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Abstract
This paper examines how sales of local small businesses can be promoted through COVID-19 stimulus payments. In the beginning of April, 2020, Gyeonggi provincial government in Korea implemented a stimulus payment program worth up to 500 thousand Korean Won (416 US dollars) per person to encourage local consumption. By exploiting unique features of the stimulus payments that restricted the use of the payments in the municipality of residence at establishments accepting local currency, the paper identifies the treatment effect of the stimulus payments, taking a difference-in-difference-in-differences approach. The results suggest that the stimulus payments led to significant increases in card spending in establishments accepting local currency, relative to other establishments. The estimated overall spending effect of 4.1% persisted over three weeks, and the effect is heterogeneous across sectors. While the estimated spending effect of the stimulus payments is larger among sectors such as groceries, furniture, and beauty, sectors such as restaurants, leisure, and travel that experienced substantial sales losses did not gain much from the stimulus payments. This suggests that targeting sectors the most severely affected can be a more effective policy measure in terms of alleviating the gaps in COVID-19 induced economic losses across sectors.

Keywords
COVID-19 stimulus payments; Card spending; Local small businesses; Korea; Difference-in-difference-in-differences.

1. Introduction

The COVID-19 pandemic has brought unprecedented economic depression around the world. Estimates by the OECD (2020) indicate that the real global GDP is expected to decrease by 4.5% in 2020, and unemployment rate is expected to soar from 5.4% in 2019 to 9.4% by the end of 2020. To alleviate the negative economic impacts of the COVID-19 pandemic, governments worldwide have implemented monetary and fiscal policies. In addition, the need for a provision of direct cash transfers to individuals or households has been discussed and has indeed been adopted in many countries (for example, Hong Kong, Japan, Korea, Singapore, and the United States). While such transfers are certainly beneficial to the recipients, it is unclear the extent to which they encourage consumption, support businesses, thereby boosting the economy. Therefore, it is a crucial empirical work to investigate the spending effect of stimulus payments.

The primary objective of this paper is to empirically examine how effective the COVID-19 stimulus payments were in supporting local small businesses vulnerable to the negative economic impact of the COVID-19 outbreak. Negative impacts of the decline in consumption arising from the widespread of the COVID-19 and the implementation of social distancing measures have been concentrated on small businesses engaged in face-to-face service industry (OECD, 2020a). However, the effectiveness of the COVID-19 stimulus payments in restoring their sales losses has not been rigorously studied, while research has been actively conducted on households' overall spending responses to the stimulus payments. Therefore, the main contribution of this paper is to provide empirical evidence on causal impacts of the COVDI-19 stimulus payments on sales of local small businesses.

The Republic of Korea (hereafter, Korea) provides a useful context to tackle the research question because the stimulus payments implemented in Gyeonggi province, the most populated region in Korea, allow for a quasi-experiment research design. The Gyeonggi provincial government and 31 municipal governments in Gyeonggi province disturbed universal stimulus payments to all individuals residing in Gyeonggi province as of April 9, 2020, a month earlier than the distribution of nationwide stimulus payments by the central government. For a clear policy objective of promoting sales of local small businesses, the stimulus payments were paid in the form of local currency that can only be spent in establishments with annual sales of 1 billion Korean Won (833,333 US dollars) or less in the

municipality of residence. By exploiting that the stimulus payments in Gyeonggi province were redeemable only at allowed local small businesses as of April 9, 2020, I estimate the spending effect of the stimulus payments by applying a difference-in-difference-in-differences (DDD) estimation to high-frequency Shinhan Card transaction data.

The main findings of this study can be summed up as follows. First, the stimulus payments led to significant increases in card spending in establishments accepting local currency, relative to other establishments. The estimated overall spending effect is about 4.1% and lasted over three weeks. Second, several robustness checks confirm that the estimated sales increase is attributed to the stimulus payments. Anticipatory behaviors of consumers in response to the implementation of the stimulus payments do not underlie the estimated effects. The stimulus payments increased Gyeonggi residents' card spending in Gyeonggi province, while they did not increase non-Gyeonggi residents' card spending in Gyeonggi province. Lastly, the effect of the stimulus payments is heterogeneous across sectors. While the estimated spending effect of the stimulus payments is larger among sectors such as groceries, furniture, and beauty, sectors such as restaurants, leisure, and travel that experienced substantial sales losses did not gain much from the stimulus payments.

The article proceeds as follows. Sections 2 provides a description of COVID-19 situation in Korea and the stimulus payments in Gyeonggi province, and Section 3 provides an overview of existing literature on the economic impacts of the payments, respectively. The data are described in Section 4, and the estimation strategy is outlined in Section 5. Section 6 presents the main results, a set of robustness analysis, and the heterogeneous treatment effect by sector. Finally, Section 7 concludes with policy implications.

2. Background: COVID-19 stimulus payments in Gyeonggi province

In Korea, the first COVID-19 case was confirmed on January 20, 2020. A month later, the daily number of new cases dramatically surged to 909, mainly around Daegu, located in southeastern part of the country (MOEF, 2020). The Korean government responded quickly to the COVID-19 outbreak by tracking the contracts of people with COVID-19 and treating them at the earliest stage. To detect the cases as early as possible, around 20,000 tests were conducted daily. Korea tried to bring the COVID-19 outbreak under control without implementing stringent social distancing measures such as travel or movement restrictions and airport closure (MOEF, 2020).

