Social Media, Consumer Behavior, and Information Disclosure: Evidence from a Shock of MERS in South Korea

Hailey Hayeon Joo
Sogang University
hjoo@sogang.ac.kr

Hyoung-Goo Kang
Hanyang University
hyoungkang@hanyang.ac.kr

Jungmin Lee
Seoul National University
& IZA
jmlee90@snu.ac.kr

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Abstract

Korea's health officials did not disclose the names of hospitals exposed to MERS-CoV for the first three weeks of the outbreak in 2015, and this inappropriate decision amplified fear in the society. Thus, this paper examines the MERS outbreak and its consequential effect on shopping patterns in the retail market, as focusing on the failure of timely information provision. The results show that those living near MERS hospitals reduced their spending at big-box and department stores and particularly decreased further during the early period of the outbreak without information disclosure. This finding suggests that the information uncertainty would raise consumers' anxiety that forced to change their economic behaviors. Therefore, the improper information withholding is much harmful to the economy and, moreover, the negative impact is not uniform across retailers but depends upon a store's expected crowdedness which is presumed to be associated with the perceived infection risk.

Keywords: MERS; Shopping patterns; Information disclosure; Information diffusion by SNS; epidemics

I. Introduction

The occurrence of epidemic diseases and natural disasters negatively influences the perceived risk of consumers, which in turn tends to restrict their economic activities (Wong, 2008; Deng et al., 20105; Elliott et al., 2015). However, what happens if the government withholds the relevant information about it from the public with intention to prevent potential economic loss? Can it achieve an intended goal or make the problem even worse? To address this question, we exploit the Korea's Middle East respiratory syndrome (MERS) outbreak in 2015 as a natural experiment.

The first MERS case in Korea was confirmed on May 20, 2015. Nevertheless, health officials did not disclose the names of hospitals exposed to MERS coronavirus (MERS-CoV) for the first three weeks of the outbreak, and this inappropriate decision amplified anxiety in the society. In particular, the fear driven by information uncertainty would affect consumer choices in a way to avoid crowds and thus to reduce the risk of infection. Hence, this paper examines the MERS outbreak and its consequential effect on retail shopping patterns, as focusing on the failure of timely information provision.

The MERS impact that a consumer faced might vary according to the physical distance from MERS hospitals and perceived insecurity about those hospitals (Wong, 2008). In this regard, we define the individual-level MERS impact as follows, by using (i) the press releases from health officials; (ii) Social Networking Service (SNS) data; and (iii) Consumer Panel Data. First, for each of 16 MERS-affected hospitals (hereafter "MERS hospitals"), we define the MERS-exposed period, as identifying whether there was at least one MERS-CoV patient in the hospital on a given day. Then, we match this MERS-exposed period for a hospital with the number of daily SNS postings on twitters and NAVER blogs that mentioned both "MERS" and the name of the hospital.[1] Finally, we compute the total number of SNS postings regarding all MERS hospitals located within 5 kilometer distance from a consumer panel on a daily basis.

Information diffusion through general social networks has been discussed in economic literature, especially regarding the deterministic factors of the speed and quality in diffusion,

[1] Social media such as twitter and Facebook have already played important roles in broadcasting and communication. They are, thus, influential on information sharing in many social issues and even natural disasters (Oh et al., 2015; Shi et al. (2014); Ascar and Muraki, 2011).

consensus process within networks, and roles of influential groups in social learning (Bala and Goyal, 1998; DeMarzo et al., 2003; Golub and Jackson, 2010; Acemoglu et al., 2011). Golub and Jackson (2010) found that a small prominent group can distort opinions even in a large network. However, a large society can eventually reach the rational belief, if the small group does not have monopolistic power over information and all individuals simply share and update the information by communications. In our setting, the government controls the information dissemination. When it withholds the information, the unproven rumors shared t SNS may hurt economy. But, when it reveals it, SNS helps the society achieving rational consensus, which in turn can positively influence economic behaviors. Hence, our model confirms the findings in Golub and Jackson (2010) with the information diffusion by SNS.

