Evaluating Hong Kong Consumption Voucher Scheme

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Abstract

This report employs detailed transaction records from AlipayHK to evaluate the effectiveness of the 2021 Hong Kong Consumption Voucher scheme. We use a difference-in-differences (DID) design that compares the change in the spending of the voucher recipients after the program with the change of the non-recipients. We find that Hong Kong Consumption Voucher (HKCV) increased the spending on AlipayHK by 109% of the value of the voucher. In particular, consumer spending on non-durable goods and services increased significantly, accounting for at least 57%–63% of the total spending increase. To assess the aggregate effect of the program, we take two approaches to infer the unobserved change in the spending through other payment methods. The first is to re-do the estimation for the consumers who are less likely to shift their spending to AlipayHK. The second is to back out the unobserved spending by calibrating a simple model with multiple payment methods. Both approaches suggest a significant amount of spending shifted to AlipayHK. Yet, the estimated increase in total spending of the recipients remains large, ranging from 80% to 101% of the value of the program. Even the most conservative estimate of the marginal propensity to consume is close to the upper bound of the estimates in the literature.

1 Introduction

The Hong Kong government launched a digital consumption voucher program in 2021, which entitles all permanent residents of Hong Kong with age above 18 and is worth HKD 5,000 (or USD 641) per recipient. The voucher program (HKCV henceforth) aimed to ameliorate the negative impact of a recession in the COVID-19 pandemic. However, the effect of such a fiscal stimulus is far from certain. The marginal propensity to consume (MPC) out of HKCV is a key variable that determines the extent to which the fiscal stimulus can stimulate the economy through a multiplier effect. Many empirical analyses have been conducted to estimate MPC out of similar fiscal stimulus payments. Yet, the estimates are astonishingly wide-ranging, from the lowest of 10% to the highest of 80% (see Table 1 for a highly selective sample). Some of the differences may be simply due to different empirical specifications and identifications across papers, and some may reflect the differences in payment designs across the stimulus programs.

Table 1: Estimated MPC out of Government Transfers

Program	Payment (USD)	Paper	MPC		
			All	Nondurable	Durable
2001 US tax rebates	300-600	Johnson et al. (2006) Agarwal et al. (2007)		20-40%	insignificant
2008 US tax rebates	600-1200	Parker et al. (2013)		12-30%	38-60%
2020 US cash payments	1,200+	Baker et al. (2021)	20%		
1999 Japan shopping coupons	200	Hsieh et al. (2010)	10-20%		
2009 Taiwan shopping vouchers	110	Kan et al. (2017)	24%		38%
2011 Singapore cash payments	78-702	Agarwal and Qian (2014)	80%		

So, the main goal of this report is to evaluate HKCV by estimating MPC out of the program. We employ de-identified transaction records for 300 thousand regular users of AlipayHK, one of the major digital platforms through which the vouchers reach recipients. We first estimate the effect of HKCV on the spending via AlipayHK by a difference-in-differences (DID) design. We compare the change in the weekly average spending of the voucher recipients after the program with that of the non-recipients (i.e., non-permanent residents ineligible for HKCV). Based on estimates using the full sample, we find that HKCV is associated with a substantial increase in the spending via Alipay. On average, for the individuals who received the first-round vouchers on August 1, 2021, the weekly spending increased significantly by HKD201 after the announcement of HKCV, compared with the non-recipients. By examining the dynamics of the spending response, we find that the recipients started to increase their spending moderately as soon as they were

officially enrolled in mid-July. The spending increase reaches its peak precisely in the two weeks after voucher disbursement (i.e., the weeks of August 1 and October 1) and then diminishes over time. Compared with the controls, the recipients spent HKD29 per week and HKD248 per week more during the announcement period and the disbursement period, respectively. Moreover, we find no evidence of intertemporal substitution within the half-year period after the program announcement. In summary, the estimates imply an increase in the spending via AlipayHK by 108.5% of the value of the voucher.

However, it is hard to translate the estimates into MPC because we do not observe spending through other payment methods. The estimated increase in the spending via AlipayHK may reflect both the effect of HKCV on the total consumer spending and its effect on the transactions shifted from other payment methods (cash, stored value cards, etc.) to Alipay. To alleviate this concern, we perform our analysis using a subsample of active users who has a relatively stable number of transactions before and after HKCV. Because individuals with many transactions shifted to Alipay should experience a substantial increase in the number of transactions after the program, switching behavior is less likely to play an important role for individuals who do not have a large increase in the number of transactions. Using an array of different sample construction rules, we find robust evidence that HKCV led to a significant increase in spending among the recipients. For the recipients in the restricted sample, HKCV led to an average increase in spending of HKD143 per week after the program announcement. Other patterns of the spending response are similar to those for the full sample. Overall, our estimates indicate that the recipients spent 74 cents to 82 cents per dollar received in the half-year period after the announcement of HKCV. The difference in the estimates from the full and restricted samples also imply a significant amount of spending shifted to AlipayHK.

Similar results are found by an entirely different approach. We build a simple model with three payment methods: mobile payment, voucher payment and cash/credit card payment. We allow different payment methods to be associated with different transaction costs. Moreover, the transaction cost of mobile payment can vary over time. The digital nature of HKCV encouraged more sellers to adopt mobile payment and, therefore, might reduce the cost for buyers to use mobile payment. We calibrate the model to match some moments from the official aggregate statistics and AlipayHK transaction records. We find that HKCV reduces the marginal transaction cost of mobile payment by 30%. After taking into account the substitution between different payment methods, we find that HKCV increased the aggregate consumption by 101% of the value of the program. Our counterfactuals suggest HKCV increase the spending of the recipient and non-recipient via AlipayHK increase by about a quarter and two-thirds, respectively, in the short run. The long-run effect would still be significant after HKCV expires, if the reduction in the transaction cost is permanent. In that case, the total spending via AlipayHK would

increase by one quarter in the long run.

We also assess the redistributive effects of HKCV across sectors. A salient feature of HKCV is that it forbids payment for education, financial products (including debts), rents and, in particular, purchase from any non-local retailer. To the extent that HKCV is meant to help local retailers, the restrictions seem reasonable since a significant proportion of the increase in spending by cash payments in the US is on rent, mortgages and student loans (Baker et al. 2021). Nevertheless, fungibility may undermine the government intention. For those who spend more on HKCV-eligible goods than they receive in benefits, a fungible voucher should be close substitute to cash and the MPCs should be similar across consumption categories. Therefore, the redistributive effects are theoretically ambiguous and have to be empirically estimated.

Leveraging the highly detailed transaction data, we examine the spending responses across consumption categories to HKCV. Both the full-sample and restricted-sample estimates indicate that the spending on non-durable goods and services increased substantially due to the voucher program. In particular, the non-durable and service categories account for at least 57% to 63% of the total spending increase. Disproportionately more spending was for offline payments. Specifically, the spending in grocery stores and restaurants each accounts for 17% to 20% of the total spending increase. In the meantime, the spending in electronics stores did not significantly increase. In addition, the HKCV also led to increases in spending on traveling and bill payments (mostly mobile phone and Internet bills). Overall, based on the estimates using the restricted sample, we find that the voucher recipients spent at least 45 cents per voucher dollar received on non-durable goods and services.

