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Consumption Response to Seoul's COVID-19 Shopping Coupons: Evidence from Consumer Data*

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This study measures the extent to which Seoul's COVID-19 shopping coupon program affects individuals' consumption. Unlike other COVID-19-related transfer programs, the Seoul Metropolitan government provides consumption coupons depending on income. We quantify the causal effect of Seoul's program by comparing eligible and ineligible groups using a difference-in-differences method. We find that the program increased consumption by 18% while it was ongoing and by 6% afterward. We find substantial heterogeneity in the treatment effects concerning recipients' income and consumption categories.

JEL Classification: H2, H6, D3, D6, L1
Keywords: COVID-19, Stimulus Payment, Consumption

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I. Introduction

In response to the COVID-19 pandemic, various countries provide income transfers and shopping coupons to relieve economic distress promptly (IMF, 2020). Although such transfers certainly benefit recipients, it is unclear to what extent they affect an individual's consumption. For example, consumption responses depend crucially on the marginal propensity to consume. Additionally, the risk of COVID-19 infection may cause people to change their consumption behaviors altogether. Recent studies examining income transfer programs include Baker et al. (2020), Chetty et al. (2020), Coibion et al. (2020), and Karger and Rajan (2020).

This study analyzes an understudied transfer program—Seoul's COVID-19 shopping coupon program—and estimates its causal effects on individuals' consumption. Our focus on Seoul's program is motivated by three reasons. First, although several studies have examined the effects of the national COVID-19 transfer program, we are the first to measure the causal effects of Seoul's shopping coupon program.[1] Furthermore, while the national program is eligible to everyone, thus generating no control group, Seoul's program is eligible only to 50% of its residents, which allows us to employ a testable identification strategy based on a difference-in-differences (DID) method. Finally, Seoul is a key geographical location in South Korea in terms of political, demographic, and economic perspectives, as it is the capital city of Korea, home to 10 million people (19% of Korea's population in 2020), and it accounts for 23% of Korea's gross domestic product. Thus, a major socio-economic policy in Seoul, including Seoul's COVID-19 program, deserves rigorous academic examination, which we provide here.

Seoul's program, launched in early April 2020 to relieve its residents' economic distress, provides shopping coupons to households whose monthly income is below the median. The median monthly income is 3,870,577 won for three-person households, and the endowed shopping coupons are worth 400,000 won. Only one person from an eligible household can fill out the application form for Seoul's shopping coupon program. If the Seoul Metropolitan government confirms the household's eligibility, the household can select one of two formats: vouchers (20%) or prepaid cards (similar to debit cards, 80%).

The shopping coupons, valid only between April and August 2020, were redeemable at retail stores—online and offline—with some restrictions. Households could use prepaid cards in retail stores and hospitals in Seoul, whereas they could use vouchers only in retail stores and hospitals located in their residential area ("Gu," in Korean). The prepaid card recipients could register their cards on an online platform provided by Shinhan Card, the largest credit card company in

[1] The studies examining the effect of the national COVID-19 transfer program include Kim and Lee (2020), Kim and Oh (2020), and Kim et al. (2020).

South Korea. The registration was free of charge and open to anyone, even if they were not a regular client of Shinhan. The registration allowed people to monitor the balance and usage of their prepaid cards in real-time. Nine percent of eligible households registered their cards at Shinhan, whose information became our data source.

To gauge the effect of Seoul's program, we use a monthly cell-level dataset between January and October 2020. Cells are defined by the account holder's residence, age group, and income group. The dataset includes the number of account holders and the amount of expenditure across consumption categories for each cell depending on the card used (either credit card or prepaid card). Our analysis uses the consumption accounted for only by Shinhan's regular customers, not those who created an account merely to enroll their prepaid cards with Shinhan. The exclusion is made because we cannot observe their regular consumption patterns other than what they purchased using the prepaid cards. Finally, we have partial information about the treatment status from the data. Specifically, we cannot distinguish those who were not eligible for the shopping coupon program from those who received the coupons but did not register on Shinhan's platform. Thus, our control group consists of both individuals, whereas our treatment group consists of those eligible for the program and registered at Shinhan's platform. Theoretically, it is ambiguous how this misclassification may bias our estimation results. If those misclassified as being in the control group increase their spending on their regular Shinhan Cards, our estimate will be downward-biased. Alternatively, our estimate will be upward biased if they reduce their regular credit card spending owing to prepaid cards. Regrettably, to the best of our knowledge, there are no data available to examine which of the two cases is more likely. Nevertheless, we think our study can still be useful for policymakers and researchers in South Korea, as it is one of the few studies examining the effect of the COVID-19 transfer programs in Korea.

