)
Income^{1}	-0.043	0.0617***	0.1109***	0.069	-0.141	0.1169**	0.1325**
	(0.062)	(0.013)	(0.041)	(0.070)	(0.229)	(0.051)	(0.053)
Income^{2}	-0.1414**	0.0396**	0.0254*	-0.070	-0.5071***	0.1594*	0.0049
	(0.063)	(0.015)	(0.014)	(0.067)	(0.156)	(0.093)	(0.029)
Income^{3}	-0.3045***	0.0334**	0.021	-0.100	-0.7069***	0.072	0.0363
	(0.056)	(0.015)	(0.017)	(0.061)	(0.155)	(0.049)	(0.034)
Fixed effects							
individual	yes	yes	yes	yes	yes	yes	yes
week*prefecture	yes	yes	yes	no	yes	yes	yes
week	–	–	–	yes	–	–	–
No. of observations	245,992	245,992	245,992	248,248	245,992	245,992	245,992
No. of individuals	5,234	5,234	5,234	5,282	5,234	5,234	5,234
R^2	0.148	0.152	0.152	0.151	0.157	0.157	0.157

Note: Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

C.2 MPC Heterogeneity

Adding the Income Shock Squared and Survey-based Liquidity Constraint I examine the robustness of MPC heterogeneity by adding two terms: the income shock squared and survey-based liquidity constraint.

In columns (1) to (5) of Table 9, I progressively introduce variables that are interacted with the income shock. In column (1), I use these variables are the income shock itself and the liquidity constraint dummy. The former indicates the dependence of the MPC on the magnitude of the income shock, which is found to be insignificant for both SCP and bonus shocks. Conversely, δ_j for the liquidity constraint dummy is significantly positive for both SCP and bonus shocks.

It is intriguing to point out that the cross-term coefficient related to the survey-based liquidity constraint is insignificant. In column (2), I replace the aforementioned liquidity constraint dummy with the survey-based liquidity constraint as the variable interacted with the income shock. This variable is determined through surveys asking whether respondents can cover the same amount of their household income by withdrawing their savings, selling their assets, or borrowing from financial institutions, friends, or relatives, with the answer ranging from one to four. The insignificance of this coefficient may raise questions regarding the relevance of borrowing constraints in explaining a heterogeneous MPC, prompting further exploration into the types of liquidity constraints that hold significance. In this regard, Patterson's (2023) finding that households' elasticity of earnings to GDP is positively correlated with the MPC is worth investigating.

Table 9: Estimation Results of MPC Heterogeneity

	(1)		(2)		(3)	
Dependent variable	Consumption		Consumption		Consumption	
Income shock	SCP	Bonus	SCP	Bonus	SCP	Bonus
Variables interacted with the income shock						
Bank transaction data						
Income shock	1.29.E-07	-2.31.E-10	1.60.E-07	-3.32E-09	1.46.E-07	1.06E-09
	(1.97E-07)	(5.36E-09)	(2.01E-07)	(5.27E-09)	(2.00E-07)	(5.66E-09)
Liquidity constraint dummy	0.1209**	0.2293***			-0.0958	0.1513***
	(0.049)	(0.033)			(0.074)	(0.047)
Log wealth					-0.0692***	-0.0236**
					(0.017)	(0.011)
Survey data						
Liquidity constraint			0.027	0.015	-0.0171	-0.021
			(0.026)	(0.023)	(0.025)	(0.018)
Fixed effects	individual, week*prefecture					
No. of observations	974,298		951,420		951,420	
No. of individuals	5,239		5,116		5,116	
R^2	0.049		0.048		0.049	