Our difference-in-differences estimation results suggest that those living near MERS hospitals reduced their spending at big-box and department stores, i.e., more crowded shopping venues. Compared to the control group, the treated consumers decreased their expenditures more at those stores, on average, by about 3.4-3.8%p per 1,000 SNS posting within 5 kilometer radius from their residences during the entire period of the MERS outbreak. Furthermore, during the early period without information disclosure, the estimated MERS effect is about 7.8%p, while during the late period with it the effect drops down to about 1.2%p. On the contrary, MERS hospitals did not influence shopping patterns at the other types of retailers. That is, the improper information withholding is much harmful to the economy and, moreover, the negative impact is not uniform across retailers but depends upon a store's expected crowdedness which is presumed to be associated with the perceived infection risk.

The remainder of the paper is organized as follows: Section II overviews the MERS outbreak in Korea. Section III explains the data; Section IV describes the estimation model and presents the empirical results; Section V concludes.

II. Korea's MERS outbreak in 2015

The Korea's MERS outbreak occurred in 2015, which was by far the second largest scale in the world followed by Saudi Arabia. The MERS-CoV was transmitted widely and rapidly at an unprecedented rate, and thus put the Korean society into shock and fear. In particular, because the social phenomenon surrounding the MERS outbreak in Korea was unique and intriguing, it may provide valuable research opportunity.

The MERS outbreak began on May 20, 2015 from a single case. The first MERS patient was a 68-year-old man who travelled and returned from the Middle East. He visited a hospital for diagnostic test when he first felt MERS symptoms, but his initial request was not urgently treated by health officials and thus he visited a few more hospitals for 9 more days until his case was finally confirmed, which resulted in a wide spread of MERS-CoV. There were a total of 186 confirmed infections by July 4, 2015, among which 36 died. The official end of the outbreak was declared on December 23, 2015.

The outbreak shocked Koreans and revealed many economic, social and cultural issues. In early June of 2015 when the proliferation reached its peak, more than 1,000 elementary schools and kindergartens were temporarily closed, and most public events were canceled. The number of international tourists visiting Korea dropped 41% year-on-year. Reduced was the number of visitors to theaters, performance halls, department stores, and the places which were typically crowded with anonymous people. Most people wore masks when they went out. Unproven rumors had been overflowing on the Internet and SNS. The infected patients who needed medical treatments were blamed as epidemic spreaders under prevailing anxiety. Medical teams that were classified as self-quarantined had to experience social stigmatization together with their family from the communities.

Especially, it was doubtful of the government’s capabilities in the epidemic prevention policies. For example, the government was criticized for not applying the principle of carriers isolation in a flexible manner and as a result, it failed to prevent the spread of the disease at an early stage after the introduction of the MERS-CoV pathogen, which in turn led to the failure in controlling for the patients and resulted in secondary and even tertiary infections through indirect contacts among patients. Indeed, hospitals took a long time to identify and isolate the infected people. In the early stages, health officials had difficulties in tracking contacts and enforcing quarantine. However, the isolation guideline of World Health Organization (WHO) was not followed well, generating superspreaders in the infectious disease and quarantines of about 16,700 cases.

In addition, the government’s attitude toward information disclosure has been controversial. In the early days of the outbreak (before 11 am on June 7, 2015), health officials maintained the principle of information non-disclosure about MERS hospitals. This accelerated the spread of MERS through hospitals that carriers had visited or hospitalized for medical care. The government argued that it would cause unnecessary anxiety to the facility users to disclose the list of the hospitals, where MERS patients were admitted. However, the Korea-WHO MERS joint mission assessed that the delay of information disclosure led to the early-stage failure. Against the nondisclosure policy of the government, ordinary Koreans responded with sharing information through SNS. Not only when the MERS hospital was initially unveiled, but also since then, people had shared the list of suspicious hospitals through SNS such as Twitter, NAVER blogs, and KakaoTalk.