We use the DID method, which uses the change in the consumption gap between the treatment and control cells after Seoul's program was launched as its causal effect. To test the plausibility of DID in our setting, we conduct a falsification test based on the pre-program period (January to March 2020) and find evidence consistent with the identification assumption behind the DID method.

Our estimates show that Seoul's shopping coupon program increased individuals' consumption by 18% between April and August 2020 (when the coupons were valid). The positive effect remains after the coupon expired, increasing individuals' consumption by 6% between September and October 2020. We observe an increase in consumption immediately after the program started (i.e., April; a 13% increase relative to the control group), with the most significant increase in May (35%). Although diminishing, the increase lasted until October (6%).

Our results show the heterogeneous impact of Seoul's shopping coupon program across consumption categories. For example, between April and August, the program increased expenditures on food and beverages by 50%, but it had no impact on spending for entertainment and leisure. We also find heterogeneity depending on income. The individuals whose reported annual income was below 30 million won increased their consumption by 29% owing to Seoul's program, whereas those whose income was between 30 million and 60 million won increased by 16%.

We conduct a back-of-the-envelope calculation to compare our findings with the results of related studies. By taking the average consumption among treatment groups between January and March, we convert the estimated increase in consumption from percentage change to amount. Our calculation shows that consumption increased by 245,963 won between April and August. As the Seoul Metropolitan government provided an average of 356,500 won worth of coupons per household, this increase implies that 69% was used to increase consumption; the remaining 31% was used for savings and non-consumption spending. This implied effect is more significant than the results reported in other studies examining the national COVID-19 program, ranging from 25% to 40% (See Kim and Oh, 2020; Kim et al., 2020). We suspect that the difference may be accounted for because Seoul's program targeted low-income groups who responded the most to the transfer, whereas the national program covered all households. Although direct comparison is not possible, our implied estimate appears to be large compared to the U.S. experience. Coibion et al. (2020) report that most U.S. consumers used the COVID-19 stimulus checks mainly on savings or paying debts, while only 15% reported using them primarily for consumption.

Finally, our back-of-the-envelope calculation must be interpreted with caution. Our primary purpose is to compare our estimates with those of other studies. The effect is calculated within the periods when the coupons were effective. However, the shopping coupon program can have a longer-term effect, which may become smaller if we consider sufficiently long periods. Moreover, the calculated number cannot be interpreted as the marginal propensity to consume (MPC) because our dataset does not allow us to control changes in an individual's income.

The remainder of this paper is organized as follows. Section II explains the background and details of how the Seoul Metropolitan government designed its shopping coupon program. Section III describes the data and sample used, the econometric framework, and the identification strategy. Section IV reports our results, and Section V presents the discussion and conclusions.

II. Institutional Background

In South Korea, the first COVID-19 case was confirmed on January 20, 2020. One month later, there was a rapid increase in the number of cases (Kim and Lee, 2020). In response to growing concerns about the recession induced by the COVID-19 pandemic, Seoul and a few local governments first launched the one-time transfers to their residents in April and May. The central government provided universal transfers to all households in South Korea in May.

Although these programs share common features, Seoul's program was unique in having eligibility criteria based on households' monthly income. All households whose monthly income was below the median were eligible for the program, whereas the rest were not. Median income depends on household size.[2] The median size of the households is three in South Korea. For three-person households, the median income used for the eligibility criteria was 3,870,577 won. Thus, Seoul's program was available to all three-person households whose monthly income was below 3,870,577 won, and the program gave shopping coupons amounting to 400,000 won. Note that Seoul's program excluded some households whose income was less than 50% of the median income if they have already been subsidized in 2020 through other comparable national or local government programs. These households include the recipients of poverty relief (up to 30% of median income) or child allowances, those having received emergency aid for low-income households, those having ever received unemployment benefits, and the recipients of Seoul youth allowances.

To receive shopping coupons, one person from an eligible household needed to apply to the Seoul Metropolitan government between March 30 and May 15, 2020. The review of an application took approximately one week. Once eligibility was confirmed, the applicant could select one of the two coupon formats. One format was vouchers, and the other was prepaid cards, similar to debit cards. 80% of the applicants chose prepaid cards, while the remaining 20% chose vouchers.

The difference between the two formats pertains to the total number of coupons and their usage. Specifically, a household could spend vouchers only at retail stores and hospitals located in the county ("Gu" in Korean) where the household was registered. Owing to these restrictions, the Seoul Metropolitan government provided a 10% premium to recipients who chose vouchers (e.g., 440,000 won for a 3-person

[2] A family's household size as of March 18, 2020. If the household size is strictly greater than six, the median income increases by 883,347 per person from 6,506,368 won. Household income includes income from all sources, including imputed income from household assets.

