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Marginal Propensity to Consume to Two-Time Income Shocks

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Abstract

During the COVID-19 pandemic, the Japanese government provided special cash payments (SCPs) multiple times. This study aims to estimate the marginal propensity to consume (MPC) to these income shocks using detailed bank transaction data. Our findings indicate that the MPC is stable at around 0.2 for both the first wave of SCPs launched in mid-2020 and the second wave of SCPs provided from the end of 2021 to the beginning of 2022. The MPC varies depending on an individual's wealth and liquidity constraints. Specifically, the MPC tends to increase as individuals become less wealthy and more liquidity constrained.

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Keywords: marginal propensity to consume; special cash payment program; heterogeneity

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1 Introduction

The marginal propensity to consume (MPC), how much a household spends in response to an unexpected transitory income shock, is a crucial variable in macroeconomics. Accurately estimating the MPC is essential for evaluating the size of the fiscal multiplier and transmission of monetary policy, and the popularity of heterogeneous agent models makes it even more important to estimate the MPC and verify its consistency with the theory (Kaplan and Violante 2022). However, estimating the MPC is challenging. The COVID-19 pandemic provided a unique opportunity to estimate the MPC, as many governments, including Japan, provided irregular and salient stimulus payments to households (OECD 2020; see literature review below). The case of Japan is particularly advantageous for two reasons. First, the timing of the special cash payments (SCPs) program was random and exogenous to individual characteristics (except for the area of residence) due to administrative overburden in local offices.[1] Second, the government provided SCPs more than once. The first wave of SCPs, launched in mid-2020, provided 100,000 Japanese yen (JPY, approximately 800 US dollars) per person to all residents in Japan. The second wave of SCPs, provided from the end of 2021 to the beginning of 2022, offered 100,000 JPY per child to households with children under 18 who earned an income below a certain threshold (9.6 million JPY annually).[2]

The primary contribution of this study is to estimate the MPC to two-time income shocks. The individuals analyzed are those who received SCPs two or more times between 2020 and 2022. Specifically, we compare the sizes of the MPC in 2020 and 2021–22 for a set of individuals. Both the first and second waves of SCPs were irregular and salient, providing an unexpected transitory income shock to individuals. As the timing of payments was random and exogenous to the individuals' characteristics, we are able to make causal inferences about the effect of SCPs using a two-way fixed-effects regression.

Based on our estimation results, the MPC is approximately 0.2 both in the first and second waves of SCPs. The MPC is slightly higher in the second wave than in the first, and tends to increase as individuals experience SCPs more frequently. This finding

[1] See Kubota, Onishi, and Toyama (2021) for detailed explanations about the timing of payments. They argue that "such lack of uniformity in time-to-payment was unique among COVID-19 relief programs worldwide. For example, time-to-payment in the US differed only by whether payment was made by direct deposit or paper check."

[2] Temporary Special Benefits for Households Raising Children in English. See https://www5.cao.go.jp/keizai1/kosodatesetaikyufu/index.html.

suggests that households may believe that income shocks are not one-off events, but are likely to repeat in the future, thus increasing their permanent income and consumption response to an income shock of the same size.

The second contribution of this study is examining the source of heterogeneity in MPC. Individuals with limited liquidity, that is, low cash on hand, tend to have a higher MPC, which is an empirically robust result. Further, recent studies such as Jappelli and Pistaferri (2020), Gelman (2021), and Aguiar, Bils, and Boar (2021) emphasize that low liquidity can arise from temporary circumstances and persistent personal characteristics. It must be noted that these two sources of low liquidity are distinct. The former suggests that temporary adverse income shocks can worsen liquidity, leading to a higher MPC when combined with precautionary savings or borrowing constraints. The latter implies that impatience can lead to a high MPC and low liquidity as impatient individuals tend not to save. Thus, the fundamental source of MPC heterogeneity is temporary adverse shocks in the former and persistent personal traits (e.g., impatience) in the latter. To distinguish temporary circumstances from persistent characteristics, it is advantageous to analyze the arrival of more-than-one-time income shocks. We calculate the MPC for each individual and SCP event and examine whether variations in MPC can be explained by changes in individuals' liquidity (temporary circumstances) or individual fixed effects (persistent characteristics).

Our estimation results indicate that the MPC tends to be higher when individuals are less wealthy (in terms of the total balance of deposits in the Mizuho Bank) or face liquidity constraints (i.e., when their wealth is lower than their income). This finding is consistent with many earlier empirical studies. Interestingly, our analysis shows that neither age or gender nor the size of income shocks (i.e., the amount of SCPs) is significantly associated with the size of the MPC. In addition, we examine whether the source of MPC heterogeneity is due to the temporary circumstances or persistent characteristics explained above. Our results are more favorable to the latter, as neither the time-varying log wealth nor the liquidity constraint dummy is significantly associated with MPC in the two-way fixed-effects regression.