	(4)		(5)		(6)	
Dependent variable	Consumption		Consumption		Cash withdrawals	
Income shock	SCP	Bonus	SCP	Bonus	SCP	Bonus
Variables interacted with the income shock						
Bank transaction data						
Income shock	9.85.E-08	4.94.E-10	1.22.E-07	-1.01E-09	-2.5e-07**	-1.33E-10
	(1.94E-07)	(5.96E-09)	(1.99E-07)	(6.06E-09)	(1.26E-07)	(8.59E-10)
Liquidity constraint dummy	-0.095	0.1516***	-0.105	0.1583***	0.059	0.0489***
	(0.073)	(0.048)	(0.073)	(0.047)	(0.057)	(0.015)
Log wealth	-0.0778***	-0.0265***	-0.0806***	-0.0216**	-0.032**	-0.0187***
	(0.017)	(0.010)	(0.017)	(0.011)	(0.013)	(0.002)
Survey data						
Liquidity constraint	-0.025	-0.031	-0.033	-0.0291*	-0.018	0.0154**
	(0.025)	(0.020)	(0.025)	(0.016)	(0.019)	(0.008)
Age	0.0086***	0.0031***	0.0081***	0.0026**	0.0076***	0.001
	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)	(0.000)
Male	0.008	-0.074	-0.012	-0.066	0.041	-0.004
	(0.057)	(0.082)	(0.058)	(0.076)	(0.037)	(0.007)
Education	0.012	-0.021	0.012	-0.023	0.009	-0.006*
	(0.017)	(0.016)	(0.017)	(0.016)	(0.012)	(0.004)
Risk aversion (quant)			-0.054	0.0315**	-0.0587*	0.006
			(0.043)	(0.013)	(0.034)	(0.005)
Discount rate (quant)			0.001	0.0028***	0.0017**	0.000
			(0.001)	(0.001)	(0.001)	(0.000)
Fixed effects	individual, week*prefecture					
No. of observations	945,620		915,488		915,488	
No. of individuals	5,085		4,923		4,923	
R^2	0.049		0.049		0.056	

Note: Figures in parentheses indicate standard errors clustered at the individual level. To conserve space, I show only the coefficients of cross terms with income shock X^k_{ijt}. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Other Dependent Variables Table 10 shows the estimation results of MPC heterogeneity when I use three kinds of expenditure measures: consumption, cash withdrawals, and outflows excluding saving.

Table 10: Estimation Results of MPC Heterogeneity: Other Dependent Variables

	(1)		(2)		(3)	
Dependent variable	Consumption		Cash withdrawals		Outflows exc saving	
Income shock	SCP	Bonus	SCP	Bonus	SCP	Bonus
Variables interacted with the income shock						
Bank data variables						
Income shock	1.22.E-07	-1.01.E-09	-2.5e-07**	-1.33E-10	1.25e-06**	-4.47E-10
	(1.99E-07)	(6.06E-09)	(1.26E-07)	(8.59E-10)	(5.78E-07)	(7.62E-09)
Liquidity constraint dummy	-0.105	0.1583***	0.059	0.0489***	-0.154	0.2944***
	(0.073)	(0.047)	(0.057)	(0.015)	(0.151)	(0.084)
Log wealth	-0.0806***	-0.0216**	-0.032**	-0.0187***	-0.092	0.022
	(0.017)	(0.011)	(0.013)	(0.002)	(0.060)	(0.024)
Surveyed variables						
Liquidity constraint	-0.033	-0.0291*	-0.018	0.0154**	-0.020	-0.011
	(0.025)	(0.016)	(0.019)	(0.008)	(0.053)	(0.036)
Age	0.0081***	0.0026**	0.0076***	0.001	0.000	0.000
	(0.003)	(0.001)	(0.002)	(0.000)	(0.006)	(0.002)
Male	-0.012	-0.066	0.041	-0.004	-0.272	0.026
	(0.058)	(0.076)	(0.037)	(0.007)	(0.184)	(0.076)
Education	0.012	-0.023	0.009	-0.006*	-0.081	-0.0348**
	(0.017)	(0.016)	(0.012)	(0.004)	(0.067)	(0.017)
Risk aversion (quant)	-0.0538	0.0315**	-0.0587*	0.006	-0.164	0.0483**
	0.042937135	0.013281382	(0.034)	(0.005)	(0.103)	(0.019)
Discount rate (quant)	0.0008	0.0028***	0.0017**	0.000	0.003	0.0044***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.003)	(0.001)
Fixed effects	individual, week*prefecture					
No. of observations	915,488		915,488		915,488	
No. of individuals	4,923		4,923		4,923	
R^2	0.049		0.056		0.040	

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X_{it}^k for $k = -9$ to -2 and $k = 1$ to 9. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Controlling Log Wealth Table 11 presents the estimation results of MPC heterogeneity when I control for log wealth in the previous period. Despite the inclusion of log wealth in the previous period, the results remain largely unchanged.