Household size	Median monthly income (won)	The value of shopping coupons (won)
1	1,757,194	300,000
2	2,991,980	
3	3,870,577	400,000
4	4,749,174	
5	5,627,771	500,000
6 or more	6,506,368	

household instead of 400,000 won). If a household chose prepaid cards, it could use them at stores beyond its residential area but located in Seoul (total of 25 Gu). Furthermore, if the household registered the prepaid card on the online platform run by Shinhan Card, free of charge, it could use the cards at online stores and check the balance and usage in real-time. Nine percent of eligible applicants registered their cards at Shinhan, and the information gathered at the platform is the source of our dataset. Finally, shopping coupons were valid from April 1, 2020, to August 31, 2020.[3]

III. Data and Empirical Framework

III.1. Data

We obtain a cell-level monthly dataset based on POS transaction data between January 1 and October 31, 2020, from Shinhan Card. Cells are defined by whether an account holder registered their prepaid card, residence (Gu, 25 categories), age group (less than 35, 35 to 49, 50 to 64, and 65 or more), and income group based on reported annual income (less than 30 million won, 30 to 60, more than 60 million). For each cell, the dataset includes the following: total number of regular Shinhan cardholders (regular account holders, hereafter)[4], those who registered prepaid cards but have no Shinhan credit cards (temporary account holders), the amount of expenditure across consumption categories, and whether the purchases were made by prepaid cards or regular Shinhan credit cards.

Owing to this data construction, our dataset includes five types of individuals, depending on whether they are regular Shinhan cardholders (column (1) of Table 1) and how they received Seoul's shopping coupons and used them (column (2)). If we had information on whether they received the shopping coupons from the Seoul Metropolitan government, we would have classified them based on their true treatment status (T_0, T_1, T_2, T_3, and C_0). We would compare the consumption patterns between the treated and control groups among the regular account holders (i.e., $\{T_0, T_1, T_2\}$ vs. C_0) and exclude temporary members (i.e., T_3) from our dataset to use the DID method (see Section III.3).

[3] The coupons were effective until June 30, 2020, but the end date was subsequently extended to August 31, 2020.

[4] Precisely, the number of account holders in the dataset is based on the daily number of account holders who made a purchase. As not every account holder makes a purchase every day, it underestimates the actual number of account holders in each cell. Therefore, we multiply a constant by the number of account holders. The total number of account holders in the dataset is equal to the national number of Shinhan account holders times the share of households in Seoul. Note that it does not affect our estimates as our dependent variable is logged.

Unfortunately, our dataset does not include the treatment status of individuals. Therefore, we cannot distinguish those who received shopping coupons and did not register them from those who did not receive coupons. Hence, we define our treatment group to include the individuals who registered their prepaid cards, while our control group includes the remaining three types (i.e., T_0 vs. $\{T_1, T_2, C_0\}$). We are aware of the possibility that this approach can interfere with the identification of the causal effect. We postpone discussing details until Section III.2.

Finally, as explained above, we need to exclude the consumptions accounted for by temporary account holders (T_3) to use the DID estimation method. We cannot distinguish whether particular spending was done by regular credit cardholders using the shopping coupons or new registrants using the prepaid cards. Therefore, we employ a few assumptions to predict the amount of expenditure by regular credit cardholders when the shopping coupons were valid (i.e., April to August 2020) and use the imputed expenditures as outcomes.

Our baseline assumption is that consumption patterns are, on average, the same between regular account holders and those who only enrolled in the prepaid cards as long as all of them belong to the same cell. Specifically, we have the total spending paid by the prepaid cards for each cell by month. We divide the amount by the total number of account holders in the corresponding cells by month to calculate per capita spending on the prepaid cards. We then impute the total consumption by regular credit cardholders by multiplying the per capita spending on the prepaid cards by the number of regular customers. In addition, we examine several alternative assumptions to exclude consumption by temporary members for robustness checks. The details are provided in Section IV.3.

[Table 1] Treatment Status: Actual vs. Data

Account holders (1)	Types (2)	Treatment Status (3)	Data: Cell, Time (4)
Regular	Prepaid cards: registered	T_0	T : pre & post
	Prepaid cards: not registered	T_1	C : pre & post
	Vouchers	T_2	C : pre & post
	None above	C_0	C : pre & post
Temporary	Prepaid card: registered	T_3	T : post only

III.2. Summary Statistics

Table 2 shows the summary statistics of our dataset, depending on whether the cells belong to the treatment group. Our dataset includes 4.5 million individuals who belong to one of the 1,188 cells. Among them, 2% belong to the treatment group. The Seoul Metropolitan government provided 1.27 million applicants with shopping coupons in the form of prepaid cards. Thus, the number of people who belong to the treatment group—107,353 individuals—accounts for 8.5% of all recipients.