Several studies have estimated the MPC to repeated income shocks, including Kueng (2018), Jappelli and Pistaferri (2020), Gelman (2021), Armantier et al. (2021), and Karger and Rajan (2021).[3] Kueng (2018) analyzes the annual Permanent Fund Div-

[3]Other empirical studies on MPC include Bodkin (1959), Shapiro and Slemrod (1995, 2003), Johnson, Parker, and Souleles (2006), Agarwal, Liu, and Souleles (2007), Blundell, Pistaferri, and Preston (2008),

idend payments from the Alaska Permanent Fund, which are large and salient. This income shock type differs from that of SCP income shocks that we analyze in our study, as the former is regular and expected, while the latter is irregular and unexpected, simplifying the estimation of the MPC in our study. Armantier et al. (2021) and Karger and Rajan (2021) find that MPC hardly changed between the first (April 2020) and second (January and March 2021) waves of stimulus payments during COVID-19 in the United States. Gelman (2021) uses household panel data to estimate the MPC to the arrival of a tax refund and finds that both temporary circumstances and persistent characteristics account for roughly half the variance in MPC. Jappelli and Pistaferri (2020) use household surveys conducted in Italy twice in 2010 and 2016 and report that unobserved heterogeneity exaggerates the sensitivity of the self-reported MPC to cash on hand, but the size of the bias is moderate, suggesting that both temporary circumstances and persistent characteristics are important, but the former is more important than the latter. In contrast with Gelman (2021) and Jappelli and Pistaferri (2020), our results demonstrate the importance of persistent characteristics rather than temporary circumstances. This difference can be attributed to the variations in data regarding the income shock type, the MPC calculation method, and the countries studied. Particularly, the income shock type is crucial. Similar to Kueng (2018), income shocks in Gelman (2021) are regular and expected, requiring a structural model to estimate the MPC in response to an unexpected income shock.

The remainder of this paper is organized as follows. Section 2 provides details about the data used in this study. Section 3 discusses the estimation method and presents the results. Section 4 concludes.

2 Data

2.1 Mizuho Transaction Data

We utilize data from Mizuho Bank, which is one of the three largest banks in Japan, with approximately 24 million accounts held by individual customers (equivalent to one

Parker et al. (2013), Parker (2017), Kueng (2018), Olafsson and Pagel (2018, 2019), Coibion et al. (2020), Havranek and Sokolova (2020), Fagereng, Holm, and Natvik (2021), Baker et al. (2022), Gelman (2022), Parker et al. (2022), and Crawley and Kuchler (2023). Studies in the Japanese context include Kaneda, Kubota, and Tanaka (2021), Kubota, Onishi, and Toyama (2021), and Ueda (2023).

in five people).[4] The data comprise records of all transactions involving Mizuho Bank, including ATM withdrawals, payroll receipts, utility bill payments, and bank transfers, all of which are assigned identification codes and remarks in Japanese. Additionally, the data include the balance of deposits and annualized income at the end of each month, as well as individuals' personal characteristics such as birth year, gender, and registration addresses at the municipal level. The time frame covered by the data is January 2019 to November 2022 (205 weeks), including the period of the COVID-19 pandemic. The data were made available through a strict contract between Mizuho Bank and Waseda University under a consignment agreement and analyzed in a setting where measures were taken to prevent the identification of individuals, such as masking and other anonymous processing.

Consumption is proxied using the total outflows, which include cash withdrawals from automatic teller machines (ATMs) as well as non-cash payments such as withdrawals from credit card payments, interbank transfers, and automatic utility bill withdrawals. As a robustness check, we also use cash deposit withdrawals from ATMs as a proxy for consumption.

There are some caveats to consider regarding the data. The individual customers are dispersed across the country but are concentrated in the metropolitan areas, compared to the census. Although all outflows are recorded, we do not know the purpose of the outflows. For individuals with credit cards linked to Mizuho Bank, we have access to a breakdown of their spending based on card statements, but the coverage is not sufficiently wide to be used for estimation. Kaneda, Kubota, and Tanaka (2021) use a personal finance management app to investigate consumption types. Information on transactions in other financial institutions, especially securities companies and postal savings accounts, is not available. Moreover, many customers hold accounts with institutions other than Mizuho Bank, and as a result, deposits and withdrawals recorded in the data may not necessarily capture all transactions. It is also important to note that the data have an omission of information on financial assets such as stocks, and transfers within households (e.g., parent-to-child and husband-to-wife transfers) are recorded as either an inflow or an outflow.

