

# Estimating the Marginal Propensity to Consume <sup>\*</sup>

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## Abstract

We estimate the marginal propensity to consume (MPC) in response to the Special Cash-Payment in Japan. We find the values of the MPC are at least 0.5 or more. We also find that time preference rates have an considerable impact on the value of the MPC. In fact, high time preference rates induce the larger values of the MPC. The results suggest that differences in time preference rates account for MPC heterogeneity.

## 1 Introduction

This study directly estimates the value of the marginal propensity to consume (MPC). The Japanese Government launched the Special Cash Payment (SCP: 特別定額給付金 in Japanese) program between the late May and August 2020. The program is a large-scale cash-transfer program during the COVID-19 pandemic. It entails a fixed cash transfer amounting to 100,000 Japanese yen (JPY) to every individual. The payment policy is an ideal situation for a natural experiment to estimate the value of the MPC. The unexpected policy is considered as purely exogeneous shocks.

Benefitting from the survey on the SPC, we document the larger value of the MPC than those in the past studies. A large number of literature document the values of the MPC (Hattori et al., 2021; Kubota et al., 2021). They report that the values of the MPC range from 0.1 to 0.5; the values are at most 0.5. In contrast to the literature, we find that the values of the MPC are at least 0.5 or more. Second, high time preference rates induce the large MPC. The results suggest that differences in time preference rates account for MPC heterogeneity. Third, liquidity constraints entail the larger values of the MPC. Fourth, negative income shocks increase the MPC. The evidence suggests that the cash payments are effective as a fiscal policy when households face severe demand shocks such as the COVID-19 pandemic.

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## 2 Data

We use the Japanese Panel Surveys of Consumers in 2020 (JPSC2020).<sup>1</sup> The JPSC is a longitudinal survey on women from 1993. It is a comprehensive survey on households' decision making about household economics, employment, and family relationships.

Our identification strategy for estimating the value of the MPC relies on the JPSC2020. The JPSC2020 was conducted in September 2020. It is a novel survey because it conducts a comprehensive survey on a survey on how the COVID-19 pandemic affects household economics. Using the survey, we provide precise measures of the MPC.

We benefit from the JPSC2020. First, the survey allows us to use a direct measurement of the MPC. The survey asks respondents to directly ask how much they receive and use the cash payments. Most literature measures the value of the MPC using structural models or quasi-experiments (Jappelli and Pisterferri, 2020). A new strand of papers depend instead on a more direct measurement (Coibion and Gorodnichenko, 2020; Kikuchi et al., 2022). The main advantage is that it does not require specific income processes or consumption models. In line with the new strand of the literature, our estimation strategy relies on a more direct measurement. Second, the JPSC2020 conducts a survey on how the COVID-19 pandemic affects household economics. It includes the question about income shocks they face and employment status. With “rich” covariates, the survey allows us to pin down the value of the MPC more precisely. Third, the survey provides relatively accurate measurements of both income and consumption expenditures. It is hard to obtain precise measure of income and consumption; income and consumption generally are underreported in surveys (Aguiar and Bilis, 2015). The systematic error of the measurement yields an attenuation bias. The bias potentially undervalues the value of the MPC. However, the survey can alleviate the measurement problem by asking respondents to provide how much they use and save the payments. The question is “How much did you use and save the payments you had received?”<sup>2</sup> Remember that the cash payments were fixed at 100,000 JPY per person. Because the sum of spending and saving equals to 100,000 JPY, the underreporting problem can be mitigated.

Figure 1 presents the histogram of the MPC from 1,678 respondents. The figure shows that the mode is one. The fact suggests that approximately half of respondents use up the cash payments they received. The evidence implies that the value of the MPC may be larger than those which the past studies estimated.

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<sup>1</sup>Panel Data Research Center at Keio University published the JPSC. See details at <https://www.pdrc.keio.ac.jp/en/paneldata/datasets/japanese-panel-survey-of-consumers-jpsc/>.

<sup>2</sup>Here, MPC is defined as the ratio of the marginal consumption to the SCP payment. The marginal consumption is measured by the answer to the question how much respondents use the payments they received.

