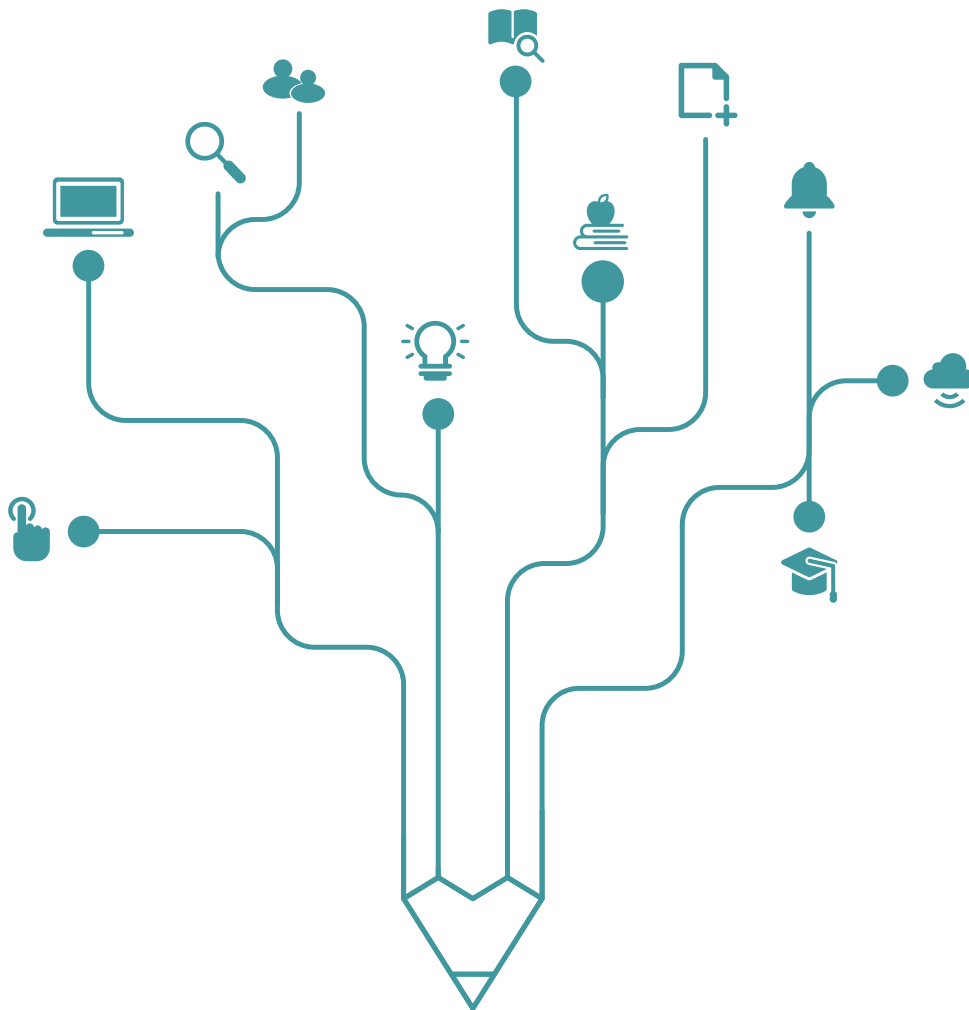


# Consumption among Different Demographic Groups During the Pandemic in Korea

*Jisun Baek (KDI School of Public Policy and Management)*



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## Abstract

We examine whether the changes in the sales of businesses after COVID-19 differ across various demographic groups using credit card transaction data in South Korea. In addition, we estimate the statistical association between the changes in the sales of businesses and the COVID-19 severity, measured by the incidence per thousand population, and investigate the differences in the statistical associations across demographical groups. We find that whether the changes in sales vary across demographic groups depends on the business category. The sales in restaurants and bars & snacks were reduced more among female cardholders than male cardholders, and cardholders in the 20s tend to reduce spending in these businesses less than older age groups did. In addition, cardholders in the 40s did not reduce spending in private education related to college entrance examinations, while they did in private education which is related less to the examinations.

**JEL classification:** R1

**Keywords:** COVID-19; Spending; Credit Card Transactions;

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# 1 Introduction

We have experienced the COVID-19 pandemic for a few years. It caused not only an enormous negative impact on health but also substantial changes in people's lifestyles. During the pandemic, particularly in the early period, various social activities were restricted, which made people change their behaviors in many parts of their lives, including their spending on various goods and services.

This paper investigates how people changed their spending on various goods and services and whether such changes exhibited differences across their demographical characteristics. We employ data on credit card transactions in South Korea from November 2018 until October 2020, which covers the first wave of the epidemic outbreak. First, we analyze the changes in sales in different regions and business sectors after COVID-19 started affecting our lives, which reflect people's spending on various goods and services. We also investigate whether such changes differ across various sectors and whether people with different demographic characteristics exhibited different patterns in the changes. Utilizing the information on the number of COVID-19 confirmed cases in each geographical region at each period, we also analyze how sales of businesses are associated with the COVID-19 spread intensity, and how the association differs across demographical groups.

Many studies have analyzed the effect of the COVID-19 pandemic on the economy, focusing on sales and consumption. It is important to analyze the impact on different business sectors as different industries have different characteristics and thus have experienced different impacts. Bloom et al. (2021) find the sales of businesses decreased substantially in the early period of the COVID-19 pandemic, and emphasize that the sales either exhibited no change or an increase among 40% of businesses. Bartik et al. (2020) also document that the impact of the spread of COVID-19 on the performance of businesses in the early period of the pandemic varies across industries. Aum et al. (2021) and Kim (2021) also find the impact of COVID-19

on the Korean economy and document the differences in the impacts across various sectors.

This study contributes to the literature by documenting the changes in sales of businesses after COVID-19 and how such changes vary across different demographic groups. In addition, we investigated how the sales varied with the severity of COVID-19, measured by the COVID-19 incidence per thousand population in a region at a time. This study allows us to understand better the experience that businesses went through during the pandemic period.

The rest of the paper is organized as follows; Section 2, explaining the empirical setting regarding the COVID-19 outbreak in South Korea in 2020, is followed by the summary of the data this paper employs in Section 3. In Section 4, we elaborate empirical specifications to compare the changes in sales of businesses and the difference in the statistical association between the sales and the COVID-19 intensity across different demographical groups, with the main empirical results and findings. Section 5 offers the summary and implications of this paper.

