The Impact of COVID-19 Regional Cash Subsidies on the Sales of Local Businesses in South Korea[†]

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This paper examines the impact of the regional cash subsidies which were granted in some districts in addition to the national universal stimulus payment in South Korea related to the COVID-19 pandemic. We evaluate the effects of the cash distribution per resident on aggregate credit and debit card sales and sales by industry using the difference-in-difference method. The increment in card spending due to the cash subsidy is about 1.58%p in total, and this effect is concentrated within a single month. The consumption stimulating effect is prominent among (semi)-durable goods that do not require close interactions between customers and sellers. In contrast, the effect is relatively small in the high-contact face-to-face service sectors and restaurants, areas the COVID-19 pandemic hit directly. On the other hand, some service sectors where customers could wear face masks, such as education and fitness, experienced a substantial sales boost due to the cash subsidy.

Key Word: COVID-19, Stimulus Payment, Cash
JEL Code: D12, E21, H12

I. Introduction

Starting in late February of 2020, when the number of COVID-19 (coronavirus disease 2019) confirmed cases rose rapidly in Daegu and Gyeongsangbuk-do, household consumption fell sharply in South Korea. Therefore, like other governments such as the U.S. and Japan, the South Korean government provided an emergency COVID-19 relief fund (EDRF) to all households in May of 2020 to mitigate the economic disruption caused by the COVID-19 pandemic.

At around the same time, most metropolitan governments and municipal governments also provided various additional subsidies to residents. For example, some regions gave cash to residents, while most local governments granted subsidies

by means of paper gift cards or magnetic prepaid cards. Some districts, including nine "Gu" areas in Busan, Namyangju-si in Gyeonggi, Donghae-si, and Sokcho-si in Gangwon-do, provided cash to residents. This study analyzes whether local small businesses' sales increased more in areas with additional cash subsidies than in areas without any additional payments from local governments apart from the EDRF.

The EDRF was the first national universal stimulus payment policy in South Korea. Thus, evaluating the impact of the national EDRF policy could be meaningful. Moreover, the total amount of the additional local stimulus payments was smaller than the nationwide EDRF total amount. However, this study mainly focuses on regional governments' cash payment policies, and not the national EDRF payment, to analyze whether the cash subsidy flowed to residential, small businesses by way of sales.

Analyzing payment by regional governments has the advantage of distinguishing the effects of specific payment methods. The primary goal of the stimulus payment policy is to support households' income and boost the sales of small businesses, which dropped distinctly due to the COVID-19 pandemic. Hence, in preparing the stimulus payment policy in early 2020 in South Korea, determining which payment methods to use was one of the major issues, along with the payment targets. Accordingly, the national EDRF and most local governments' subsidies were paid as local currency coupons with several limitations to their use. First, the validation period was short as three to four months. Second, gift cards or prepaid cards and credit card coupons were valid only within the recipients' residency areas. Third, the payments were only available in specific sectors and excluded department stores and online malls. These limitations were established to increase the effectiveness of the policy, preventing the subsidy from flowing into saving accounts or online shopping malls, where sales increased even after the outbreak of COVID-19.

However, as most households consume a large portion of their living expenses within their residential areas, even a cash subsidy could flow to local small businesses. Chetty *et al.* (2020) also report that small businesses' revenues increased after the U.S. government provided a stimulus payment as cash. It is costly to issue certificates/coupons and to establish a system that distinguishes transactions within a residential area and in specific sectors. Furthermore, for consumers, it is confusing to attempt to determine where the coupons would be accepted. On the other hand, providing subsidies as cash can be an economical and straightforward payment method. However, cash payments were regarded as an ineffective method in the policy design absent any empirical evidence.

We utilize the combined credit and debit card sales of eight prominent card companies in Korea. We find that businesses in regions with additional cash subsidies experienced significantly more card sales compared to areas without additional support. Thus, a simple payment in the form of cash can also increase business sales in residential areas, without high administrative expenses and/or consumer inconveniences. Some local governments paid subsidies as local consumption vouchers in a similar period, and comparing the policy impact between coupon payments and cash payments would be more informative. However, this approach was not plausible here, as voucher consumption data pertaining to local governments were not available.

Moreover, analyzing the effect of regional cash payments can evaluate the impact

of the stimulus payment in a more robust way than analyzing the national EDRF subsidy. Several studies have reported the impact of the EDRF stimulus payments in South Korea. However, as it is challenging to find an appropriate control group (excluded as recipients), various methods have been tested, with varying results. Hong (2020) and W. Lee *et al.* (2020) utilize consumption in the previous year (2019) as a type of control sample, reporting marginal propensity to consume (MPC) as 76.2% and 65.4~78.2%, respectively.[1] However, this approach can severely overestimate the consumption boosting impact, as it cannot control factors that significantly facilitate consumption only in the period after the policy in 2020, which was not present in 2019.[2]

Kim and Oh (2020) utilize the synthetic control method by Abadie and Gardeazabal (2003) to construct control groups from the sales of sectors that do not accept EDRF coupons. They report that the increment ratio in nationwide card spending among sectors that accept consumption vouchers relative to the total amounts of funds injected is in the approximate range of 26.2~36.1%. On the other hand, Kim *et al.* (2020) report that the MPC of Seoul residents within six weeks is 24%. They utilize Shinhan card spending by non-Seoul residents within the Seoul area as a control group.

In this study, we compare the card sales of the regions' businesses with additional cash subsidies to the sales of areas without any local governmental support, which is a distinct control group. Thus, we can utilize the difference-in-difference method as a traditional setting.

This study also investigates how the impact of the cash subsidy differs by industry. In a situation where the pandemic is still spreading, the effect of the stimulus payment can be asymmetric according to how each business requires personal interaction to transact. In this case, even with the increased income, households may not significantly increase their consumption in the high-contact service sectors, while the damage by COVID-19 was concentrated in these sectors. We estimate the policy's heterogeneous effects in different industries, i.e., face-to-face services, restaurants, (semi)-durable goods such as clothes and furniture, essential goods, and education/fitness services, among others.

This study also uses the number of confirmed COVID-19 cases by district (Si/Gun/Gu) as a control variable and analyzes whether the effect of the cash subsidy on local business sales is asymmetric according to the degree of the spread of the pandemic. This approach is also distinct from other in the literature.