Nevertheless, in addition to the communication problems of the Korean government, many other factors contributed to the MERS spread such as lack of awareness of medical staffs, inadequate infection prevention and control measures of medical institutions, overcrowding of emergency rooms, medical shopping, and family-caring culture. The MERS outbreak was also threatening to Korean society, characterized by overcrowding in a narrow territory. The cost of the outbreak was massive. It was estimated that the sum of the social costs due to the direct damage to medical institutions, the contraction of domestic demand and the slowdown of exports will be at least 20 trillion KRW (KERI Economic Bulletin, 2015).

III. Data

Our data come from three sources: (i) the press releases available at the Korean government MERS portal site[2]; (ii) SNS data obtained from *Daumsoft*; and (iii) Consumer Panel Data collected by RDA. First, using the official press releases about MERS patients and hospitals, we defined the MERS-exposed period by hospital, as presented in Table 1. For each hospital, the starting date was the visit date of the first patient who brought MERS-CoV into the hospital and the ending date was the discharge date of the last patient who was infected within it.[3] Of 16 MERS hospitals, 11 were located in Seoul or Gyeonggi and thus the MERS impacts were concentrated in the Seoul Capital Area (i.e., the metropolitan area containing Seoul, Incheon, and

[2] http://www.mers.go.kr

[3] The discharge dates of some patients were not clear. In those cases, we assume that they stayed in hospitals during 14 days, an average period of MERS patients' hospitalization.

Gyeonggi in Korea, and referred to as Sudogwon in Korean; hereafter “SCA”).

[Insert Table 1]

Then, we combine the MERS-exposed period of a hospital with the number of daily SNS postings on twitters and NAVER blogs that mentioned both “MERS” and the name of the hospital. Figure 1 shows the daily pattern in SNS postings of all MERS hospitals during the period from March 1, 2015 to September 30, while Figure 2 describes that in the postings of each hospital. In both figures, the red line indicates the date of June 7, 2015 on which the names of the MERS hospitals were disclosed. As comparing the peak dates of social buzz with the timing of information disclosure, we could find that the anxiety driven by information uncertainty was quite large in the early period of MERS outbreak and it seemed revolved after the information was properly provided.

[Insert Figures 1 & 2]

To estimate the impact of the MERS outbreak on economic behaviors, we exploited the Consumer Panel Data from March 1, 2014 to September 30, 2014 and from March 1, 2015 to September 30, 2015. The panel consisted of 667 households who originally lived in the SCA, but we excluded 28 households who moved out of it, by which our final sample size became 649 households. The Consumer Panel Data included real-time detailed retail shopping information such as brand, payment, amount/volume, and shopping venue, as well as household home addresses. We measured the distance from a household to each of 16 MERS hospitals with a geographic information system program (Arc GIS 12.3), and finally computed the daily-basis total number of SNS postings regarding the MERS hospitals which were located within 5 kilometer distance from the household. We assumed it as the individual-level daily MERS impact. Table 2 presents the summary of the individual-level MERS impacts and Table 3 provides that of daily expenditures at each store type (e.g., all stores, big-box/department stores, supermarkets, traditional markets, and the other stores).

[Insert Tables 2 & 3]

IV. Empirical Findings

IV.1 Model

We estimate the following equation separately for each store type (i.e., all stores, big-box/department stores, supermarkets, traditional markets, and the other stores):

$$\begin{aligned}\ln(EXP_{it}) &= \beta_0 + \beta_1 SNS_{it} + \beta_2 (AFTER_t)(SNS_{it}) \\ &\quad + \beta_3 MERS_t + \beta_4 (AFTER_t)(MERS_t) + \mu_i + T_t + \varepsilon_{it}, \qquad (1)\end{aligned}$$

where $\ln(EXP_{it})$ is the natural log of daily expenditure of household i at the corresponding store type on day t, $t =$ March 1, 2014 $-$ September 30, 2014, March 1, 2015 $-$ September 30, 2015.[4] SNS_{it} is the total number of SNS postings regarding the MERS hospitals which were located within 5 kilometer distance from household i on day t. $AFTER_t$ is the dummy for whether day t is after June 7, 2015 (i.e., the date on which the information of the MERS hospitals was disclosed); and $MERS_t$ is that for whether there was at least one MERS patient in any MERS hospital on day t, i.e., the MERS outbreak period.[5] Therefore, $(AFTER_t)(SNS_{it})$ indicates the total number of daily SNS postings in the information disclosure period, while $(AFTER_t)(MERS_t)$ means the "late" MERS outbreak period with information disclosure. μ_i is the household fixed effect that controls the unchanged preference for the corresponding store type, T_t is the time fixed effects (e.g., year dummies, month dummies, and day-of-week dummies) and ε_{it} is the standard error term.