This paper can be viewed as an attempt to revisit the life-cycle/permanent-income hypothesis (LC/PIH). The theoretical prediction is that consumption should not respond to any predictable income change. Our estimated MPC is close to one, adding to the mounting evidence in the literature that goes against the key implication of LC/PIH. While our findings are not tied to any theoretical model, they seem to suggest bounded rationality or behavioral bias for consumption vouchers. For instance, consumers might be reluctant to re-optimize their consumption because of sufficiently large costs of processing the predictable income changes relative to the gains from consumption smoothing. Hsieh (2003) shows that consumption does not respond to large and regular income changes, as predicted by LC/PIH, but does respond to small and irregular changes. An interesting implication is that consumption would respond less if the stimulus payments become more generous and regular in recessions. This is worth being investigated in the future work for its theoretical importance and policy relevance.

By studying the large-scale digital voucher program in Hong Kong, this report is also

related to Liu et al. (2021) and Xing et al. (2020), which use transaction-level data from Alipay to estimate the effect of small-value digital coupon programs on consumer spending in two Chinese cities amid the COVID-19 pandemic. Both papers find large consumption responses to digital coupon programs that offer small-value discounts or deductions from spending.

2 Consumption Voucher in Hong Kong

Since COVID-19 was first reported in January 2020, Hong Kong has experienced multiple waves of COVID-19. The Hong Kong government has imposed a number of stringent measures to control the spread of the virus. In late January 2020, the government closed most of its entry points to Mainland China and required all individuals with a Mainland travel history to take a 14-day compulsory quarantine. In March 2020, the government banned all non-residents from entering Hong Kong. The economic effect of the pandemic has been seen in the real economy. According to official statistics, Hong Kong's GDP fell by 6.5% in 2020. In the first half of 2020, income in the wholesale and retail sector fell by 54.3%–58.8%, and income in the hotel and food service sector fell by 42.7%–45.9%.

In late February 2021, the Hong Kong government announced its plan to issue digital consumption vouchers to eligible Hong Kong residents. The details of the HKCV were officially released on June 18, 2021. The eligible population includes all Hong Kong permanent residents aged over 18 and their adult relatives who are officially in progress to acquire permanent residency. Foreigners and Chinese nationals on a work or student visa are not eligible for the vouchers. Eligible individuals must first register online or on paper between July 4 and August 14. In particular, they may choose to receive the vouchers through one of four payment instruments, including three mobile payment platforms—AlipayHK, Tap&Go, WeChat Pay HK—and Octopus, a contactless payment card tied to the city's mass transit system. The consumption vouchers were delivered in two waves in the amount of HDK2,000 and HKD3,000. Depending on the enrollment time, individuals received the first-wave vouchers on either August 1 or September 1. All vouchers expire five months after the first disbursement date.[1] Officials statistics show that among the 6.3 million voucher recipients, 20% use AlipayHK, 70% use Octopus, and the remaining 10% use one of the other two e-wallets.

Since the main goal of HKCV is to benefit local small and medium-sized businesses, the vouchers can not be used towards payment for rents, utility bills, education, financial products and services (including debts), charity, online purchase from non-local retailers, and any person-to-person transfer. E-wallet technology helps implement this broadly

1. For August 1 and September 1 recipients, all vouchers expired on December 31, 2021, and January 31, 2022, respectively.

targeted voucher program. Registered merchants can charge consumers by either asking consumers to scan the merchant's Quick Response (QR) code or scanning the QR code on a consumer's mobile device. Consumers can choose to pay from saving accounts and credit cards associated with their AlipayHK accounts or using vouchers in their e-wallets.

3 Data and Empirical Strategy

3.1 Data

We use de-identified individual transaction-level data from AlipayHK. For this analysis, we draw a random sample of 271,633 individuals from the voucher recipients to form the treatment group and use the information of 22,166 ineligible residents to form the control group. For each individual, we observe her entire daily transaction history since July 2020 or the account opening date (whichever date is later). For each transaction, we observe the transaction amount, transaction date, payment method (bank checking accounts or credit cards), consumption category, whether the transaction is online or offline, and voucher usage (including redemption amount). Since demographic information is not necessary for using AlipayHK, we observe gender and age information for only 34.7% of the sample individuals.[2] For the main analysis, we use both the full sample and the subsample of individuals with reported demographic information to excess the external validity of our empirical analysis. For each individual, we also calculate her average monthly transaction volume before the official announcement of HKCV in June 2021 to gauge her wealth level and Alipay usage prior to the HKCV program.

Since we aim to examine consumer spending changes after HKCV, we drop individuals who only joined AlipayHK after the program announcement in June 2021. Such individuals account for 14.2% of the entire sample and 14.9% of the voucher recipients. Notably, disproportionately more older people started using AlipayHK after the program announcement. Among the new joiners with reported demographic information, 11.1% were born in or before 1959, whereas the same cohort only accounts for 4.2% of the existing users in June 2021.

For the main analysis, we aggregate individual transaction information to the weekly level. As our dataset covers up to 78 weeks of an individual's transactions (including 21 weeks after the voucher disbursement), we are able to examine individuals' spending response in longer periods, compared with a few prior research that focuses on examining the short-run response to digital voucher programs in China.

2. Individuals provide demographic information either voluntarily or when they request further financial services from AlipayHK for which such information may be necessary.

Table 2: Summary Statistics

	Full sample			Wave-I recipients			Non-recipients		
	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs
Individual-week level									
Weekly spending	358.91	1436.50	18,603,354	370.73	1427.34	16,169,143	250.67	1531.17	1,511,479
Individual level									
Pre-HKCV monthly spending	1105.08	3178.45	251,951	1126.82	3100.61	218,516	928.51	3781.21	20,937
Gender ($female = 1$)	0.55	0.50	87,541	0.53	0.50	72,429	0.70	0.46	11353
Birth cohort									
1995 or later	0.17	0.38	140,428	0.17	0.38	118,886	0.18	0.39	15,394
1980–1994	0.45	0.50	140,428	0.43	0.49	118,886	0.62	0.49	15,394
1960–1979	0.33	0.47	140,428	0.35	0.48	118,886	0.19	0.39	15,394
1959 or earlier	0.04	0.20	140,428	0.05	0.21	118,886	0.004	0.06	15,394

Notes: All money values are in HKD. USD1=HKD7.8. The full sample also includes wave-II voucher recipients.

3.2 Descriptive Statistics

Table 2 presents descriptive statistics of the main variables for the treatment and control groups in the sample. We drop observations of any individuals who started to use AlipayHK only after the official announcement of HKCV. Among the 251,951 individuals, the average weekly spending is HKD358.9. Since we do not observe income, we calculate each individual's monthly Alipay spending before the program announcement. On average, a sample individual spent HKD1105.1 per month before June 2021. In 2020, an average household in Hong Kong spent HKD3955 per person per month on non-housing consumption. This difference implies that the Alipay spending possibly represents only a fraction of their regular consumption for the sample individuals. We ought to discuss and address this issue in our empirical analysis. Note that we do not observe age and gender information for all individuals, as such information is not necessary for using AlipayHK. About 35% (56%) of the sample individuals have gender (age group) reported. Among the individuals with age information, females account for approximately 55%, roughly the same proportion of female residents in Hong Kong (54.4% in 2020). The individuals with reported age information are younger than average Hong Kong residents. Individuals born in 1995 or later account for 17% of the (sub)sample, while similar age groups only represent 5.6% of the adults in Hong Kong. Meanwhile, individuals born in 1959 or earlier account for only 4% of the (sub)sample, while this age cohort represents 37% of the adults. Individuals born between 1980 and 1994 account for 45% of the (sub)sample.