Despite the health and quarantine measures to curb the spread of the virus, the fear of infection led to a sharp decline in consumption and a contraction in the economy. The Korean government implemented various fiscal and monetary policies to overcome the economic downturn. Central bank of Korea lowered the base interest rate from 1.25% to 0.50%. The government expanded fiscal spending to stabilize labor and financial markets (MOEF, 2020). On top of that, the need for providing direct cash transfers to individuals or households has been raised. After severe political debates over the scope of the payments, a one-time transfer to all households in Korea worth up to 1 million Korean Won (833 US dollars) per household was finally passed on April 30 and the deposit to an account was made as of May 13.

About a month before the national assembly in Korea passed the nationwide stimulus payments to all households in Korea, the Gyeonggi Provincial Council legislated the distribution of the so-called, "Disaster Basic Income" on March 23. "Gyeonggi Provincial Disaster Basic Income" paid 100,000 Korean Won (83 US dollars) to all individuals residing in Gyeonggi province regardless of income, property, or employment status. In a similar fashion, each of the 31 municipal governments in Gyeonggi province also paid universal stimulus payments called "Gyeonggi Municipal Disaster Basic Income" to its residents.[1] The amount of the municipal stimulus payments varied by municipality, ranging from 50,000 to 400,000 Korean Won (42~333 US dollars) per person. Gyeonggi residents therefore received both stimulus payments. Table 1 summarizes the variation in the total amount of deposits across municipalities.

[TABLE 1]

As of April 9, Gyeonggi residents could apply for the stimulus payments online, and payments were sent to a credit or a debit card account within 48 hours after the application. Since the main goal of the stimulus payments in Gyeonggi province was to support local small businesses vulnerable to COVID-19-induced economic recession, the stimulus payments were provided in the form of local currency redeemable only in establishments accepting local currency in the municipal area of residence.[2] Small retail businesses with annual sales of 1

[1] Gyeonggi province consists of 31 municipalities (28 cities and 3 counties). It is the most populated region in Korea, with more than 13 million residents. Municipal governments are the smallest unit of government which has discretion over tax revenues and expenditures.

[2] Applicants could opt for one of the three types of payment methods: Gyeonggi Local Currency Card, Credit

billion Korean Won (833,333 US dollars) or less could accept local currency, thus eligible for the stimulus payments. Online-based stores and large-scale stores such as department stores and supermarkets were excluded. Due to high infection risks, the stimulus payments were not allowed to be spent in bars, clubs, and casinos even though their annual sales were less than 1 billion Korean Won (833,333 US dollars). In addition, the period of use of the payments was limited to three months, and the unused amount was forfeited. Overall, the stimulus payments in Gyeonggi province were designed with a clear focus to promote the revitalization of the local economy by encouraging local consumption.

3. Literature review

This study makes a meaningful contribution to the spending responses to economic stimulus payments literature by providing empirical evidence on the effectiveness of COVID-19 stimulus payments in supporting local small businesses. One strand of the literature investigates the U.S. CARES (Coronavirus Aid, Relief, and Economic Security) Act that includes 300 billion dollars in one-time stimulus payments to individuals who submit a tax return. Majority of the studies find evidence of significant increase in consumption attributed to the CARES stimulus payments. Baker et al. (2020) estimate a marginal propensity to consume (MPC) of magnitude 0.26 to 0.36 for the CARES stimulus payments, using data from a personal financial app (Saverlife). Chetty et al. (2020) applying a regression discontinuity design to card transaction data point out that the spending response to the CARES stimulus payments is heterogeneous by income: for low-income households, the spending increased by 26 percentage points while the spending increase was 9 percentage points for high-income households. Misra et al. (2021) employ debit card transaction data and indicate that 31% of the CARES payments was spent within the first four days. Coibion et al. (2020) document that self-reported average MPC by survey respondents is approximately 0.4. In general, the estimated MPC of the CARES payments is smaller than that of tax rebates program during the recessions in 2001 and 2008 in the U.S., implying that COVID-19 infection risks and social distancing measures may have a negative influence on the spending behaviors of the COVID-

Card, and Prepaid Card. However, the deposit to an account is redeemable only in establishments that are eligible for accepting local currency no matter what type of payment method was chosen.

19 stimulus payments.[3]

There have also been several studies examining the effect of COVID-19 related stimulus payments outside the U.S. Kubota et al. (2021) examine households' spending responses to a special cash payment program in Japan using bank transaction data (Mizuho Bank) and document an estimation of MPC ranging from 0.31 to 0.49. Feldman and Heffetz (2020) study Israeli case, pointing out that 42 percent of the survey respondents used the COVID-19 stimulus payments in Israel for paying debts and 26 percent of them used it for purchases. Liu et al. (2020) investigate the spending effects of a temporary digital discount coupon during the COVID-19 pandemic. They show that the coupon led to an increase in consumption and the estimated MPC ranges from 3.4 to 5.8. These diverse results across countries are mainly attributed to different economic circumstances and COVID-19 situations in which consumption could be promoted.