The rest of this paper is structured as follows. Section 2 reviews related studies and the features of the regional stimulus payments in South Korea. Section 3 presents the data and the empirical strategy. The descriptive statistics and regression results are presented in section 5, Section 6 concludes the paper.

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[1]Hong (2020) analyze daily Shinhan Card sales, and W. Lee *et al.* (2020) use quarterly data of household incomes and expenditure survey results from Statistics Korea

[2]The decreased number of confirmed COVID-19 cases, tax exemptions for the purchase of new automobiles, and large-scale discount promotions could be among these factors. Therefore, it is necessary to select a control group from the same period which experiences other factors other than the EDRF policy.

II. The COVID-19 Crisis in Korea

A. *Literature Review*

This study is closely related to the literature on evaluations of stimulus payments policy in response to COVID-19. Previously, a stimulus payment policy providing cash or consumption coupons was implemented in many countries to induce an economic recovery after a recession. Several studies of these stimulus payments report that such a policy partially promotes consumption, as households spend part of the increased income (Agarwal *et al.,* 2007; Johnson *et al.,* 2006; Parker *et al.,* 2013; Kan *et al.,* 2017).

Several studies investigate the impact of the U.S. CARES Act stimulus payments with individual transaction data (Baker *et al.,* 2020; Chetty *et al.,* 2020; Misra *et al.,* 2020) Previous studies analyze the heterogeneous impact of the policy by industry and income level. Karger *et al.* (2020) report that non-needy individuals spend 23% of the payment within two weeks, while those living 'hand-to-mouth' spend 70% of the payment. Baker *et al.* (2020) also report that low-income households increased consumption within ten days after the cash payment. They also point out that the consumption of preserved food increased considerably. Chetty *et al.* (2020) report that the impact of the US CARES Act payments was larger in sectors requiring little physical interaction. Kim *et al.* (2020) report that card sales increased less in areas with higher average incomes or more confirmed COVID-19 cases, analyzing the impact of the EDRF through Seoul citizens' card consumption levels. The impact is also lower in sectors which experienced larger sales decreases after an outbreak of COVID-19. Kim and Oh (2020) also report using a synthetic control method that the consumption-boosting effect of the EDRF is greater in durable goods and essential goods, while the impact is smaller in restaurants or in-person service sectors.

This study is similar to previous studies as we also investigate the heterogeneous effects of the stimulus payment by industry. Nonetheless, it is distinct in that we focus on the effects of cash payments on local business sales. T. Lee *et al.* (2020) investigate the impact of cash payments through survey data on 1,386 EDRF cash recipients and report that consumption increased by 21.7%. However, T. Lee *et al.* (2020) did not distinguish the consumption-boosting impact within and outside of residential areas. This study is also similar to that by Chetty *et al.* (2020) as they investigated the effect of cash payments according to zip-code-level business revenue. However, this comparison between regions with additional cash payments and areas without any regional relief funding is distinguished from the study of Chetty *et al*. (2020).

B. *Policy Review*

From May 11 (the 20th week) of 2020, the COVID-19 EDRF was provided to most households in South Korea, and existing welfare recipients such as basic livelihood security funds, basic pensions, and pensions for the disabled were paid in cash a week earlier (May 4, the 19th week). The amount of the payment increases with the number of people in a household by KRW 200,000, varying from KRW

400,000 (single-member households) to KRW 1,000,000 (families with four or more). Except for welfare recipients who received cash, the payment was in the form of local consumption vouchers with many restrictions based on sectors, regions, and dates. To boost the sales of local small businesses, the Korean government limited the industries or sectors that could accept the vouchers. For instance, online retailers were excluded, as they did not suffer damage with the increased sales after COVID-19. Department stores or large retailers such as E-mart (similar to Walmart in the U.S.) and Costco could not accept the vouchers either, as they are not small businesses needing protection. Entertainment venues such as pubs and karaoke bars were also excluded, as promoting these sectors may have increased the risk of infection. The vouchers were accepted at local stores in residential areas. This was done to prevent a situation in which the subsidy would be concentrated in large metropolitan areas with more and better shopping conditions than in less populated areas. The payments expired at the end of August of 2020, and this was done to boost consumption more effectively.

At the same time, most metropolitan counties and local city authorities provided additional subsidies, and the type of payment mainly was consumption vouchers such as the EDRF again with region, sector and period restrictions.

In this way, most of the EDRF was paid in the form of local consumption coupons, and the portion of cash recipients stood at only 12.9% out of KRW 14.2 trillion. Additionally, KRW 1,800 million was paid by metropolitan city or provincial governments and KRW 2,700 million by local municipal governments. The reason for designing a large amount of money in the form of a coupon with many restrictions stems from an agreement that payment in cash would not increase the sales of local small businesses significantly. However, the hypothesis that payment in the form of cash does not help revitalize local business has not been empirically tested, although high issuance costs are required during the process of designing consumption, and consumers' choices are limited.

Therefore, this study aims to analyze whether local business sales were boosted in regions where households receive a 'cash' transfer. Table 1 shows the amounts of cash support and the time of the payment in each region. KRW 50,000 to KRW 200,000 per person was distributed, equivalent to KRW 800,000 for a household

TABLE 1—AMOUNTS OF CASH SUPPORT AND TIME OF PAYMENT

Province	District	Subsidy per person (KRW)	Date of payment
Busan	Busanjin-gu	50,000	4. 8.
Busan	Buk-gu	50,000	5. 29.
Busan	Gangseo-gu	50,000	4. 27.
Busan	Gijang-gun	100,000	3. 28.
Busan	Jung-gu	100,000	5. 20.
Busan	Nam-gu	50,000	4. 22.
Busan	Sasang-gu	50,000	4. 16.
Busan	Seo-gu	50,000	5. 6.
Busan	Yeongdo-gu	50,000	4. 22.
Gangwon-do	Donghae-si	200,000	6. 3.
Gangwon-do	Sokcho-si	200,000	5. 13.
Gyeonggi-do	Namyangju-si	100,000	5. 1.

TABLE 2—SHARES OF TRANSACTION TYPES IN KOREA (TRANSACTION AMOUNT)

(UNIT: %)

Type	2017	2019
Cash	20.3	17.4
Credit Card	32.8	53.8
Debit Card	10.1	15.3
Account Transfer	16.7	8.0
Mobile Card	2.0	3.8
Prepaid magnetic Card / Electronic Currency	0.0	0.5

Source: Bank of Korea (2020).

with four members. The distribution timing varied from March 28 to June 3, with this being utilized as an identification strategy. The earliest payments were in Busanjin-gu in Busan starting on April 8, and the last payments were in Donghae-si of Gangwon-do from June 3.