To identify the receipts of SCPs, we use transaction remarks in Japanese and select inflow transactions that include keywords related to special payments. We then restrict

[4]Source: https://www.mizuho-fg.co.jp/investors/individual/strength/index.html

the inflow transactions to those that were multiples of 50,000 JPY.[5] Note that SCPs were usually paid to head-of-household accounts.

After obtaining information on the receipt of the SCPs, we select individuals who received SCPs for more than one year in the three-year period between 2020 and 2022. We then collect weekly transaction records for these individuals, including the amount of outflows and cash withdrawals. Wealth and annualized income, which are provided on a monthly basis, are merged using values at the end of the previous month.[6] To ensure sufficient observation periods, we select individuals with wealth and annual income records that are observable for at least 36 months from 2019 to 2022 and whose ages are between 20 and 80 years as of January 2021.

The number of individuals collected in this way is 307,944 (see Table 1). This number is one-tenth of the number of individuals in Kubota, Onishi, and Toyama (2021), which is 2,832,537. The individuals in their study are those who received SCPs in 2020 but not necessarily in 2021–22. This suggests that a vast proportion of the heads of households did not have a child under 18, did earn income above a certain threshold in the Mizuho Bank data, or did change their bank accounts to receive SCPs. It should be noted that we select individuals who received SCPs more than once, because we aim to examine changes in MPC between the first and second waves of SCPs for the same set of individuals.

2.2 Overview of the Data

Table 1 presents descriptive statistics for approximately 300,000 individuals as of 2020, with the maximum and minimum values omitted to maintain anonymity. The mean and median amount of SCPs received are around 200,000 JPY, indicating that the average household consists of two family members, with one person receiving 100,000 JPY. The median amounts of outflows and cash withdrawals are around three million and one

[5]Specifically, transaction remarks should include the words "tokubetsu kyufu (special payments)," "teigaku kyufu (fixed-amount payments)," or "tokubetsu teigaku (special fixed-amount"). The transaction remarks that include the words "jizoku (continuous)" or "sumai (housing)" are excluded as they do not appear to be associated with SCPs. For the two waves of the SCPs, the government provided multiples of 100,000 JPY to individuals; however, some local offices divided the payments into two installments of 50,000 JPY per child in the second wave of the SCP. Additionally, some local offices provided less than 100,000 JPY.

[6]Wealth is defined as the balance of deposits at the Mizuho Bank, which is the sum of demand deposits, time deposits, other banking accounts, public bonds, mutual funds, and life and non-life insurance balances. The majority of deposits are demand deposits.

million JPY, respectively. The median log wealth and log annual income are 6.0 and 6.3, respectively, which suggests that the median wealth and annual income are 384,000 JPY and 562,000 JPY. The median wealth in our study is lower than that in Kubota, Onishi, and Toyama (2021), at 444,000, which may be attributed to the fact that the government provided the second wave of the SCP to households with incomes below a certain threshold, and those individuals are included in our study. Additionally, our sample has individuals who are a few years younger than those in Kubota, Onishi, and Toyama (2021) for a similar reason.

To isolate the effects of SCPs on consumption from the aggregate time-varying changes that influence consumption, the timing of SCPs must be dispersed. Figure 1 shows a histogram of the timing of the SCPs, indicating that the histogram is nearly bimodal, with one mode from June to July 2020 (the first wave of SCP) and the other around December 2021 to February 2022 (the second wave of SCP, with a dip due to the New Year holidays). Further, within the same wave of SCP, the timing appears dispersed. Kubota, Onishi, and Toyama (2021) document that the timing was unpredictable and nearly random. The lower panel of Figure 1 shows the distribution of the sum of SCPs by week, which suggests that the size of SCPs in the first wave is larger than that in the second wave.

3 Estimation

This section explains our estimation strategy and results.

3.1 Estimation Strategy

We estimate the effect of SCPs on consumption using a two-way fixed-effects regression:

$$C_{it} = \alpha_i + \alpha_t + \sum_{k=a}^{b} \gamma^k SCP_{it}^k + \varepsilon_{it}, \tag{1}$$

where C_{it} represents the outflow amount, which is a proxy for consumption of individual i in week t, and SCP_{it}^k is a dummy that takes the amount of SCP in week T_i if $t - T_i = k$, and zero otherwise. Here, T_i denotes the week in which individual i receives an SCP. By including $k < (>)0$, we consider the effect of SCP on consumption $|k|$ weeks before (after) the event. Coefficient γ^k indicates the extent to which C changes before and