Panel A of Table 2 presents the composition of the individuals in our data based on age and income groups. We divide ages into four categories (less than 35, 35–49, 50–64, and over 64) and annual incomes into three categories. The three categories are low (annual salary less than 30 million), middle (annual salary between 30 million and 60 million), and high (annual salary above 60 million). Notably, the annual incomes are based on the information that account holders reported to the company when they applied for a credit card. Thus, the income information in our data is far from perfect, as it is based on self-reporting and past income, not current.

Notably, individuals in the high-income group were eligible for Seoul's program if they lived with more than five other family members, and they were the only income earners of their family. Alternatively, those individuals could be eligible if their income dropped after Shinhan issued its card to them. In this case, they should have been classified in a low- or middle-income category rather than a high-income group.

Panel B of Table 2 shows the monthly average per capita consumption by category. We classify consumption categories into 15: 4 durables and 11 non-durables. Durables include (1) home appliances and furniture, (2) clothing, glasses, and jewelry, (3) automobiles, and (4) home improvement and others that include sports and leisure equipment. Non-durables include (1) living services that include rent, insurance, internet and phone services, cleaning services, etc., (2) education that includes costs associated with schooling and private education services, (3) beauty that includes a hair salon, cosmetics, and esthetic services, (4) entertainment and leisure services, (5) transportation, (6) restaurants, (7) retail and wholesale sales, (8) bars, (9) food and beverage, (10) health care and pharmacy, and (11) gas and fuels.

On average, individuals in our data spend 569,000 won, and the top three categories of their spending are retail and wholesale sales (37%), restaurants (14%), and health care and pharmacy (13%). The consumption patterns across categories are comparable between the treatment and control groups. The noticeable difference is that the share of retail and wholesale expenses is high in the treatment group relative to the control group (46% vs. 37%). In return, the share of health care and pharmacy is low in the treatment group relative to the control group (8% vs. 13%).

[Table 2] Summary Statistics

	All (1)	Treatment (2)	Control (3)
No of cells	1,188	588	600
No of individuals (thousand)	4,511.8	107.4	4,404.5
Panel A. Composition of individuals (%)			
Age group			
- less than 35	26.7	41.6	26.3
- 35 ~ 49	33.7	34.2	33.6
- 50 ~ 64	28.5	19.7	28.7
- over 64	11.2	4.5	11.4
Income group[a] (%)			
- Low	27.1	20.3	27.3
- Middle	54.7	74.2	54.2
- High	18.2	5.5	18.5
Panel B. Per capita Consumptions (thousand won)			
- All	569.1	357.6	574.3
- Home Appliance and Furniture	20.2	8.8	20.5
- Clothing, Glasses, and Jewelry	11.7	6.8	11.9
- Automobile	12.4	5.7	12.5
- Home Improvement and others	4.6	2.1	4.7
- Living Service	58.4	37.7	58.9
- Education	19.9	9.4	20.1
- Beauty	7.1	4.6	7.1
- Entertainment and Leisure	13.2	6.2	13.4
- Transportation	16.5	9.6	16.7
- Restaurants	80.9	53.0	81.6
- Retail and Wholesale	212.7	165.9	213.8
- Bars	2.4	1.4	2.4
- Food and Beverage	13.0	7.0	13.2
- Health Care and Pharmacy	74.3	29.0	75.5
- Gas/Fuel	21.8	10.2	22.1

Note: By individuals, we mean the regular account holders of Shinhan. Per capita consumptions are measured by month, reported in thousand Korean won. The “Low”, “Middle”, and “High” income groups are those with annual income below 30 million won, between 30 and 60 million won, and above 60 million won, respectively.

III.3. Empirical Framework

Empirical Specifications

To estimate the effects of the shopping coupons, we use the DID model:

$$y_{c,t} = \alpha + \beta_1 T_c \times D_{1,t} + \beta_2 T_c \times D_{2,t} + \gamma_c + \delta_t + \varepsilon_{c,t} \tag{1}$$

where $y_{c,t}$ is the logarithm of the average spending of individuals belonging to cell c in month t. The variable T_c is 1 if cell c is in the treatment group and 0 otherwise. Variable $D_{1,t}$ is 1 if the shopping coupon program had started and remained effective in the corresponding month (i.e., $t \in \{April, \ldots, August\}$) and 0 otherwise. Variable $D_{2,t}$ is 1 if the shopping coupon program had ended, and the coupons were no longer redeemable in the corresponding month (i.e., $t \in \{September, October\}$), and 0 otherwise. We include $D_{2,t}$, although the shopping coupons were expired. This is because the program could still boost consumption if the treatment group saved some income and maintained a higher level of consumption (i.e., intertemporal substitution effects). Parameter γ_c captures cell-fixed effects, whereas δ_t captures month-fixed effects to incorporate seasonality. Variable $\varepsilon_{c,t}$ captures random shocks not accounted for by observables, which are clustered at the cell level. We apply weights in estimating Equation (1) where the weights are based on the average number of regular customers in a cell across time.