We use the difference-in-difference method to identify the effect of the regional relief funding on businesses' sales, along with the corresponding heterogeneity of the number of confirmed COVID-19 cases. Here, we compare the treated groups who receive an additional cash subsidy from the local government to those who did not receive any additional subsidy in Chungcheongnam-do, Ulsan, and Incheon.

Local governments transferred cash into the checking accounts of the heads of household. Therefore, individuals may have used a certain percentage of their increased income in the form of credit or debit cards. Table 2 shows the portion of each payment type in Korea. As of 2019, 53.8% of credit cards and 15.3% of debit cards were used. Compared to 2017, the proportion of cash payments decreased further in 2019, and the proportion of credit and debit cards increased further. The decreasing trend in cash use is expected to have intensified in 2020, when COVID-19 spread. Therefore, it can be assumed that households with increased cash incomes may consume by credit cards or debit cards at least 70% of their total consumption.

III. Data and Empirical Strategy

A. *Data*

The card sales data used in this paper consist of credit and debit card consumption data from eight credit card companies (BC, Shinhan, Kookmin, Nonghyup, Lotte, Samsung, Hyundai, Hana). For each credit card company, weekly card sales of thirty different industries are summed at the district level (Si/Gun/Gu) from the first week of January of 2019 to the second week of August 2020. We construct card sales growth as a dependent variable compared to the sales amount of the previous year. The thirty industries are divided into sectors that accept the national EDRF vouchers and sectors that do not take them. We grouped the EDRF-accepting sectors into seven categories, as some districts do not have a particular business, out of the finely divided thirty industries. Those are face-to-face services, (semi)-durable goods, drugstores/hospitals, restaurants, essential goods, education/fitness, and others.

Face-to-face services include leisure, hairdressing, and public bathhouses. Restaurants include all types of dining establishments, coffee shops and bakeries, and fast food outlets. (Semi)-durable goods combine the sales of books, apparel/accessories, stationery, glasses, and furniture. Essential goods are sales by convenience stores and grocery shops.

IBK Industrial Bank, Citibank Korea, SC Bank Korea, Korea Development Bank, Suhyup Bank, K Bank, and local banks, including Daegu Bank, Busan Bank, and Kyeongnam Bank, all use the BC Card Network, while Kakao Bank uses the Kookmin Card Network. In addition, we only use sales put on personal cards, which are suitable for this type of analysis, excluding sales put on corporate cards. Transactions with pre-paid cards or cash are excluded from the actual sales of local businesses.

In order to control for regional characteristics, we use the ratio of the elderly (65+) population rate and the year-on-year population growth rate as control variables. These are monthly variables available through the Korean Statistical Information Service.

Because the spread of COVID-19 by region can also significantly affect local business sales, we also use the ratio of the number of confirmed COVID-19 cases relative to the regional population. We constructed a weekly ratio of confirmed cases relative to the population both at the district (Si/Gun/Gu) and province (Si/Do) level. The weekly variation of confirmed COVID-19 cases at the city level is confidential data obtained through the Korea Disease Control and Prevention Agency. Its exclusive use was pledged by the authors in this case.

B. *Empirical Strategy*

We use the difference-in-difference method to identify the effects of the regional relief funds in the form of cash on local business sales. Here, we focus on treated groups in two cities in Gangwon-do, Namyangju-si in Gyeonggi-do, and nine districts of Busan that granted cash to all residents as well as the national EDRF subsidy. The control group is the sales growth of businesses in Chungcheongnam-do, Ulsan, and Incheon province, which only provided the EDRF without any additional universal subsidies to households. Ulju-gun in Ulsan and districts that are not included in the treated groups in Busan/Gyeonggi-do/Gangwon-do are excluded from our sample as they distributed prepaid cards or paper gift cards as subsidies.

The method, amount, and timing of the payment of the regional relief funds solely depend on the local government's decision. Therefore, a cash payment represents an exogenous shock to the local economy, and this is a reliable setting in which to apply the difference-in-difference method for a policy evaluation.

In the treated groups, the regional relief fund is paid between April of 2020 and June of 2020. Therefore, the first difference in the difference-in-difference method is the period before and after the payment. Additionally, the second difference comes from whether or not a district belongs to a region where the regional relief fund is paid as cash. Because there is a difference in the timing of additional subsidies paid, a unique treated point is defined and used for each region when implementing the difference-in-difference method.