after the SCP. The lead terms for $k < 0$ are used to test for the presence of a pre-trend before the SCP. We normalize the coefficient γ^{-1} to zero and set $a = -5$ and $b = 5$, as in Kubota, Onishi, and Toyama (2021). The two-way fixed effects α_i and α_t control for time-invariant heterogeneity across individuals and the effects of aggregate time-series developments, such as the state of emergency declaration and the number of COVID-19 infections, on aggregate consumption. This regression is different from that of Kubota, Onishi, and Toyama (2021), where they take differences from the same week in the previous year as the dependent variable to avoid using the individual fixed effects because of the enormous sample size. We cluster standard errors at the individual level. We estimate this regression using a balanced panel dataset that covers 307,944 individuals and 194 weeks from February 2019 to October 2022.

3.2 Estimation Results

3.2.1 Main Results

Table 2 and Figure 2 present the main estimation results. In column (1), the benchmark result shows that the coefficient γ^0 of SCP^0 is 0.225, which is significant at the 5% level. This suggests that, on average, individuals spent approximately 20% of their SCP on the week in which they received it. The size of this on-impact MPC is 0.225, which is comparable to that obtained in the early studies for Japan, namely, 0.19 in Kubota, Onishi, and Toyama (2021) and 0.15 in Kaneda, Kubota, and Tanaka (2021). Coefficients γ^k for positive $k's$ ($k = 1$ to 5) are also significant at the 5% level, implying that the SCP had persistent effects on consumption. In contrast, coefficients γ^k for negative $k's$ are insignificant at the 5% level, which supports a parallel consumption trend between individuals with different timings of SCPs.

The estimation results are robust to changes in model specifications, as shown in Table 2 and Figures 3 and 3. Column (2) and the right-hand panel of Figure 2 show the results when using cash withdrawals from ATMs as the dependent variable. The MPC, γ^0, slightly decreases to 0.185 but remains significant at the 5% level. Coefficients γ^k for negative $k's$ are small but significant at the 5% level and increase as k increases (i.e., as the date of the SCP approaches), suggesting that individuals anticipated the receipt of SCP and began spending before the SCP. Columns (3) to (6) and Figure 3 compare the MPC between the first and second waves of SCPs, in 2020 and 2021–22, respectively. Observations for 2020 and 2021–22 are used in Columns (3) and (4), whereas we split

SCP_{it}^0 into those in 2020 and 2021–22 in Columns (5) and (6), respectively. The results show that the MPC is similar at approximately 0.22 for 2020 and 0.24 for 2021–22, when the dependent variable is the total outflows. In other words, the MPC in 2021–22 is slightly larger than that in 2020.

It is important to compare the economic and COVID-19-related circumstances between the two periods. Although we include the time fixed effect in the regression, different circumstances can yield different estimates of MPC. Figure 4 shows the popularity of the two keywords obtained using Google Trends for Japan from January 2020 to December 2022: one is "kyufukin" (in Japanese), which is cash payments (SCP), and the other is "corona" (in Japanese), which is COVID-19. Two peaks for the keyword cash payments are observed in mid-2020 and from the end of 2021 to the beginning of 2022, corresponding to the timing of the two SCPs. In both periods, the popularity of the keyword COVID-19 fell. While COVID-19 hit sectors unevenly (most notably, the hospitality sector was severely impacted), the Mizuho Bank data we use do not provide detailed information on consumption types. Thus, we plot Figure 5, which demonstrates the time-series changes in aggregate consumption by type of goods and services—durable, non-durable, and services—based on the system of national accounts. This indicates that the demand for durable goods started to increase during both SCP periods; however, the consumption of services is relatively weaker during the first wave of SCP than during the second wave of SCP.

3.2.2 Heterogeneity

Next, we investigate the sources of heterogeneity in MPC. We run a two-way fixed-effects regression, as shown in the equation:

$$C_{it} = \alpha_i + \alpha_t + \gamma SCP_{it} + \beta SCP_{it} \times X_{it} + \varepsilon_{it}, \tag{2}$$

where SCP_{it} equals $SCP_{it}^{k=0}$ and X_{it} represents individual i's characteristics consisting of the cumulative number of SCPs, age, gender, the amount of SCPs, log wealth, and a liquidity constraint dummy. The cumulative number of SCPs at t is calculated as the sum of SCP receipts from the first week of observations in 2019 to week t for each individual and week. A liquidity constraint dummy at t is defined by Kubota, Onishi, and Toyama (2021) as the variable that takes one if end-of-month wealth at $t-1$ is below the individual's monthly income (annual income at $t-1$ divided by 12). Unlike Kubota, Onishi, and Toyama (2021), we do not explore the sources of heterogeneity by

running the regression for subgroups classified by individuals' characteristics. Although the sub-group regression is visually illustrative, we cannot know which factor is more fundamental because the individuals' characteristics are correlated.