Table 3 shows that there exist significant differences between the treatment and control groups. For instance, the treated individuals spent significantly more on average than the controls before the program. The control group has a higher proportion of females and individuals aged between 26 and 41 than the treatment group. To address comparability concerns, we use the propensity score matching method (PSM) to construct a matched sample of voucher recipients and non-recipients. Specifically, we perform

a nearest neighbor matching based on a logistic regression using the gender, birth cohort, and pre-HKCV monthly spending variables. After matching, the differences in two key variables—pre-HKCV spending and the proportion of the 1980—1994 individuals—between the treatment and control groups become smaller and statistically insignificant. Differences in other variables also shrink. Overall, the treatment and control groups become largey comparable after the matching process.

Table 3: Comparison between the Treatment Group and Control Group

	Treatment group			Control group			Diff.
	Mean	SD	Obs	Mean	SD	Obs	
Before matching							
Pre-HKCV monthly spending	1126.15	3098.86	218,516	928.51	3781.21	20,937	197.64***
Gender ($female = 1$)	0.53	0.50	72,429	0.70	0.46	11,353	-0.17***
Birth cohort							
1995 or later	0.17	0.38	118,886	0.18	0.39	15,394	-0.01***
1980–1994	0.42	0.49	118,886	0.62	0.49	15,394	-0.19***
1960–1979	0.35	0.48	118,886	0.19	0.39	15,394	0.16***
1959 or earlier	0.05	0.21	118,886	0.004	0.06	15,394	0.04***
After matching							
Pre-HKCV monthly spending	804.08	3488.88	11,353	869.83	4068.84	11,353	65.74
Gender ($female = 1$)	0.72	0.45	11,353	0.70	0.46	11,353	0.015**
Birth cohort							
1995 or later	0.17	0.37	11,353	0.20	0.40	11,353	-0.032***
1980–1994	0.62	0.49	11,353	0.61	0.49	11,353	0.007
1960–1979	0.21	0.41	11,353	0.19	0.39	11,353	0.02***
1959 or earlier	0.008	0.087	11,353	0.004	0.061	11,353	0.003***

Notes: All money values are in HKD. USD1=HKD7.8. Significance at * 10%, ** 5%, and *** 1% levels.

3.3 Empirical Strategy

To estimate the effect of HKCV on consumer spending, we use a difference-in-differences (DID) strategy. The treatment group consists of HKCV-receiving individuals, and the control group consists of non-permanent residents who are not eligible for HKCV. Formally, we use the following specification:

$$y_{it} = \alpha + \beta Treat_i \times Post_t + \omega_i + \theta_t + \epsilon_{it} \tag{1}$$

where y_{it} is individual i's total spending in week t. $Treat_i$ is an indicator variable that equals 1 if i is in the treatment group. $Post_t$ is an indicator variable that equals 1 for weeks after the announcement of HKCV (June 18, 2021). ω_i represents individual fixed effects that capture any unobserved, time-invariant heterogeneity across individuals. θ_t

represents week fixed effects, used to control for weekly shocks to spending that is common to all individuals. Standard errors are clustered at the individual level.

The coefficient of interest, β, measures the average weekly change in spending of HKCV recipients after the program announcement, compared with the spending of ineligible individuals. For the main analysis, we focus on the spending response of the wave-I recipients (94.58% of the treatment group) whose vouchers expired on December 31, 2021. Since the spending cycle we observe for wave-II recipients is incomplete, we only use the wave-II subgroup as a robustness check. Moreover, since we do not use the staggered rollout of HKCV, the DID specification in the form of equation (1) does not suffer from the issues with two-way fixed effects emphasized by recent economic literature (e.g., de Chaisemartin and d'Haultfoeuille 2020; Goodman-Bacon 2021).

Following Agarwal and Qian (2014), we also divide the post-treatment period into the announcement period and the disbursement period in order to examine spending responses in these two periods separately. The specification is given as follows:

$$y_{it} = \alpha + \beta_a Treat_i \times Announce_t + \beta_d Treat_i \times Disburse_t + \omega_i + \theta_t + \epsilon_{it} \tag{2}$$

where $Announce_t$ is an indicator variable equal to 1 for the weeks during the announcement window (June 18 to August 1 for wave-I recipients), and $Disburse_t$ is an indicator variable equal to 1 for the weeks after the (first-round of) e-voucher disbursement. We are interested in estimating the coefficients β_a and β_d, which measure the average weekly change in spending of treated individuals in the announcement period and the disbursement period, respectively, compared with the spending change of the ineligible individuals.

To examine the dynamics of the spending response, we perform an event study analysis by estimating the following model:

$$y_{it} = \alpha + \sum_{j=-9}^{27} \beta_k Treat_i \times \mathbb{1}(t = j) + \omega_i + \theta_t + \epsilon_{it} \tag{3}$$

where $\mathbb{1}(t = j)$ a binary variable equal to 1 if t is exactly week j, with week 0 being the program announcement week. In particular, $j = -9$ represents 9 and more weeks before June 19, 2021, and $j \in \{-8, -7, \ldots, \ldots, 26, 27\}$ represents 7 weeks before to 27 weeks after the program announcement. The omitted period is $j = -1$. β_0 therefore measures the immediate spending response of the treated individuals, relative to the spending change of the control group, during the announcement week. The coefficients β_{-9}, ..., β_{-2} measure the differences in spending between the treated and control individuals in the pre-treatment period. The coefficients β_1, ..., β_{27} measure the spending responses 1

week, ..., and 27 weeks after the announcement, respectively.

To examine the heterogeneous effects of HKCV across demographic groups, we estimate the following model:

$$y_{it} = \alpha + \beta_0 Treat_i \times Post_t + \beta_G Treat_i \times Post_t + \omega_i + \theta_t + \epsilon_{it} \quad (4)$$

where, with a slight abuse of notation, β_G represents a vector of group-specific coefficients. For instance, when we put the sample individuals into n subgroups, β_G contains $n-1$ coefficients measuring the difference in spending response of a subgroup relative to the benchmark subgroup.

4 Results

4.1 The Effect of HKCV on Consumer Spending

Table 4 reports the results from estimation of equations (1) and (2). In column 1, the estimate of β is positive and highly significant (at the 1% level). It indicates that, on average, the wave-I recipients spent HKD201.4 more per week after the announcement of HKCV, compared with in the control group. Column 2 examines the effect of HKCV in the announcement period and the disbursement period separately. The estimates show that consumer spending increased significantly by HKD29.3 per week in the announcement period and HKD248.4 per week after the voucher disbursement. Consistent with the life-cycle theory and previous findings by Agarwal and Qian (2014), we find that the treated individuals started to increase spending moderately after the program announcement but before they received the vouchers. The results show that the spending response is much smaller in the announcement period than in the disbursement period.