In Korea, most studies have measured the spending responses of the nationwide COVID-19 stimulus payments in Korea, endeavoring to control for all possible confounding factors unrelated to the payments. Although different results have been found depending on methodology and data used in the analysis, empirical studies have converged to suggest that the spending impact of the stimulus payments is substantial and the MPC ranges from 24% to 78%. The Korean literature also indicates significant heterogeneity across individuals. The spending responses to the COVID-19 stimulus payments are higher for households with liquidity constraints, suggesting that targeting households in greater need of income support is a more appropriate policy measure in terms of boosting demands for goods and services, thereby reviving economy (for example, Baek et al., 2020; Kim and Oh, 2020; Kim et al., 2020).

Kim et al. (2020) investigate the spending effect of Korea's COVID-19 stimulus payments applying a difference-in-differences approach to card transaction data in Seoul and find, on average, 24% of the stimulus payments was spent to increase card spending. They also show that the stimulus payments led to larger consumption increases in sectors and regions that suffered less during the COVID-19 pandemic. Kim and Oh (2020) use a synthetic control method to explore the spending effect of the stimulus payments and indicate that the estimated MPC lies between 0.26 and 0.36. Their findings also suggest that the face-to-face service and food industries do not benefit much from the stimulus payments as consumers are reluctant to

[3] For example, studies such as Johnson et al. (2006) and Parker et al. (2013) point out that the marginal propensity to consume of the tax rebates during the recessions in 2001 and 2008 in the U.S. was higher than 0.5.

use face-to-face services due to the risk of COVID-19 infection. Unlike most studies in Korea using card transaction data, Kang et al. (2020) employ, the 'Household Income and Expenditure Survey', official data collected by the Korean National Statistics Office. Their difference-in-differences estimates indicate that the MPC of the stimulus payments during the second and third quarters in 2020 ranges from 0.65 to 0.78.

The main limitation pointed out in the literature studying the Korean case is a difficulty of finding an appropriate control group since the nationwide stimulus payments were paid to all households in Korea. I circumvent this identification challenge by capitalizing on the fact that the stimulus payments in Gyeonggi province clearly target a group of beneficiaries. The stimulus payments in Gyeonggi province, disturbed a month earlier than the nationwide stimulus payments by the central government, were designed to be redeemable only in establishments accepting local currency. Therefore, establishments not accepting local currency are used as a control group, and the DDD estimator measures how sales of establishments accepting local currency were affected by the stimulus payments, relative to their counterpart.

To the best of my knowledge, Baek et al. (2020) is the only paper that empirically examines the impacts of the stimulus payments in Gyeonggi province. Baek et al. (2020) applying a difference-in-differences (DD) framework to individual-level monthly panel data argue that the overall MPC of the stimulus payments is approximately 0.4 for single families. They find substantial heterogeneity in consumption responses: the MPC of households with liquidity constraints is close to unity while the MPCs of the other households are not statistically significant. My research is distinguished from Baek et al. (2020) in that the use of a DDD estimation employing establishment group-level data is more suitable for providing empirical evidence on the effectiveness of the COVID-19 stimulus payments in supporting local small businesses. In addition, the use of weekly card spending data enables me to explore how the spending effect of the stimulus payments evolves over weeks.

4. Data

This paper employs high-frequency offline credit and debit card transaction records in Gyeonggi province from Shinhan Card. Shinhan Card is one of the largest credit card companies in Korea, whose market share is about 23%. The data provided by Shinhan Card

contain information on daily number of transactions and spending, which are aggregated by characteristics of retail establishments (district, sector, and availability of local currency) and cardholders (residence, age, and income). Instead of providing raw data (spending by Shinhan Card), Shinhan Card estimates the total card spending considering its market share and other information. Thus, the total card spending estimated can be regarded as a proxy for the total card expenditures actually spent. Given that credit and debit card spending accounts for about 69.1% of all spending modes including cash (Bank of Korea, 2020), it is safely assumed that the card data used in the analysis can reflect overall consumption pattern in Gyeonggi province.

For the empirical analysis, I construct district-, treatment status (availability of local currency)-, week-level card spending data in Gyeonggi province that cover the period from week 1 to week 19 in 2019 and 2020. The rationale for this choice is that, in the middle of May (week 20) in 2020, nationwide stimulus payments were distributed to all residents in Korea. To isolate the effect of the stimulus payments in Gyeonggi province from the effect of the nationwide stimulus payments, I limit the period of analysis to week 19, just before the disbursement of the nationwide stimulus payments. To control for changes in card spending in the same period a year ago, weeks 1 to 19 in 2019 are also included in the dataset. Thus, I work with a sample of 3,192 observations (42 districts, 2 treatment status groups, 19 weeks, and 2 years).

Table 2 reports the means of weekly card spending of the 42 districts in 2020, organized by week and treatment status. The table shows that, on average, weekly card spending in establishments accepting local currency was slightly higher than that in establishments not accepting local currency in 2020. Establishments accepting local currency report average weekly sales of 20.8 billion Korean Won, while establishments not accepting local currency report average weekly sales of 18.5 billion Korean Won. The difference in weekly card spending between the two treatment status groups appears to be stable over weeks in general. The mean of the differences during the period of analysis is around 2.3 billion Korean Won, and the difference fluctuates between 1.4 and 2.6 billion Korean Won prior to the disbursement of the stimulus payments in week 15.[4] After the distribution of the stimulus payments, the gap

[4] In week 4, the difference in weekly card spending between the treatment status groups is 3.3 billion Korean Won, which is somewhat higher than usual due to an influence of Lunar New Year's Day, the biggest holiday in Korea. Consumption in traditional markets to prepare for the Lunar New Year holiday tends to increase a few days before the holiday. Most of the traditional markets accept local currency, and Lunar New Year's Day in 2020 was January 25 that belongs to week 4.

started increasing immediately, implying that the stimulus payments may contribute to increasing card spending in establishments accepting local currency relative to establishments not accepting local currency.