Table 3 reports the estimation results. Coefficient β for the cross term of SCPs and the cumulative number of SCPs is positive and significant at the 5% level. This finding suggests that the MPC increases as individuals receive SCPs more frequently. One possible explanation for this is that households may believe that income shocks from SCPs are not one-time events, but rather are likely to recur in the future, especially as they experience SCPs more frequently. Therefore, the permanent income of these households increases, leading to higher consumption for the same size of SCPs. It should also be noted that the MPC may decrease, instead of increasing if households are more concerned about future tax burdens when the government repeats SCPs, a phenomenon known as Ricardian equivalence.

In addition, the regression results show that coefficient β for the cross term of SCPs is positive and significant for the liquidity constraint dummy, whereas it is negative and significant for log wealth. This implies that the MPC increases as individuals become more liquidity constrained and less wealthy. This finding is consistent with the stylized fact of the existing literature on the relationship between wealth and MPC. Interestingly, neither age, gender, nor the amount of SCPs appear to have a significant impact on the heterogeneity of MPC.

Jappelli and Pistaferri (2020), Gelman (2021), and Aguiar, Bils, and Boar (2021) emphasize that the heterogeneity of MPC arises from two distinct sources: temporary circumstances and persistent characteristics. In our previous regression, we found that a lower level of wealth is associated with a higher MPC. This lower wealth may be due to bad luck, such as a temporary adverse income shock, or impatience, which is a persistent characteristic.

Fortunately, we have access to detailed bank transaction data and multiple SCP events. To investigate heterogeneity in MPC more comprehensively, we define the MPC for individual i in week t as

$$MPC_{it} \equiv \frac{C_{it} - C_{it-1}}{SCP_{it}} \tag{3}$$

when $SCP_{it} \equiv SCP_{it}^{k=0}$ is positive. That is, we define the MPC simply as the change in consumption divided by the amount of SCPs when individual i receives them. We then

run the following regression, following Jappelli and Pistaferri (2020):

$$MPC_{it} = \alpha_i + \alpha_t + \beta X_{it} + \varepsilon_{it}. \tag{4}$$

The data are an unbalanced panel because we calculate MPC_{it} only when individual i receives SCPs.

Table 4 reports the estimation results, with the four columns differing in the use of fixed effects for individuals and weeks. Columns (1) and (2) indicate that neither the coefficient on log wealth nor the liquidity constraint dummy is significant at the 5% level. When we control for individual fixed effects, the time-series change in log wealth or the liquidity constraint dummy does not appear to strongly influence the size of the MPC. However, when we do not use individual fixed effects but instead use week fixed effects, Column (3) shows that log wealth is inversely associated with MPC, whereas the liquidity constraint dummy is positively associated with MPC, consistent with the results what we found in Table 3. These findings suggest the importance of persistent characteristics, rather than temporary circumstances, in explaining the heterogeneity in MPC. Although our results are consistent with Jappelli and Pistaferri (2020), Gelman (2021), and Aguiar, Bils, and Boar (2021) on the importance of persistent characteristics, we find little support for temporary circumstances, unlike Jappelli and Pistaferri (2020) and Gelman (2021). However, it should be noted that the lack of significance does not necessarily mean that temporary circumstances are not a source of heterogeneity in MPC. This study may have insufficient power to evaluate temporary circumstances fully, as the interval between the first and second SCP waves is only one and a half years, which may be too short to obtain sufficient time-series variations in log wealth or the liquidity constraint dummy. Finally, Column (4) shows that the signs of the coefficients are the opposite when neither individual nor week fixed effects are used.

4 Concluding Remarks

In this study, we estimated the MPC in response to multiple SCP income shocks using Japanese bank transaction data. Our findings show that the estimated MPC is stable at approximately 0.2 in 2020 and 2021–22, although it tends to increase as individuals receive SCPs more frequently. Moreover, we find that the MPC is heterogeneous and tends to increase as individuals become less wealthy and more liquidity constrained. Our

results suggest that persistent characteristics, rather than temporary circumstances, are the primary drivers of heterogeneity in MPC.