### 3 Estimation strategy

To pin down the value of the MPC, we estimate the following equation;

$$\begin{aligned}
 MPC_i = & c + \beta_1 Education_i + \beta_2 TimePreference_i + \beta_3 HtoM_i \\
 & + \beta_4 CashOnHand_i + \beta_5 IncomeShock1_i + \beta_6 IncomeShock2_i + \mathbf{X}\gamma + \varepsilon_i,
 \end{aligned}
 \tag{1}$$

where  $MPC_i$  is defined as the household  $i$ 's MPC. Our primary focus is on the coefficient of the constant term  $c$ . The coefficient directly pins down the value of the MPC.

We control covariates such as educational attainments, time preference, liquidity constraints, cash on hand, income shocks, and socioeconomic factors.  $Education_i$  is a variable which captures household  $i$ 's educational attainment.<sup>3</sup>  $TimePreference_i$  is a proxy of time preference rates implied from the answer to the relevant question in the JPCS 2020.<sup>4</sup>  $HtoM$  refers to “hand-to-mouth” households, which are defined as households with less savings than two months of monthly household income. We define  $CashOnHand'$  as the sum of monthly household income, the stock of financial assets (transaction accounts, mutual funds, stocks, and outstanding claims), and net of consumer debt.  $IncomeShock1$  and  $IncomeShock2$  indicate that she or her husband has a monthly salary decrease of 0%–50% and 50% or more.<sup>5</sup> In addition, we control for age, age squared term, and number of family members in Equation (1).

### 4 Result

Table 1 shows the estimation results. There are four findings. First, the values of the MPC ranges 0.5 to 0.7. The column (1) in the table shows that the value of the MPC is 0.6. The estimation result is robust when we control covariates; the columns (2) to (6) in the table shows that the value of the MPC ranges from 0.5 to 0.7. The results suggest that the MPC is at least 0.5 or more.

Second, time preference rates may influence the MPC. The columns (3) to (6) in Table 1 show that the coefficients of a proxy of time preference are all significantly negative.<sup>6</sup> This implies that those who heavily discount future utility have a large value of the MPC.

Third, households with liquidity constraint have a large value of the MPC. The columns (4) to (6) in Table 1 show that the coefficients of  $HtoM$  are approximately 0.1. This suggests that hand-to-mouth households have larger values of the MPC by 0.1 than non-HtoM households. The results are supported by the evidence from “cash on hand”. The columns (5) to (6) in Table

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<sup>3</sup> $Education$  takes larger values when household  $i$  completed higher degrees.

<sup>4</sup>The question is “Choose the most appropriate option for the following question; You try to enjoy my life now rather than thinking about the future.” Respondents choose (1) agree, (2) agree a little, (3) neither agree nor disagree, (4) disagree a little, and (5) disagree. We interpret the most “patient” respondents when ones choose option (5).

<sup>5</sup>Note that the variables reflect employment status. Facing unemployment entails high income shocks, which may fall into  $IncomeShock2$ .

<sup>6</sup>Note that a proxy of time preference is “inverse” measure of time preference rates; respondents are patient when the proxy is larger. Thus, negative coefficients are consistent to the standard theory which predicts that households with high time preference rates spend more and save less today.

1 show that the coefficients of Cash on hand are all negative. This implies that the liquidity matters for the values of the MPC (Jappelli and Pisterferri, 2020; Kaplan and Violante, 2014).

Fourth, negative income shocks increase the MPC. The column (6) in Table 1 shows that the coefficients of income shock dummies are all positive. The negative income shocks may increase the value of the MPC. The results are consistent to the standard theory and similar to the past studies (Christelis et al., 2019; Kubota et al., 2021).

## 5 Conclusion

We directly estimate the value of the MPC. Benefitting from the survey on the SPC program, we document the larger value of the MPC than those in the past studies. There are four findings. First, the values of the MPC are at least 0.5 or more. Alleviating measurement errors allow us to pin down more precise and larger values of the MPC. Second, high time preference rates induce the larger values of the MPC. The results suggest that differences in time preference rates account for MPC heterogeneity.<sup>7</sup> Third, liquidity constraints entail larger values of the MPC. The robust evidence we present supports the prediction of the standard consumption theory. Fourth, negative income shocks increase the MPC. The evidence suggests that the cash payments are effective as a fiscal policy when households face severe demand shocks such as the COVID-19 pandemic.

The evidence on the sizable values of the MPC has important policy implications. Some economists cast doubt on the effects of the cash payments as a fiscal policy because of the small values of the MPC. However, the past studies use the data containing non-negligible measurement errors, which entail systematic biases in estimation. Our identification strategy relies on a more direct measure of consumption and allows us to provide the larger values of the MPC more than those in the past studies.