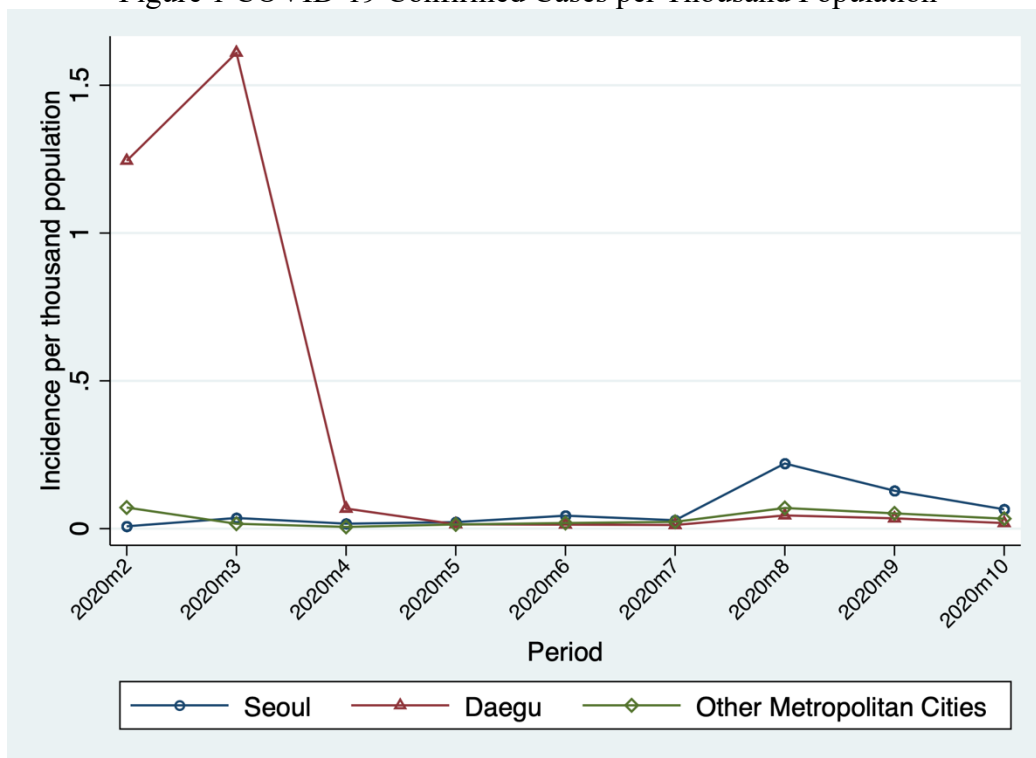
## **2 The First Wave of the COVID-19 in South Korea**

When analyzing the changes in sales of businesses after the COVID-19 pandemic, we consider two definitions for the period under the pandemic. For a discrete measure, March 2020 or the later periods are regarded as the periods under the pandemic, but January and February 2020 are excluded from the analyses. The first confirmed case of COVID-19 in South Korea was a 35-year-old Chinese woman reported on January 20<sup>th</sup>, and the number of confirmed cases gradually increased to 30 cases until the 31<sup>st</sup> case was reported on February 18, 2020. Since the contacts of the 31<sup>st</sup> case were discovered, the number of COVID-19 cases drastically increased. Although there was the first case reported in January 2020, the public did not take it seriously and the impact on the economy was not severe because approximately one confirmed case per day on average in the whole country until February 18. Therefore, we regard the periods after

the 31<sup>st</sup> case report as the period under the pandemic, but we exclude January and February of 2020 from our analyses. For a continuous measure (which reflects COVID-19 intensity), January 2020 or the later periods are used, and we use the number of confirmed cases per thousand population in each region (si-gun-gu) as the intensity of COVID-19 spread of the region in the period.

Figure 1 depicts the monthly number of COVID-19 confirmed cases per thousand population in Seoul, Daegu, and all other metropolitan cities, separately. The spike in Daegu in February and March of 2020 reflects the concentration of confirmed cases traced from the 31<sup>st</sup> case. For periods other than February and March, all areas exhibit similar trends of the COVID-19 severity.

Figure 1 COVID-19 Confirmed Cases per Thousand Population



Note. Each curve is the monthly confirmed cases per thousand population in Seoul, Daegu, and all other metropolitan cities in 2020 in South Korea.

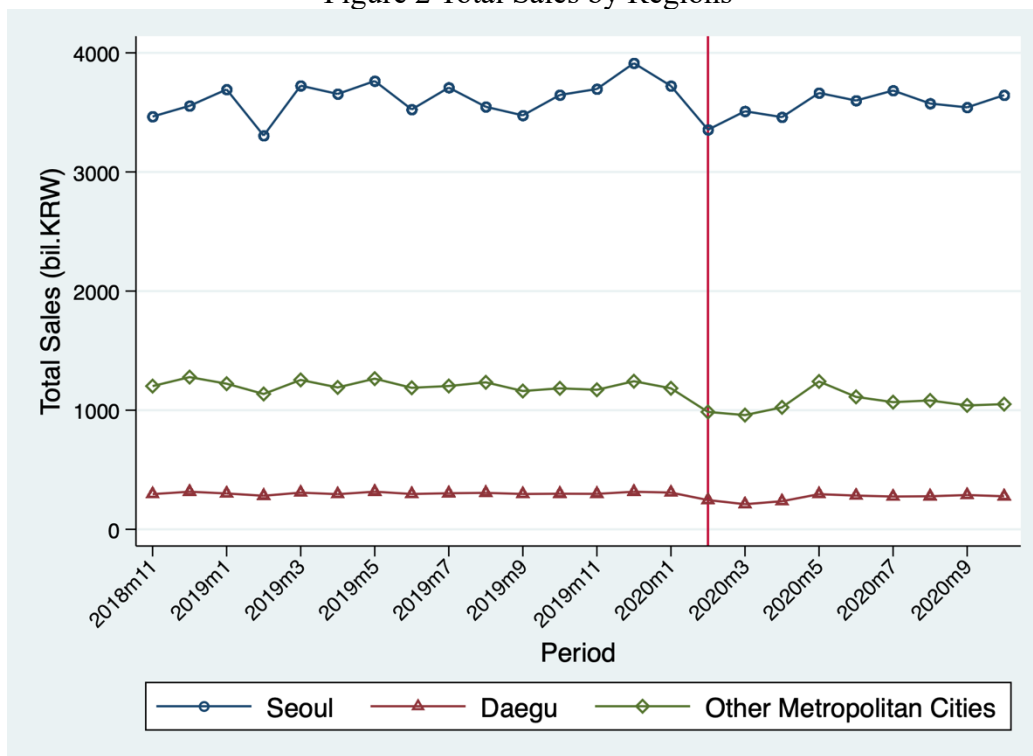
### 3 Data

We use data of credit card transactions of BC Card monthly aggregated based on the location

(Si-gun-gu, similar to district or county) of business and demographic information of card holders such as age range and sex. The transactions in the data cover all transactions through the BC Card network at offline businesses in Seoul and six metropolitan cities (covering 74 si-gun-gu) during the period between November 2018 and October 2020. The data provides the amount and counts of transactions. One advantage of this dataset is the detailed information regarding the category of business. As all the businesses using the transaction network are categorized into eight first-tier groups, 43 second-tier groups, and 234 third-tier groups, the dataset allows us to trace the changes in spending in each business category before and after the pandemic began in effect, and it also allows us to compare the changes between demographic groups.

Figure 2 plots the total sales over all business categories in Seoul, Daegu, and all other metropolitan cities over two years around the pandemic. The vertical red line indicated February 2020, when the first wave of the outbreak began. Although most of the confirmed cases in February 2020 were concentrated in Daegu, the sales in other cities also plummeted.

