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Research paper

# COVID-19, social distancing, and risk-averse actions of hospitality and tourism consumers: A case of South Korea

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## ABSTRACT

The COVID-19 pandemic has significantly changed individuals' daily life due to increased risk aversion, which has affected their consumption patterns and preferences. To understand the effect of the pandemic on consumer behavior through risk aversion, this study investigated the relationships among the pandemic, social distancing, online information search, and firm performance in the hospitality and tourism industries. For data analysis, we developed two joint models and estimated the models using the fixed-effects method. The results of the first model showed that social distancing triggered by COVID-19 news stories affected firm value. The second regional-level analysis revealed that the number of confirmed cases and COVID-19 news stories influenced individuals' social distancing and online information search for tourist attractions and the changed social distancing and online search, in turn, affected the volume of online hotel reviews.

## 1. Introduction

The coronavirus diseases 2019 (COVID-19) rapidly became a global pandemic in just a few months after it first came to light in China in December 2019. In the absence of effective medical treatment and vaccines, this novel, highly contagious virus has triggered massive fear due to the uncertainty surrounding almost every aspects of the pandemic (e.g., mortality and transmission rates and routes) and public healthcare systems (e.g. capacity and availability of medical facilities and diagnostic testing; [Bartik et al., 2020](#)). The extraordinary nature of the current health crisis has led governments to use extreme forms of protective measures to contain the spread. These include compulsory social distancing interventions such as travel restrictions, bans on congregations, disclosure of schools, and even full-scale lockdowns accompanied with stay-at-home restrictions. Social distancing refers to “staying home and away from others as much as possible to help prevent spread of the pandemic” ([Johns Hopkins Medicine, 2020](#)). Governments' social distancing measures are designed to limit human interactions to reduce the possibility of contacting infected individuals who have not been tested ([Wilder-Smith & Freedman, 2020](#)). As intended, these measures have slowed down the new infections substantially ([Hsiang et al., 2020](#)).

However, compulsory social distancing interventions have resulted

in unprecedented global economic turmoil by limiting mobility and restricting offline social and business activities. The hospitality and tourism industries are one of the worst affected industries. In the U.S., the unemployment rate was 14.7% in April 2020, which marks the highest rate since the monthly rate was tracked in January 1948 ([U.S. Bureau of Labor Statistics, 2020](#)). In the same month, 6.1 million employees in the U.S. lodging industry lost their jobs, which accounts for 29.7% of the total monthly job loss (20.5 million). [Smith Travel Research \(2020\)](#) shows that the year-on-year (YOY) occupancy rate fell 63.9% and the revenue per available room dropped 79.9% to \$17.93 in April.

As the COVID-19 crisis continues, the prolonged economic disruption has triggered policy debates on how to strike a balance between public health and the economy. The exponentially increasing economic costs have made complete lockdowns infeasible for handling the ongoing health crisis. Many countries are, therefore, entering a new phase of lifting lockdowns gradually without a full control over the pandemic. Although people have started to go back to their everyday routines, normal life will be different from pre-COVID-19 life. Among the behavioral changes caused by the pandemic, social distancing is likely to voluntarily continue as an individual-level risk-averse action under the new normalcy without vaccines. Further, the pandemic-

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induced economic uncertainty can facilitate individual-level social distancing by curtailing consumption on social gathering, traveling, and outdoor activities in an attempt to prepare for financial distress (Poudyal et al., 2013; Wu et al., 2011). In this sense, individuals' social distancing is a manifestation of their risk-averse attitudes toward health and financial concerns.

As the pandemic becomes more severe, voluntary social distancing practices will likely increase and, thus, lead to a delay in the recovery of the hospitality and tourism industries that inevitably require consumers' mobility and physical contact for product consumption in most cases. Furthermore, even if social distancing practices decline, risk aversion may still be reflected in hospitality and tourism consumption patterns and create new preferences until vaccines for the pandemic are developed and become widely available. Thus, it is of great importance to understand how the pandemic, risk aversion, and purchase behavior are connected.