Table 11: Estimation Results of MPC Heterogeneity with/without Wealth Control

	(1)		(2)	
Control log wealth	no		yes	
Dependent variable	Consumption		Consumption	
Income shock	SCP	Bonus	SCP	Bonus
Log wealth			24266.883***	
			(2023.214)	
Variables interacted with the income shock				
Bank transaction data				
Liquidity constraint dummy	-0.094	0.159***	-0.076	0.1643***
	(0.071)	(0.047)	(0.070)	(0.047)
Log wealth	-0.0763***	-0.0204*	-0.0849***	-0.0239**
	(0.017)	(0.012)	(0.017)	(0.000)
Survey data	0	0		
Age	0.0075***	0.0024*	0.0077***	0.0025*
	(0.002)	(0.001)	(0.002)	(0.0014)
Male	-0.002	-0.066	0.002	-0.068
	(0.057)	(0.075)	(0.057)	(0.075)
Education	0.014	-0.022	0.017	-0.022
	(0.017)	(0.014)	(0.016)	(0.014)
Risk aversion (quant)	-0.042	0.031**	-0.038	0.0316**
	(0.037)	(0.013)	(0.037)	(0.013)
Discount rate (quant)	0.0008	0.0027**	0.001	0.0027**
	(0.0009)	(0.0011)	(0.0009)	(0.00108)
Fixed effects	individual, week*prefecture			
No. of observations	930,554		930,554	
No. of individuals	5,004		5,004	
R^2	0.049		0.051	

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X_{it}^k for $k = -9$ to -2 and $k = 1$ to 9. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Standardized Variables In this appendix, I take an alternative method by standardizing a variable using a time mean. Specifically, I divide the dependent variable (e.g., consumption) by its time mean, while the income shock is divided by the time mean of inflows (salary + bonus + SCP payments). Table 12 shows the estimation results.

Table 12: Estimation Results of MPC Heterogeneity: Standarized Variables

	(1)		(2)		(3)	
Dependent variable	Consumption		Consumption		Consumption	
Income shock	SCP	Bonus	SCP	Bonus	SCP	Bonus
Variables interacted with the income shock						
Bank transaction data						
Income shock	-5e-04***	-5e-04***	-6e-04***	-6e-04***	-5e-04***	-5e-04**
	(1.10E-04)	(1.36E-04)	(1.31E-04)	(1.92E-04)	(1.10E-04)	(1.78E-04)
Liquidity constraint dummy	-0.0048	0.1644***			0.0179	0.1253***
	(0.025)	(0.018)			(0.017)	(0.023)
Log wealth					0.0142	-0.0098**
					(0.017)	(0.005)
Survey data						
Liquidity constraint			-0.0122	0.041***	0.0004	0.0149
			(0.021)	(0.013)	(0.013)	(0.012)
Fixed effects	individual, week*prefecture					
No. of observations	969,834		946,956		946,956	
No. of individuals	5,215		5,092		5,092	
R^2	0.006		0.005		0.006	

	(4)		(5)		(6)	
Dependent variable	Consumption		Consumption		Cash withdrawals	
Income shock	SCP	Bonus	SCP	Bonus	SCP	Bonus
Variables interacted with the income shock						
Bank transaction data						
Income shock	-5e-04***	-5e-04***	-5e-04***	-5e-04**	-0.0012***	-6e-04***
	(1.33E-04)	(1.76E-04)	(1.33E-04)	(2.02E-04)	(1.74E-04)	(1.57E-04)
Liquidity constraint dummy	0.060	0.1222***	0.073	0.1199***	0.015	0.1056***
	(0.052)	(0.023)	(0.052)	(0.024)	(0.033)	(0.024)
Log wealth	0.015	-0.011**	0.017	-0.0104**	0.002	-0.0189***
	(0.016)	(0.005)	(0.017)	(0.005)	(0.007)	(0.005)
Survey data						
Liquidity constraint	-0.011	0.015	-0.008	0.006	0.009	0.017
	(0.021)	(0.012)	(0.022)	(0.013)	(0.022)	(0.012)
Age	0.0030	0.0009	0.0036*	0.0009	0.0015	0.0006
	(0.0019)	(0.0007)	(0.0021)	(0.0008)	(0.0014)	(0.0007)
Male	-0.069	0.009	-0.069	0.010	-0.008	-0.009
	(0.074)	(0.014)	(0.068)	(0.015)	(0.033)	(0.015)
Education	-0.003	0.002	-0.001	0.001	-0.020	-0.003
	(0.011)	(0.006)	(0.013)	(0.006)	(0.013)	(0.006)
Risk aversion (quant)			-0.024	0.0202***	-0.1676***	0.005
			(0.027)	(0.006)	(0.064)	(0.006)
Discount rate (quant)			-0.0004	0.0014**	0.0001	0.0001
			(0.0007)	(0.0006)	(0.0006)	(0.0003)
Fixed effects	individual, week*prefecture					
No. of observations	941,156		911,210		898,579	
No. of individuals	5,061		4,900		4,832	
R^2	0.006		0.006		0.004	

Note: Figures in parentheses indicate standard errors clustered at the individual level. To save space, I do not show the coefficients of income shock X_{ijt}^k. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Separate Regression for Each Income Shock I run the regression separately for each type of income shock by using one of SCP, bonus, or salary incomes as X_{it}^k. Table 13 shows the estimation results.