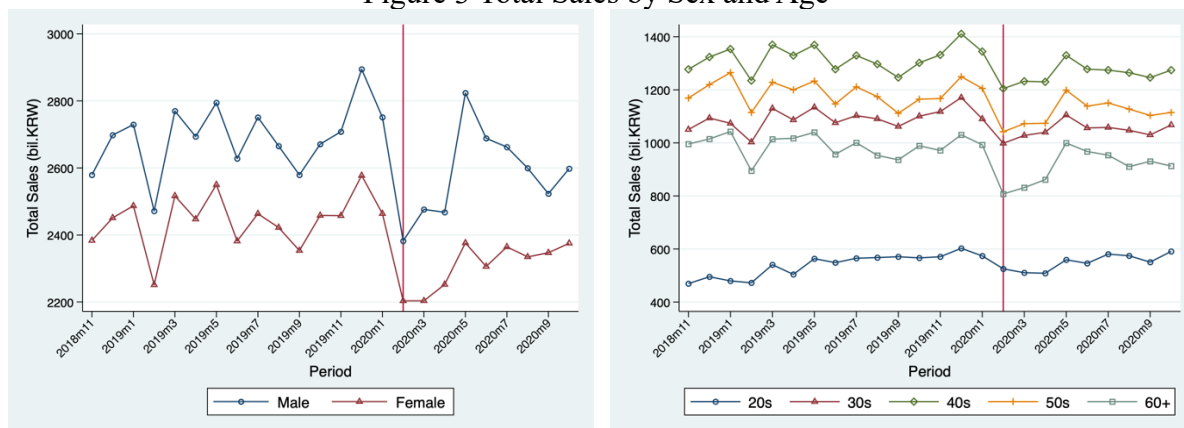
Figure 2 Total Sales by Regions



Note. Each curve is the monthly sales, in Seoul, Daegu, and all other metropolitan cities, respectively, in 2020 in South Korea. The vertical red line indicates February 2020, when the first wave of the outbreak began.

Figure 3 presents the trend of the total sales for various demographical groups. The numbers for the sales are aggregated over all the metropolitan cities and all the business categories. Figure 3 (a) shows that regardless of the sex of cardholders, the sales plunged in February 2020. However, the sales from male cardholders recovered to the same value in May of the last year in May while those from female cardholders were still below the value in May of the previous year. Figure 3 (b) depicts the trends of the sales for different age groups.

Figure 3 Total Sales by Sex and Age



(a) By the Sex of Cardholders

(b) By Ages of Cardholders

Note. Each curve is the monthly sales aggregated over all the metropolitan cities in an indicated demographical group, in 2020 in South Korea. The vertical red line indicates February 2020, when the first wave of the outbreak began.

Figures 2 and 3 show that the overall trends in sales in different regions and among different demographic groups are similar. We compare the changes in sales among different demographic groups in each business category to explore whether different demographic groups exhibited different spending patterns during the pandemic.

Each panel of Tables 1-4 summarizes the sales in a given business during the period of analysis. As the dataset covers more than 200 third-tier categories, we present a few selected categories of businesses. The variable reported in Tables 1-4 is based on the total amount of transactions in a given business category in a region in a month. We provide the means and the standard deviations of the variable separately for the periods before and after the COVID-19 pandemic outbreak, and we also report the variable aggregated separately for different demographical groups of card holders, indicated in the row heading. Columns (1) and (2) report the means and standard deviations during the period before COVID-19, and columns (3) and (4) report those in the period after the COVID-19 outbreak. Columns (5) and (6) present the changes between the two periods.

Table 1 Descriptive Statistics for selected business categories (1/4)

2018.1~2019.12		2020.3~2020.10			
(1)	(2)	(3)	(4)	(5)	(6)



	Mean	Std.Dev.	Mean	Std.Dev.	Change	Change Rate
<b>Leisure &amp; Recreation</b>	N=1036		N=592			
All	0.646	0.451	0.463	0.371	-0.183	-0.283
Male	0.505	0.340	0.378	0.294	-0.127	-0.251
Female	0.141	0.123	0.085	0.088	-0.056	-0.396
20~29	0.174	0.122	0.143	0.104	-0.030	-0.176
30~39	0.129	0.114	0.083	0.080	-0.046	-0.353
40~49	0.121	0.104	0.074	0.085	-0.047	-0.386
50~59	0.140	0.119	0.104	0.120	-0.036	-0.260
60+	0.079	0.078	0.055	0.079	-0.024	-0.301
<b>Accommodation</b>	N=1036		N=592			
All	0.438	0.740	0.264	0.442	-0.174	-0.398
Male	0.308	0.470	0.191	0.285	-0.117	-0.381
Female	0.130	0.278	0.073	0.161	-0.057	-0.437
20~29	0.051	0.083	0.039	0.050	-0.011	-0.221
30~39	0.109	0.164	0.075	0.129	-0.034	-0.308
40~49	0.100	0.173	0.056	0.091	-0.043	-0.436
50~59	0.086	0.139	0.047	0.071	-0.039	-0.456
60+	0.092	0.246	0.046	0.136	-0.046	-0.502
<b>Tourism</b>	N=789		N=407			
All	4.290	13.604	2.783	9.446	-1.506	-0.351
Male	2.387	7.559	1.592	5.382	-0.796	-0.333
Female	1.902	6.049	1.192	4.066	-0.711	-0.373
20~29	0.848	2.930	0.714	2.561	-0.134	-0.158
30~39	1.037	3.503	0.652	2.277	-0.385	-0.371
40~49	0.864	2.769	0.512	1.713	-0.353	-0.408
50~59	0.879	2.690	0.527	1.714	-0.353	-0.401
60+	0.656	1.942	0.369	1.190	-0.287	-0.438

Note: The variable summarized in this table is the amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category.

Most of the business categories reported in Tables 1-4 exhibit decreases in sales in almost all demographic groups, but sales of durables goods such as furniture and electrical appliances and sales at convenience stores increase. The decreases are large in some categories such as tourism (approximately, 35% decrease) and accommodation (40% decrease), but the decreases in these two categories are heterogeneous across demographic groups. For example,

the sales in tourism and accommodation decreased by 15.8% and 22.1% among cardholders in their 20s, but the sales in these categories among people older than 40 decreased by more than 40%. Similarly, the decrease in the sales at leisure businesses was smaller among people in their 20s.

Table 2 Descriptive Statistics for selected business categories (2/4)

	2018.1~2019.12		2020.3~2020.10		(5) Change	(6) Change Rate
	(1) Mean	(2) Std.Dev.	(3) Mean	(4) Std.Dev.		
<b>Furniture</b>	875		510			
All	0.046	0.103	0.092	0.314	0.046	0.992
Male	0.022	0.052	0.047	0.161	0.025	1.158
Female	0.024	0.053	0.045	0.154	0.020	0.843
20~29	0.001	0.003	0.004	0.018	0.003	3.364
30~39	0.009	0.029	0.019	0.082	0.010	1.085
40~49	0.012	0.027	0.023	0.087	0.012	0.995
50~59	0.013	0.029	0.025	0.076	0.012	0.895
60+	0.011	0.027	0.021	0.060	0.010	0.857
<b>Electrical Appliance</b>	1008		577			
All	0.463	1.611	0.524	1.846	0.062	0.134
Male	0.256	0.856	0.283	0.952	0.027	0.105
Female	0.207	0.760	0.242	0.900	0.035	0.169
20~29	0.016	0.066	0.019	0.081	0.003	0.176
30~39	0.063	0.233	0.071	0.258	0.007	0.116
40~49	0.099	0.365	0.120	0.431	0.021	0.214
50~59	0.132	0.467	0.152	0.545	0.020	0.149
60+	0.152	0.533	0.163	0.592	0.011	0.071
<b>Apparel</b>	1036		591			
All	0.847	1.323	0.616	0.995	-0.230	-0.272
Male	0.275	0.482	0.220	0.396	-0.055	-0.202
Female	0.572	0.848	0.397	0.606	-0.175	-0.306
20~29	0.138	0.269	0.103	0.203	-0.035	-0.254
30~39	0.168	0.380	0.126	0.297	-0.042	-0.251
40~49	0.147	0.262	0.105	0.201	-0.041	-0.282
50~59	0.187	0.246	0.134	0.180	-0.053	-0.285
60+	0.205	0.260	0.147	0.185	-0.058	-0.284

<b>Convenience Store</b>	1036		592			
All	2.478	1.543	2.509	1.473	0.031	0.012
Male	1.579	0.919	1.666	0.924	0.087	0.055
Female	0.899	0.640	0.843	0.563	-0.056	-0.063
20~29	0.550	0.359	0.548	0.341	-0.002	-0.004
30~39	0.705	0.514	0.662	0.455	-0.044	-0.062
40~49	0.586	0.361	0.599	0.344	0.013	0.022
50~59	0.424	0.239	0.455	0.239	0.031	0.073
60+	0.204	0.127	0.229	0.132	0.025	0.124

Note: The variable summarized in this table is the amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category.