IV.2 Results

Table 4 presents the estimation results for the daily expenditure at all stores. For explanatory variables, column (1) uses the individual-level MERS impact during the entire period of the outbreak only; column (2) additionally controls the overall impact of the MERS outbreak; and

[4] Because our expenditure data include 0 values, we add 1 before taking the log.
[5] Thus, in this paper, the last day of the MERS outbreak is defined as July 14, 2015, which is not the same as the official last day (i.e., December 23, 2015).

finally, column (3) exploits all variables.

[Insert Table 4]

In columns (1)-(3), we find that the individual-level MERS impact on overall spending is not significant at any conventional levels of significance, regardless of before or after the timing of information disclosure. During the entire MERS outbreak period, the total expenditure increases by about 12%p in column (2) and about 18%p in column (3). However, it is uncertain whether households actually consume more or not, because the increase in total expenditure may result from the increased shopping costs by switching shopping venues during that period. That is, in order to evaluate and interpret the situation accurately, we should control the impact of the price change caused by the venue choices, but alternatively, in this preliminary version of the paper, we divide the expenditures by store type based upon crowdedness as well as similarity in prices and then separately estimate the results for each store type.

In both Tables 5 and 6, the estimation results by store type are presented. Columns (1)-(3) of Table 5 show the results for big-box/department stores (i.e., relatively more crowded shopping venues) and columns (4)-(6) of the table those for supermarkets (i.e., less crowded and closely located shopping places). And, columns (1)-(3) of Table 5 indicate the results for traditional markets and columns (4)-(6) of the table those for the other stores (e.g., organic stores, meat shops, fruit shops, convenience stores and so on). For explanatory variables in both tables, columns (1) and (4) use the individual-level MERS impact during the entire period of the outbreak only; columns (2) and (5) additionally controls the overall impact of the MERS outbreak; and finally, columns (3) and (6) exploit all variables.

[Insert Table 5]

In columns (1)-(2) of Table 5, we find that the individual-level MERS impact on shopping at big-box and department stores is negative and significant at the 10% significance level. Compared to the control group, the treated consumers decreased their expenditures more at those stores, on average, by about 3.8%p in column (1) and about 3.4%p in column (2) per 1,000 SNS posting within 5 kilometer radius from their residences during the entire period of the

MERS outbreak. Furthermore, in column (3), during the early period without information disclosure, the estimated MERS effect is about 7.8%p, while during the late period with it the effect drops down to about 1.2%p. The impact of the MERS outbreak period is negative and significant at the 5% significance level in column (2), which is no longer significant in column (3) of the full specification. On the contrary, columns (4)-(6) present that the individual-level MERS impact on purchasing at supermarkets is insignificant at any conventional levels of significance in all specifications. And, the impact of the MERS outbreak period is positive and significant at the 1% significance level in column (5), which is not robust in column (6) of the full specification.

[Insert Table 6]

In columns (1)-(3) of Table 6, there is no individual-level MERS impact on spending at traditional markets. Also, the MERS outbreak period does not influence the spending, either. On the other hand, in columns (4)-(5) of the table, the individual-level MERS impact on shopping at the other stores is negative and significant at the 5% significance level. Compared to the control group, the treated consumers decreased their expenditures more at those stores, on average, by about 4.8%p in column (4) and about 5.9%p in column (5) per 1,000 SNS posting within 5 kilometer radius from their residences during the entire period of the MERS outbreak. However, in column (6), such impact disappears in both the early and late period of the outbreak. And, in columns (5) and (6), the impact of the outbreak period is positive and significant at the 5% significance level, though the net impact of the early period (about 25.3%p) is large than that of the late period (about 11%p). But, the increase in spending at the other stores may still come from the increased shopping costs by switching shopping venues during that period, because the prices of those stores are relatively expensive. Thus, we need to further examine it by converting the expenditures into consumption amounts.