Therefore, this study aims to explore the relationships among the pandemic, social distancing, and firm performance in the hospitality and tourism industries. In our analysis, social distancing is used to represent the risk aversion level among consumers. Specifically, we investigated 1) the extent of voluntary social distancing driven by the pandemic, 2) changes in information search for hospitality and tourism products since the outbreak of COVID-19, 3) the effect of these two behavioral changes (social distancing and information search) on firm value and customers' product reviews, and 4) the differences in the product consumption between regions with different infection risks. This study was conducted in South Korea as it is one of the few hard-hit countries that managed to flatten the new infection curve without resorting to a complete lockdown. In South Korea, businesses were allowed to continue operations unless they were directly involved in community infections. Thus, our investigation can provide timely insights regarding the effect of COVID-19 on hospitality and tourism consumer behaviors while reopening the economy.

## 2. Literature review

### 2.1. Social distancing, economic crisis, and risk aversion

To contain the spread of COVID-19, countries have implemented a comprehensive set of protective measures. Given that there are no pharmaceutical agents that are safe and effective in preventing or treating the pandemic, nonpharmaceutical interventions like social distancing measures are critical in control and mitigation of COVID-19 (Hartley & Perencevich, 2020). Social distancing measures minimize possible contacts among people with bans on mass gatherings, bans on international and domestic travels, disclosure of schools and non-essential businesses, and stay-at-home restrictions. Their effectiveness has been proven consistently in different COVID-19 contexts (Hsiang et al., 2020), indicating that social distancing is a proper risk-averse action against infection risk.

Compulsory public health measures including social distancing interventions become economic threats by suddenly halting economic activities on both supply and demand sides (Izvorski et al., 2020; McKee & Stuckler, 2020). Due to the continued spread of COVID-19, this crisis has now turned into an economic calamity. Accordingly, the dynamic of protecting public health and preserving the economy has changed. To avoid a global economic collapse, countries are beginning to relax the extensive restrictions and gradually reopen their economies. However, economic activities, particularly on the demand side, are still suppressed because of increased risk aversion among consumers. Risk aversion is

individuals' natural reaction to a pandemic and likely to persist or decline slowly in the presence of the ongoing pandemic. A survey conducted in the middle of May 2020 found that 83% of Americans are concerned with the second wave of the pandemic after the economy reopens and that 60% and 69% still support compulsory stay-at-home policies and compulsory social distancing measures, respectively (Beaumont & Fingerhut, 2020). To handle such perceived risk, individuals will voluntarily engage in social distancing even after strict restrictions are lifted. Thus, voluntary social distancing can be indicative of the degree of risk aversion resulting from health concerns.

Reduction in social contact and outdoor activities can also be related to individuals' financial concerns from the economic uncertainty created by COVID-19. During a recession, significant financial distress and uncertainty contributes to individuals' risk aversion (Brunnermeier & Nagel, 2008). To prepare for potential financial difficulties, individuals tend to reduce non-essential activities such as social gathering and home visits to relatives (Fenge et al., 2012). Accordingly, social distancing can also emerge in response to the perceived financial risk amid the pandemic. Indeed, Moschovou and Tyrinopoulos (2018) empirically found that passenger traffic significantly decreased during the 2008 economic crisis, which supports the link between social distancing and financial risk during an economic crisis. In sum, health and financial concerns both can provoke voluntary social distancing via risk aversion in the COVID-19 crisis.