Identification Assumption and Falsification Test

Our parameters of interest are β_1 and β_2, capturing the effect of Seoul's program on consumption. The identification assumption is that the treatment and control groups should have a common trend in estimating its causal effect. We conduct a falsification test by estimating Equation (1) for the sample from January to March 2020, before Seoul's program was launched, to see whether the two groups show a common trend. Specifically, we estimate the following regression:

$$y_{c,t} = \alpha + \beta_1 T_c \times 1(t = February) + \beta_2 T_c \times 1(t = March) + \gamma_c + \delta_t + \varepsilon_{c,t} \tag{2}$$

If the treatment and control groups share the same time trend, then the time effect should be fully captured by δ_t; thus, the estimated β_1 and β_2 should not be statistically different from zero (see column (1) of Table 3). This pattern can be seen in the raw data. Figure 1 plots the average expenditure per person, depending on the treatment status. The two groups exhibit different consumption levels, but the lines are parallel until March, in line with the common trend assumption.

In addition to the identification assumption, a few issues—arising because of data limitations—can threaten our estimation strategy. First, as explained in Section III.1, we are subject to misclassifying individuals who received shopping coupons into the control group, as not all coupon recipients registered their prepaid cards. Theoretically, it is ambiguous how this misclassification may bias our estimation results. If those misclassified as being in the control group increased their spending on their regular Shinhan Cards, our estimate will be downward-biased. In contrast, if they replaced some of their usual consumption with prepaid cards, their balance at Shinhan's credit cards may become smaller than the actual consumption—the sum of credit card balance and the spending on prepaid cards that are not observable. To the extent that these individuals' unobserved shopping coupon expenditures crowded out Shinhan Card expenditures, our results would overestimate the true causal effect of the shopping coupon program.[5]

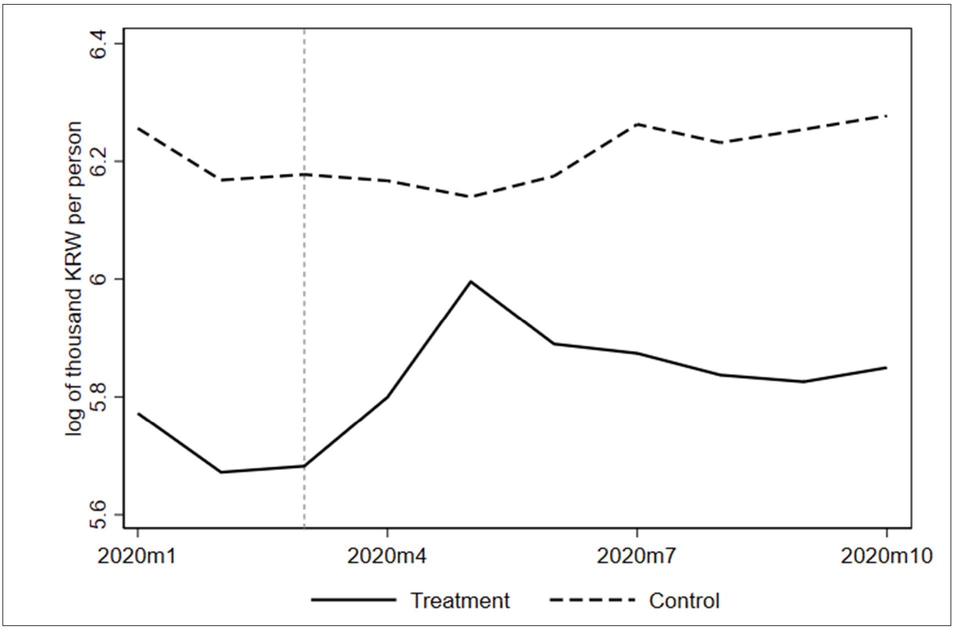
[Table 3] Impact of the Stimulus Package on Individual Consumption