The most crucial point when identifying the effect of the regional relief funds on
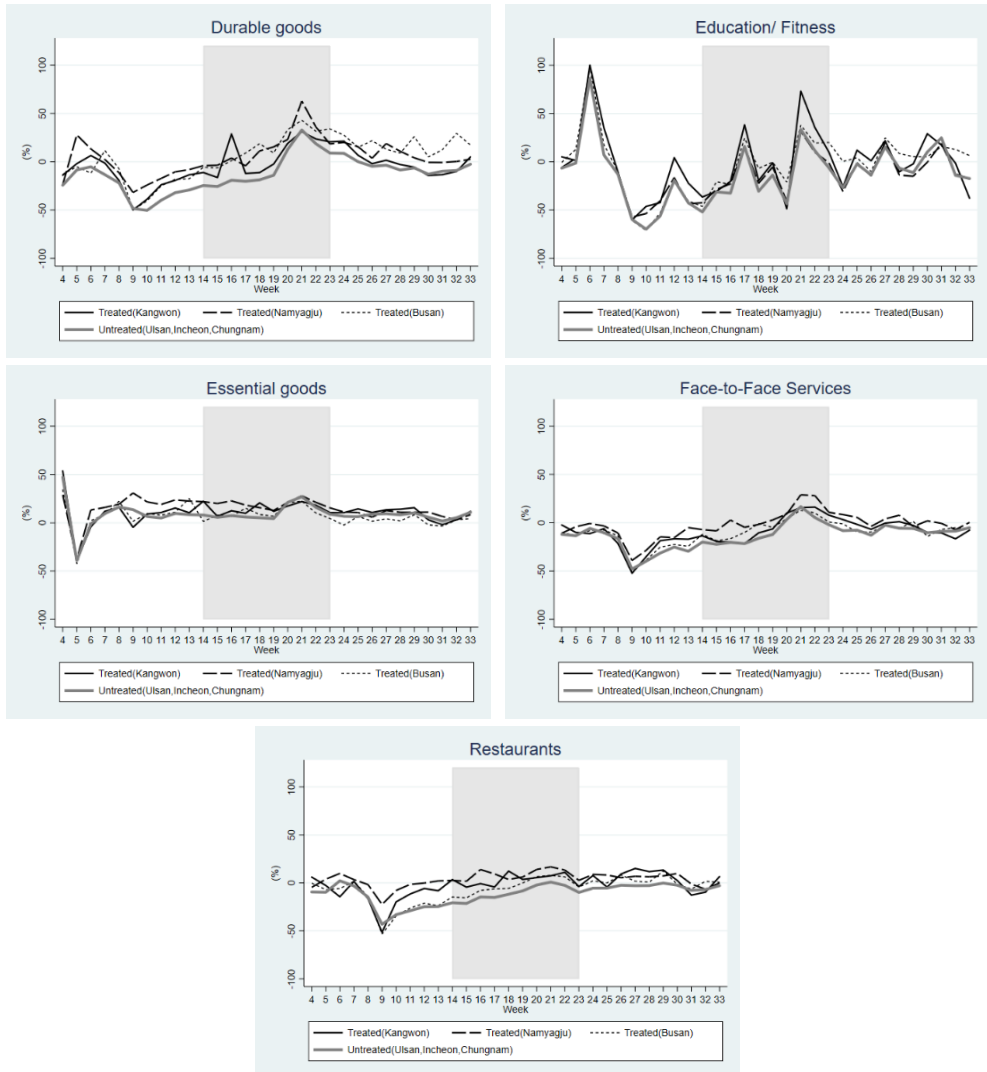
FIGURE 1. YEAR-ON-YEAR SALES GROWTH BY SECTOR

business sales using the difference-in-difference method is whether the parallel trend assumption is valid or not. Moreover, we need to assume a homogeneous treatment effect given that the national EDRF was paid to all districts as the regional relief funding was additionally paid with the EDRF subsidy.

Figure 1 shows the year-on-year change in sales for the treated group with additional cash subsidies from local governments and the control group that did not have additional subsidies. For each industry, the year-on-year sales show parallel movement before the national EDRF and regional relief funds in the form of cash.

In most industries, except for essential goods, year-on-year sales were lowest in the ninth week, when the number of confirmed COVID-19 patients surged in Korea. Later, as the number of confirmed cases decreased gradually, year-on-year sales even rose back to the level before the EDRF distribution. After 19-20th weeks, the EDRF

payment period, year-on-year sales increased notably. Through an empirical analysis, we estimate whether year-on-year sales increased significantly in regions where local governments provided additional subsidies in cash as compared to regions without additional subsidies.

C. *Econometric Model*

The econometric model used in the empirical analysis is as follows. We apply difference-in-difference OLS regression with covariates and several fixed effects. We use control variables with the number of confirmed COVID-19 cases both at the province (Si/Do) and the district (Gun/Gu) level, the population growth rate compared to the same period in the previous year, and the ratio of the elderly population at the district level. We also include regional fixed effects (district level), time fixed effects (week level), and industry fixed effects to control for unobserved factors that may affect business sales.

Equation 1 is the basic model with covariates and regional/time/industry fixed effects, whereas in equation 2, AF1, AF2, and AF3 correspondingly capture the diff-in-diff effects for the first, second and third months. Finally, equation 3 includes the DD* Case in order to capture the heterogeneous treatment effect of the number of confirmed COVID-19 cases.

(1) $$y_{i,j,t} = \alpha + \beta_{DD} DD_{i,t} + \beta_R R_i + X_{i,j,t}\gamma + \varepsilon_{i,j,t}$$

(2) $$y_{i,j,t} = \alpha + \beta_1 AF1_{i,t} + \beta_2 AF2_{i,t} + \beta_3 AF3_{i,t} + \beta_R R_i + X_{i,j,t}\gamma + \varepsilon_{i,j,t}$$

(3) $$y_{i,j,t} = \alpha + \beta_{DDD} DD * Case_{i,t} + \beta_{DD} DD_{i,t} + \beta_{R\_cf} R_i * Case_{i,t} + X_{i,j,t}\gamma + \varepsilon_{i,j,t}$$

IV. Empirical Results

A. *Descriptive Statistics*

Table 3 presents summary statistics of sales growth overall and in the regional characteristic variables. We compare these variables of the treatment group with additional subsidies in cash and the control group with only the national EDRF subsidy within the data period. On average, the sales growth rate in regions where other cash subsidies are paid is higher than in regions without additional local subsidies. This may be the effect of additional subsidies by the local governments but may also be due to basic differences between regions. Accordingly, additional subsidies by the local governments are estimated through the difference-in-difference method. The average corresponding population growth rates year-on-year is similarly less than zero at -0.41 and -0.49.

The ratios of the elderly population in both regions are nearly identical (19.13%).

TABLE 3—SUMMARY STATISTICS: CONTROL VARIABLES

Variable	Cash Support			Non Cash Support		
	Obs.	Mean	SD	Obs.	Mean	SD
Sales (YoY%)	3,240	0.23	24.28	7,290	-5.10	22.99
Population growth rate (YoY%)	3,240	-0.41	2.23	7,290	-0.49	2.42
Elderly population ratio (%)	3,240	19.13	4.52	7,290	19.13	8.51
Confirmed cases by District (per 0.1M population)	3,240	0.19	0.65	7,290	0.32	0.94
Confirmed cases by City (per 0.1M population)	3,240	0.22	0.36	7,290	0.35	0.57

In contrast, the number of confirmed COVID-19 cases (per 0.1M population) is lower in regions with cash subsidies than in regions without cash subsidies both by district and by city.

Table 4 and Table 5 compare card sales growth outcomes according to eight industry categories before and after the subsidy between regions with and without additional cash support. Table 4 shows the summary statistics in the region with regional relief funds by each industry category, comparing before and after the cash support in each group. Remarkably, the year-on-year growth rate of card sales increases after the cash subsidies. This may be due to the regional cash subsidies, but it can also be attributed to the decrease in the number of confirmed COVID-19 cases before and after the subsidy payments. Accordingly, we also use the number of confirmed COVID-19 cases as a control variable to estimate the effect of additional cash subsidies on the card sales of local businesses. Year-on-year sales of durable goods increased the most after the subsidies were paid, and year-on-year sales of restaurants, face-to-face services, and education and fitness services also increased. In areas with the regional relief fund, year-on-year sales of durable goods increased by approximately 29.9%p after the cash provision.