Social distancing is an absolute risk avoidance strategy that eliminates the possibility of being affected by risks completely (Zhu & Deng, 2020). As the severity of COVID-19 increases, this strategy is more likely to be resorted in an effort to mitigate the pandemic risk. Hence, this would lead to a substantial decrease in the demand for some experiential products that require physical presence, such as tourism, exhibitions, leisure activities, theatres, lodging, and theme parks. However, many consumers prefer partial avoidance over absolute avoidance to manage risks because it provides consumption benefits while minimizing the loss from risks (Maser & Weiermair, 1998; Zhu & Deng, 2020). Thus, when the infection risk decreases, consumers are highly likely to take partial risk avoidance strategies. For example, there might be an increased demand for products offered by businesses that are located in safer geographic regions or operate in safer ways. To explore these absolute and partial risk avoidance strategies, this study investigated the effect of social distancing caused by the pandemic on firm performance at national and regional levels.

### 2.2. Crisis, risk aversion, and hospitality and tourism industries

Hospitality and tourism industries have been a prominent victim of increased risk aversion during health and economic crises (Kim et al., 2020; Zheng et al., 2016). The COVID-19 pandemic has brought about global-scale health and economic crises simultaneously. The combined adverse impact is particularly devastating to the global hospitality and tourism industries. Sales of the U.S. hospitality and tourism industries in March including airlines, lodging, cruises, online travel agencies and rental cars decreased 85% from the previous year (Leatherby & Gelles, 2020). According to the United Nations World Tourism Organization (2020), it is estimated that international tourism receipts will drop at least \$910 billion in 2020, which is 14.2 times the total loss in tourism receipts due to the SARS outbreak in 2003 (\$50 billion) and 10.3 times the loss due to the global financial crisis in 2008–09 (\$88 billion).

As large-scale health and economic crises are uncontrollable, fear of infection and economic volatility temporarily affect risk aversion among consumers (Kim et al., 2020; Pandelica & Pandelica, 2011). This

temporary change in consumers' mindset is seen in the form of voluntary social distancing that represents individual mobility. In the hospitality and tourism context, changes in risk aversion can also appear in information search behavior. Information search is a typical behavior taken before an actual purchase to reduce quality uncertainty in experiential products. In this respect, prospective consumers' information search changes first according to their risk perception of the crisis. Then, the changed search behavior is translated into the demand for hospitality and tourism products. Thus, information search can well represent the fluctuations in risk aversion among hospitality and tourism consumers during the COVID-19 crisis. We investigated information search as a measure of pandemic-induced risk aversion among consumers along with social distancing.

### 3. Methods

#### 3.1. Data

This study focused on the first wave of COVID-19 in South Korea which is the 19-week period from the 3rd week of January 2020 when the first case was confirmed to the last week of May. To measure and/or construct variables for data analysis, we accessed several databases. The data on confirmed cases and online information search were retrieved from the database of the National Information Society Agency of South Korea and Google Trends, respectively. To construct a proxy variable for social distancing, we used transportation data collected from the database of the government-owned Korea Expressway Corporation. For online reviews, this study used Booking.com and acquired 56,984 reviews for 719 hotels. We also obtained the stock prices of 18 hospitality and tourism companies (see Appendix A) and the data on media coverage of COVID-19 from Naver, the largest web services provider in South Korea. Naver provides public companies' financial information including stock prices and news stories from 152 newspapers, 57 magazines, and 23 television networks. The collected daily observations were converted into weekly totals or averages. In addition, the weekly observations of some variables were divided into eight regions for the regional-level analysis.

#### 3.2. Variables

Table 1 presents the description of variables. For the data analysis, this study used two outcome variables to measure firm performance: weekly average stock prices of hospitality and tourism companies ( $Y_{1it}$ ) and the weekly number of online hotel reviews in each region ( $Y_{2kt}$ ). To explore the effect of the COVID-19 status on the outcome variables, two explanatory variables were used: weekly number of confirmed cases ( $z_{1t}$ )