Model	Falsification (1)	Baseline (2)	Dynamic (3)
1(Treat, Feb)	-0.012		
	(0.009)		
1(Treat, Mar)	-0.010		
	(0.009)		
1(Treat, Apr-Aug)		0.178***	
		(0.007)	
1(Treat, Sep-Oct)		0.062***	
		(0.009)	
1(Treat, Apr)			0.130***
			(0.007)
1(Treat, May)			0.352***
			(0.009)
1(Treat, Jun)			0.210***
			(0.008)
1(Treat, Jul)			0.103***
			(0.008)
1(Treat, Aug)			0.096***
			(0.010)
1(Treat, Sep)			0.061***
			(0.010)
1(Treat, Oct)			0.062***
			(0.011)
Obs.	3,333	11,284	11,284
R-squared	0.991	0.986	0.986
Mean Y	6.189	6.202	6.202

Note: The unit of observations is cell by month. Standard errors are clustered at the cell level, reported in parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

[5] We do not observe any decrease in Shinhan Card expenditures among the treated group immediately following the coupon program, which suggests that the magnitude of this bias will be limited.

[Figure 1] Trends in Per-Capita Consumption: The Treated and Control Group



Second, our dataset includes a small fraction of shopping coupon recipients (9%). It is certainly possible that those included in our data may have responded differently to the shopping coupons compared to those who opted for vouchers or decided not to enroll their prepaid cards. We acknowledge this possible selection bias; however, given that there is no other dataset available, we decided to use this data but took a careful interpretation. Our findings are based on those who were regular credit cardholders of Shinhan and registered in their prepaid cards. For them, our analysis can provide insights into how much shopping coupons affected their consumption relative to other Shinhan cardholders. Although the group we examine is not a representative subset of the eligible population, it is still significant to make up 7% of the total recipients. Therefore, we believe that they deserve attention.

Third, as explained in Section II, some low-income households were ineligible for the coupon program because they had already been subsidized through other comparable programs. The inclusion of these individuals in the control group would bias the estimates upwardly unless the other programs were simultaneously controlled for in the regressions and the coupon program. Unfortunately, it is not feasible to exclude them or control for the other programs, and we note that our estimates for the middle-income group may be less prone to this potential bias.

Finally, we note that there can be two distinct substitutions that may lead to overestimation. Prepaid-card expenditures may have crowded out in part those made through any of the other means of payments such as non-Shinhan credit cards, debit cards, cash, and bank-account transfers, all of which are missing in our data set. In addition, prepaid-card expenditures may also have crowded out those made by the other members of treated households, who are likely to be included in the control group in the analysis. To the extent that these substitutions have occurred, we acknowledge that our estimates should be interpreted as an upper bound for the true effects.

IV. Results

IV.1. Baseline Results

Before we show the estimation results, we start by observing the patterns shown by the raw data, suggesting a positive effect of the program on consumption. As Figure 1 shows, the gap in consumption between the treatment and control groups sharply decreases starting from April—when Seoul's shopping coupon program started—and continues to decrease until June. Although the gap widens again, it is smaller than in the pre-program period. This pattern is consistent with our estimation results presented below.

Column (2) of Table 3 shows the estimated effect of the program (i.e., β's in Equation (1)). The estimates are all significant and positive, indicating that the shopping coupon program effectively increased consumption expenditure for at least seven months after its introduction. The estimates of 0.178 and 0.062 mean that, relative to the control group, individual consumption in the treatment group, on average, increased by 18% between April and August and 6% between September and October.

We convert the estimates in terms of the amount of consumption increase, not the percentage. We calculate the average amount of consumption among the treatment groups between January and March (i.e., $e^{\bar{y}_c}$). We would calculate the counterfactual amount of average consumption if there were no shopping coupons ($e^{\bar{y}_c-\beta}$). By taking the difference between the two, we calculate the amount of consumption increase owing to the program. Between April and August, the program increased consumption by 49,193 won per month or 245,963 won in total. As the Seoul shopping coupon program provided 356,500 won per household on average, we infer that 69% of the government transfer was used for consumption, whereas 31% was put into savings or non-consumption spending.

The amount of consumption increase we find is more significant than the effects reported by other studies examining the national COVID-19 transfer program (Kim and Oh, 2020; Kim et al., 2020). They report that 25–40% of the national government's transfers were used to increase consumption, whereas the rest was put into savings or used for non-consumption spending. This might be because, unlike the national program, the program in Seoul targeted families at the lower end of the income distribution, and low-income groups responded more substantially to the government transfers. We find evidence consistent with this conjecture. We present the heterogeneity by income groups in the following subsection.