Table 14 shows the estimation results of MPC heterogeneity when I do not control liquidity based on the transaction data. Specifically, I exclude the cross term of the income shock and log wealth and the cross term of the income shock and liquidity constraint dummy.

Table 13: Estimation Results of MPC Heterogeneity: Separate Regression for Each Income Shock

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable					
	Consumption	Outflows exc saving	Cash withdrawals	Consumption	Outflows exc saving	Cash withdrawals
Income shock	SCP	SCP	SCP	Bonus	Bonus	Bonus
Explanatory variables						
Income	0.3887*	1.0713*	0.073	0.3146***	0.033	0.162***
	(0.210)	(0.588)	(0.165)	(0.089)	(0.200)	(0.036)
Income × age	0.0082***	0.000	0.0076***	0.001	-0.002	7e-04*
	(0.003)	(0.006)	(0.002)	(0.001)	(0.002)	(0.000)
Income × male	-0.018	-0.265	0.042	0.027	0.0598*	0.004
	(0.058)	(0.184)	(0.037)	(0.017)	(0.036)	(0.009)
Income × education	0.014	-0.080	0.010	0.004	-0.018	-0.005
	(0.017)	(0.066)	(0.012)	(0.009)	(0.014)	(0.004)
Income ×	-0.046	-0.149	-0.0566*	0.0413***	0.0524**	0.006
risk aversion (quant)	(0.042)	(0.102)	(0.034)	(0.014)	(0.023)	(0.005)
Income ×	0.001	0.003	0.0016**	0.0019***	0.0036***	0.000
discount rate (quant)	(0.001)	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)
Income ×	-0.036	-0.021	-0.018	-0.009	0.026	0.011
liquidity constraint (direct)	(0.026)	(0.053)	(0.019)	(0.015)	(0.035)	(0.008)
Income × income	4.79E-08	1.19e-06**	-2.86e-07**	2.40E-08	7.97e-08**	-9.36e-09**
	(2.00E-07)	(5.79E-07)	(1.27E-07)	(1.62E-08)	(3.94E-08)	(3.87E-09)
Income × log wealth	-0.0786***	-0.088	-0.0313**	-0.0409***	0.003	-0.017***
	(0.018)	(0.060)	(0.013)	(0.007)	(0.025)	(0.003)
Income ×	-0.061	-0.103	0.079	0.0872**	0.2273***	0.0601***
liquidity constraint	(0.078)	(0.155)	(0.059)	(0.037)	(0.083)	(0.015)
Fixed effects	individual, week*prefecture					
No. of observations	915,488	915,488	915,488	912,140	912,140	912,140
No. of individuals	4,923	4,923	4,923	4,905	4,905	4,905
R^2	0.044	0.040	0.051	0.048	0.040	0.055

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X_{it}^k for $k = -9$ to -2 and $k = 1$ to 9. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 14: Estimation Results of MPC Heterogeneity without the Cross Term of Income Shock and Wealth/Liquidity Constraint Dummy

	(1)	(2)	(3)
	Dependent variable		
	Consumption	Consumption	Consumption
Income shock	SCP	Bonus	Salary
Explanatory variables			
Income	-0.050	0.118	0.293
	(0.166)	(0.123)	(0.186)
Income × age	0.0052*	-0.003	0.001
	(0.003)	(0.002)	(0.002)
Income × male	-0.024	0.0882***	-0.037
	(0.058)	(0.034)	(0.065)
Income × education	-0.002	-0.021	-0.0463*
	(0.016)	(0.013)	(0.026)
Income × risk aversion (quant)	-0.051	0.041*	0.0277*
	(0.043)	(0.023)	(0.016)
Income × discount rate (quant)	0.001	0.0041***	0.002
	(0.001)	(0.001)	(0.002)
Income × liquidity constraint (direct)	0.013	0.045	0.036
	(0.027)	(0.031)	(0.027)
Income × income	7.42E-08	8.16e-08**	-5.09E-09
	(2.00E-07)	(3.83E-08)	(9.61E-09)
Income × log wealth			
Income × liquidity constraint			
Fixed effects	individual, week*prefecture		
No. of observations	915,488	912,140	749,576
No. of individuals	4,923	4,905	4,031
R^2	0.044	0.041	0.034

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X_{it}^k for $k = -9$ to -2 and $k = 1$ to 9. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

MPC to Salary Table 15 shows the estimation results of MPC heterogeneity when the income shock is salary.