To address the concern that our treatment and control groups differ in their observables (as shown in Table 3), we use the propensity score matching (PSM) method to construct a matched sample for comparison and perform our DID analysis using the matched sample. Given that only about 34.7% to 54.4% of the sample individuals provide demographic information, we first estimate equations (1) and 2 using the subsample with non-missing demographic information. In columns 3 and 4 of Table 4, the estimated effects are positive, highly significant, and larger than the full-sample estimates. For instance, the estimates suggest that consumer spending on average increased by HKD240.2 per week after the announcement of HKCV. In columns 5 and 6, the estimates using the PSM-matched sample are similar to those in columns 3 and 4, indicating that the issue of selection on observables is not important in our context. This gives us confidence in the empirical strategy used. In what follows, we also compare trends in spending between the treatment and control groups in an event study analysis to address the potential issue

Table 4: Effect of HKCV on weekly spending

Dependent variable: *total weekly spending*						
	Full sample		Individuals w/ demographic information			
	DID		DID		PSM-DID	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × *Post*	201.41***		240.20***		245.39***	
	(5.14)		(7.73)		(10.98)	
Treat × *Announce*		29.33***		57.55***		50.09***
		(6.00)		(7.89)		(11.20)
Treat × *Distribute*		248.35***		290.02***		298.65***
		(5.63)		(8.84)		(12.19)
No. individuals	239,454		83,782		22,688	
Obs.	17,684,549		6,135,067		1,627,177	
Adj. R^2	0.23	0.229	0.214	0.214	0.245	0.245

Notes: All regressions include week and individual fixed effects. Robust standard errors clustered by individual are displayed in parentheses. Significance at * 10%, ** 5%, and *** 1% levels.

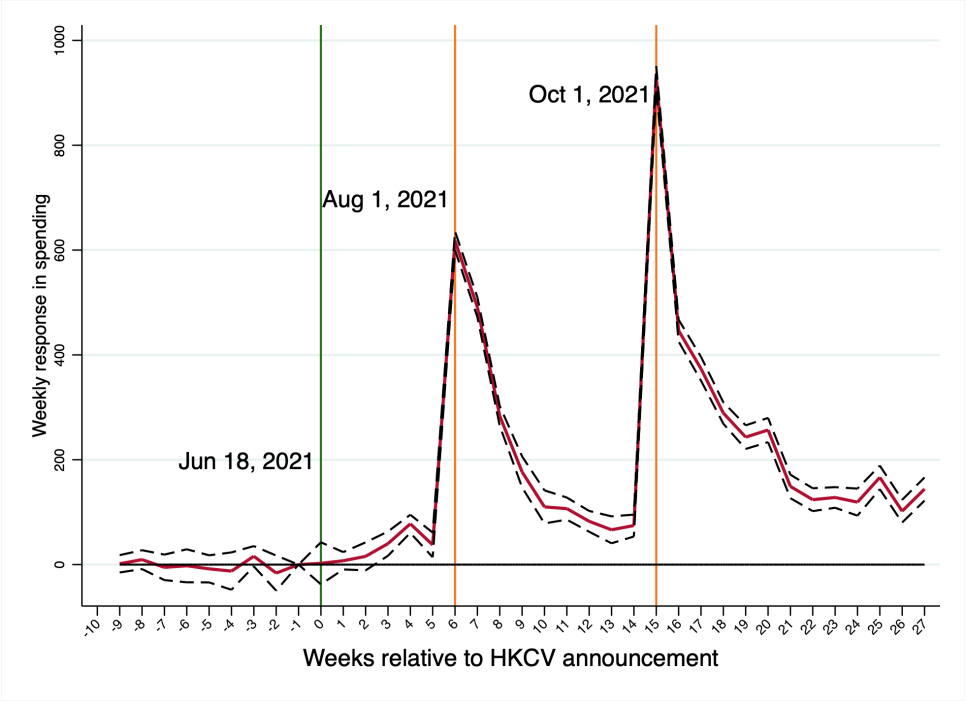
of selection on unobservables.

To investigate the dynamics of the spending response, we perform an event study analysis by estimating equation (3). Figure 1a graphs the estimated coefficients of the weekly effects (with benchmark week being one week before the announcement week) and the 95% confidence intervals. It shows that the pre-announcement differences in consumer spending between the treatment and control groups are statistically indistinguishable from zero, thus supporting the identifying assumption that absent the voucher program, the two groups of individuals would have similar trends in total spending. Moreover, the estimates suggest that the HKCV recipients did not change their spending behavior before the announcement. In fact, the parallel trend in spending continues into the post-announcement weeks. The positive differences in spending become significant three weeks after the announcement—around the time point when the official registration was open to the public on July 4, 2021. In other words, our results indicate that eligible individuals started to increase spending as soon as they were officially enrolled and could expect to receive the vouchers. The spending spikes occurred precisely in the weeks of August 1 and October 1—the dates for the two rounds of voucher disbursement. The estimates suggest that the wave-I recipients spent approximately HKD618 and HKD930 more during these two weeks. The spending increase during the four weeks (i.e., the weeks of August 1, August 8, October 1, and October 8) accounts for 46% of the total increase in spending after the announcement of HKCV.

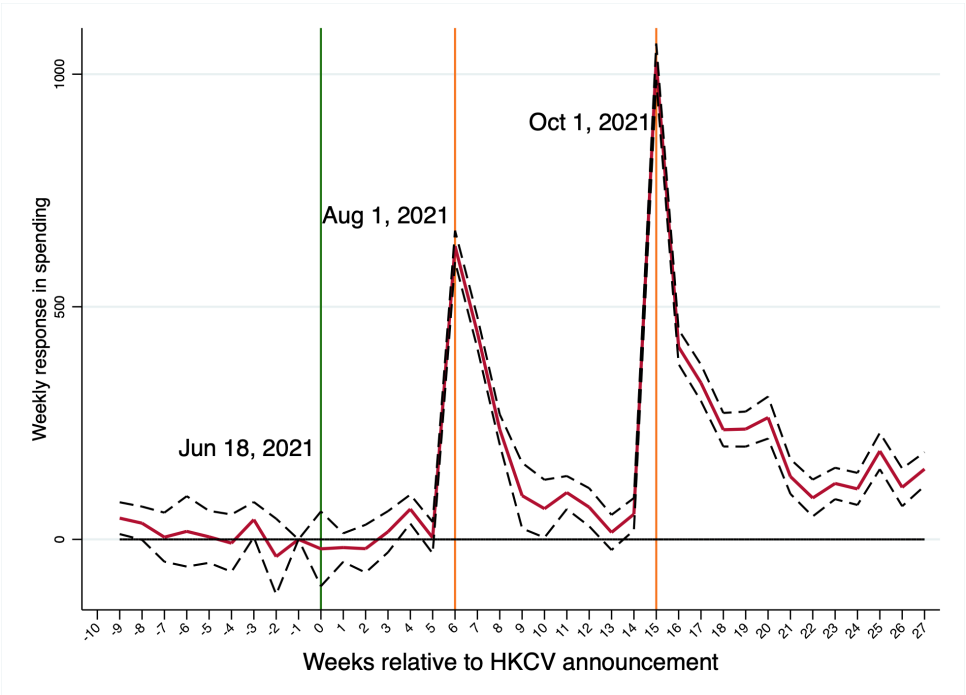
Another important pattern is that the recipients still spent significantly more than the

Figure 1: Weekly Spending Responses to HKCV

(a) Full-sample estimates



(b) Restricted-sample estimates



Notes: The figures plot the estimated coefficients of the weekly effects of HKCV on consumer spending and the 95 percent confidence intervals.

controls several weeks after the voucher disbursements. Figure 1a shows that the spending increase diminishes over time but remains significant in late December. In other words, we find no evidence of intertemporal substitution within the half-year period since the announcement of HKCV. This result is consistent with the findings of a number of previous studies on stimulus programs, such as Agarwal and Qian (2014), Liu et al. (2021), and Kubota et al. (2021). One possible explanation is that the recipients spent their voucher money heavily on non-durable goods, such as groceries and dining (as our estimates in Table 6 suggest), for which intertemporal substitutability is usually low.