[TABLE 2]

The table also reveals that there is a strong relationship between weekly card spending and the weekly number of new COVID-19 cases. Since the first COVID-19 case was confirmed in week 4, the mean weekly card spending of the treatment status groups have decreased. It reached the lowest level, 17.9 billion Korean Won, in week 9 in which the daily number of new cases hit a peak at 909. Since then, as the spread of the virus has been slowed down, card spending has gradually increased. This clearly describes that infection risks have a considerable negative impact on consumption, suggesting that it is crucial to control for the direct spending effect of COVID-19 when estimating the unbiased spending effect of the stimulus payments.

5. Methodology: Difference-in-Difference-in-Differences estimation

The stimulus payments in Gyeonggi province creates three dimensions of variation (availability of local currency, week, and year) that I exploit to identify the treatment effect. The stimulus payments were redeemable only in establishments accepting local currency as of April 9, 2020, generating variation across treatment status groups and over weeks. This makes it suitable to employ a typical DD estimation. I use as the treatment group establishments accepting local currency whose sales may increase relative to their counterparts, establishments not accepting local currency. Since Gyeonggi residents could apply for the stimulus payments as of Thursday, April 9, 2020 and payment was made within 48 hours after the application, the spending effect of the stimulus payments is expected to be present from the end of week 15 (from Sunday, April 5 to Saturday, April 11) onward. Thus, the DD estimation examines the treatment effect of the stimulus payments by comparing the shift in sales of establishments accepting local currency to the shift in sales of establishments not accepting local currency.

For the DD approach to yield a consistent estimate of the treatment effect, the parallel trends assumption needs to hold. Figure 1 seems to describe that in general, weekly spending trends were the similar in both treatment (establishments accepting local currency) and control

(establishments not accepting local currency) groups prior to the disbursement of the stimulus payments in week 15. However, there are also some weeks in which the trends of the two groups appear slightly different, suggesting that time-variant treatment status group-specific shocks need to be controlled for, to further remove a potential source of bias.

[FIGURE 1]

I control for the underlying weekly spending trends not associated with the stimulus payments such as seasonal factors by using a DDD method. The DDD method first compares the change in sales of establishments accepting local currency to the change in sales of establishments not accepting local currency in 2020. This difference in differences is then compared to the difference between the change in sales of establishments accepting local currency to the change in sales of establishments not accepting local currency in 2019. The use of the triple-difference model can difference out trends that may differ for treatment and control groups, addressing the concern on the parallel trends assumption in the DD estimator (Zavodny, 2000).

The basic regression used to estimate the effect of the stimulus payments on the relative card spending in establishments accepting local currency includes fixed effects, interactions of the fixed effects and district-specific covariates. The equation at the district level is

$$Y_{irwy} = \alpha_i + \alpha_r + \alpha_w + \alpha_y + \gamma_{iw} + \lambda_{iy} + \theta_{wy} + \delta D_{iwy} + \beta COVID19_{rwy} + \varepsilon_{irwy} \quad (1)$$

where i denotes treatment status groups (establishments accepting local currency or establishments not accepting local currency), r denotes districts (42 districts), w denotes calendar weeks (week 1 ~ week 19) and y denotes years (2019 or 2020). Y_{irwy} is the outcome of interest (logged card spending); α_i is a treatment (establishments accepting local currency) group dummy; α_r is a full set of district dummies; α_w is a full set of week dummies; and α_y is a year 2020 dummy. By including interactions of the fixed effects, this model provides full nonparametric control for the year-invariant week effects of belonging to a treatment group (γ_{iw}), the week-invariant year effects of belonging to a treatment group (λ_{iy}) and year 2020-specific week effects common across treatment status groups (θ_{wy}). The variable of interest, D_{iwy}, indicates a treatment group in weeks and years that are subject to stimulus

payments. Hence, the DDD estimate δ is interpreted as the effect of the the stimulus payments on the relative card spending in establishments accepting local currency.

$COVID19_{rwy}$ indicates the number of confirmed COVID-19 cases per 1 million people in district *r* in week *w* and year *y*, which controls for the spending effect of COVID-19. Following Bertrand et al. (2004), I compute clustered standard errors at the district level to prevent false rejections of the null hypothesis of no effect.

To examine how the spending effect of the stimulus payments evolves over weeks, I estimate equation (2) where the treatment effect in equation (1) is disentangled by week.

$$Y_{irwy} = \alpha_i + \alpha_r + \alpha_w + \alpha_y + \gamma_{iw} + \lambda_{iy} + \theta_{wy} + \sum_{15}^{19} \delta_k \ D^k{}_{iwy} + \beta COVID_{rwy} + \varepsilon_{irwy} \quad (2)$$

$D^k{}_{iwy}$ is an indicator variable taking the value 1 if the observation belongs to a treatment group in week *k* in 2020. Thus, the coefficients of interest δ^k capture the heterogeneous effect of the stimulus payments by week on the relative card spending in establishments accepting local currency.