**Table 1**  
Description of variables.

Variable	Description
$y_{1it}$	Log-transformed average stock price of company $i$
$y_{2kt}$	Log-transformed number of online hotel reviews in region $k$
$x_{1t}$	Mobility measured as scaled highway traffic flow (1st week of January = 1.0)
$x_{1kt}$	Regional mobility measured as scaled highway traffic flow in region $k$ (1st week of January = 1.0)
$x_{2it}$	Log-transformed relative frequency of Google search queries for company $i$
$x_{3kt}$	Log-transformed relative frequency of Google search queries for tourist attractions of region $k$
$x_4$	Industry fixed effects
$x_5$	Region fixed effects
$z_{1t}$	Log-transformed number of confirmed cases
$z_{1kt}$	Log-transformed number of confirmed cases in region $k$
$z_{2t}$	Ratio of news stories on COVID-19 to the popular 1260 news stories (180 stories per day) by the number of viewers

and media coverage on the pandemic ( $z_{2t}$ ). The number of confirmed cases were again divided into two variables: the national cases ( $z_{1t}$ ) and regional cases ( $z_{1kt}$ ). Media coverage is measured as the ratio of COVID-19 news stories to the popular news stories in a week. Based on the number of views, 180 news stories were identified daily and a total of 1360 news stories in a week. Then, we computed the proportion of weekly COVID-19 news stories in relation to the total number of news stories.

This study investigated two risk-averse behaviors brought on by the pandemic: social distancing and information search. Mobility ( $x_{1t}$ ) was adopted as a proxy variable for social distancing that represents general risk-averse behavior. We used weekly highway traffic volume to measure individuals' mobility. The traffic volume was rescaled as a proportion of traffic volume in the first week of January. For example, 0.90 indicates that the traffic volume in that week is 10% less than the volume in the reference week. In addition, the weekly traffic volume was divided into ones in eight region-wise volumes to measure mobility at the regional level ( $x_{1kt}$ ). The rescaling for the regional traffic volume was conducted based on each region's traffic volume in the first week of January.

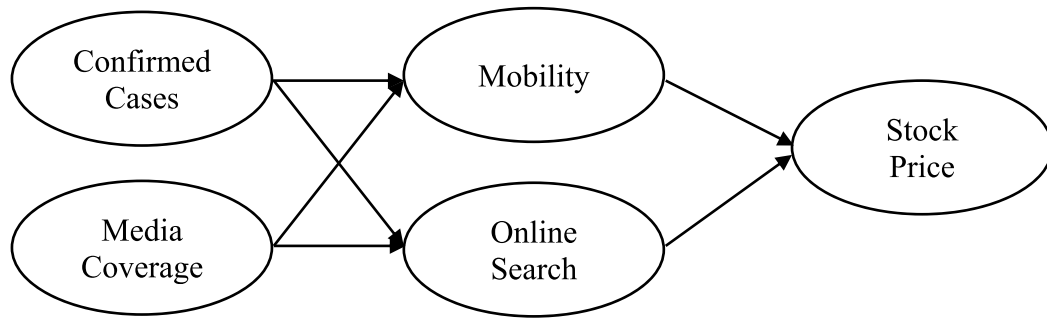
Information search was used to show risk aversion related to hospitality and tourism. According to the geographic level (national and regional), two explanatory variables for information search were developed. To construct online search for companies ( $x_{2it}$ ), we computed the relative volume of Google search queries for each hospitality or tourism company. The highest weekly number of search queries for *Korean Air*—the largest company in the hospitality and tourism industries in terms of market value—was set as a baseline. Then, the search queries for other companies were standardized in relation to the baseline. For online search for regional tourist attractions ( $x_{3kt}$ ), the relative search volume for major regional tourist attractions, which were used in main tourism statistics of the *Korea Culture and Tourism Institute (2020)*, was calculated. As in the online search for companies, we normalized the query share of a particular tourist attraction by the highest query share of *Lotte World*, a theme park that we used as a representative. Then, the normalized query shares were averaged per region. In addition, to capture the industrial, and geographical effects, industry ( $x_4$ ) and region ( $x_5$ ) fixed-effects variables were considered in data analysis.