Another interesting observation is found in restaurants. Sales in restaurant businesses made by both male and female cardholders reduced, but the magnitude of the decrease tends to be larger among female cardholders. Likewise, the overall sales in bars and snacks businesses were reduced by approximately 17%, and the decrease was larger among female cardholders than among male cardholders. As in restaurant businesses, people in the 20s reduced relatively less in bars and snacks. However, people in the 60s exhibited a different pattern from that in the restaurant businesses, and they reduced spending in bars and snacks less than younger people.

Table 3 Descriptive Statistics for selected business categories (3/4)

	2018.1~2019.12		2020.3~2020.10		(5) Change	(6) Change Rate
	(1) Mean	(2) Std.Dev.	(3) Mean	(4) Std.Dev.		
<b>Restaurants</b>	N=1036		N=592			
All	10.589	7.620	8.703	6.123	-1.886	-0.178
Male	6.381	4.411	5.415	3.658	-0.967	-0.151
Female	4.208	3.251	3.288	2.496	-0.919	-0.219
20~29	1.575	1.373	1.418	1.222	-0.157	-0.100
30~39	2.453	2.368	1.951	1.898	-0.501	-0.204
40~49	2.376	1.692	1.909	1.324	-0.467	-0.196
50~59	2.355	1.371	1.968	1.090	-0.387	-0.164
60+	1.820	1.184	1.435	0.841	-0.385	-0.212
<b>Bars &amp; Snacks</b>	N=1036		N=592			
All	1.407	1.036	1.169	0.841	-0.237	-0.169

Male	0.886	0.659	0.764	0.553	-0.122	-0.138
Female	0.520	0.385	0.405	0.292	-0.115	-0.221
20~29	0.303	0.257	0.244	0.197	-0.059	-0.193
30~39	0.337	0.298	0.259	0.231	-0.078	-0.231
40~49	0.336	0.251	0.283	0.209	-0.053	-0.156
50~59	0.296	0.204	0.259	0.167	-0.037	-0.125
60+	0.133	0.105	0.120	0.083	-0.013	-0.097
<b>Food &amp; Beverage</b>	N=1036		N=592			
All	1.927	1.068	2.062	1.192	0.135	0.070
Male	0.893	0.512	0.990	0.583	0.097	0.109
Female	1.034	0.575	1.072	0.631	0.038	0.037
20~29	0.128	0.097	0.116	0.081	-0.011	-0.089
30~39	0.286	0.188	0.290	0.190	0.003	0.012
40~49	0.439	0.251	0.461	0.282	0.022	0.049
50~59	0.510	0.281	0.549	0.319	0.039	0.076
60+	0.562	0.330	0.645	0.397	0.083	0.148
<b>Bakery</b>	N=1036		N=592			
All	0.547	0.350	0.485	0.306	-0.062	-0.114
Male	0.230	0.143	0.211	0.130	-0.019	-0.083
Female	0.317	0.209	0.274	0.178	-0.043	-0.136
20~29	0.071	0.053	0.062	0.046	-0.009	-0.123
30~39	0.120	0.088	0.102	0.073	-0.018	-0.149
40~49	0.145	0.087	0.125	0.075	-0.020	-0.139
50~59	0.124	0.074	0.111	0.065	-0.013	-0.106
60+	0.086	0.064	0.084	0.059	-0.003	-0.031
<b>Alcoholic Bev.</b>	N=347		N=232			
All	0.009	0.021	0.014	0.032	0.005	0.561
Male	0.006	0.015	0.010	0.023	0.004	0.594
Female	0.003	0.006	0.004	0.009	0.001	0.493
20~29	0.001	0.001	0.001	0.002	0.000	0.675
30~39	0.004	0.010	0.007	0.015	0.003	0.654
40~49	0.003	0.007	0.004	0.010	0.001	0.561
50~59	0.001	0.003	0.002	0.004	0.000	0.336
60+	0.000	0.002	0.000	0.001	0.000	0.046

Note: The variable summarized in this table is the amount (in billion KRW) of sales from card holders in each demographic group in all businesses located in a region at a time in each business category.

In private educational service businesses, the total sales decrease, but there are

differences across third-tier categories within private educational service businesses. There are several third-tier categories within private educational service businesses, and we summarized three of them in Table 4. The sales in foreign language education decreased in all age groups, but the decrease was substantially smaller among people in the 40s. Similarly, the sales in supplementary education businesses among people in the 40s did not decrease while all other age groups decreased their spending. However, people in the 40s decreased their spending by 44.5%, which is the largest among all the age groups, in arts and sports academies.

Table 4 Descriptive Statistics for selected business categories (4/4)

	2018.1~2019.12		2020.3~2020.10		(5) Change	(6) Change Rate
	(1) Mean	(2) Std.Dev.	(3) Mean	(4) Std.Dev.		
<b>Private Edu.</b>	N=1036		N=592			
All	1.434	1.422	1.268	1.169	-0.166	-0.115
Male	0.357	0.609	0.304	0.522	-0.052	-0.147
Female	1.077	0.848	0.964	0.691	-0.113	-0.105
20~29	0.025	0.036	0.030	0.034	0.005	0.203
30~39	0.442	0.258	0.481	0.273	0.039	0.089
40~49	0.694	0.665	0.551	0.575	-0.143	-0.206
50~59	0.255	0.644	0.194	0.476	-0.061	-0.238
60+	0.018	0.066	0.012	0.045	-0.007	-0.359
<b>Foreign Lang.</b>	N=908		N=496			
All	0.065	0.137	0.051	0.108	-0.013	-0.205
Male	0.029	0.066	0.025	0.058	-0.003	-0.115
Female	0.036	0.072	0.026	0.050	-0.010	-0.276
20~29	0.004	0.011	0.002	0.007	-0.002	-0.413
30~39	0.003	0.011	0.002	0.005	-0.002	-0.491
40~49	0.040	0.073	0.036	0.064	-0.004	-0.100
50~59	0.016	0.047	0.011	0.037	-0.005	-0.319
60+	0.001	0.005	0.001	0.003	-0.001	-0.558
<b>Arts &amp; Sports</b>	N=956		N=462			
All	0.065	0.083	0.039	0.063	-0.026	-0.399
Male	0.027	0.034	0.017	0.026	-0.010	-0.364
Female	0.039	0.050	0.022	0.038	-0.016	-0.423
20~29	0.001	0.005	0.002	0.006	0.000	0.252
30~39	0.003	0.006	0.002	0.004	-0.001	-0.237