Overall, our full-sample DID estimates suggest that the average cumulative spending increase reaches HKD5438 six months after the program announcement. However, this estimate reflects both the HKCV effect on *net* spending and transactions shifted from other payment methods (e.g., cash or credit cards) to AlilayHK induced by the digital program. Therefore, to understand the economic effect of HKCV, we ought to isolate the impact on net spending from the payment method switching effect. To address this concern, we focus on a subsample of active users who makes a *stable* number of transactions per month before and after the program. The idea is that if a consumer shifts many transactions from other payment methods to AlipayHK because of HKCV, the number of her AlipayHK transactions must increase substantially. Conversely, program-induced switching behavior is less likely to play an important role for individuals who do not experience a large increase in the number of transactions. In implementation, we define active users as those who have spent at least HKD100 per week in the pre-policy period, with a moderate increase in the number of monthly transactions of less than 2. We also use a few alternative threshold values to define this subgroup for robustness checks, all of which yield similar estimates.

Column 1 of Table 5 reports the estimate using the restricted sample with $50,107$ individuals (21% of the full sample). We find that the estimated effect of HKCV is significantly smaller than the full-sample estimates. The coefficient indicates that for the active users with only moderate increases in the number of transactions, their weekly spending increased by HKD145.3 per week after program announcement, compared with the control group. This estimate implies that six months after the program announcement, the voucher recipients on average spent HKD3923 more, or 78 cents per dollar perceived. In columns 2 to 4, the estimates using alternative threshold values are largely comparable to each other. The results indicate that the recipients spent 74 cents to 82 cents per dollar received in vouchers.

Figure 1b plots the event study estimates for the subgroup of active users with a moderate increase in the number of transactions. Consistent with our findings with the full sample, there are no significant differences in spending between the treatment and control groups individuals before the program announcement. The voucher recipients started to

Table 5: Effect of HKCV on Weekly Spending: Restricted Sample

Dependent variable: *total weekly spending*				
Sample restrictions:	($\geq X$ dollars per month before HKCV, increase in no. transactions per month $\leq Y$)			
	Baseline	Robustness		
(X, Y)	$(\$100, 2)$	$(\$200, 2)$	$(\$100, 1)$	$(\$200, 1)$
	(1)	(2)	(3)	(4)
$Treat \times Post$	145.26***	151.94***	136.48***	145.18***
	(11.16)	(13.12)	(12.65)	(14.73)
No. individuals	50,107	45,835	38,876	36,007
Obs	3,810,727	3,498,961	2,954,141	2,745,221
Adj. R^2	0.238	0.236	0.236	0.235

Notes: All regressions include week and individual fixed effects. Robust standard errors clustered by individual are displayed in parentheses. Significance at * 10%, ** 5%, and *** 1% levels.

significantly increase their spending three weeks before the disbursement period, in the enrollment week (i.e., the week of July 4, 2021). Their spending increases are the largest in the two weeks after the voucher disbursement and then decrease over time. Overall, the pattern of spending behavior is similar to that for the full sample.

4.2 Heterogeneous Responses across Consumption Categories

4.2.1 Full sample

Using the highly detailed transaction data, we also examine how HKCV affects spending across consumption categories. We first consider the full-sample results with the caveat that the full-sample estimates possibly include spending shifted from other payment platforms/methods (e.g., cash and stored value cards) to AlipayHK. Table 6 summarizes the results. We find that the spending in nearly all categories increased, except for "entertainment" and "electronics store." In fact, the spending in electronics stores decreased slightly by HKD0.34 per week. The spending in the categories of "grocery store," "restaurant," and "service" increased by HKD34.5, HKD35.8, and HKD40.2 per week, respectively, accounting for 17.2%, 17.8%, and 20% of the total spending increase. The spending in "clothing store" increased by HKD15.43, accounting for 7.7% of the total spending increase. The spending increase in the four above categories together accounts for 62.7% of the total spending increase. The spending on bill payments and travel expenses increased by smaller amounts (HKD6.7 and HKD2.6, respectively).

Because AlipayHK labels each consumption based on the merchant's business form, we ought to use caution in interpreting the results. In particular, whereas categories such as "grocery store," "restaurant," and "electronics store" likely represent both distinct

shopping venues and different consumption goods, the spending in "department store" may include both durable (e.g., electronics) and non-durable (e.g., food and clothing) items sold at other places. In addition, Table 6 shows that HKCV significantly increased AlipayHK spending in the "unclassified" category by HKD53.6 per week (26.6% of the total spending increase). "Unclassified" broadly includes many types of businesses with a missing classification for various reasons. Further inspection reveals that, among the top 10 merchants that have more than 1,000 transactions, 5 sell food or provide catering services, 2 are small investment companies, and the rest includes a smartphone seller, a gas station, and a movie theater. In other words, any type of consumption can go into this category. Nonetheless, we can use the estimates to bound the program effects. For instance, the results suggest that the non-durable and service categories account for *at least* 62.7% of the spending increase induced by HKCV. The spending on durable goods ("electronics store"+"department store"+"unclassified") accounts for *at most* 30.5% of the total increase.

Table A.2 examines online and offline spending separately. The estimates indicate that online and offline spending, on average, increased by HKD34.5 and HKD166.9, respectively, accounting for about 17% and 83% of the total increase. This is consistent with our above results that the increased spending is concentrated in offline settings, such as "restaurant," "service," and "grocery store".

4.2.2 Restricted sample

We also examine the spending responses across consumption categories using the restricted sample of early active users and summarize the results in Table 6. Compared with the full-sample results, the subsample estimates are all qualitatively similar to the full-sample estimates. As expected, the subsample estimates using only individuals with a moderate increase in the number of transactions are also smaller than the full-sample estimates, thus confirming that payment method switching is responsible for the large spending increase seen in the full-sample analysis.

We find that the spending in the categories of "grocery store," "restaurant," "clothing store," "service," "travel," "bills," and "unclassified" increased significantly after the program announcement, whereas the spending in "electronics store," "department store" and "entertainment" did not increase. (In fact, the spending in electronics stores decreased slightly by HKD0.6 per week.) For instance, the estimates indicate that for "grocery store," "restaurant," "clothing store" and "service", spending increased by HKD29.5, HKD26.9, HKD15.3, HKD10.8 per week, respectively, accounting for 20.3%, 18.5%, 10.5%, and 7.5% of the total spending increase for this subsample. Together, the four categories of non-durable good and service consumption account for 56.8% of the total increase. The spending on bill payments increased by HKD4.8 (3.3% of the total

increase). We also look at the composition effect within this category and find that the increase is mostly attributable to the spending increase on telecommunication bills (i.e., mobile phones and broadband Internet). The voucher program also has a small positive effect on travel expenditure (HKD2.8 or 2% of the total increase). Like what we find with the full sample, the "unclassified" spending increased substantially by HKD41.6, which accounts for 28.2% of the total increase. Put together, this set of findings indicates that (i) for the subgroup of individuals who are less likely to exhibit payment method switching, HKCV has a strong positive impact on non-durable good and service consumption; our estimates imply that this subgroup spent *at least* HKD0.45 per dollar received (in vouchers) on those categories. It is therefore reasonable to expect that a significant portion of the *net* spending increase went to sectors (e.g., grocery, restaurant, and service) that are closely tied to the local economy.