#### 3.3. Model specification and estimation

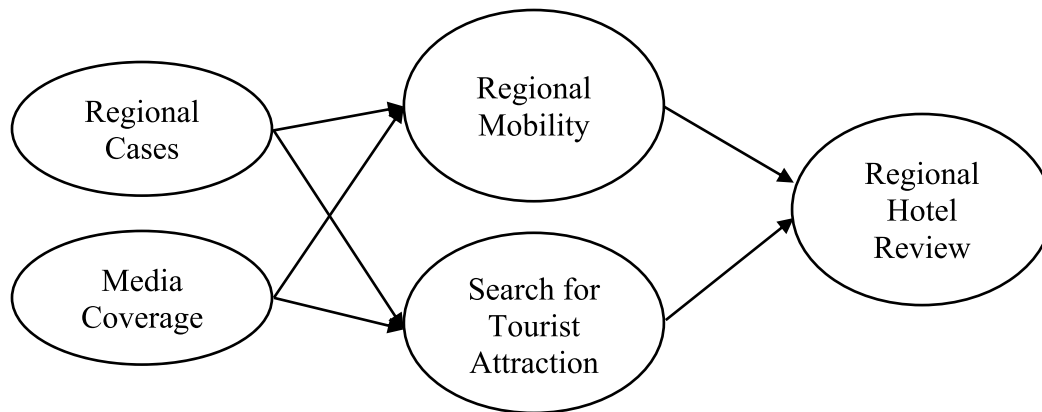
Our goal in data analysis was to understand the joint structure of mobility and information search behavior changed over the 19-week window, conditional on the spread of COVID-19 and subsequent changes in media coverage of the pandemic. We developed two sets of joint models that describe two outcome variables: stock price and hotel reviews. To construct valid models, we made three key assumptions in addition to the classical conditions of regression:

- (A1) Outcome variable  $y_t$  is independent of  $z_t$  conditional on  $x_t$ .
- (A2) Outcome variable  $y_t$  is independent of  $x_{t-1}$  conditional on  $x_t$ .
- (A3) Explanatory variable  $x_t$  is independent each other conditional on  $z_t$  except  $x_4$  and  $x_5$ .

The first assumption (A1) is based on the fact that mobility and online search occur prior to hospitality and tourism product consumption. The second assumption (A2) indicates that  $x_{t-1}$  does not help in explaining outcome variables  $y_t$  conditional on the current information  $x_t$ . This is similar to Markov's property in stochastic processes. Third assumption (A3) implies that mobility and online search are connected only through pandemic status and media coverage. That is, the partial correlations of  $x$ 's conditional on  $z$  are all zeros. Since industry category and regions are used to control for industrial and geographical effects in model estimation, these variables are excluded from the third assumption (A3).



(a) Stock price model



(b) Hotel review model

Fig. 1. Proposed conceptual models.

Combining the three assumptions, we derive the basic research models for this study presented in Fig. 1. The joint models are decomposed into three regression equations. Since the two outcome variables of the models: stock prices  $y_{1it}$  and hotel reviews  $y_{2jkt}$  require different levels of explanatory variables due to their different data structures, we develop a set of equations for each outcome variable. The first joint model for stock prices is formulated as follows:

Following the basic probability theory, this joint model  $f$  can be expressed as two Equations  $f_1$ , and  $f_2$  in the first equality. Then, the second equality is obtained from Assumptions (A1) and (A2). The third equality is derived from Assumption (A3). From the last equality, we obtain three Equations  $g_1$ ,  $g_2$ , and  $g_3$ . Following Rubin (2004) and Van Buuren et al. (1999), this study employed the sequential regression approach to identify the joint structure of the three equations.