40~49	0.050	0.047	0.028	0.033	-0.022	-0.445
50~59	0.012	0.037	0.008	0.028	-0.004	-0.317
60+	0.000	0.001	0.000	0.001	0.000	-0.361
<b>Supp. Edu.</b>	N=973		N=462			
All	0.309	0.819	0.279	0.671	-0.030	-0.096
Male	0.139	0.393	0.135	0.347	-0.004	-0.027
Female	0.170	0.427	0.144	0.326	-0.026	-0.153
20~29	0.003	0.012	0.002	0.008	-0.001	-0.302
30~39	0.001	0.003	0.001	0.002	0.000	-0.172
40~49	0.140	0.307	0.147	0.294	0.007	0.050
50~59	0.159	0.471	0.125	0.348	-0.034	-0.215
60+	0.006	0.035	0.004	0.027	-0.002	-0.264

Note: The variable summarized in this table is the amount (in billion KRW) of sales from card holders in each demographic group in all businesses located in a region at a time in each business category.

## 4 Regressions and Results

We perform two sets of analyses to investigate the difference in the changes in sales after the COVID-19 outbreak and the different patterns in the statistical association between sales and the COVID-19 intensity, measured by the number of COVID-19 confirmed cases per thousand population, across various demographical groups.

First, we employ the following equation in each business category to test whether the changes in sales after the COVID-19 outbreak differ across demographical groups:

$$Y_{grt} = \alpha \text{Post}_t \cdot \text{Female}_g + \gamma \text{Post}_t + \delta \text{Female}_g + \lambda_r + \mu_t + \varepsilon_{grt} \quad (1)$$

where  $Y_{grt}$  is the logarithm of sales of businesses located in a region  $r$  at time  $t$  in a given sector made by cardholders in demographical group  $g$ .  $\text{Post}_t$  is an indicator variable that takes a value equal to one if  $t$  is after the COVID-19 outbreak.  $\text{Female}_g$  is an indicator variable taking one if the observation is based on female cardholders.  $\lambda_r$  and  $\mu_t$  indicate region (metropolitan city)-fixed and month of year-fixed effects, respectively. The error term  $\varepsilon_{grt}$  is clustered at the region level, where the impact of the COVID-19 outbreak varies. The

coefficients of the interest are  $\alpha$  and  $\gamma$ :  $\gamma$  captures the changes in sales after the COVID-19 outbreak among male cardholders in a given business category, and  $\alpha$  summarizes the difference in the change between male and female cardholders.

When analyzing the difference in the change of sales between age groups, we estimate the following equation:

$$Y_{grt} = \sum_g \alpha_g \text{Post}_t \cdot \text{Age}_g + \gamma \text{Post}_t + \sum_g \delta_g \text{Age}_g + \lambda_r + \mu_t + \varepsilon_{grt} \quad (2)$$

where  $\text{Age}_g$  is an indicator variable taking a value equal to one if the observation is based on cardholders with age group  $g$ . We use the age groups in the 20s, 30s, 40s, 50s, and 60 or older in our analysis, and  $\text{Age}_g$  for the 30s is omitted as the base group. Therefore, like in equation (1),  $\gamma$  summarizes the changes in the sales among the base group (cardholders in the 30s) and  $\alpha_g$  captures the difference in the change of sales in the age group  $\alpha_g$  relative to the change among cardholders in the 30s. The definitions of all the other variables are identical to those in equation (1).

Tables 5-8 present the results from the regressions based on the equation (1) and (2). The dependent variables are the amount of credit card transactions made by cardholders in group  $g$  in a region  $r$  at time  $t$ , in the business category indicated in the column heading, in the natural logarithm. Panels A in Tables 5-8 show the difference in the changes of sales after COVID-19 by sex, and Panels B shows the difference across age groups.

As we observed in Section 3, accommodation and tourism businesses suffered from a large decrease in sales. While females reduced more than males in leisure & recreation and accommodation businesses, the reduction in the sales in tourism businesses does not exhibit the difference between males and females. Another interesting observation in these businesses is that the decreases in the sales in tourism businesses do not differ much across age groups, but the decreases in the sales in leisure & recreation and accommodation businesses vary significantly across age groups. In particular, sales from cardholders in the 20s in these two

categories reduced much less than those from other age group card holders.

**Table 5 Comparison of Changes in Sales between Groups in Selected Business Categories (1/4)**

	(1)	(2)	(3)
	<b>Leisure &amp; Recreation</b>	<b>Accommodation</b>	<b>Tourism</b>
<b>Panel A</b>			
Post	-0.356*** (.0284)	-0.406*** (.0213)	-0.669*** (.195)
Female*Post	-0.298*** (.0325)	-0.114*** (.0359)	0.195 (.1682)
Adj. R-sq.	0.473	0.325	0.197
Mean of Y	18.88	17.95	17.58
N	3252	3249	2192
<b>Panel B</b>			
Post	-0.458*** (.0316)	-0.451*** (.0288)	-0.464** (.2267)
Age20*Post	0.256*** (.0319)	0.273*** (.0246)	-0.0645 (.1835)
Age40*Post	-0.215*** (.0306)	-0.00626 (.0311)	-0.148 (.1601)
Age50*Post	-0.0269 (.0352)	-0.0289 (.0353)	0.167 (.2164)
Age60*Post	-0.246*** (.064)	-0.156*** (.0526)	-0.0479 (.2092)
Adj. R-sq.	0.244	0.171	0.274
Mean of Y	18.04	17.19	17.14
N	8131	8124	4959

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking the logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

While leisure & recreation, accommodation, and tourism businesses suffered from the decrease in sales, some industries avoided the decrease. For example, electrical appliance retails experienced an increase in sales, and the increase did not differ across groups. The sales in convenience stores also increased slightly during the pandemic, but the changes in sales vary across demographic groups. While the sales from male cardholders increased, those from female cardholders did not. The change of sales in convenience stores from cardholders in different age groups also exhibit differences.

**Table 6 Comparison of Changes in Sales between Groups in Selected Business Categories (2/4)**

(1) (2) (3) (4)



	<b>Furniture</b>	<b>Electrical Appliance</b>	<b>Apparel</b>	<b>Convenience Store</b>
<b>Panel A</b>				
Post	0.159 (.1487)	0.0985*** (.0321)	-0.210*** (.0308)	0.0142** (.0067)
Female*Post	-0.246** (.1082)	-0.0173 (.0255)	-0.155*** (.0227)	-0.0991*** (.0062)
Adj. R-sq.	0.031	0.186	0.318	0.468
Mean of Y	15.52	17.90	18.86	20.68
N	2491	3167	3233	3256
<b>Panel B</b>				
Post	0.0988 (.211)	0.112 (.0806)	-0.336*** (.0485)	-0.0936*** (.0097)
Age20*Post	0.445** (.177)	-0.0536 (.1067)	0.0622 (.0757)	0.0587*** (.0109)
Age40*Post	-0.00656 (.1631)	0.100 (.0715)	-0.0514 (.0422)	0.0804*** (.005)
Age50*Post	0.156 (.1583)	0.0220 (.0732)	-0.0262 (.0459)	0.127*** (.0054)
Age60*Post	0.0766 (.1669)	-0.0852 (.0789)	-0.0324 (.0466)	0.179*** (.0071)
Adj. R-sq.	0.141	0.390	0.266	0.503
Mean of Y	14.76	16.57	17.81	19.74
N	4678	7328	7881	8140

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking the logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

The sales in restaurants and bars & snacks businesses decreased, and the decreases vary across demographic groups. The sales from female cardholders in both categories tend to decrease more than those from male cardholders. The differences in the changes across age groups are interesting. In the restaurant businesses, the sales from cardholders in the 20s decreased much less than those in other age groups, but in bars & snacks businesses, the sales from cardholders in the 60s decreased the least, which could be off the expectation as the elderly was the most vulnerable to the COVID-19 risk and visiting bars could increase the risk of the COVID-19 infection.