Table 15: Estimation Results of MPC Heterogeneity: Income Shock of Salary

	(1)	(2)	(3)
	Dependent variable		
	Consumption	Outflows exc saving	Cash withdrawals
Income shock	Salary	Salary	Salary
Explanatory variables			
Income	0.2062***	-0.485	0.1701***
	(0.055)	(0.391)	(0.034)
Income × age	0.0018***	-0.002	0.0026***
	(0.001)	(0.002)	(0.000)
Income × male	0.0371***	-0.017	0.0153*
	(0.012)	(0.070)	(0.008)
Income × education	-0.0171***	-0.0558*	-0.014***
	(0.005)	(0.029)	(0.003)
Income × risk aversion (quant)	0.0181**	0.0272*	0.0112***
	(0.007)	(0.015)	(0.004)
Income × discount rate (quant)	0.000	0.001	0.000
	(0.000)	(0.002)	(0.000)
Income × liquidity constraint (direct)	0.0175*	0.0964***	0.008
	(0.009)	(0.034)	(0.007)
Income × income	-1.26e-08***	6.09E-09	-1.15e-08***
	(1.53E-09)	(1.20E-08)	(1.25E-09)
Income × log wealth	-0.0216***	0.1046***	-0.0219***
	(0.005)	(0.040)	(0.003)
Income × liquidity constraint	0.0768***	0.3076***	0.0353***
	(0.016)	(0.109)	(0.011)
Fixed effects		individual, week*prefecture	
No. of observations	749,576	749,576	749,576
No. of individuals	4,031	4,031	4,031
R^2	0.035	0.034	0.063

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X_{it}^k for $k = -9$ to -2 and $k = 1$ to 9. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Responses to Expected and Unexpected Income Shocks Table 16 shows the estimation results of MPC heterogeneity when I divide the income shock into expected and unexpected components. I separate income shocks for bonuses and salary, X^0_{it}, into expected and unexpected components (denoted by $X^0_{it,expected}$ and $X^0_{it,unexpected}$, respectively), and include the cross terms of $X^0_{it,expected} \times Z_{it}$ and $X^0_{it,unexpected} \times Z_{it}$ in the regression.

Table 16: Estimation Results of MPC Heterogeneity without the Cross Term of Income Shock and Wealth/Liquidity Constraint Dummy

	Dependent variable			
	Consumption			
Income shock	Bonus		Salary	
Explanatory variables	Expected	Unexpected	Expected	Unexpected
Income	0.3376***		0.1906***	
	(0.088)		(0.055)	
Income × age	0.001	0.000	0.0019***	0.0021***
	(0.001)	(0.001)	(0.001)	(0.001)
Income × male	0.016	0.046	0.0393***	0.019
	(0.018)	(0.031)	(0.012)	(0.020)
Income × education	0.005	0.009	-0.019***	-0.009
	(0.011)	(0.010)	(0.005)	(0.006)
Income × risk aversion (quant)	0.0349***	0.0832**	0.0186**	0.0233***
	(0.011)	(0.042)	(0.009)	(0.008)
Income × discount rate (quant)	0.002**	0.003***	5e-04*	0.000
	(0.001)	(0.001)	(0.000)	(0.000)
Income × liquidity constraint (direct)	-0.009	-0.037	0.0217**	-0.004
	(0.016)	(0.026)	(0.009)	(0.013)
Income × income	2.66E-08		-1.35e-08***	
	(1.73E-08)		(2.99E-09)	
Income × log wealth	-0.0429***		-0.0202***	
	(0.007)		(0.005)	
Income × liquidity constraint	0.0684*		0.0861***	
	(0.037)		(0.016)	
Fixed effects				
No. of observations	908,733		749,037	
No. of individuals	4,905		4,031	
R^2	0.0472		0.0349	

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X^k_{it} for $k = -9$ to -2 and $k = 1$ to 9. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Cross Terms with More Detailed Explanatory Variables Table 17 shows the estimation results of MPC heterogeneity, in which I use more detailed explanatory variables, which are multiplied by income shocks (SCP or bonus). In the multivariate regression, I include all the explanatory variables listed in the table in one regression. In the univariate regression, I use the cross term of income shocks and one of the explanatory variables listed.