V. Conclusion

By exploiting the Korea’s MERS outbreak in 2015 as a natural experiment, this paper examines the impact of the outbreak itself as well as the failure of timely information disclosure on changes in shopping patterns. The results show that those living near MERS hospitals reduced their spending at big-box and department stores and particularly decreased further during the early period of the outbreak without information disclosure. This finding implies that the information uncertainty would raise consumers' anxiety, influencing their choices on shopping places. That is, the improper information withholding is much harmful to the economy and, moreover, the negative impact is not uniform across retailers but depends upon a store's expected crowdedness which is presumed to be associated with the perceived infection risk.

In this paper, we investigate the changes in consumers' shopping patterns using their expenditures. However, the changes in expenditures do not necessarily imply the same patterns of the changes in consumptions. Thus, we should further check the changes in consumptions to understand and interpret consumer activities more accurately.

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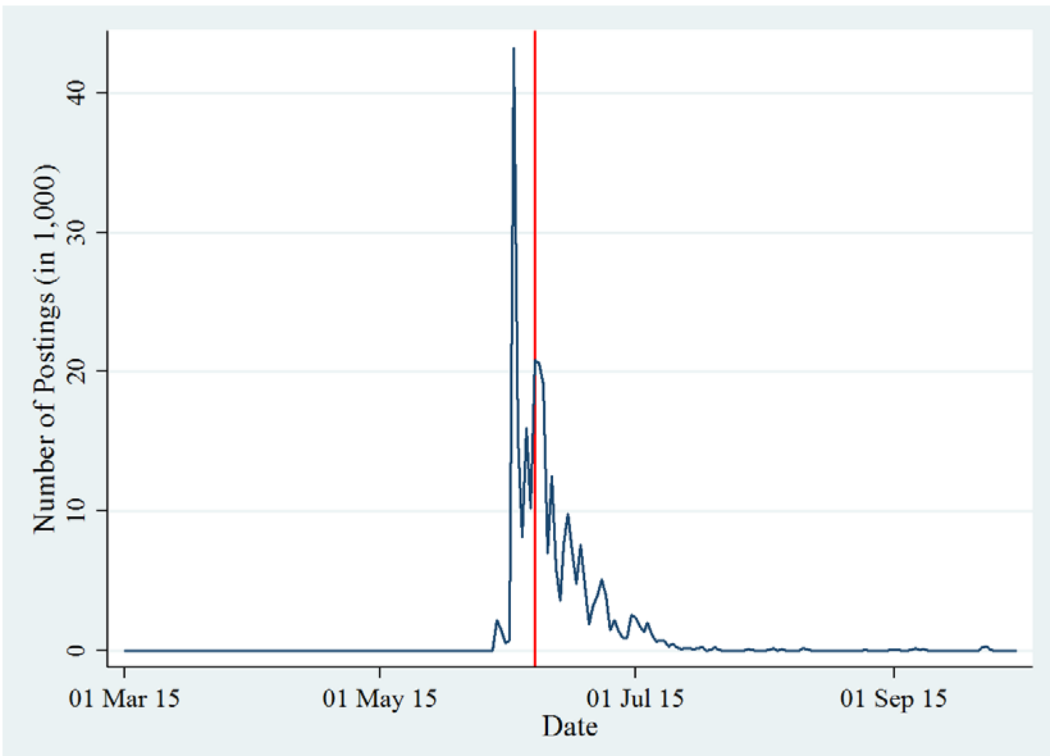
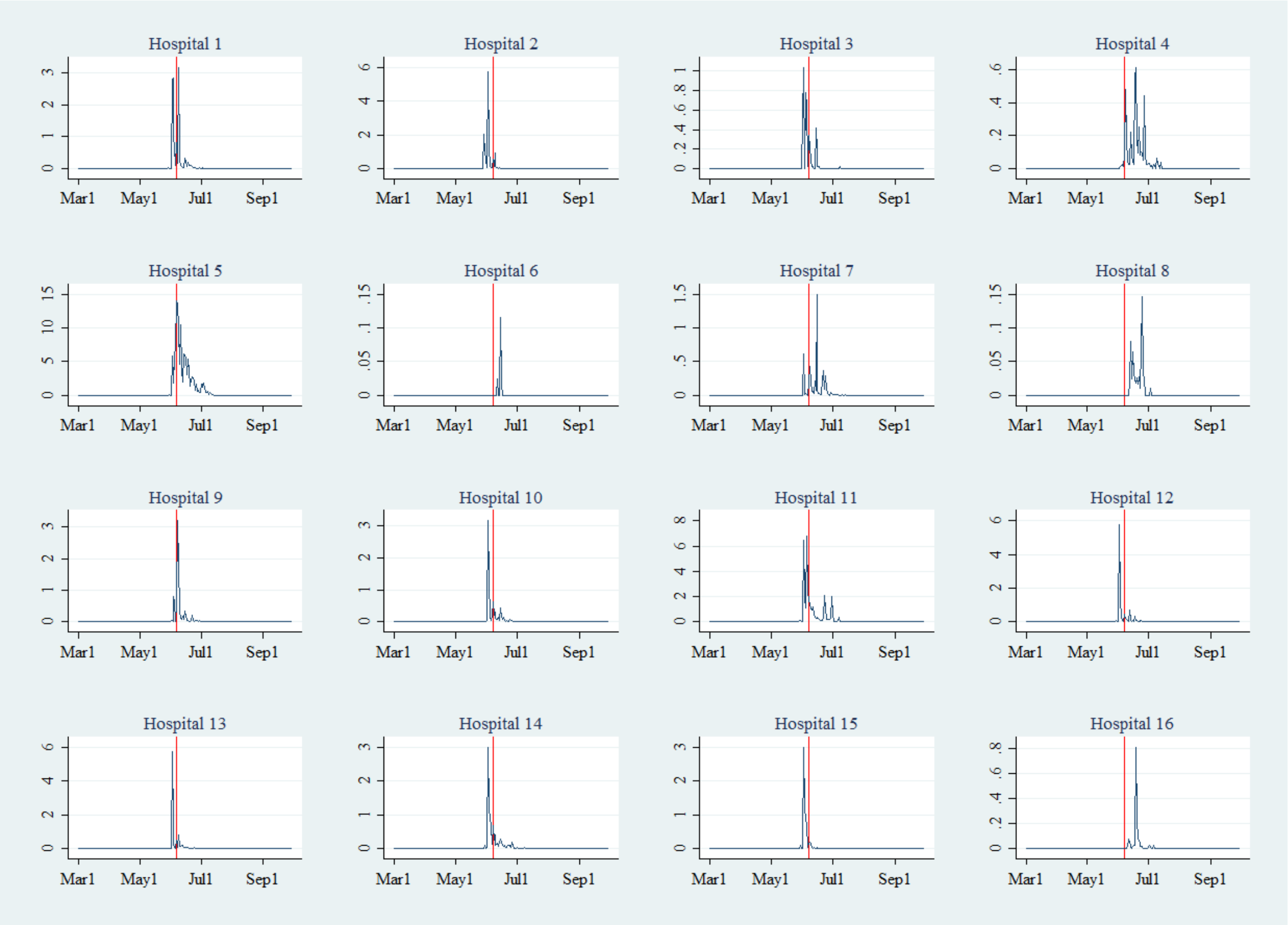
Figure 1. Daily Patterns in SNS Postings for All 16 MERS Hospitals



Note: The blue line presents the sum of the number of daily SNS postings for all 16 MERS hospitals and covers the period from March 1, 2015 to September 30, 2015. The red line indicates the date of information disclosure (i.e., June 7, 2015).