$$\begin{aligned}
 f(y_{1it}, x_{1t}, x_{2it} \mid y_{1i,t-1}, x_{1,t-1}, x_{2i,t-1}, x_4, z_{1t}, z_{2t}) &= f_1(y_{1it} \mid y_{1i,t-1}, x_{1t}, x_{1,t-1}, x_{2it}, x_{2i,t-1}, x_4, z_{1t}, z_{2t}) f_2(x_{1t}, x_{2it} \mid y_{1i,t-1}, x_{1,t-1}, x_{2i,t-1}, x_4, z_{1t}, z_{2t}) \\
 &= f_1(y_{1it} \mid y_{1i,t-1}, x_{1t}, x_{2it}, x_4) f_2(x_{1t}, x_{2it} \mid y_{1i,t-1}, x_{1,t-1}, x_{2i,t-1}, x_4, z_{1t}, z_{2t}) \\
 &= g_1(y_{1it} \mid y_{1i,t-1}, x_{1t}, x_{2it}, x_4) g_2(x_{2it} \mid y_{1i,t-1}, x_{2i,t-1}, x_4, z_{1t}, z_{2t}) g_3(x_{1t} \mid y_{1i,t-1}, x_{1,t-1}, x_4, z_{1t}, z_{2t}) = g_1(y_{1it} \mid y_{1i,t-1}, x_{1t}, x_{2it}, x_4) g_2(x_{2it} \mid x_{2i,t-1}, x_4, z_{1t}, z_{2t}) g_3(x_{1t} \mid x_{1,t-1}, z_{1t}, z_{2t})
 \end{aligned}$$

Fixed-effects analysis was used to estimate each of these equations within the joint model.

The second joint model for hotel reviews is presented as follows:

$$\begin{aligned}
 f(y_{2kt}, x_{1kt}, x_{3kt} | y_{2k,t-1}, x_{1k,t-1}, x_{3k,t-1}, x_5, z_{1kt}, z_{2t}) &= f_1(y_{2kt} | y_{2k,t-1}, x_{1kt}, x_{1k,t-1}, x_{3kt}, x_{3k,t-1}, x_5, z_{1kt}, z_{2t}) f_2(x_{1kt}, x_{3kt} | y_{2k,t-1}, x_{1k,t-1}, x_{3k,t-1}, x_5, z_{1kt}, z_{2t}) \\
 &= f_1(y_{2kt} | y_{2k,t-1}, x_{1kt}, x_{3kt}, x_5) f_2(x_{1kt}, x_{3kt} | y_{2k,t-1}, x_{1k,t-1}, x_{3k,t-1}, x_5, z_{1kt}, z_{2t}) \\
 &= h_1(y_{2kt} | y_{2k,t-1}, x_{1kt}, x_{3kt}, x_5) h_2(x_{3kt} | y_{2k,t-1}, x_{3k,t-1}, x_5, z_{1kt}, z_{2t}) h_3(x_{1kt} | y_{3k,t-1}, x_{1k,t-1}, x_5, z_{1kt}, z_{2t}) \\
 &= h_1(y_{2kt} | y_{2k,t-1}, x_{1kt}, x_{3kt}, x_5) h_2(x_{3kt} | x_{1k,t-1}, x_5, z_{1kt}, z_{2t}) h_3(x_{1kt} | x_{1k,t-1}, x_5, z_{1kt}, z_{2t})
 \end{aligned}$$

Similar to the first joint model for stock prices, we obtain three Equations  $h_1$ ,  $h_2$ , and  $h_3$  for  $y_{2kt}$ ,  $x_{3kt}$ , and  $x_{1kt}$ . Since Equations  $h_2$ , and  $h_3$  include weekly-observed explanatory variables, these variables cannot be incorporated as the weekly dummy into the equations. As for the first joint model, fixed-effects analysis was used to obtain the coefficients of distinct variables of the equations in the joint model.

Because the outcome variables of stock prices and hotel reviews were observed every week, serial correlation should be controlled for in the analysis. To tackle this issue, we used lagged variables for both  $y$  and  $x$  as predictors. Residual plots were also checked to see if the developed models severely violated heterogeneity and independence assumptions, which are key conditions in multiple linear regression estimation. No serious violation of the assumptions was observed.