Table 5 shows the average sales growth at each industry before and after the national EDRF subsidy, which was distributed from the 19th week. In contrast, in areas without regional relief funding in cash, the year-on-year sales of durable goods increased by about 23.3%p after the national EDRF. As we estimate the increase in the growth rate of business sales from the additional cash subsidies using the difference-in-difference method, a simple comparison of the summary statistics shows that additional cash subsidies increase the sale growth rate (semi)-durable goods by about 6.6%p. As we can control for other factors such as the number of COVID-19 patients and regional characteristics, we estimate the effect of the cash subsidy via a difference-in-difference regression analysis in the following subsection. Similarly, for face-to-face services and essential goods, the effect of increasing sales due to the additional local government subsidies is not notable, while the effect is large in the education/fitness service industry.

TABLE 4—SALES GROWTH RATE (YOY%) BY INDUSTRY
BEFORE AND AFTER AN ADDITIONAL CASH SUPPORT FOR THE TREATED GROUP

Business Sectors	Before Cash			After Cash			Difference
	Obs.	Mean (a)	SD	Obs.	Mean (b)	SD	(b) – (a)
Accepting Voucher Sectors	171	-4.86	14.07	189	3.78	9.71	8.64
(Semi)-durable goods	171	-12.42	27.87	189	17.50	38.13	29.92
Face-to-Face Services	171	-16.78	14.94	189	0.09	12.08	16.87
Non-Accepting Voucher sectors	171	-7.66	27.70	189	-1.98	21.69	5.69
Drugstores / Hospitals	171	9.77	26.58	189	12.32	10.46	2.54
Restaurants	171	-11.97	17.40	189	3.36	10.54	15.33
Essential goods	171	9.31	20.36	189	12.50	11.38	3.19
Education / Fitness	171	-10.19	44.89	189	8.28	26.05	18.47
Others	171	-5.89	18.97	189	-6.06	10.24	-0.18

TABLE 5—SALES GROWTH RATE (YOY%) BY INDUSTRY
BEFORE AND AFTER THE NATIONAL EDRF PAYMENT FOR THE CONTROL GROUP

Business Sectors	Before EDRF			After EDRF			Difference
	Obs.	Mean (a)	SD	Obs.	Mean (b)	SD	(b) – (a)
Accepting Voucher Sectors	432	-7.12	12.90	378	0.41	9.83	7.53
(Semi)-durable goods	432	-20.66	17.97	378	2.65	19.37	23.31
Face-to-Face Services	432	-21.11	15.31	378	-4.63	14.11	16.47
Non-Accepting Voucher sectors	432	-15.17	19.90	378	-8.07	29.58	7.10
Drugstores / Hospitals	432	2.87	23.75	378	10.16	13.81	7.30
Restaurants	432	-13.83	13.61	378	-1.48	11.24	12.35
Essential goods	432	7.29	22.50	378	9.45	11.20	2.16
Education / Fitness	432	-13.15	43.20	378	-0.55	34.24	12.60
Others	432	-6.73	17.04	378	-6.10	13.75	0.63

B. *Regression Results*

Through descriptive statistics, we outlined the effect of an increase in sales growth

due to additional subsidies by local governments. In this section, we control for other factors that can affect local business sales with a regression analysis. Control variables are the number of confirmed COVID-19 cases, the growth rate of the population, the ratio of the elderly population, industry fixed effects and district fixed effects, and time (weekly) fixed effects. These control variables are constructed as panel data for each district and sector.

Table 6 shows the estimation results of the effects of the additional cash support on local business sales in all sectors. The estimate of the DID variable in the third column is positive and significant at the 10% significance level, meaning that the year-on-year sales growth rate increased by about 1.58%p for three months on average due to the additional cash subsidies by local governments. Thus, we can confirm that a cash payment can boost the sales of local businesses. From the results presented in the fourth column, we can divide the effect of the cash subsidy by the time period. The consumption-boosting effect of the additional cash subsidy is concentrated one month after the reception of the subsidy, and the impact is large and significant at the 1% significance level. The year-on-year sales growth rate increases by approximately 3.34%p within the first month of the payment, while during the following month, the effect is not statistically significant.

From the negative estimate of the number of COVID-19 cases, the growth rate of local business sales decreases as the number of confirmed cases at the district level

TABLE 6—DIFF-IN-DIFF ESTIMATION RESULTS: IN TOTAL

VARIABLES	(1) YOY Sales	(2) YOY Sales	(3) YOY Sales	(4) YOY Sales
DID	2.17**	2.00**	1.58*	
(After Cash subsidy)	(0.91)	(0.91)	(0.91)	
DID_1 month				3.34***
(1st month effect)				(1.11)
DID_2 month				0.31
(2nd month effect)				(1.27)
DID_3 month				-0.51
(3rd month effect)				(1.21)
Population Growth Rate			0.94	1.07
			(0.68)	(0.68)
Elderly Population Rate			-13.0***	-13.4***
			(3.39)	(3.38)
# COVID-19 (Si/Gun/Gu level)		-1.07***	-0.97***	-0.95***
		(0.26)	(0.27)	(0.27)
# COVID-19 (Si/Do level)		-0.69	-0.90	-0.89
		(0.54)	(0.55)	(0.55)
Constant	5.57***	5.26***	255***	263***
	(1.77)	(1.77)	(65.3)	(65.2)
Weekly Fixed Effect	o	o	o	o
Regional Fixed Effect	o	o	o	o
Business Sector Fixed Effect	o	o	o	o
Observations	9,152	9,152	9,152	9,152
R-squared	0.343	0.344	0.346	0.347

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

increases. When the number of confirmed cases per 100 thousand people within the same district increases by one unit, the year-on-year sales growth rate decreases by approximately 0.97%p. Card sales by local businesses are more sensitive to the number of patients in nearby neighborhoods. Despite the fact that the estimate of the number of confirmed cases at the city level is negative, this outcome is not statistically significant. Moreover, as the ratio of the elderly population in the region increases, the year-on-year sales growth rate decreases significantly. This occurs because in situations where the spread of an infectious disease continues, older people are at a greater risk of infection due to outdoor activities and are more likely to reduce their consumption.