6. Results

6. 1. Main results

Panel A in table 3 presents the results of the DDD estimation, the average impact of the stimulus payments on the relative card spending in establishments accepting local currency in Gyeonggi province. Column 1 shows the estimate of the effect of the stimulus payments estimated by equation (1), while Column 2 shows the result of an alternative specification additionally controlling for district-specific treatment group, week, and year fixed effects, respectively. Establishments accepting local currency appear to increase sales relative to establishments not accepting local currency after the stimulus payments are disbursed. The estimated increases are about 4.1%, which are statistically significant at the 5% level. The coefficients of the stimulus payments in both columns are very similar, indicating that further controlling for district-specific variation does not significantly contribute to improving the accuracy of the estimates.

[TABLE 3]

Panel B in table 3 shows how the spending effect of the stimulus payments evolves over weeks. In week 15, the disbursement week of the stimulus payments, card spending in establishments accepting local currency in Gyeonggi province increased by 2.1%, relative to establishments not accepting local currency. However, the increase is not large enough to be statistically significant since the stimulus payment was disbursed at the end of week 15. As more people received the stimulus payments, card spending increased dramatically in weeks 16 and 17. The estimated increases are 8.8% and 9.0%, respectively, which are statistically significant at the 1% level. The size of the increase in card spending became smaller and statistically insignificant from week 18 onward. The results suggest that the positive overall spending effect presented in panel A are mainly concentrated within three weeks after the disbursement of the payments. This is in line with the findings in papers such as Baek et al. (2020) in which the positive spending impact of stimulus payments persists over a couple of weeks.

6. 2. Robustness checks

The robustness of the main findings is tested by performing placebo tests. Since the stimulus payments increase the income of residents in Gyeonggi province, they lead to an increase in consumption in Gyeonggi province by Gyeonggi residents. However, the stimulus payments do not provide non-residents of Gyeonggi province with any incentive to increase spending in Gyeonggi province because their income is unaffected by the stimulus payments. To check for the heterogenous reactions of the two resident groups to the stimulus payments, I split card spending into two parts: card spending by Gyeonggi residents and non- Gyeonggi residents. Equations (1) and (2) are estimated separately using card spending data of residents of Gyeonggi province and card spending data of non-residents of Gyeonggi province. For the estimation, model (1) without district-specific fixed effects is used. If the spending increases shown in table 3 are attributed to the stimulus payments, non-residents' spending in Gyeonggi province should not change.

Table 4 shows the estimation results. The positive spending effect of the stimulus payments in panel A in table 3 is observed in panel A in table 4, and the estimated effect for Gyeonggi residents is greater than the estimates in panel A in table 3. The same coefficient for non-

residents of Gyeonggi province in panel A in table 4 indicates that the stimulus payments did not significantly change card spending by non-residents in Gyeonggi province, which suggests that the spending increases shown in panel A in table 3 are attributed to the stimulus payments.

[TABLE 4]

For Gyeonggi residents, the coefficients of the stimulus payments in panel B in table 4 are similar to those in panel B in table 3. The magnitude of the estimated spending effects in panel B in table 4 is greater, and the spending increases in week 15 and week 18 are large enough to be statistically significant. This implies that the increase in card spending shown in panel B in table 3 are mainly driven by the increases in card spending by Gyeonggi residents as the policy intended. Conversely, a similar pattern in card spending is not observed for non-Gyeonggi residents in panel B in table 4. None of the estimates of the policy variables for non-residents of Gyeonggi province in panel B in table 4 are statistically different from zero at conventional levels, reaffirming that the DDD estimator yields an unbiased estimate of the treatment effect.

The main findings may still suffer from bias if an anticipatory effect plays a role (Angrist and Pischke, 2008). For instance, the DDD estimates would be biased if individuals anticipating the receipt of the stimulus payments increased spending immediately prior to the distribution of the payments. This would render the treatment effect underestimated. To explore the existence of the anticipatory effect, I repeated the regressions in panel B in table 3 adding leads of the stimulus payments. More specifically, I augmented equation (2) with indicators for one and two weeks before the distribution of the stimulus payments. Considering the Gyeonggi provincial council voted for the stimulus payments on March 23, the beginning of week 13, indicators for weeks 13 and 14 are included in the regression model. The results show that the estimated coefficients of the policy variables (week 15 to 19) produced by this alternative specification in table 5 are very similar to the results in panel B in table 3. More importantly, the coefficients of the leads in the alternative specification are not statistically different from zero, which implies that the disbursement of the stimulus payments indeed produces a significant positive impact on card spending in establishments accepting local currency relative to their counterparts.

[TABLE 5]

6. 3. Heterogeneous spending effects by sector

The stimulus payments were designed to support local small businesses that suffered sizeable sales losses attributed to the COVID-19 pandemic. The main results of the paper indicate that local small businesses in Gyeonggi province clearly benefited from the stimulus payments on average. However, it is necessary to verify how the benefits have been distributed among those affected businesses. To figure out who gains the most from the stimulus payments, I disaggregated card spending by sector and estimated equation (1) separately using card spending data of each sector.