Table 7 Comparison of Changes in Sales between Groups in Selected Business Categories (3/4)

(1) (2) (3) (4) (5)

	<b>Restaurants</b>	<b>Bars &amp; Snacks</b>	<b>Food &amp; Beverage</b>	<b>Bakery</b>	<b>Alcoholic Beverage</b>
<b>Panel A</b>					
Post	-0.161*** (.0088)	-0.157*** (.0118)	0.116*** (.0174)	-0.0620*** (.0171)	0.0568 (.2129)
Female*Post	-0.0764*** (.0049)	-0.0954*** (.0072)	-0.0775*** (.0073)	-0.0860*** (.0254)	0.193 (.1718)
Adj. R-sq.	0.366	0.420	0.212	0.281	0.141
Mean of Y	22.06	19.94	20.52	19.12	14.15
N	3256	3256	3256	3252	1009
<b>Panel B</b>					
Post	-0.225*** (.0128)	-0.280*** (.0144)	0.0267 (.0224)	-0.139*** (.0191)	0.250 (.1797)
Age20*Post	0.143*** (.0115)	0.0602*** (.0147)	-0.0619*** (.0178)	0.0377*** (.0106)	0.0486 (.1823)
Age40*Post	0.00967* (.0058)	0.0912*** (.0068)	0.0162 (.0097)	0.00221 (.0065)	0.157 (.115)
Age50*Post	0.0495*** (.0073)	0.147*** (.0103)	0.0444*** (.0148)	0.0271 (.0191)	-0.242 (.2785)
Age60*Post	-0.00220 (.0101)	0.194*** (.0139)	0.107*** (.0197)	0.108*** (.0334)	-0.339 (.2526)
Adj. R-sq.	0.313	0.420	0.517	0.326	0.212
Mean of Y	21.13	18.99	19.43	18.15	13.64
N	8140	8140	8140	8130	1742

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

The changes in the sales in private education businesses after the COVID-19 outbreak depend on the sub-categories within it. For example, the sales in arts & sports academies reduced substantially, but it is hard to tell that the decreases in sales in foreign language institutions and supplementary educational institutes were significant. In particular, the decreases of the sales in these categories from cardholders in the 20s-40s were not significant. Another interesting observation is that the sales in foreign language and supplementary education institutes, which are closely related to college entrance examination, did not decrease among cardholders in the 40s, but the sales in arts & sports academy businesses, which are relatively less related to college entrance examinations, reduced the most among these

cardholders. Unlike cardholders in 30s and 40s, cardholders in the 20s, who are likely to have preschoolers, did not decrease their spending in arts & sports academy businesses.

**Table 8 Comparison of Changes in Sales between Groups in Selected Business Categories (4/4)**

	(1)	(2)	(3)	(4)
	<b>Private Edu.</b>	<b>Foreign Lang.</b>	<b>Arts &amp; Sports</b>	<b>Suppl. Edu</b>
<b>Panel A</b>				
Post	-0.228*** (.024)	-0.126 (.0761)	-0.713*** (.0803)	-0.0686 (.0625)
Female*Post	0.136*** (.0209)	-0.202*** (.0617)	-0.121** (.0567)	-0.168*** (.0606)
Adj. R-sq.	0.495	0.157	0.189	0.193
Mean of Y	19.67	16.28	16.45	17.66
N	3256	2649	2828	2957
<b>Panel B</b>				
Post	0.0651*** (.0134)	-0.213 (.1665)	-0.170** (.0782)	-0.200 (.1884)
Age20*Post	0.330*** (.0627)	0.0935 (.1867)	0.0803 (.2233)	0.0968 (.2423)
Age40*Post	-0.352*** (.017)	0.0384 (.1652)	-0.643*** (.0905)	0.163 (.2065)
Age50*Post	-0.528*** (.0519)	-0.0375 (.1681)	-0.0506 (.112)	-0.0558 (.2027)
Age60*Post	-0.381*** (.1275)	-0.340* (.1888)	0.0441 (.2318)	-0.0295 (.2511)
Adj. R-sq.	0.670	0.276	0.459	0.473
Mean of Y	18.01	15.69	15.37	16.75
N	7518	3633	4181	4164

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

In addition to the comparison of sales before and after COVID-19 across various demographical groups, we also compare the statistical association between the COVID-19 severity and the sales across the groups. To measure the COVID-19 severity, we utilize the number of confirmed cases per thousand population in a region (si-gun-gu) in a month. This analysis allows us to understand how people's spending in various business categories responded to the severe COVID-19 situation during the early period of the pandemic. For this analysis, we estimate the following equations in each business category:

$$Y_{grt} = \beta \text{COVID}_{rt} \cdot \text{Female}_g + \eta \text{COVID}_{rt} + \delta \text{Female}_g + \lambda_r + \varepsilon_{grt} \quad (3)$$

$$Y_{grt} = \sum_g \beta_g \text{COVID}_{rt} \cdot \text{Age}_g + \eta \text{COVID}_{rt} + \sum_g \delta_g \text{Age}_g + \lambda_r + \varepsilon_{grt} \quad (4)$$

where  $\text{COVID}_{rt}$  is the number of COVID-19 confirmed cases per thousand population in a region in a month, and the definition of all the other variables are identical to those in equations (1) and (2). For the COVID-19 intensity, we use the incidence per thousand population at time  $t$ , and we also use the lagged variable in another regression to see how the association differs when adopting the COVID-19 intensity from the last month. The coefficients of the interest are  $\beta_s$  and  $\eta$ ;  $\eta$  captures the statistical association between the sales and the COVID-19 intensity in a given business category among the baseline group (male card holders or card holders in the 30s), and  $\beta_g$  summarizes the difference in the association between group  $g$  and the baseline group.

Tables 9-12 report the results based on the equations (3) and (4). Similar to those in Table 5-8, panel A in each table presents the different gradients of COVID-19 severity on the sales in each business category indicated in the column heading by the sex of cardholders, and panel B presents those by age groups.

The statistical associations between the sales and the COVID-19 severity in leisure & recreation, accommodation, and tourism businesses are overall negative, that is, the higher number of confirmed cases per population is associated with the smaller sales. Although there is little difference in the association between the sexes of cardholders, there are significant differences across age groups, particularly in leisure & recreation. Relative to the sales from cardholders in the 30s, those from people in the 20s tend to be less sensitive to the COVID-19 intensity. This pattern remains the same for the association between the sales and the COVID-19 severity from the previous month.<sup>1</sup>

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<sup>1</sup> The results for the association between the sales and the COVID-19 severity from the previous month in various business categories are reported in Tables A1.