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Table 1: Descriptive Statistics as of 2020

Statistic	N	Mean	St. Dev.	Pctl(25)	Median	Pctl(75)
Amount of SCPs	307,944	206,204	137,479	100,000	200,000	300,000
Amount of total outflows	307,944	5,397,726	18,268,601	1,324,249	2,843,999	5,682,210
Amount of cash withdrawals	307,944	1,477,660	2,091,252	317,420	1,015,000	2,017,425
Log wealth	267,401	5.683	2.552	4.013	5.950	7.608
Log income	267,401	4.254	4.024	0.000	6.332	8.294
Gender	259,332	0.325	0.468	0.000	0.000	1.000
Age	267,401	49.717	14.977	37.923	46.923	61.923

Note: The table presents the actual transactions in 2020 for individuals who received the special cash payment (SCP) for more than one year from 2020 to 2022. The unit is yen for the amount of outflows, cash withdrawals from ATMs, and SCPs. Wealth and income are measured as the log of one plus total deposits and annual income, respectively, in thousand yen. The gender dummy takes the value of zero for male, one for female, and minus one for others. To maintain anonymity, we do not report the maximum or minimum values.

Table 2: Main Estimation Results

	Dependent variables					
	(1)	(2)	(3)	(4)	(5)	(6)
	Outflows	Cash withdrawals	Outflows 2020	Outflows 2021–22	Outflows	Cash withdrawals
Explanatory variables						
SCP^{-5}	0.007	0.001	0.008	-0.002	0.007	0.001
	(0.012)	(0.001)	(0.015)	(0.020)	(0.012)	(0.001)
SCP^{-4}	-0.012	0.002	-0.022	0.016	-0.012	0.002
	(0.006)	(0.001)	(0.006)	(0.014)	(0.006)	(0.001)
SCP^{-3}	0.014	0.004	0.000	0.058	0.014	0.004
	(0.006)	(0.001)	(0.007)	(0.014)	(0.006)	(0.001)
SCP^{-2}	0.007	0.006	0.006	-0.001	0.006	0.006
	(0.007)	(0.001)	(0.007)	(0.016)	(0.007)	(0.001)
SCP	0.225	0.185	0.215	0.244		
	(0.008)	(0.001)	(0.009)	(0.016)		
SCP in 2020					0.217	0.183
					(0.009)	(0.002)
SCP in 2021–22					0.252	0.192
					(0.016)	(0.002)
SCP^{1}	0.120	0.097	0.119	0.111	0.120	0.097
	(0.007)	(0.001)	(0.007)	(0.016)	(0.007)	(0.001)
SCP^{2}	0.052	0.045	0.057	0.013	0.051	0.045
	(0.006)	(0.001)	(0.007)	(0.011)	(0.006)	(0.001)
SCP^{3}	0.032	0.028	0.038	-0.008	0.031	0.028
	(0.008)	(0.001)	(0.008)	(0.019)	(0.008)	(0.001)
SCP^{4}	0.045	0.025	0.032	0.080	0.045	0.025
	(0.008)	(0.001)	(0.009)	(0.017)	(0.008)	(0.001)
SCP^{5}	0.059	0.018	0.020	0.192	0.059	0.018
	(0.021)	(0.001)	(0.008)	(0.088)	(0.021)	(0.001)
Fixed effects	individual/week					
No. of observations	59,741,136	59,741,136	16,013,088	28,946,736	59,741,136	59,741,136
No. of individuals	307,944	307,944	307,944	307,944	307,944	307,944
No. of weeks	194	194	52	94	194	194
R^2	0.044	0.045	0.062	0.048	0.044	0.044

Note: Figures in parentheses indicate standard errors clustered at the individual level.

Table 3: Estimation Results: Heterogeneity of MPC

	Dependent variables	
	(1)	(2)
	Outflows	Outflows
Explanatory variables		
SCP^{-5}	0.007	0.005
	(0.012)	(0.012)
SCP^{-4}	-0.012	-0.014
	(0.006)	(0.005)
SCP^{-3}	0.014	0.013
	(0.006)	(0.006)
SCP^{-2}	0.006	0.010
	(0.007)	(0.007)
SCP	0.185	0.461
	(0.016)	(0.060)
SCP^{1}	0.120	0.117
	(0.007)	(0.007)
SCP^{2}	0.051	0.054
	(0.006)	(0.007)
SCP^{3}	0.031	0.030
	(0.008)	(0.008)
SCP^{4}	0.045	0.042
	(0.008)	(0.008)
SCP^{5}	0.059	0.051
	(0.021)	(0.021)
SCP × no. of SCPs	0.032	0.033
	(0.010)	(0.011)
SCP × age		-0.001
		(0.001)
SCP × gender		-0.011
		(0.023)
SCP × SCP		2.43E-08
		(6.00E-08)
SCP × log wealth		-0.041
		(0.005)
SCP × liquidity constraint		0.087
		(0.017)
Fixed effects	individual/week	
No. of observations	59,741,136	50,239,699
No. of individuals	307,944	259,627
No. of weeks	194	194
R^2	0.044	0.042

Note: Figures in parentheses indicate standard errors clustered at the individual level.