Table 6 shows the heterogeneous spending responses of the stimulus payments across 13 sectors. The sector benefited the most from the stimulus payments was groceries, followed by furniture and beauty. The sales of establishments accepting local currency that belong to the grocery sector increased by 32% relative to establishments not accepting local currency after the disbursement of the stimulus payments. The stimulus payments seem to distort beneficiaries' decision-making about where to buy groceries: grocery purchases at large-scale supermarkets have been replaced with grocery purchases at small local markets. Also, beneficiaries of the stimulus payments in Gyeonggi province also increased relative card spending in establishments accepting local currency related to the furniture and beauty sectors by 18.7% and 8.3%, respectively. The stimulus payments seem to be used to buy things that were not routinely purchased such as furniture, home appliances, beauty products, and beauty care services. An interesting finding is that the spending effect at the services sector is negative and statistically significant. This might be attributable to the fact that people were still reluctant to using in-person services supplied by small-sized providers due to the ongoing infection risks. For example, when using legal, accounting, or counseling services, people might prefer those services supplied by large-scale providers that are systematically more capable of providing non-face-to-face type services.

[TABLE 6]

Given that sales losses attributed to the COVID-19 pandemic and social distancing measures have been larger in face-to-face service industry, the results in table 8 describe a paradoxical

situation wherein sectors suffered the most were not the ones benefited the most from the stimulus payments. While the estimated spending effect of the stimulus payments is larger among sectors such as groceries, furniture, and beauty, sectors such as restaurants, leisure, and travel did not gain much from the stimulus payments. Establishments in those sectors have experienced substantial sales losses because their services entail physical interactions with other customers.[5] The findings suggest that restricting the use of stimulus payments only in local small businesses is not the most effective way of restoring sales losses of businesses most affected by COVID-19 pandemic although the stimulus payments could contribute to improving overall sales of local small businesses.

7. Conclusion

This paper shows that the COVID-19 stimulus payments to all individuals in Gyeonggi province, Korea significantly contribute to increasing sales of local small businesses vulnerable to the negative economic impact of the COVID-19 outbreak. The stimulus payments appear to significantly increase card spending in establishments accepting local currency, relative to establishments not accepting local currency. The estimated overall spending effect of 4.1% persisted over three weeks. Anticipatory behaviors of consumers in response to the implementation of the stimulus payments and card spending in Gyeonggi province by non-Gyeonggi residents do not seem to affect the estimated effects, suggesting that the stimulus payments indeed resulted in the sales increase. The effect of the stimulus payments is not uniform across sectors. While the estimated spending effect of the stimulus payments is larger among sectors such as groceries, furniture, and beauty, sectors such as restaurants, leisure, and travel that experienced substantial sales losses did not gain much from the stimulus payments. The findings suggest that restricting the use of stimulus payments only in local small businesses can make a non-negligible contribution to restoring their COVID-19 induced sales losses; however, targeting sectors the most severely affected can be a more effective policy measure in terms of alleviating the gaps in COVID-19 induced economic losses across sectors.

Further research is needed to clearly determine the channels through which the stimulus payments cause the positive effects observed in establishments accepting local currency.

[5] The findings are consistent with the previous studies such as Chetty et al. (2020) and Kim et al. (2020) that point out that the spending effect was greater in sectors less severely affected by the COVID-19 pandemic.

Establishment-level panel data would help to fully control for the potential indirect effects of the stimulus payments. It is also important to further study general equilibrium effects of the stimulus payments. The positive impacts revealed in this paper only took place for a few weeks after the stimulus payments was distributed, and it is unknown the extent to which the increase in spending in local small businesses results in an increase in aggregate demands for goods and services, thereby engendering a final increase in national income. Future research exploring the magnitude of the 'multiplier effect' should be conducted to fully assess the overall effect of the stimulus payments and to further suggest fine-tuned policy recommendations.

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Table 1
Amount of stimulus payments by municipality

Municipality	Gyeonggi provincial stimulus payments	Gyeonggi municipal stimulus payments	Total
Pocheon	100	400	500
Anseong	100	250	350
Hwaseong	100	200	300
Yeoncheon	100	200	300
Icheon	100	150	250
Dongducheon	100	150	250
Yangpyeong	100	120	220
Suwon	100	100	200
Yongin	100	100	200
Seongnam	100	100	200
Ansan	100	100	200
Namyangju	100	100	200
Pyeongtaek	100	100	200
Siheung	100	100	200
Paju	100	100	200
Osan	100	100	200
Yangju	100	100	200
Yeoju	100	100	200
Gapyeong	100	100	200
Gwacheon	100	100	200
Guri	100	90	190
Goyang	100	50	150
Bucheon	100	50	150
Anyang	100	50	150
Euijeongbu	100	50	150
Gimpo	100	50	150
Gwangju	100	50	150
Gwangmyeong	100	50	150
Gunpo	100	50	150
Hanam	100	50	150
Euiwang	100	50	150

NOTE. –. The amount of stimulus payments is presented in thousands of Korean Won.