Table 17: Estimation Results of MPC Heterogeneity: Multivariate and Univariate Regression

	(1)	(2)	(3)	(4)	(5)	(6)
Income shock		SCP			Bonus	
Explanatory variables (cross term with income shocks)	Multivariate	Univariate	Univariate	Multivariate	Univariate	Univariate
Age	0.0082***	0.005**	0.0076***	-0.002	0.001	0.0028**
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)
Male	-0.018	0.002	0.023	0.0753**	-0.054	-0.075
	(0.066)	(0.055)	(0.055)	(0.037)	(0.082)	(0.085)
Education	0.014	-0.006	0.009	-0.012	-0.0349*	-0.028
	(0.019)	(0.015)	(0.016)	(0.015)	(0.018)	(0.021)
Risk aversion	-0.043	-0.022	-0.020	0.0476**	0.020	0.0374**
	(0.043)	(0.035)	(0.034)	(0.024)	(0.017)	(0.015)
Discount rate 1 week	-0.001	0.000	0.000	-0.001	0.0033***	0.0026***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Discount rate 1 year	0.000	0.000	0.000	0.000	0.002***	0.0015**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Discount rate 10 years	0.001	0.001	0.001	0.0027**	0.0013**	0.0012*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Discount rate (direct, inverse)	0.026	-0.012	0.012	0.009	-0.018	-0.006
	(0.033)	(0.030)	(0.029)	(0.038)	(0.017)	(0.013)
Inflation perception	0.011	0.010	0.008	0.004	-0.001	-0.001
	(0.012)	(0.008)	(0.009)	(0.004)	(0.002)	(0.001)
Inflation expectation	-0.001	0.003	0.002	-0.003	0.001	0.0011*
	(0.005)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Wage increase expectation	0.011	0.009	0.007	0.005	0.001	0.000
	(0.012)	(0.009)	(0.010)	(0.004)	(0.002)	(0.002)
Liquidity constraint	-0.026	0.023	-0.023	0.028	0.018	-0.020
	(0.027)	(0.026)	(0.026)	(0.032)	(0.025)	(0.018)
Control wealth/liquidity constraint dummy	yes	no	yes	yes	no	yes
Fixed effects	individual, week*prefecture					

Note: In the univariate regression, I use the cross term of income shock (SCP and bonus) and one of the explanatory variables listed. Other explanatory variables are the lag and lead of income shocks up to 9 weeks. Figures in parentheses indicate standard errors clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Estimation on a Monthly Basis Table 18 shows the estimation results of MPC heterogeneity when a period is shown on a monthly basis.

Table 18: Robustness to Time Horizon: Monthly Basis

	(1)	(2)	(3)	(4)
	Dependent variable			
	Consumption			
Income shock	SCP		Bonus	
Explanatory variables				
Income	1.3183***	0.280	0.3273*	0.192
	(0.417)	(0.313)	(0.174)	(0.160)
Income × age	0.006	0.001	0.0049**	0.004
	(0.005)	(0.005)	(0.002)	(0.002)
Income × male	0.161	0.136	-0.063	-0.026
	(0.102)	(0.102)	(0.078)	(0.077)
Income × education	-0.053	-0.0815**	-0.014	-0.021
	(0.037)	(0.036)	(0.017)	(0.017)
Income × risk aversion (quant)	0.061	0.052	0.003	-0.019
	(0.077)	(0.079)	(0.021)	(0.022)
Income × discount rate (quant)	-0.002	-0.001	0.0029**	0.0033***
	(0.002)	(0.002)	(0.001)	(0.001)
Income × liquidity constraint (direct)	-0.035	0.061	-0.029	0.023
	(0.051)	(0.052)	(0.032)	(0.030)
Income × income	4.88.E-07	5.23.E-07	-2.38.E-09	-7.48.E-09
	(4.65E-07)	(4.60E-07)	(8.24E-09)	(7.04E-09)
Income × log wealth	-0.1715***		-0.024	
	(0.038)		(0.018)	
Income × liquidity constraint	-0.2835*		0.2315***	
	(0.161)		(0.069)	
Fixed effects				
No. of observations	230,991	230,999	230,991	230,999
No. of individuals	4,915	4,915	4,915	4,915
R^2	0.147	0.147	0.153	0.152

Note: Figures in parentheses indicate standard errors clustered at the individual level. For simplicity, I do not show the coefficients of income shock X_{it}^k for $k = -3$ to -2 and $k = 1$ to 3. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.