Table 4: Estimation of Proxy for MPC: Heterogeneity of MPC

	Dependent variables			
	(1)	(2)	(3)	(4)
	MPC	MPC	MPC	MPC
Explanatory variables				
Log wealth	-0.034	-0.032	-0.025	0.443
	(0.033)	(0.032)	(0.011)	(0.049)
Liquidity constraint	0.110	0.110	0.060	-0.020
	(0.090)	(0.090)	(0.028)	(0.011)
Fixed effects	individual/week	individual	week	no
No. of observations	602,642	602,642	602,642	602,642
R^2	0.424	0.423	0.0015	0.000037

Note: Figures in parentheses indicate standard errors clustered at the individual level.

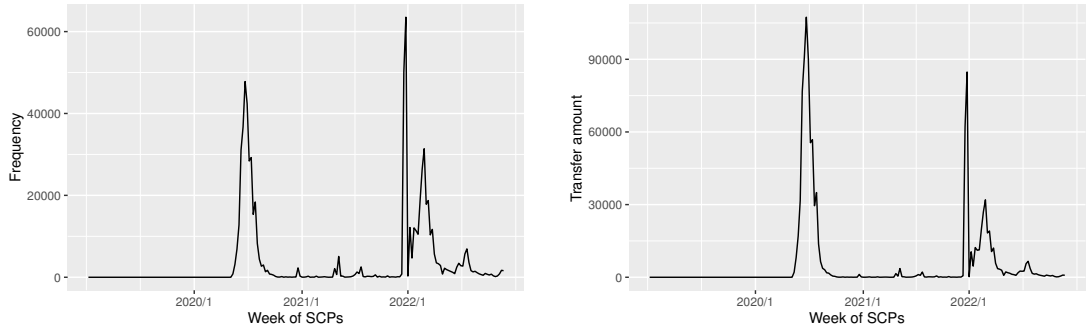

Figure 1: Timing of SCPs

Note: In the right-hand panel, the unit of the vertical axis is 100,000 JPY.

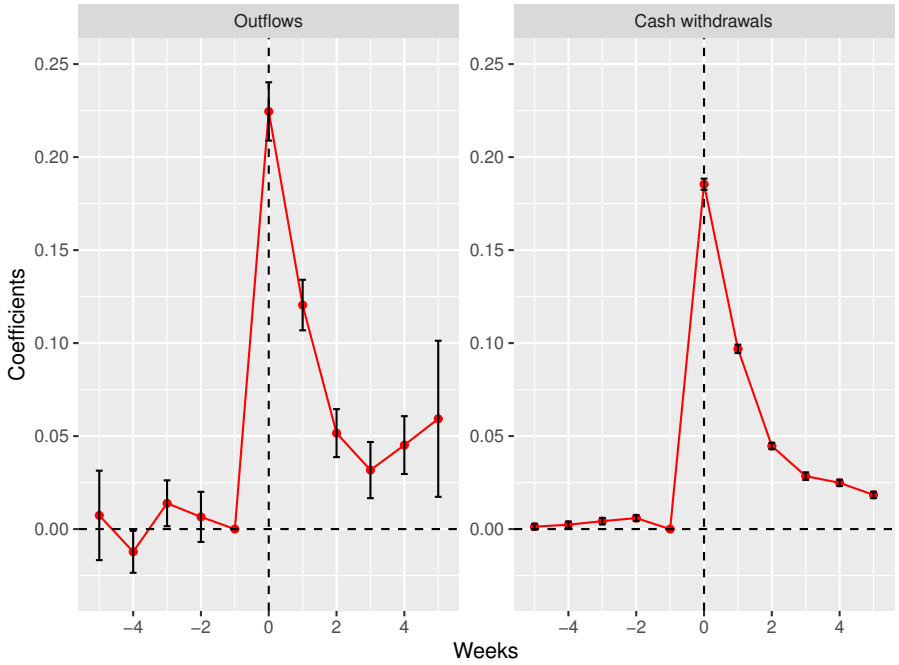

Figure 2: Consumption Responses to SCPs

Note: The figure shows estimated coefficients γ^k for $k = -5, -4, \cdots, 4, 5$, which suggests consumption responses in week $|k|$ before/after SCPs. Bars indicate 95% confidence intervals.