Table 9 Correlation between the Sales and COVID-19 Intensity (1/4)

	(1)	(2)	(3)
	<b>Leisure &amp; Recreation</b>	<b>Accommodation</b>	<b>Tourism</b>
<b>Panel A</b>			
COVID	-0.163** (.0702)	-0.176** (.0759)	-0.629* (.3251)
Female*COVID	-0.0160 (.0602)	-0.0454 (.0474)	0.184 (.4924)
Adj. R-sq.	0.448	0.312	0.183
Mean of Y	0.237	0.136	1.547
N	1296	1291	819
<b>Panel B</b>			
COVID	-0.0298 (.0698)	-0.0784 (.0978)	-0.896*** (.2836)
Age20*COVID	0.149*** (.0538)	0.0826** (.0375)	0.990** (.4232)
Age40*COVID	-0.397*** (.0644)	-0.208** (.0875)	1.193*** (.3931)
Age50*COVID	-0.414*** (.0708)	-0.242** (.0924)	1.374*** (.3712)
Age60*COVID	-0.351*** (.0875)	-0.487*** (.1435)	1.390*** (.4249)
Adj. R-sq.	0.230	0.144	0.310
Mean of Y	0.232	0.136	1.713
N	3238	3228	1863

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking the logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

In the second set of businesses, furniture, electrical appliances, apparel, and convenience stores, the sales are overall negatively associated with the COVID-19 intensity, and there is little variation in the gradients. In addition, the associations between the sales and the COVID-19 intensity in the previous month in these categories do not differ across demographical groups.

Table 10 Correlation between the Sales and COVID-19 Intensity (2/4)

	(1)	(2)	(3)	(4)
	<b>Furniture</b>	<b>Electrical Appliance</b>	<b>Apparel</b>	<b>Convenience Store</b>
<b>Panel A</b>				
COVID	-0.639** (.2462)	-0.410*** (.1097)	-0.309*** (.0876)	-0.0951*** (.0241)

Female*COVID	0.113 (.2199)	-0.198** (.0949)	0.0162 (.0602)	0.0621** (.0303)
Adj. R-sq.	0.027	0.163	0.267	0.487
Mean of Y	0.0509	0.259	0.304	1.245
N	979	1259	1286	1296
<b>Panel B</b>				
COVID	-0.802*** (.1537)	0.114 (.472)	-0.532*** (.1538)	-0.0440* (.0248)
Age20*COVID	-0.562 (.7106)	0.112 (.5461)	0.00735 (.1639)	0.0435 (.0353)
Age40*COVID	0.514* (.259)	-0.599 (.5076)	0.342*** (.1276)	-0.0532** (.0221)
Age50*COVID	0.563 (.5234)	-0.671 (.5335)	0.327** (.1499)	-0.0507** (.0198)
Age60*COVID	0.263 (.2059)	-0.712 (.4912)	0.264 (.1642)	-0.0918** (.0362)
Adj. R-sq.	0.103	0.366	0.242	0.485
Mean of Y	0.0670	0.280	0.316	1.242
N	1778	2876	3141	3240

Note: The mean of Y reported in this table shows the mean of amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

The sales in restaurants, bars & snacks, food & beverage, and bakery are negatively associated, and the sales from female cardholders tend to be less sensitive to the COVID-19 severity. In these categories of businesses, we do not find a significant difference in the statistical association between the sales and the COVID-19 intensity across age groups. Unlike the aforementioned observation that the sales in bars & snacks from cardholders in the 60s reduced the least, the sales in this business category from cardholders in the 60s are the most sensitive. One interesting observation that can be found in alcoholic beverage retail businesses is that the sales in this category are positively associated with the COVID-19 intensity.

Table 11 Correlation between the Sales and COVID-19 Intensity (3/4)

	(1)	(2)	(3)	(4)	(5)
	Restaurants	Bars & Snacks	Food & Beverage	Bakery	Alcoholic Beverage
<b>Panel A</b>					
COVID	-0.176*** (.034)	-0.184*** (.0367)	-0.161*** (.0282)	-0.0921** (.0395)	1.983 (2.08)

Female*COVID	0.0323* (.0189)	0.0966** (.039)	0.122*** (.0248)	0.0667*** (.0176)	2.720 (2.834)
Adj. R-sq.	0.382	0.431	0.198	0.291	0.195
Mean of Y	4.355	0.586	1.019	0.244	0.00828
N	1296	1296	1296	1296	428
<b>Panel B</b>					
COVID	-0.155*** (.0388)	-0.140*** (.038)	-0.135*** (.0311)	-0.0616 (.0427)	4.729*** (1.691)
Age20*COVID	0.0948* (.0482)	0.0773 (.0578)	0.0704 (.0557)	0.0710* (.0413)	-3.624 (2.9)
Age40*COVID	-0.0296 (.0311)	-0.0197 (.0295)	0.0317 (.027)	-0.0149 (.0211)	-0.921 (2.646)
Age50*COVID	-0.0203 (.0372)	-0.00739 (.0314)	0.0571 (.0366)	0.0197 (.0279)	-3.972 (3.178)
Age60*COVID	-0.0685 (.0465)	-0.0684* (.0367)	0.0642* (.0327)	-0.0333 (.0299)	-3.778 (2.773)
Adj. R-sq.	0.304	0.412	0.529	0.336	0.252
Mean of Y	4.345	0.585	1.019	0.244	0.0117
N	3240	3240	3240	3239	734

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$

The sales in the private education businesses are negatively associated with the COVID-19 intensity, and there is little difference in the gradients across demographical groups. It is hard to tell anything about the correlation between the sales and the COVID-19 intensity in private education businesses because the number using the COVID-19 incidence in the month and the number using the incidence in the previous month differ. We cannot be sure about the reason, but one possible reason is the payment timing in the business category.

Table 12 Correlation between the Sales and COVID-19 Intensity (4/4)

	(1) Private Edu.	(2) Foreign Lang.	(3) Arts & Sports	(4) Suppl. Edu
<b>Panel A</b>				
COVID	-0.182*** (.0527)	-0.488** (.2417)	-0.348* (.1998)	-0.631*** (.2177)
Female*COVID	0.0908* (.0532)	0.0586 (.1365)	0.0898 (.2428)	0.0207 (.1291)
Adj. R-sq.	0.507	0.141	0.129	0.256
Mean of Y	0.647	0.0275	0.0212	0.144
N	1296	1014	1046	1161

<b>Panel B</b>				
COVID	-0.0949 (.0609)	-0.385 (.2813)	0.208 (.4059)	-0.404*** (.1515)
Age20*COVID	-0.0560 (.1535)	0.456*** (.1718)	-0.290 (.4397)	0.689*** (.1215)
Age40*COVID	-0.0300 (.0255)	-0.263 (.2211)	-0.490 (.4138)	-0.351** (.1647)
Age50*COVID	-0.123 (.1242)	0.155 (.1787)	-0.351 (.4841)	-0.358 (.2345)
Age60*COVID	-0.149 (.1969)	0.0112 (.1853)	1.774 (2.454)	0.477 (.4205)
Adj. R-sq.	0.658	0.266	0.368	0.509
Mean of Y	0.659	0.0394	0.0279	0.205
N	2943	1338	1491	1623

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10

## 5 Conclusion

The COVID-19 pandemic has created a massive shock throughout the entire economy. People had to change their lifestyles and behavior in many aspects, which led to enormous changes in the performance of local businesses. In this paper, we extend our understanding of how people shaped their lives during the pandemic, by exploring how the changes in sales vary across different demographic groups in each business category. Using the credit card transaction data we compared the mean changes in the sales in each business category across different demographic groups to understand how people changed their spending during the pandemic. We also compare the statistical association between COVID-19 severity and sales to examine whether the sensitivity to the changes in sales varies across demographic groups. We find that whether the changes in sales vary across demographic groups depends on the business category. While the reduction in sales in some business categories such as restaurants, and bars & snacks varies across the sexes of cardholders, the reduction in the sales in the tourism category does



not differ between the sexes of cardholders. We also document that the changes in sales in private education among cardholders in the 40s depend on whether private education is closely related to college entrance examinations.