Furthermore, we show heterogeneous effects of the cash payments. First, we show that time preference rates may matter for the cash payments. In fact, patient households have the lower values of the MPC than impatient ones do. Second, liquidity constraints and negative income shocks matters for the values of the MPC. These results imply heterogeneous effects of the cash payments on intertemporal allocation of consumption. The empirical evidence we show contributes to a recent development of DSGE models such as the Heterogeneous Agent New Keynesian (HANK) model.

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<sup>7</sup>The hyperbolic discount functions may entail the larger values of the MPC (Angeletos et al., 2001).

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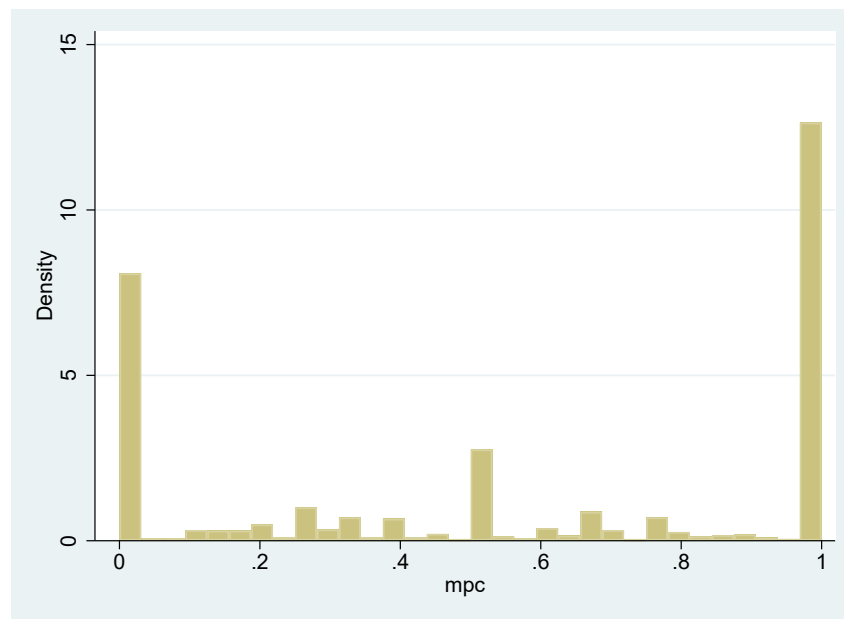


Figure 1: Histogram of marginal propensity to consume (MPC)

Table 1: Measuring marginal propensity to consume (MPC)

	(1)	(2)	(3)	(4)	(5)	(6)
Education		-0.033*** (0.008)	-0.032*** (0.008)	-0.032*** (0.008)	-0.022*** (0.008)	-0.023*** (0.008)
Time preference			-0.036*** (0.011)	-0.035*** (0.011)	-0.043*** (0.011)	-0.044*** (0.011)
HtoM				0.108** (0.040)	0.134*** (0.042)	0.126*** (0.043)
Cash on hand					-0.005** (0.003)	-0.003 (0.003)
Income shock 1						0.108*** (0.027)
Income shock 2						0.136*** (0.039)
Constant	0.557*** (0.010)	0.697** (0.295)	0.549* (0.296)	0.550* (0.296)	0.525* (0.304)	0.505* (0.300)
Control	NO	YES	YES	YES	YES	YES
Observations	1,639	1,639	1,638	1,638	1,544	1,544

Note: Robust standard errors are in parentheses, and \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively. *Education* takes larger values when household  $i$  completed higher degrees. *TimePreference <sub>$i$</sub>*  is a proxy of time preference rate implied from the answer to the question in the JPCS 2020. Respondents are interpreted as more “patient” ones when *TimePreference* takes larger values. HtoM represents households with liquidity constraint who are households with less savings than two months of monthly household income. We define cash on hand as the sum of monthly household income, the stock of financial assets (transaction accounts, mutual funds, stocks, and outstanding claims), and net of consumer debt. Income shock 1 and 2 indicate that she or her husband has a monthly salary decrease of 0%–50% and 50% or more. We control for age, age squared term, number of family members, and square of the number of family members at the estimation. We exclude the sample where the sum of consumption expenditures and savings does not equal to 100,000 JPY per person.