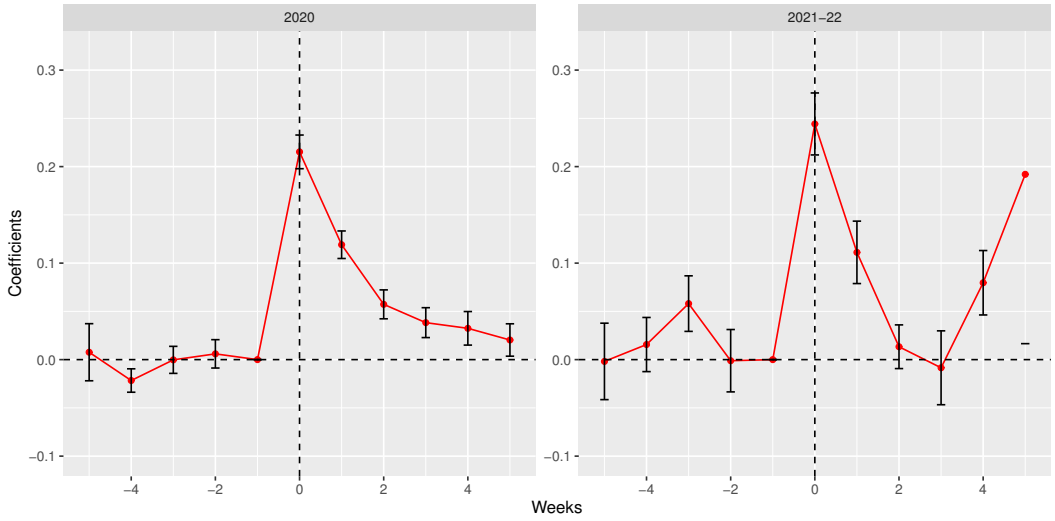

Figure 3: Consumption Responses to SCPs in 2020 and 2021–22

Note: The figure shows estimated coefficients γ^k for $k = -5, -4, \cdots, 4, 5$, which suggests consumption responses in week $|k|$ before/after SCPs. Bars indicate 95% confidence intervals.

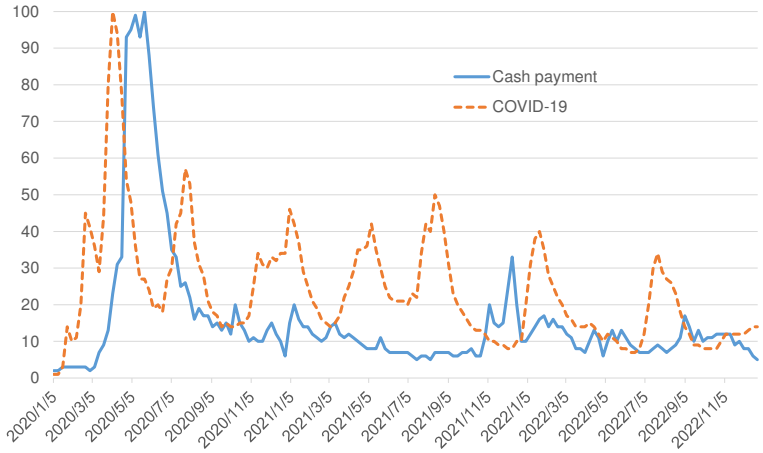

Figure 4: Popularity of Google Search Terms for Cash Payment and COVID-19

Note: The figure shows the popularity of the keywords of "kyufukin" (cash payment) and "corona" (COVID-19) based on data from Google Trends in Japan from January 2020 to December 2022. The values are normalized so that the highest point is represented as 100.

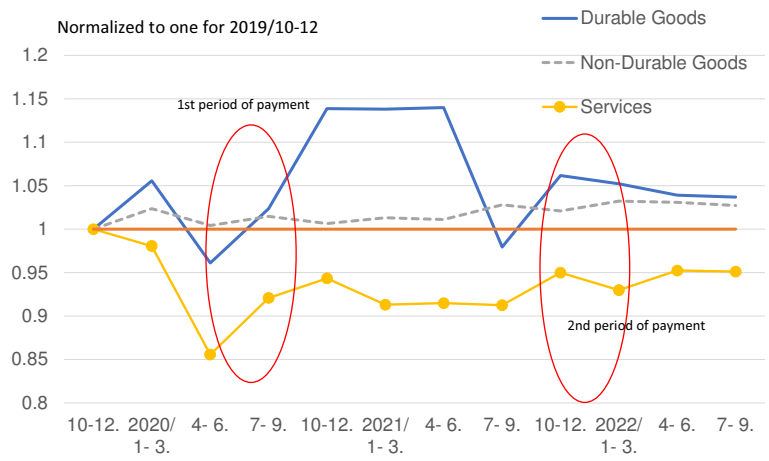

Figure 5: Aggregate Consumption

Source: Cabinet Office "System of National Accounts"