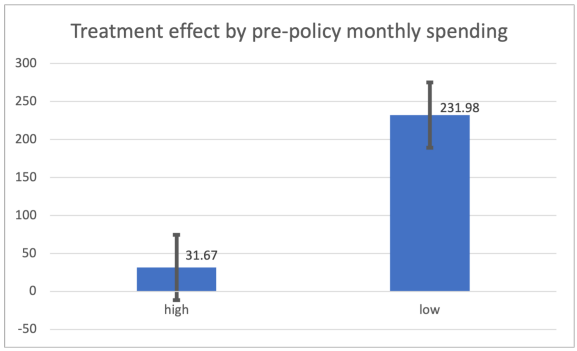
In Table A.2, we also examine consumers' online and offline spending separately using the restricted sample. The estimates show that, like what we find for the full sample, offline spending significantly increased after the program. On average, the voucher recipients spent HKD179.8 more per week. However, different from the full-sample estimates, the estimated effect on online spending is significantly negative. The estimates suggest that the recipients cut online spending by HKD34.5 per week. Overall, for this restricted

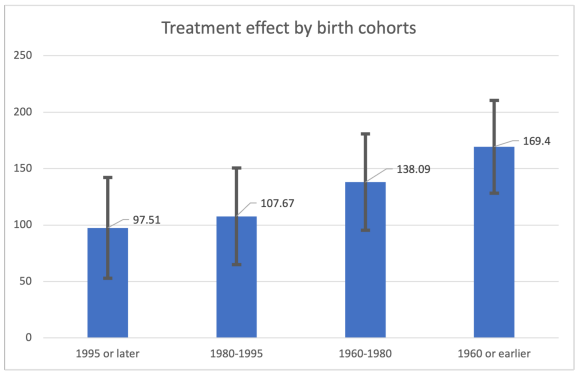
Table 6: Effect of HKCV on Weekly Spending Across Consumption Categories

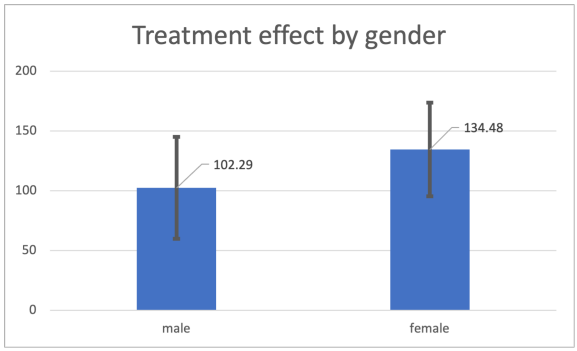
	Grocery store		Restaurant		Clothing store	
	Full	Restricted	Full	Restricted	Full	Restricted
$Treat \times Post$	34.53***	29.47***	35.83***	26.92***	15.43***	15.31***
	(0.55)	(0.70)	(0.85)	(1.72)	(0.11)	(0.21)
	Electronics store		Department store		Service	
	Full	Restricted	Full	Restricted	Full	Restricted
$Treat \times Post$	-0.34***	-0.62***	8.21***	2.30	40.42***	10.84***
	(0.66)	(1.11)	(0.69)	(1.77)	(2.20)	(3.32)
	Travel		Entertainment		Bill	
	Full	Restricted	Full	Restricted	Full	Restricted
$Treat \times Post$	2.58***	2.79***	4.60	11.83	6.67***	4.82***
	(0.17)	(0.29)	(3.37)	(8.46)	(0.68)	(1.35)
	Unclassified					
	Full	Restricted				
$Treat \times Post$	53.56***	41.59***				
	(2.28)	(5.29)				

Notes: The restricted sample consists of individuals who have spent at least HDK100 before the program, with an increase in the number of transactions per month less than 2. All regressions include week and individual fixed effects. Robust standard errors clustered by individual are displayed in parentheses. Significance at * 10%, ** 5%, and *** 1% levels.

Figure 2: Heterogeneous Spending Responses across Consumer Groups







sample, our findings show that the increased spending is directed towards spending in offline settings.

4.3 Heterogeneous Responses across Consumers Groups

We next examine the heterogeneity in spending responses to HKCV across consumer groups. To minimize the confounding factor of payment method switching behavior, we conduct the heterogeneity analysis using only the subgroup of active individuals with only a moderate transaction increase. We estimate equation (4) with the caveat that the sample size shrinks considerably because only a fraction of users have useful demographic information. Figure 2 presents the estimated effect of HKCV for different consumer groups.

We first divide the sample into two groups based on individuals' average monthly spending before HKCV. We find that the spending response of the low-spending group is larger than that of the high-spending group. One likely explanation is that the pre-HKCV spending is correlated with an individual's wealth level and that more wealthy individuals are less responsive to the stimulus. Next, we examine the heterogeneous responses across age groups. The estimates indicate that the individuals aged above 61 are most responsive to the program. The spending increase for the individuals aged between 26 and 41 is similar

to the increase for individuals aged below 25. Lastly, we analyze the gender difference in spending responses. We find that, on average, the female recipients spent HKD32.19 more than males.

4.4 Additional Robustness Results

In this section, we perform additional robustness tests for the main results. In the main analysis, we examine the spending response of wave-1 recipients only. We re-do the analysis using the wave-II recipients as the treatment group. Appendix Table A.3 presents the results. The estimates are similar to the baseline results for wave I. For instance, the results indicate that, on average, a treated individual spent HKD163.5 more per week after the program announcement; the total spending increase amounts to HKD5231 by the end of 2021. Furthermore, to check whether the treatment and control groups exhibit similar trends in spending before the announcement of HKCV, we include more weekly dummies in the event study equation (3) and re-estimate the model. The estimates show a similar pattern as our main event study results, indicating no pre-HKCV differences in the weekly consumer spending between the treatment and control groups.

5 A Simple Model of Multiple Payment Methods

We build a toy model in which households can choose different payment methods. The model will be used to quantify the potential shifts from other payment methods to AliPayHK, which we do not observe. The economy has one good, homogeneous households and three payment methods: out-of-pocket mobile payment, voucher payment and cash/credit card payment. The first two assumptions are made for notational convenience and can easily be generalized.

The price of the good is normalized to unity. Let c_M, c_B and c_N be the expenses through out-of-pocket mobile payment, voucher payment and cash/credit card payment, respectively. We assume that each payment method entails some quadratic transaction costs: $\phi_M c_M^2/2$, $\phi_M \delta c_B^2/2$ and $\phi_N c_N^2/2$. Since voucher payment is attached to mobile payment, we assume the transaction cost parameter of voucher payment is related to that of mobile payment. The assumption will matter when we quantify the effect of reduction in ϕ associated with HKCV. The household budget constraint can be written as

$$\begin{aligned} c + \frac{1}{2}\left(\phi_M\left(c_M^2 + \delta c_B^2\right) + \phi_N c_N^2\right) &= e + B, \\ c_B &\leq B, \end{aligned}$$

where $c \equiv c_M + c_B + c_N$.