In Table 7, the heterogeneous effect of the cash subsidy according to confirmed COVID-19 cases is investigated through the variable DDD. The estimate is insignificant, and we cannot find a heterogeneous effect of the cash subsidies. This is different from prior expectations. However, as shown in Figure A1 and Figure A2 in the appendix, there were few confirmed cases in the sample period. Thus, it is difficult to generalize this result to other situations and different types of relief funds.

TABLE 7—HETEROGENEOUS EFFECT ON CONFIRMED COVID-19 CASES

VARIABLES	(1) YOY Sales	(2) YOY Sales
DID	1.45	
(After Cash subsidy)	(0.95)	
DID_1 month		3.19***
(1st month effect)		(1.14)
DID_2 month		0.17
(2nd month effect)		(1.30)
DID_3 month		-0.89
(3rd month effect)		(1.28)
DDD	0.73	1.14
	(1.31)	(1.32)
Treated * # COVID-19	-0.076	-0.18
	(1.21)	(1.21)
Population Growth Rate	0.92	1.06
	(0.68)	(0.68)
Elderly Population Rate	-13.0***	-13.5***
	(3.39)	(3.38)
# COVID-19 (Si/Gun/Gu level)	-1.03***	-1.03***
	(0.29)	(0.29)
# COVID-19 (Si/Do level)	-0.89	-0.88
	(0.55)	(0.55)
Constant	256***	265***
	(65.3)	(65.2)
Weekly Fixed Effect	o	o
Regional Fixed Effect	o	o
Business Sector Fixed Effect	o	o
Observations	9,152	9,152
R-squared	0.346	0.347

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

Tables 8~11 show the effects of the regional cash subsidies for specific sectors. Table 8 shows the estimation results of the effects of additional cash on local business card sales growth among (semi)-durable goods. (Semi)-durable goods include furniture, glasses, fashion, books, stationery, and toys, and similar items. The regression results show that the year-on-year growth rate of the consumption of (semi)-durable goods increases by about 5.8%p, a considerable increase. This result is consistent with earlier works (Kim *et al.*, 2020; Kim and Oh, 2020; Chetty *et al.*, 2020) that found consumption boosting as highest in durable goods. The reason for the prominent increase in the consumption of (semi)-durable goods would be related to the risk of infection under the pandemic. The consumption of (semi)-durable goods does not require close and extended face-to-face interactions between customers and sellers. In the second column, the sales boost effect is divided into three periods, and the effect in the third month is large and significant while the effect in the second month is insignificant. These findings stand in contrast to results in other sectors, which show that the cash subsidy effect gradually fades over time. Most districts started to distribute cash subsidies from April, as shown in Table 1. The third month

TABLE 8—DIFF-IN-DIFF ESTIMATION: (SEMI)-DURABLE GOODS

VARIABLES	(1) YOY Sales	(2) YOY Sales	(3) YOY Sales
DID	5.80***		5.62***
(After Cash subsidy)	(1.54)		(1.63)
DID_1 month		8.26***	
(1st month effect)		(1.99)	
DID_2 month		0.24	
(2nd month effect)		(2.12)	
DID_3 month		6.62***	
(3rd month effect)		(2.15)	
DDD			0.91
			(2.53)
Treated * # COVID-19			0.12
			(2.45)
Population Growth Rate	0.60	0.64	0.58
	(1.55)	(1.52)	(1.56)
Elderly Population Rate	-14.6*	-15.1*	-14.7*
	(8.26)	(8.26)	(8.27)
# COVID-19 (Si/Gun/Gu level)	-0.95*	-1.00**	-1.05*
	(0.49)	(0.50)	(0.54)
# COVID-19 (Si/Do level)	-1.74	-1.84*	-1.71
	(1.06)	(1.06)	(1.06)
Constant	266*	276*	268*
	(159)	(159)	(159)
Weekly Fixed Effect	o	o	o
Regional Fixed Effect	o	o	o
Business Sector Fixed Effect	o	o	o
Observations	1,144	1,144	1,144
R-squared	0.794	0.796	0.794

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

becomes June, when households purchase clothes and shoes due to the seasonal change. As clothes and shoes are included in this (semi)-durable sector, the time heterogeneous effect of the cash subsidy can differ from those in other sectors.

On the other hand, the consumption of face-to-face services does not increase much. Table 9 shows estimates from the regression analysis of the face-to-face service sector. The year-on-year sales growth rate of the face-to-face service sector increases by about 1.98%p due to the subsidy payment. Like the changes in sales of other industries, the increase in sales growth due to cash payments is mainly concentrated in the first month of the payment. In the first month, the year-on-year growth rate of the face-to-face service sector increased by approximately 3.89%p and did not show a significant effect in the following months. In the face-to-face industry, the effect of the increase in sales is small because consumers do not pursue consumption with a high risk of infection as a pandemic spreads. The estimate of the population growth is negative, and it is significant in the first and the third columns. This result appears to go counter to prior expectations. However, the negative estimate indicates that consumption in this service does not strongly

TABLE 9—DIFF-IN-DIFF ESTIMATION: FACE-TO-FACE SERVICES

VARIABLES	(1) YOY Sales	(2) YOY Sales	(3) YOY Sales
DID	1.98**		1.79*
(After Cash subsidy)	(0.97)		(1.02)
DID_1 month		3.89***	
(1st month effect)		(1.13)	
DID_2 month		-0.71	
(2nd month effect)		(1.47)	
DID_3 month		1.01	
(3rd month effect)		(1.28)	
DDD			1.00
			(1.39)
Treated * # COVID-19			-0.13
			(1.32)
Population Growth Rate	-1.44*	-1.34	-1.46*
	(0.83)	(0.83)	(0.83)
Elderly Population Rate	-15.1***	-15.5***	-15.1***
	(3.73)	(3.75)	(3.74)
# COVID-19 (Si/Gun/Gu level)	-0.82	-0.83	-0.90
	(0.51)	(0.52)	(0.58)
# COVID-19 (Si/Do level)	-1.42*	-1.46*	-1.41*
	(0.76)	(0.76)	(0.77)
Constant	281***	289***	283***
	(71.6)	(72.0)	(71.8)
Weekly Fixed Effect	o	o	o
Regional Fixed Effect	o	o	o
Business Sector Fixed Effect	o	o	o
Observations	1,144	1,144	1,144
R-squared	0.709	0.711	0.709

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

correlate with the residential population. In this study, the face-to-face service sector includes leisure, hairdressing, and public bathhouses, and consumers can often drive outside of their residential areas to consume these services, especially with regard to leisure. The estimate of COVID-19 is significant only at the broader province level, while it is more significant at the narrow district level in other sectors. This result can also show that consumption of face-to-face services, like leisure, is executed in the broader market compared to other sectors.