Figure 2. Daily Patterns in SNS Postings by MERS Hospital



Note: In each diagram, the blue line presents the number of daily SNS postings for a MERS hospital and covers the period from March 1, 2015 to September 30, 2015, while the red line indicates the date of information disclosure (i.e., June 7, 2015). In all diagrams, the x-axis is the date and y-axis is the number of postings in 1,000 that mention both "MERS" and the hospital's name. The names of hospitals 1-16 are as follows: (1) Asan Medical Center; (2) the Catholic University of Korea, Yeouido St. Mary's Hospital; (3) 365 Open Hospital; (4) Kyung Hee Univ. Hospital at Gangdong; (5) Samsung Medical Center; (6) Song Taeui Clinic; (7) Konkuk University Medical Center; (8) Good Gang-An Hospital; (9) Dae Cheong Hospital; (10) Konyang Univ. Hospital; (11) Pyeongtaek St. Mary Hospital; (12) Pyeongtaek Good Morning Hospital; (13) Hallym University Dongtan Sacred Heart Hospital; (14) Seoul Samsung Clinic; (15) Seoul Clinic; and (16) Asan Chungmu Hospital.

Table 1. Information of 16 MERS Hospitals

No.	Name	Province	MERS-Exposed Period Start	MERS-Exposed Period End
1	Asan Medical Center	Seoul	May 12, 2015	June 9, 2015
2	The Catholic University of Korea, Yeouido St. Mary's Hospital	Seoul	May 27, 2015	June 11, 2015
3	365 Open Hospital	Seoul	May 17, 2015	May 31, 2015
4	Kyung Hee Univ. Hospital at Gangdong	Seoul	June 05, 2015	June 20, 2015
5	Samsung Medical Center	Seoul	May 25, 2015	July 13, 2015
6	Song Taeui Clinic	Seoul	June 08, 2015	June 22, 2015
7	Konkuk University Medical Center	Seoul	June 06, 2015	June 20, 2015
8	Good Gang-An Hospital	Busan	June 08, 2015	June 22, 2015
9	Dae Cheong Hospital	Daejeon	May 14, 2015	July 14, 2015
10	Konyang Univ. Hospital	Daejeon	May 28, 2015	June 17, 2015
11	Pyeongtaek St. Mary Hospital	Gyeonggi	May 15, 2015	June 9, 2015
12	Pyeongtaek Good Morning Hospital	Gyeonggi	May 23, 2015	June 8, 2015
13	Hallym University Dongtan Sacred Heart Hospital	Gyeonggi	May 27, 2015	June 10, 2015
14	Seoul Samsung Clinic	Gyeonggi	June 05, 2015	June 19, 2015
15	Seoul Clinic	South Chungcheong	May 12, 2015	May 26, 2015
16	Asan Chungmu Hospital	South Chungcheong	June 05, 2015	June 19, 2015

Note. For each hospital, the starting date is the visit date of the first patient who brought MERS-CoV into the hospital and the ending date is the discharge date of the last patient who was infected within it.

Table 2. Individual-Level MERS Impacts

2.A All panels (N = 649)

Variables	Mean	S.D.	Min	Max	Obs.
Within 5 kilometer distance from a panel					
Dummy for MERS Hospitals	0.010	0.100	0	1	276,546
Number of MERS Hospitals	0.013	0.143	0	4	276,546
Number of daily SNS postings about MERS Hospitals	0.011	0.255	0	14.973	276,546

2.B Treated panels (N = 117)

Variables	Mean	S.D.	Min	Max	Obs.
Within 5 kilometer distance from a panel					
Dummy for MERS Hospitals	0.056	0.230	0	1	49,984
Number of MERS Hospitals	0.074	0.330	0	4	49,984
Number of daily SNS postings about MERS Hospitals	0.060	0.597	0	14.973	49,984

Note. The data covers the period from March 1, 2014 and September 30, 2014 and that from March 1, 2015 and September 30, 2015. The unit is 1,000 postings.