Denote by $u(c)$ the utility of the representative household. For simplicity, we assume interior solution so that $c_B = B$ always holds. The first-order conditions imply

$$c_N = \phi c_M = \phi\delta c_B, \tag{5}$$

where $\phi \equiv \phi_M/\phi_N$. The intuition of (5) is straightforward. The expense share between cash/credit card payment and out-of-pocket mobile payment is solely determined by their relative transaction cost ϕ. Analogously, the "discount" of voucher payment, δ, pins down the expense share between c_M and c_B. (5) shows that if we know ϕ, the unobservable c_N can be inferred from c_M.

5.1 Empirical Implications

We now add subscript $t \in \{0, 1\}$ to denote the variables and parameters before and after the introduction of HKCV. Each period in the model consists of 27 weeks. We allow ϕ_M to vary because the transaction cost of mobile payment may be affected by HKCV in the two-sided markets. ϕ_N is time-invariant. The control and treatment groups are indexed by superscript $i \in \{-, +\}$, where $-$ and $+$ refer to the non-recipient and recipient individuals, respectively.

When both ϕ_M and ϕ_N are sufficiently small (but their ratio, ϕ, remains significant), we can ignore the transaction costs in the budget constraint. For the pre-HKCV period, we have

$$c^i_{M,0} = \frac{1}{1+\phi_0} e^i_0, \quad c^i_{N,0} = \frac{\phi_0}{1+\phi_0} e^i_0.$$

For the post-HKCV period, we distinguish voucher-recipient and non-recipient households by superscribt $+$ and $-$:

$$c^-_{M,1} = \tfrac{1}{1+\phi_1} e^-_1, \qquad c^-_B = 0, \qquad c^-_{N,1} = \tfrac{\phi_1}{1+\phi_1} e^-_1,$$

$$c^+_{M,1} = \tfrac{\delta}{1+\delta+\phi_1\delta}\left(e^+_1 + B\right), \quad c^+_B = \tfrac{1}{1+\delta+\phi_1\delta}\left(e^+_1 + B\right), \quad c^+_{N,1} = \tfrac{\phi_1\delta}{1+\delta+\phi_1\delta}\left(e^+_1 + B\right).$$

Let Δx denote the change of variable x in the two periods. The MPC out of HKCV for the recipients is

$$MPC^+ = 1 + \frac{\Delta e^+}{B}. \tag{6}$$

The effectiveness of HKCV is determined by how much out-of-pocket spending is substituted out by the voucher. While Δe^+ is not observable, the model provides a structural

interpretation of the observed change in the out-of-pocket mobile spending, Δc_M^+, which allows us to back out MPC. For example, a sufficiently large mobile spending that satisfies $c_{M,1}^+ > \delta B/(1+\delta+\phi_1\delta)$ would imply $\Delta e^+ > 0$ and, therefore, $MPC^+ > 1$.

The model also illustrates the pitfall of ignoring the unobserved change in the other payments, Δe_N^+. The MPC would be biased upwards (downwards) if $\Delta c_N^+ > 0$ (< 0), which, in turn, is largely determined by the substitutability between different payment methods implied by ϕ_t and δ.

We now calibrate the key parameters, ϕ_t and δ. We observe $c_{M,0}^i$, which implies the ratio of the spending between the two groups: e_0^+/e_0^-. We know the average household consumption expenditure exclusive of rents and payment for public utilities in the official statistics. However, we do not know the extent to which the spending of AliPayHK users differ from the average. We consider two scenarios. The benchmark case assumes the spending of the treatment group to be equal to that implied by the average household consumption expenditure exclusive of rents and payment for public utilities in the official statistics. Since the average household has 2.8 people (based on HK Census and Statistics), this gives $e_0^+ = 28.6$ and $e_0^- = 23.7$ (thousand HKD). The share of $c_{M,0}^i$ in e_0^i gives $\phi_0 = 2.9$. As a robustness check, we will assume that the spending of the non-recipient, rather than the recipient, is set to the average spending implied by the official statistics.

The expenditure change for the control group is

$$\Delta c_{\bar{M}}^- = c_{M,1}^- - c_{M,0}^- = \frac{1}{1+\phi_1} e_1^- - \frac{1}{1+\phi_0} e_0^-.$$

We assume HKCV doesn't change the spending of the control group: $e_1^-/e_0^- = 1$. So, we can infer ϕ_1 from $\Delta c_{\bar{M}}^-$. This gives $\phi_1 = 2.0$, implying a 31% reduction in the marginal transaction cost of AliPayHK.

The out-of-pocket mobile payment change for the treatment group is $c_{M,1}^+ = \frac{\delta}{1+\delta+\phi_1\delta}\left(e_1^+ + B\right)$

$$\Delta c_M^+ = c_{M,1}^+ - c_{M,0}^+ = \frac{\delta}{1+\delta+\phi_1\delta}\left(e_1^+ + B\right) - \frac{1}{1+\phi_0} e_0.$$

We can infer δ from the treatment group: $c_{M,1}^+/c_B$. This gives $\delta = 1.9$. Therefore, we can back out the new spending from the out-of-pocket expenditure for the treatment group:

$$e_1^+ = \frac{1+\delta+\phi_1\delta}{\delta} c_{M,1}^+ - B = 28.8,$$

which is actually slightly higher than the spending before HKCV. The implied MPC out of HKCV is by (6) is 1.01. The spending by payment methods is summarized in Table 7. One can see that the inferred out-of-pocket mobile payment increases by HKD 2.1

thousand, dominating the inferred decline of HKD 1.9 thousand in the other payment. In other words, the calibrated model implies a modest shift of payment to AliPayHK.

Table 7: Spending by Payment Methods (HKD 1000)

Non-Recipient				
	Data		Inferred	Robust
$c^-_{M,0}$	6.1	$c^-_{N,0}$	17.5	22.5
$c^-_{M,1}$	7.8	$c^-_{N,1}$	15.8	20.8
Recipient				
	Data		Inferred	Robust
$c^+_{M,0}$	7.4	$c^+_{N,0}$	21.2	27.2
$c^+_{M,1}$	9.5	$c^+_{N,1}$	19.3	25.3

Notes: The data for $c^i_{M,t}$ is from AliPayHK. "Inferred" and "robust" refer to the results in the calibrated model where the spending of the recipient and non-recipient is set to the average spending implied by the official statistics, respectively.

We would also like to assess the expansion of AliPayHK caused by HKCV. There are two channels. The exclusive disbursement of HKCV on the chosen payment platform tends to boost spending on AliPayHK. Such anticipation may prompt more retailers to adopt AliPayHK, forming a reinforcing mechanism that reduces the marginal transaction cost of AliPayHK in the two-sided market. The latter is consistent with the increase in the spending of the non-recipient via AliPayHK. To quantify the importance of the two channels, we conduct two counterfactual exercises. Both assume the same e^i_1 implied by the calibrated model. The first counterfactual assumes constant ϕ: $\phi_1 = \phi_0$. The second counterfactual assumes that B is a transfer to the recipient's bank account. Moreover, we maintain the assumption that $\phi_1 = \phi_0$ in the first scenario. In the second scenario, the voucher is entirely replaced with cash transfer like the Singapore Growth Dividend Program in 2011 (Agarwal and Qian 2014). If the change in ϕ is caused by using the digital voucher on AliPayHK, it would be reasonable to assume constant ϕ in the second scenario.