Table 2
Weekly card spending in 2020 by treatment status

Week	Establishments accepting local currency	Establishments not accepting local currency	Difference	Mean
1	13.1	11.7	1.4	12.4
2	21.8	19.7	2.1	20.8
3	22.8	21.4	1.4	22.1
4	21.8	18.5	3.3	21.3
5	20.7	19.0	1.7	19.9
6	20.2	17.6	2.6	18.9
7	20.6	18.3	2.3	19.5
8	20.8	18.3	2.5	19.6
9	18.9	16.9	2.0	17.9
10	18.9	17.4	1.5	18.1
11	19.2	17.4	1.8	18.3
12	20.2	18.1	2.1	19.2
13	20.2	18.1	2.1	19.2
14	20.8	18.9	1.9	19.9
15	20.4	18.1	2.3	19.2
16	23.4	19.1	4.3	21.2
17	23.0	19.2	3.8	21.1
18	24.4	21.3	3.1	22.8
19	23.7	20.8	2.9	22.2
	20.8	18.5	2.3	19.7

NOTE. –. The amount of card spending is presented in billions of Korean Won.

Table 3
Spending effect of the stimulus payments

	Log card spending	
Variable	(1)	(2)
A. Overall effects:		
Stimulus payments	0.041**	0.041**
	(0.016)	(0.019)
COVID-19	-0.001	-0.002***
	(0.001)	(0.001)
Local currency accepting establishment dummy	Yes	Yes
District FE	Yes	Yes
Week FE	Yes	Yes
Year FE	Yes	Yes
Local currency accepting establishment dummy * Week FE	Yes	Yes
Local currency accepting establishment dummy * Year FE	Yes	Yes
Week FE * Year FE	Yes	Yes
Local currency accepting establishment dummy * District FE		Yes
Week FE * District FE		Yes
Year FE * District FE		Yes
Observations	3,192	3,192
B. Heterogeneous effects:		
Week 15 * Stimulus payments	0.021	0.021
	(0.012)	(0.014)
Week 16 * Stimulus payments	0.088***	0.088***
	(0.023)	(0.027)
Week 17 * Stimulus payments	0.090***	0.090***
	(0.019)	(0.022)
Week 18 * Stimulus payments	0.023	0.023
	(0.025)	(0.029)
Week 19 * Stimulus payments	-0.018	-0.018
	(0.019)	(0.022)
COVID-19	-0.001	-0.002***
	(0.001)	(0.001)
Local currency accepting establishment dummy	Yes	Yes
District FE	Yes	Yes
Week FE	Yes	Yes
Year FE	Yes	Yes
Local currency accepting establishment dummy * Week FE	Yes	Yes
Local currency accepting establishment dummy * Year FE	Yes	Yes
Week FE * Year FE	Yes	Yes
Local currency accepting establishment dummy * District FE		Yes
Week FE * District FE		Yes
Year FE * District FE		Yes
Observations	3,192	3,192

NOTE. – Robust standard errors clustered at the district level are in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 4
Spending effect of the stimulus payments by residency

Variable	Log card spending	
	Gyeonggi residents	Gyeonggi non-residents
A. Overall effects:		
Stimulus payments	0.051***	-0.011
	(0.012)	(0.029)
COVID-19	-0.001*	-0.001
	(0.001)	(0.001)
Local currency accepting establishment dummy	Yes	Yes
District FE	Yes	Yes
Week FE	Yes	Yes
Year FE	Yes	Yes
Local currency accepting establishment dummy * Week FE	Yes	Yes
Local currency accepting establishment dummy * Year FE	Yes	Yes
Week FE * Year FE	Yes	Yes
Local currency accepting establishment dummy * District FE		Yes
Week FE * District FE		Yes
Year FE * District FE		Yes
Observations	3,192	3,192
B. Heterogeneous effects:		
Week 15 * Stimulus payments	0.018*	0.016
	(0.010)	(0.027)
Week 16 * Stimulus payments	0.108***	-0.010
	(0.018)	(0.043)
Week 17 * Stimulus payments	0.102***	0.023
	(0.016)	(0.035)
Week 18 * Stimulus payments	0.039**	-0.032
	(0.019)	(0.041)
Week 19 * Stimulus payments	-0.012	-0.049
	(0.017)	(0.031)
COVID-19	-0.001*	-0.001
	(0.001)	(0.001)
Local currency accepting establishment dummy	Yes	Yes
District FE	Yes	Yes
Week FE	Yes	Yes
Year FE	Yes	Yes
Local currency accepting establishment dummy * Week FE	Yes	Yes
Local currency accepting establishment dummy * Year FE	Yes	Yes
Week FE * Year FE	Yes	Yes
Local currency accepting establishment dummy * District FE		Yes
Week FE * District FE		Yes
Year FE * District FE		Yes
Observations	3,192	3,192

NOTE. – Robust standard errors clustered at the regional level are in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 5
Spending effect of the stimulus payments by week with leads