Table 10 shows estimation results of restaurants, which represent the food and beverage service sector. The year-on-year sales growth rate of this sector increases by approximately 2.42%p due to the cash subsidy payment. The effect on local business sales by the cash subsidy is also weaker in the food and beverage sector than in (semi)-durable goods. This may stem from the fact that consumers are worried about the risk of contagion in these businesses. This result is consistent with Kim and Oh (2020), who found that a policy impact or universal payment policy is weaker in the service industry, which experienced a larger shock from the pandemic. The estimate of population growth is significant and positive only in this sector. This

TABLE 10—DIFF-IN-DIFF ESTIMATION: FOOD AND BEVERAGE

	(1)	(2)	(3)
VARIABLES	YOY Sales	YOY Sales	YOY Sales
DID	2.42**		2.33**
(After Cash subsidy)	(0.96)		(1.02)
DID_1 month		2.95***	
(1st month effect)		(0.97)	
DID_2 month		2.49*	
(2nd month effect)		(1.28)	
DID_3 month		1.33	
(3rd month effect)		(1.54)	
DDD			0.54
			(1.47)
Treated * # COVID-19			-0.31
			(1.20)
Population Growth Rate	1.87**	1.92**	1.86**
	(0.76)	(0.77)	(0.77)
Elderly Population Rate	-3.38	-3.52	-3.41
	(3.36)	(3.37)	(3.36)
# COVID-19 (Si/Gun/Gu level)	-1.67***	-1.66***	-1.68***
	(0.30)	(0.29)	(0.32)
# COVID-19 (Si/Do level)	-1.19*	-1.18*	-1.19*
	(0.71)	(0.71)	(0.72)
Constant	70.7	73.2	71.3
	(65.0)	(65.2)	(65.1)
Weekly Fixed Effect	o	o	o
Regional Fixed Effect	o	o	o
Business Sector Fixed Effect	o	o	o
Observations	1,144	1,144	1,144
R-squared	0.753	0.754	0.753

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

result suggests that the consumption of food and beverages is mostly done within residential districts.

Table 11 shows the regression results from the effect of the regional relief fund in cash on card sales growth in the education and fitness sector. The year-on-year growth rate increases by about 6.72%p due to the cash subsidy payment. Like the changes in the sales of other sectors, the increase in sales due to the subsidy payments is mainly concentrated in the first and second months of the payment. In the first month, the year-on-year growth rate in the education and fitness service sector increased by about 8.23%p and 5.89%p in the following month. Considering that education and fitness services require personal interaction for a certain number of hours, this strong impact of the cash subsidy is somewhat perplexing. However, the consumption of these services can be performed with a face mask, which is the most crucial factor related to the prevention of infection. Thus, we find that some service industries also had considerable advantages from the government's stimulus payment policy when consumers believe that the risk of infection is not high. This point was not indicated in previous studies.

TABLE 11—DIFF-IN-DIFF ESTIMATION: EDUCATION AND FITNESS

	(1)	(2)	(3)
VARIABLES	YOY Sales	YOY Sales	YOY Sales
DID	6.72***		6.50***
(After Cash subsidy)	(2.33)		(2.45)
DID_1 month		8.23***	
(1st month effect)		(2.99)	
DID_2 month		5.89**	
(2nd month effect)		(2.79)	
DID_3 month		4.69	
(3rd month effect)		(3.21)	
DDD			1.38
			(2.89)
Treated * # COVID-19			-0.91
			(2.14)
Population Growth Rate	-1.23	-1.11	-1.25
	(1.34)	(1.35)	(1.34)
Elderly Population Rate	-38.6***	-39.0***	-38.7***
	(11.4)	(11.5)	(11.4)
# COVID-19 (Si/Gun/Gu level)	-2.54***	-2.52***	-2.54***
	(0.75)	(0.75)	(0.82)
# COVID-19 (Si/Do level)	-1.31	-1.30	-1.32
	(1.46)	(1.46)	(1.46)
Constant	749***	756***	750***
	(220)	(220)	(220)
Weekly Fixed Effect	o	o	o
Regional Fixed Effect	o	o	o
Business Sector Fixed Effect	o	o	o
Observations	1,144	1,144	1,144
R-squared	0.761	0.762	0.761

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

In the appendix, we supplement the result of the robustness checks. Table A1 shows the regression results with more control variables, adding the employment rate of the previous month, and Table A2 shows the regression results with a smaller sample, in this case without Incheon. Certain estimates become somewhat smaller in some cases. However, the patterns in the magnitude of the estimates by sectors are identical, and the effect of the cash subsidy is still largest and firm in (semi)-durable goods.

V. Concluding Remarks

We investigate the impact of regional cash subsidies which were granted in some districts in addition to the national EDRF payment in South Korea. Analyzing the combined weekly debit and credit card sales of eight card companies with the difference-in-difference method, we find that the cash subsidy bolstered the sales of local businesses that experienced a large collapse after the outbreak of COVID-19. We also find that the consumption boosting impact was clear and strong within a month, immediately after the payment.

We find also that a simple cash subsidy effectively boosted the sales of local businesses without complicated and costly policy design efforts. However, further analysis is required to compare the costs and benefits of choosing the vouchers to boost local businesses, with extensive data on prepaid cards and paper gift card sales, which were not available in this study.

The consumption-boosting effect of the cash subsidy is extensive among (semi)-durable goods, which do not require close interaction between customers and retailers. On the other hand, the consumption boosting effect was modest in the face-to-face service sector or in restaurants, which were more directly damaged by the COVID-19 pandemic. These results suggest that the effect of the stimulus payment may have been concentrated in industries that suffered less damage from COVID-19 or that even benefited from COVID-19. On the other hand, some service sectors such as education and fitness experienced a substantial sales boost due to the cash subsidy. This result suggests that the effects of the consumption-boosting policy can be effective in some service industries in which consumption is available with a face mask when the pandemic disease is not active.