The results are reported in Table 8. The change in the spending of the non-recipient is more straightforward. Since they do not receive HKCV, their spending via AliPayHK is the same in both scenarios. Yet, the effect of a lower ϕ after HKCV is significant. If there were no reduction in the marginal transaction cost, the spending of the non-recipient via AliPayHK, $c^-_{M,1}$, would decline by 22%. The effect is smaller for the recipient. Their out-of-pocket spending via AliPayHK would decline by 19% in the first scenario. Replacing digital voucher with cash has two effects. The first is mechanic: c_B becomes zero. The second comes from the allocation of the total spending between the mobile and other payments. The total spending via AliPayHK would be reduced by nearly 40% (down

from HKD 14.5 thousand to 8.7 thousand). The out-of-pocket spending via AliPayHK would fall by 8%. The difference between the benchmark case and second scenario can be considered the short-run gain of HKCV for AliPayHK, which builds on both the lower ϕ and the voucher payment tied to AliPayHK. Our counterfactuals suggest the spending of the recipient and non-recipient via AliPayHK increase by about a quarter and two thirds, respectively. If the reduction in ϕ is permanent after HKCV expires, the long-run effect on AliPayHK might be captured by the difference between the benchmark case and first scenario, which suggests an increase of spending via AliPayHK by approximately a quarter.

Table 8: Counterfactual Exercises (HKD 1000)

Non-Recipient					
		$\phi_1 = \phi_0$		cash transfer	
	Data	Inferred	Robust	Inferred	Robust
$c^-_{M,1}$	7.8	6.1	6.1	6.1	6.1

Recipient					
		$\phi_1 = \phi_0$		cash transfer	
	Data	Inferred	Robust	Inferred	Robust
$c^+_{M,1}$	9.5	7.7	7.6	8.7	8.5
$c^+_{M,1} + c_B$	14.5	12.7	12.6	8.7	8.5

Notes: "Cash transfer" refers to the second scenario in which $\phi_1 = \phi_0$ and the voucher is replaced with cash.

Finally, we check the sensitivity of our main findings to an alternative assumption that the spending of the non-recipient, rather than the recipient, is set to the average spending implied by the official statistics. This gives $\phi_1 = 2.7$, $e_1^+ = 34.8$. The implied spending by payment methods is reported in the last column of Table 7. The MPC out of HKCV increases to 1.01, which is consistent with our benchmark estimate. The effects of HKCV on the spending via AliPayHK are reported in the columns labeled as "robust" in Table 8. The results are essentially the same.

6 Conclusion

This paper finds the HKCV scheme to be a very effective fiscal stimulus policy. According to our estimates, the aggregate consumption increased by 80%–101% of the value of the program. The increase is substantially larger than the effect of most similar stimulus policies estimated before. In terms of MPC, the effect of HKCV more than quadruples the effect of the 1999 Japan Shopping coupons, at least triples the effect of the 2009 Taiwan Shopping Voucher Program and the 2020 CARES Act stimulus payments in the

US, and is comparable to or larger than the effect of the 2011 Growth Dividend Program in Singapore, one of the most effective fiscal transfers to consumers found in the literature. In addition, our estimates show that older people and individuals with lower pre-policy monthly spending are more responsive to the stimulus program.

We also find large compositional effects that are in line with the government rhetoric in promoting local businesses but against the prediction of fungibility. In particular, our estimates indicate that the spending on non-durable goods and services increased significantly due to the voucher program, accounting for at least 57%–63% of the total spending increase. On average, the voucher recipients spent at least 45 cents per dollar received on non-durable goods and services. Similar results have been found on the effects of the Supplemental Nutrition Assistance Program (SNAP). Hastings and Shapiro (2018) show that the recipient households have a marginal propensity to consume food out of SNAP between 0.5 and 0.6, while the effects of SNAP on nonfood expenditure is negligible.

The very high MPC and large compositional effects are consistent with bounded rationality or behavioral bias for consumption vouchers. For instance, mental accounting may provide a coherent explanation to our findings and, perhaps a useful guidance to future stimulus policies. We leave this for future research. While our finding provide supporting evidence for using consumption vouchers to boost aggregate demand, the policy implication needs to be taken with cautions. To the extent that the high MPC may be driven by bounded rationality, the effect of such a fiscal stimulus would be weakened if the government increases the size of transfer or makes the transfer more frequent.

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Appendix

Additional Tables

Table A.1: Effect of HKCV on the Composition of Consumption

	Grocery store		Restaurant		Clothing store	
	Full	Restricted	Full	Restricted	Full	Restricted
$Treat \times Post$	0.0362***	0.0397***	0.0228***	0.0149***	0.0233***	0.0272***
	(0.0013)	(0.0019)	(0.0014)	(0.0020)	(0.0007)	(0.0011)
	Electronics store		Department store		Service	
	Full	Restricted	Full	Restricted	Full	Restricted
$Treat \times Post$	-0.0009***	-0.0010***	-0.0043***	-0.0024**	-0.0758***	-0.0680***
	(0.0002)	(0.0002)	(0.0006)	(0.0010)	(0.0014)	(0.0021)
	Travel		Entertainment		Bill	
	Full	Restricted	Full	Restricted	Full	Restricted
$Treat \times Post$	0.0009***	0.0014***	0.0003	-0.00002	-0.0273***	-0.0318***
	(0.0003)	(0.0004)	(0.318)	(0.0004)	(0.0014)	(0.0021)
	Unclassified					
	Full	Restricted				
$Treat \times Post$	-0.0247***	0.0200***				
	(0.0014)	(0.0020)				

Notes: The restricted sample consists of individuals who have spent at least HDK100 before the program, with an increase in the number of transactions per month less than 2. The dependent variable is the ratio of a particular type of consumption to total monthly spending. All regressions include week and individual fixed effects. Robust standard errors clustered by individual are displayed in parentheses. Significance at * 10%, ** 5%, and *** 1% levels.

Table A.2: Online vs. Offline Spending

	Online				Offline			
	Full sample		Restricted sample		Full sample		Restricted sample	
Treat × *Post*	34.52***		-34.52***		166.97***		179.79***	
	(2.81)		(4.73)		(4.21)		(10.07)	
Treat × *Announce*		3.78		-66.93***		25.62***		32.62***
		(4.20)		(5.44)		(4.23)		(9.57)
Treat × *Disburse*		42.91***		-25.69***		205.52***		219.92***
		(2.94)		(5.27)		(4.69)		(11.25)
Obs	17,680,622	17,680,622	3,810,727	3,810,727	17,680,622	17,680,622	3,810,727	3,810,727
Adj. R^2	0.274	0.274	0.279	0.279	0.122	0.123	0.145	0.145

Notes: All regressions include week and individual fixed effects. Robust standard errors clustered by individual are displayed in parentheses. Significance at * 10%, ** 5%, and *** 1% levels.

Table A.3: Effect of HKCV on Weekly Spending: Wave II Recipients

Dependent variable: *total weekly spending*		
	(1)	(2)
Treat × *Post*	163.47***	
	(7.35)	
Treat × *Announce*		2.25***
		(7.72)
Treat × *Distribute*		253.31***
		(8.47)
No. individuals	33,179	
Obs.	2,416,433	
Adj. R^2	0.206	0.206

Notes: All regressions include week and individual fixed effects. Robust standard errors clustered by individual are displayed in parentheses. Significance at * 10%, ** 5%, and *** 1% levels.