IV.2. Heterogeneous Effects

Dynamic Effects

Next, we examine the possibility that the program's effect may depend on time. We additionally include the interaction terms between the treatment status and months in the post-program period in Equation (1) and report the results in column (3) of Table 4. The results show that individuals initially increased their expenditures by 13% in April. The response peaks in May, when consumption increased by 35%. The positive effects decreased in June but remained positive until October.

Consumption Categories

To determine the extent to which the program effects differ across consumption categories, we estimate Equation (1) separately by a consumption category. We classify goods and services into 16 different groups: four are durables, and the rest are non-durables (see Table 4).

Column (1) of Table 4 reports the estimated effect on each consumption category from April to August, while column (2) reports the estimated effect during September and October. The estimated coefficients vary by category. As for the impacts from April to August, the estimates range from 0.027 (entertainment and leisure) to 0.504 (food and beverage).

In almost all categories, we find that the program effect decreases between September and October, relative to April through August. The exceptions are bars (9%→20%) and transportation (6%→12%). This pattern may coincide with the finding that, as time passes, people no longer constrain their activities as much.

Income Groups

This section examines potential heterogeneous effects across income groups. Column (1) of Table 5 shows our falsification test results. It shows that both low- and middle-income groups show no significant differences between the treatment and control groups before Seoul introduced the shopping coupon program. However, we find a 10% level difference between the treatment and control groups in February.

[Table 4] Heterogeneous Effect by Consumption Categories

Outcomes	1(Treat, Apr-Aug) (1)	1(Treat, Sep-Oct) (2)	Mean Y (3)	R-squared (4)
Panel A. Durables				
- All	0.217***	0.107***	3.490	0.893
	(0.024)	(0.035)		
- Home Appliance and Furniture	0.097**	0.107**	2.604	0.855
	(0.040)	(0.048)		
- Clothing, Glasses, and Jewelry	0.330***	0.070**	2.106	0.909
	(0.020)	(0.029)		
- Automobile	0.172	0.162	1.571	0.731
	(0.151)	(0.133)		
- Home Improvement and others	0.372***	0.088	1.143	0.846
	(0.046)	(0.057)		
Panel B. Non-Durables				
- All	0.190***	0.063***	5.920	0.991
	(0.006)	(0.009)		
- Living Service	0.083***	0.044***	3.740	0.976
	(0.011)	(0.014)		
- Education	0.153***	0.090*	2.157	0.971
	(0.038)	(0.051)		
- Beauty	0.307***	0.104***	1.619	0.914
	(0.018)	(0.024)		
- Entertainment and Leisure	0.027	-0.200***	2.047	0.952
	(0.025)	(0.034)		
- Transportation	0.064***	0.117***	2.359	0.965
	(0.016)	(0.021)		
- Restaurants	0.241***	0.053***	4.060	0.988
	(0.006)	(0.009)		
- Retail and Wholesale	0.221***	0.070***	5.015	0.988
	(0.008)	(0.010)		
- Bars	0.088*	0.200**	0.298	0.889
	(0.048)	(0.092)		
- Food and Beverage	0.504***	0.049***	2.207	0.961
	(0.017)	(0.018)		
- Health Care and Pharmacy	0.164***	0.065***	3.751	0.981
	(0.017)	(0.022)		
- Gas/Fuel	0.087***	0.027	2.632	0.983
	(0.019)	(0.028)		

Note: Each row reports results from a separate regression. The unit of observations is cell by month. Standard errors are clustered at the cell level, reported in parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Column (2) of Table 5 shows that, owing to the shopping coupons, all groups noticeably increased their consumption. However, the low-income group responded the most (29% between April and August and 15% between September and

October). This pattern is found in durable consumption (31% between April and August and 16% between September and October).

[Table 5] Heterogeneous Effect by Reported Income Groups

Model	Falsification (1)	Baseline All consumption (2)	Baseline Durables (3)
1(Treat, Feb) x Low	0.014		
	(0.013)		
x Middle	-0.010		
	(0.010)		
x High	-0.075*		
	(0.042)		
1(Treat, Mar) x Low	0.009		
	(0.017)		
x Middle	-0.015		
	(0.010)		
x High	-0.055		
	(0.051)		
1(Treat, Apr-Aug) x Low		0.294***	0.312***
		(0.013)	(0.038)
x Middle		0.162***	0.208***
		(0.006)	(0.030)
x High		0.091***	-0.000
		(0.029)	(0.096)
1(Treat, Sep-Oct) x Low		0.154***	0.158**
		(0.012)	(0.064)
x Middle		0.051***	0.124***
		(0.009)	(0.041)
x High		0.006	-0.251*
		(0.036)	(0.137)
Obs.	3,333	11,284	10,818
R-squared	0.992	0.987	0.897
Mean Y	6.189	6.202	3.490

Note: The unit of observations is a cell by month. Standard errors are clustered at the cell level, reported in parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%. The “Low”, “Middle”, and “High” income groups are those with annual income below 30 million won, between 30 and 60 million won, and above 60 million won, respectively.