We cannot find evidence of the heterogeneous effect of subsidies varying according to how COVID-19 spreads. However, this may be due to the relatively few patients in the sample period.

Our study has several limitations in that we analyzed only combined card sales at the district level. It would be desirable to study more of a heterogeneous effect among households with different incomes or consumption patterns with more detailed and individual household-level data.
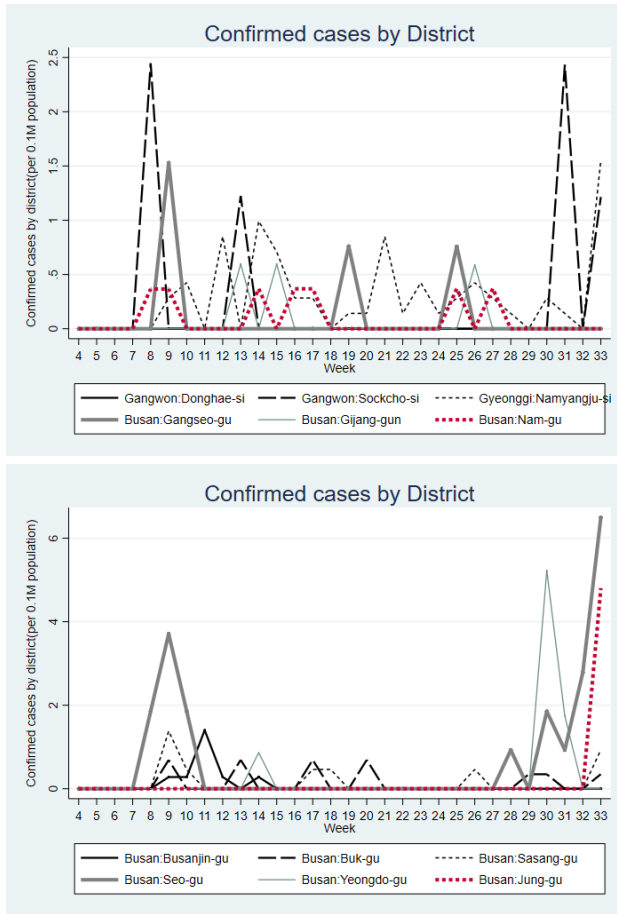
APPENDIX

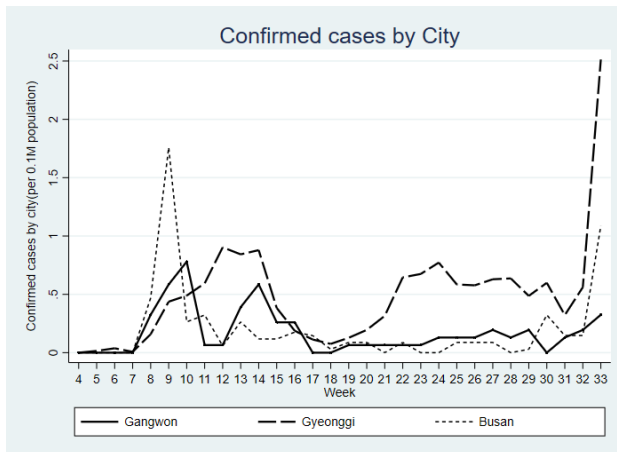FIGURE A1. COVID-19 CONFIRMED CASES BY DISTRICT WITHIN THE TREATED GROUP

FIGURE A2. CONFIRMED COVID-19 CASES BY CITY WITHIN THE TREATED GROUP

TABLE A1—ROBUSTNESS: ADDITIONAL CONTROL VARIABLE (EMPLOYMENT RATES)

VARIABLES	(1) (Semi)-durable YOY Sales	(2) Face-to-face service YOY Sales	(3) Food and beverage YOY Sales	(4) Education and fitness YOY Sales
DID (After Cash subsidy)	5.02***	1.77*	1.70	3.57
	(1.61)	(1.01)	(1.20)	(2.46)
Population Growth Rate	0.74	-1.40*	2.00***	-0.66
	(1.58)	(0.82)	(0.76)	(1.37)
Elderly Population Rate	-14.1*	-14.9***	-2.86	-36.3***
	(8.20)	(3.67)	(3.34)	(11.2)
# COVID-19 (Gun/Gu level)	-0.93*	-0.82	-1.65***	-2.46***
	(0.49)	(0.51)	(0.29)	(0.76)
# COVID-19 (City/DO level)	-1.92*	-1.47*	-1.36*	-2.05
	(1.08)	(0.77)	(0.74)	(1.50)
Employment Rate (1 month before)	-0.45	-0.12	-0.41	-1.82***
	(0.36)	(0.26)	(0.28)	(0.58)
Constant	283*	285***	86.0	817***
	(161)	(74.5)	(66.1)	(224)
Weekly Fixed Effect	o	o	o	o
Regional Fixed Effect	o	o	o	o
Business Sector Fixed Effect	o	o	o	o
Observations	1,144	1,144	1,144	1,144
R-squared	0.795	0.709	0.754	0.764

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

TABLE A2—ROBUSTNESS: SMALLER SAMPLE (WITHOUT INCHEON)

VARIABLES	(1) (Semi)-durable YOY Sales	(2) Face-to-face service YOY Sales	(3) Food and beverage YOY Sales	(4) Education and fitness YOY Sales
DID (After Cash subsidy)	3.85**	0.97	1.88**	6.00**
	(1.58)	(1.06)	(0.92)	(2.48)
Population Growth Rate	2.63	-2.93***	1.60*	1.73
	(2.14)	(0.79)	(0.88)	(1.64)
Elderly Population Rate	-9.62	-16.0***	-1.86	-25.2**
	(8.69)	(3.85)	(3.42)	(12.3)
# COVID-19 (Gun/Gu level)	-0.87*	-0.71	-1.84***	-1.87*
	(0.52)	(0.76)	(0.37)	(0.97)
# COVID-19 (City/DO level)	7.11***	4.44***	5.38***	4.61*
	(1.77)	(1.19)	(1.51)	(2.52)
Constant	173	299***	43.3	495**
	(168)	(74.1)	(66.3)	(236)
Weekly Fixed Effect	o	o	o	o
Regional Fixed Effect	o	o	o	o
Business Sector Fixed Effect	o	o	o	o
Observations	874	874	874	874
R-squared	0.806	0.718	0.802	0.792

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% significance levels, respectively.

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