	Log card spending	
Variable	(1)	(2)
Week 13 * Stimulus payments	0.032	0.032
	(0.029)	(0.033)
Week 14 * Stimulus payments	0.006	0.006
	(0.029)	(0.034)
Week 15 * Stimulus payments	0.023	0.023
	(0.015)	(0.018)
Week 16 * Stimulus payments	0.091***	0.091***
	(0.026)	(0.030)
Week 17 * Stimulus payments	0.092***	0.092***
	(0.021)	(0.024)
Week 18 * Stimulus payments	0.026	0.026
	(0.028)	(0.033)
Week 19 * Stimulus payments	-0.015	-0.015
	(0.020)	(0.024)
COVID-19	-0.001	-0.002***
	(0.001)	(0.001)
Local currency accepting establishment dummy	Yes	Yes
District FE	Yes	Yes
Week FE	Yes	Yes
Year FE	Yes	Yes
Local currency accepting establishment dummy * Week FE	Yes	Yes
Local currency accepting establishment dummy * Year FE	Yes	Yes
Week FE * Year FE	Yes	Yes
Local currency accepting establishment dummy * District FE		Yes
Week FE * District FE		Yes
Year FE * District FE		Yes
Observations	3,192	3,192

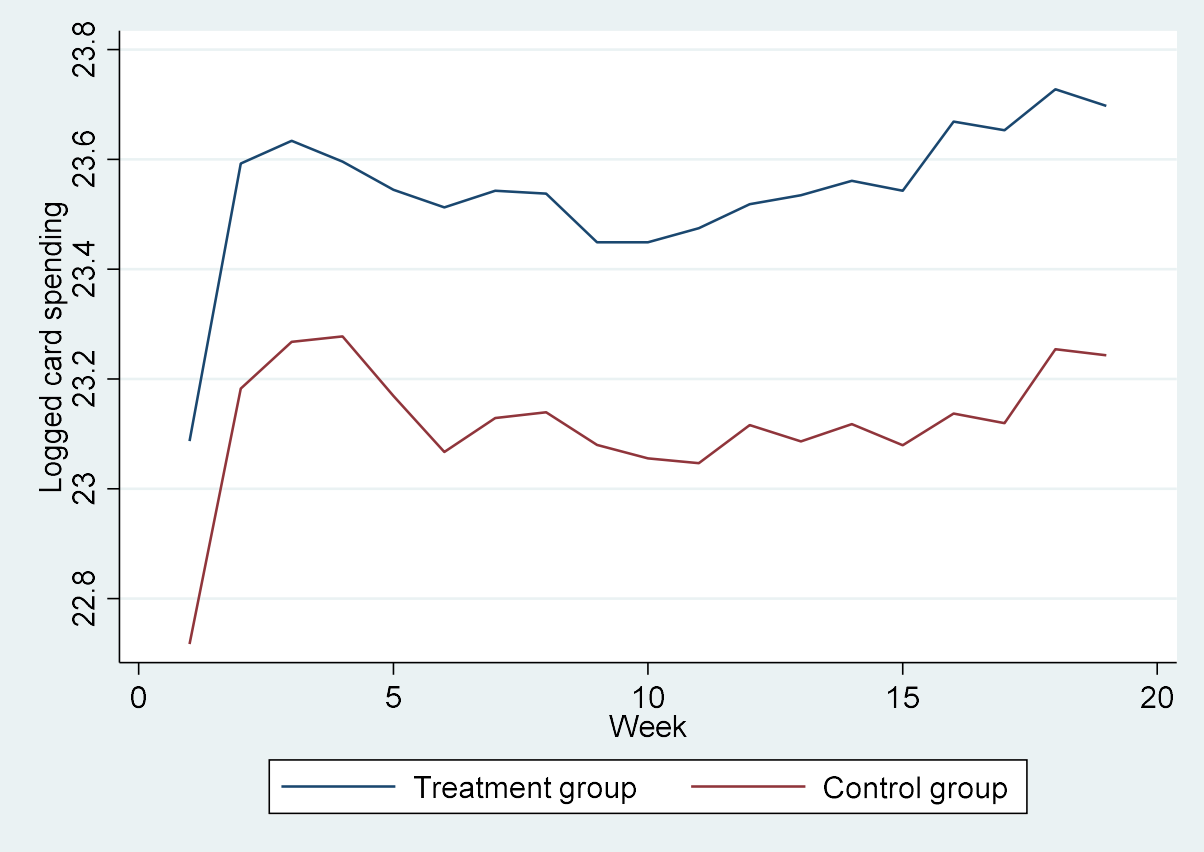
NOTE. – Robust standard errors clustered at the regional level are in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Table 6
Heterogeneous spending effect of the stimulus payments by sector

	Log card spending												
Variable	(1) Restaurants	(2) Distribution	(3) Groceries	(4) Clothes	(5) Leisure	(6) Travel	(7) Beauty	(8) Services	(9) Education	(10) Health care	(11) Furniture	(12) Vehicles	(13) Fuel
Stimulus payments	0.014	-0.007	0.320***	0.012	-0.014	-0.019	0.083*	-0.152**	0.061	-0.158	0.187***	-0.063	0.023
	(0.023)	(0.016)	(0.104)	(0.059)	(0.066)	(0.086)	(0.048)	(0.073)	(0.105)	(0.116)	(0.050)	(0.082)	(0.072)
Local currency accepting establishment dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local currency accepting establishment dummy * Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local currency accepting establishment dummy * Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE * Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,192	3,192	3,190	3,164	3,184	3,158	3,189	3,179	3,168	3,151	3,167	3,171	3,080

NOTE. – Robust standard errors clustered at the regional level are in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Figure 1
Weekly trends of logged card spending in 2020 by treatment status



NOTE. – The treatment group indicates establishments accepting local currency and the control group indicates establishments not accepting local currency.