IV.3. Robustness Checks

This subsection employs alternative approaches to impute consumptions by individuals who are temporary account holders of Shinhan. In our baseline analysis, we assume that the average per capita amount of prepaid-card expenditure for a given cell is the same regardless of account types (benchmark). Instead, we use the following four assumptions to estimate the program effect for a robustness check.

Specifically, we assume that the average per capita amount of prepaid-card expenditure among regular account holders for a given cell is a fraction (60%) of that among temporary account holders (A1). We vary that fraction to 40% and 20% (A2 and A3, respectively). Table 6 presents the results. As we lower the fraction from 100% (the baseline) to 20%, the estimated effect from April to August 2020 reduces from 0.178 to 0.124. Nonetheless, the estimated effects are economically and statistically significant. Note that the coefficient of "1 (Treat, Sep-Oct)" does not vary across columns. This is because in September and October, prepaid cards were already expired, and thus, the treatment group cells contained no irregular account holders.

[Table 6] Robustness Checks

Models	1(Treat, Apr-Aug) (1)	1(Treat, Sep-Oct) (2)	R-sq (3)
Benchmark	0.178***	0.062***	0.986
(in a cell, Reg. = 100%* Temp)	(0.007)	(0.009)	
Alternative imputation			
- Al	0.164***	0.062***	0.986
(in a cell, Reg. = 60%*Temp.)	(0.007)	(0.009)	
- A2	0.150***	0.062***	0.986
(in a cell, Reg. = 40%*Temp.)	(0.006)	(0.009)	
- A3	0.124***	0.062***	0.986
(in a cell, Reg. = 20%*Temp.)	(0.006)	(0.009)	

Note: The unit of observations is a cell by month. Standard errors are clustered at the cell level, reported in parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

V. Concluding Remarks

This study examines Seoul's shopping coupon program aimed at alleviating COVID-19 induced economic distress. Using the information on credit cardholders, we find that individuals who received shopping coupons increased their consumption by 18% on average between April and August. The increase in consumption is particularly pronounced for food and beverage (50%), home improvement (37%), and among individuals who reported low monthly income (29%).

Our back-of-the-envelope calculation suggests that of the total amount of shopping coupons, 69% increased consumption, whereas 31% were used for savings and non-consumption spending. Our finding that a third of transfers are used for saving and non-consumption spending can be attributed to multiple factors. For example, households may have faced a substantial decrease in their incomes since the COVID-19 pandemic started compared to the pre-COVID-19 pandemic period. Nam and Lee (2021) report that the adult employment rate started to drop in March 2020 and became more severe as the COVID-19 pandemic progressed. The negative shock on employment is more severe among less-educated workers, those who used to have temporary or non-regular jobs, young adults aged 25–29 years, and middle-aged adults aged 45–54 years. As Seoul's program was temporary, households facing negative income shocks may have tried to smooth their consumption across time by saving some of the Seoul Metropolitan government transfers. Another reason is that the MPC is smaller than one, which is not surprising given the literature's findings (e.g., Hsieh et al., 2010). Regrettably, the data limitation—not having the current income in our data—prevents us from further investigating the driving forces accounting for the degree of substitution. We leave this task for future research.

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코로나19에 따른 서울시 재난긴급생활비의 소비 효과: 신용카드 자료로부터의 증거*

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초 록 이 연구는 코로나19에 따른 서울시 재난긴급생활비 지원 프로그램이 수혜자의 소비에 미친 영향을 추정한다. 소득과 무관하게 모든 주민들에게 지급된 코로나19 관련 국내 이전 지출 프로그램들과 달리, 서울시 재난긴급생활비는 기준중위소득 이하 가구에만 지급되었다. 우리는 소비 쿠폰을 받지 못한 개인을 대조군으로 활용하여, 서울시 재난긴급생활비가 개인 소비에 미친 인과 효과를 추정하였다. 신한카드 및 재난긴급생활비 지출 자료를 기초로 이중차분법을 적용하여 추정한 결과, 서울시 재난긴급생활비로 인해 개인 소비는 쿠폰 만료 전까지 평균 18%, 만료 이후 3개월 동안 평균 6% 증가한 것으로 나타났다. 이러한 서울시 소비 지원금의 준탄력성은 쿠폰 수혜자의 소득 수준 그리고 소비 품목 유형에 따라 상당한 차이를 보인 것으로 추정되었다.

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