Table 3. Descriptive Statistics of Daily Expenditures

Variables	Mean	S.D.	Min	Max	Obs.
Daily expenditure at					
All stores	12.799	27.141	0	3,922	276,546
Big-box and department stores	3.236	17.518	0	3,922	276,546
Supermarkets	5.087	14.461	0	793	276,546
Traditional markets	1.428	7.829	0	585	276,546
The other stores	3.048	13.706	0	1,520	276,546

Note. The data consists of all 649 panels and covers the period from March 1, 2014 and September 30, 2014 and that from March 1, 2015 and September 30, 2015. Online shopping expenditures are excluded. The unit is 1,000 KRW.

Table 4. Results for All Retail Stores

	Dependent Variable: Log of Expenditure at All Stores		
Variables	(1)	(2)	(3)
SNS postings	0.032	0.023	0.035
	(0.034)	(0.034)	(0.058)
After Ｘ SNS postings			-0.021
			(0.070)
MERS outbreak		0.124***	0.181***
		(0.038)	(0.062)
After Ｘ MERS outbreak			-0.074
			(0.062)
Constant	4.524***	4.537***	4.538***
	(0.052)	(0.052)	(0.052)
Panel FE	Yes	Yes	Yes
Time FE			
Year	Yes	Yes	Yes
Month	Yes	Yes	Yes
Day of week	Yes	Yes	Yes
No. of panels	649	649	649
Obs.	276,546	276,546	276,546
R-squared	0.099	0.099	0.099

Note. The data consists of all 649 panels and covers the period from March 1, 2014 and September 30, 2014 and that from March 1, 2015 and September 30, 2015. Online shopping expenditures are excluded. We add 1 before taking the log of expenditure.

Table 5. Results for Big-Box/Department Stores and Supermarkets

	Dependent Variable: Log of Expenditure at					
	Big-Box/Department Stores			Supermarkets		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
SNS postings	-0.038*	-0.034*	-0.078***	0.042	0.034	0.065
	(0.020)	(0.020)	(0.027)	(0.035)	(0.034)	(0.059)
After Ｘ SNS postings			0.066*			-0.044
			(0.037)			(0.064)
MERS outbreak		-0.053**	-0.040		0.105***	0.051
		(0.022)	(0.034)		(0.033)	(0.053)
After Ｘ MERS outbreak			-0.017			0.069
			(0.034)			(0.056)
Constant	0.836***	0.830***	0.830***	2.232***	2.243***	2.243***
	(0.032)	(0.032)	(0.032)	(0.047)	(0.047)	(0.047)
Panel FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes
Day of week	Yes	Yes	Yes	Yes	Yes	Yes
No. of panels	649	649	649	649	649	649
Obs.	276,546	276,546	276,546	276,546	276,546	276,546
R-squared	0.088	0.088	0.088	0.099	0.099	0.099

Note. The data consists of all 649 panels and covers the period from March 1, 2014 and September 30, 2014 and that from March 1, 2015 and September 30, 2015. We add 1 before taking the log of expenditure.

Table 6. Results for Traditional Markets and the Other Stores

	Dependent Variable: Log of Expenditure at					
	Traditional Markets			The Other Stores		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
SNS postings	0.024	0.023	0.017	-0.048*	-0.059**	-0.052
	(0.030)	(0.030)	(0.033)	(0.027)	(0.027)	(0.048)
After Ｘ SNS postings			0.009			-0.017
			(0.034)			(0.052)
MERS outbreak		0.005	0.019		0.144***	0.253***
		(0.021)	(0.032)		(0.029)	(0.048)
After Ｘ MERS outbreak			-0.019			-0.143***
			(0.033)			(0.050)
Constant	0.784***	0.785***	0.785***	1.336***	1.352***	1.352***
	(0.025)	(0.025)	(0.025)	(0.032)	(0.032)	(0.032)
Panel FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes
Day of week	Yes	Yes	Yes	Yes	Yes	Yes
No. of panels	649	649	649	649	649	649
Obs.	276,546	276,546	276,546	276,546	276,546	276,546
R-squared	0.183	0.183	0.183	0.101	0.101	0.101

Note. The data consists of all 649 panels and covers the period from March 1, 2014 and September 30, 2014 and that from March 1, 2015 and September 30, 2015. We add 1 before taking the log of expenditure.