## Reference

- Aum, S., Lee, S.Y., and Shin, Y. (2021). COVID-19 Doesn't Need Lockdowns to Destroy Jobs: The Effect of Local Outbreaks in Korea. *Labour Economics*, 79: 101993.
- Bartik, A.W, Bertrand, M., Cullen, Z., and Glaeser, E.L., Luca, M., and Stanton, C. (2020). The impact of COVID-19 on small business outcomes and expectations, *Proceedings of the National Academy of Sciences of the United States of America*, 28:117(30), 17656-17666.
- Bloom, N., Fletcher, R.S., and Yeh, E. (2021). The Impact of COVID-19 on U.S. Firms. *NBER Working Papers No. 28314*, National Bureau of Economic Research, Inc.
- Fairlie, R., and Fossen, F.M. (2021). The early impacts of the COVID-19 pandemic on business sales. *Small Business Economics*, 58, 1853–1864.
- Kim, Jiyeon. (2021). Searching for the Cause of the Gender Gap in Employment Losses during the COVID-19 Crisis. *KDI Journal of Economic Policy*, 43(2), 53-79.

## Appendix A

Table A1 reports the results from the regression of the equations (3) and (4) using incidence in the previous month for the COVID-19 intensity.

Table A 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Leisure & Recreation	Accommodation	Tourism	Furniture	Electrical Appliance	Apparel	Convenience Store
<b>Panel A</b>							
COVID (lag)	-0.269*** (.0872)	-0.286*** (.0742)	-0.323 (.4022)	-0.0108 (.4361)	-0.582*** (.0729)	-0.406*** (.1167)	-0.120*** (.029)
Female*COVID (lag)	-0.0337 (.0483)	0.0410 (.0385)	0.969 (.7915)	0.0339 (.2635)	0.0146 (.0906)	0.0866 (.0824)	0.0508* (.0259)
Adj. R-sq.	0.457	0.312	0.176	0.022	0.167	0.264	0.493
Mean of Y	0.234	0.135	1.530	0.0526	0.268	0.315	1.260
N	1152	1147	732	877	1121	1143	1152
<b>Panel B</b>							
COVID (lag)	-0.143* (.0752)	-0.183* (.1022)	-0.294 (.5314)	0.104 (.2822)	-0.239 (.2725)	-0.395** (.1496)	-0.0653*** (.0218)
Age20*COVID (lag)	0.154*** (.0561)	0.0722 (.0491)	0.853 (.7407)	-1.540*** (.5778)	-0.0900 (.2899)	-0.0478 (.1179)	0.0229 (.0292)
Age40*COVID (lag)	-0.552*** (.0694)	-0.291*** (.0961)	0.130 (.2577)	-0.213 (.2855)	-0.293 (.2853)	-0.00114 (.0677)	-0.0495** (.0206)
Age50*COVID (lag)	-0.556*** (.0998)	-0.178 (.1244)	-0.470 (.9496)	-0.212 (.3839)	-0.284 (.2934)	0.127 (.1228)	-0.0561*** (.0208)
Age60*COVID (lag)	-0.668*** (.1296)	-0.571*** (.1309)	0.627 (.787)	-0.362 (.3452)	-0.287 (.2852)	0.137 (.1826)	-0.0962** (.0366)
Adj. R-sq.	0.244	0.145	0.307	0.102	0.372	0.244	0.486
Mean of Y	0.229	0.136	1.693	0.0690	0.289	0.327	1.257
N	2878	2868	1662	1598	2565	2798	2880

(Table A1 continued)

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Restaurants	Bars & Snacks	Food & Beverage	Bakery	Alcoholic Beverage	Private Edu.	Foreign Language	Arts & Sports	Suppl. Edu
<b>Panel A</b>									
COVID (lag)	-0.225*** (.0358)	-0.231*** (.0392)	-0.172*** (.0309)	-0.110*** (.0348)	2.085 (1.493)	-0.280*** (.056)	-0.743*** (.1514)	-1.027*** (.2971)	-0.698*** (.1121)
Female*COVID (lag)	0.0290* (.0163)	0.0999** (.0408)	0.137*** (.0313)	0.0717*** (.0211)	-1.592 (1.111)	0.122** (.0585)	0.0912 (.1333)	0.243 (.2369)	0.103 (.0685)
Adj. R-sq.	0.388	0.435	0.199	0.293	0.190	0.512	0.143	0.135	0.260
Mean of Y	4.386	0.589	1.039	0.245	0.00846	0.636	0.0281	0.0208	0.146
N	1152	1152	1152	1152	387	1152	892	918	1030
<b>Panel B</b>									
COVID (lag)	-0.189*** (.028)	-0.165*** (.0313)	-0.128*** (.0305)	-0.0670 (.041)	2.543 (1.635)	-0.145** (.0594)	-1.771 (1.353)	-0.703*** (.2315)	-1.058*** (.1342)
Age20*COVID (lag)	0.0737* (.0379)	0.0419 (.0529)	0.0149 (.0451)	0.0327 (.0314)	-1.120 (1.558)	-0.0664 (.1185)	1.583 (1.341)	1.073 (1.508)	1.155*** (.1465)
Age40*COVID (lag)	-0.0417 (.0296)	-0.0323 (.0268)	0.0230 (.0214)	-0.0143 (.019)	-1.998 (1.408)	-0.0538* (.0313)	0.814 (1.376)	-0.0154 (.2776)	0.245 (.2501)
Age50*COVID (lag)	-0.0331 (.0358)	-0.0275 (.0299)	0.0463 (.0308)	0.0103 (.0248)	-4.896** (2.067)	-0.221 (.1491)	1.405 (1.364)	0.0885 (.385)	0.512*** (.1189)
Age60*COVID (lag)	-0.101** (.0492)	-0.0856** (.0389)	0.0631** (.0301)	-0.0355 (.0329)	-4.523 (2.791)	-0.177 (.2646)	-0.947 (2.031)	0.290 (2.701)	0.717*** (.2057)
Adj. R-sq.	0.309	0.412	0.539	0.338	0.247	0.667	0.267	0.357	0.506
Mean of Y	4.367	0.585	1.038	0.245	0.0119	0.649	0.0404	0.0277	0.208
N	2880	2880	2880	2880	663	2612	1173	1303	1448

Note: The mean of Y reported in this table shows the mean amount (in billion KRW) of sales from cardholders in each demographic group in all businesses located in a region at a time in each business category, without taking logarithm. The standard errors clustered at the region (si-gun-gu) level are reported in parentheses. \*\*\* p < 0.01; \*\* p < 0.05; \* p < 0.10