## 4. Results and discussion

### 4.1. Descriptive statistics

Table 2 presents the descriptive statistics of the variables. In South Korea, the average weekly new infections are 576.6 cases during the study period. The peak of 3,945 cases is observed in Week 7. The lowest cases after Week 7 are found in Week 15 (46 cases). The average weekly regional cases are 70.0 with the maximum of 3,689 cases in Daegu-Gyeongbuk in Week 7. COVID-19 news stories account for 23.75% of the popular news stories on average. The highest ratio is 45% in Week 6

**Table 2**  
Descriptive statistics.

Variable	Mean	STD	Min	Max
$Y_{1it}$ (Stock)	17,464.26	983.03	1366.00	106,900.00
$Y_{2kt}$ (Review)	133.05	12.64	6.00	858.00
$x_{1t}$ (Mobility)	1.02	0.02	0.86	1.15
$x_{1kt}$ (Regional Mobility)	1.02	0.01	0.70	1.32
$x_{2it}$ (Search for company)	29.05	1.36	19.34	40.18
$x_{3kt}$ (Search for attraction)	76.87	2.63	0.00	169.66
$z_{1t}$ (Confirmed cases)	576.63	229.79	2.00	3947.00
$z_{1kt}$ (Regional cases)	69.96	28.78	0.00	3689.00
$z_{2t}$ (Media coverage)	23.75	2.25	4.4	45

**Table 3**  
Estimation results.

	EQ $g_1$ (Traffic)	EQ $g_2$ (Search)	EQ $g_3$ (Stock)		EQ $h_1$ (Traffic)	EQ $h_2$ (Search)	EQ $h_3$ (Review)
Lagged term	0.545***	0.92***	0.99***	Lagged term	0.44***	0.26***	0.70***
$z_{1t}$ (Confirmed cases)	-0.01	0.00		$z_{1kt}$ (Regional cases)	-0.01***	-0.03***	
$z_{2t}$ (Media coverage)	-0.43***	-0.37**		$z_{2t}$ (Media coverage)	-0.45***	-0.20**	
$x_{1t}$ (Mobility)			0.33***	$x_{1kt}$ (Regional Mobility)			1.61***
$x_{2it}$ (Search for company)			0.00	$x_{3kt}$ (Search for attraction)			0.57**
$R^2$	0.83	0.92	0.99	$R^2$	0.69	0.70	0.97

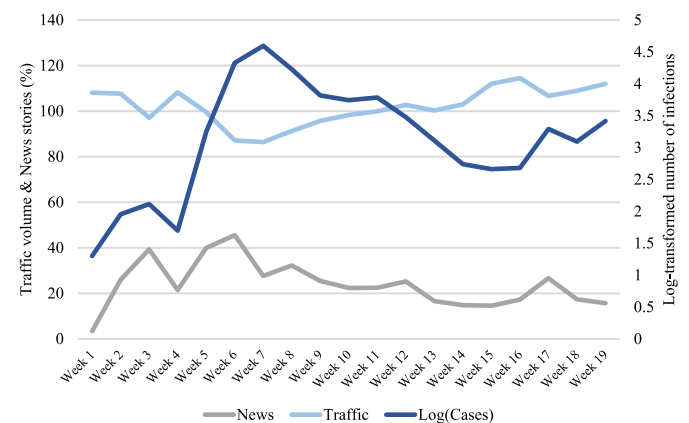
Note: \*.01, \*\*.05, \*\*\*0.01.

while the lowest 4.4% is observed in Week 3. The mean of mobility is 1.02, indicating that the average weekly traffic volume is 102% of the volume in the beginning of 2020. While the minimum traffic volume is

0.86 in Week 6, the maximum traffic volume is 1.14 in Week 18. The mean of regional mobility is the same as that of the national-level mobility (1.02), but the regional minimum was 0.70 in Daegu-Gyeongbuk in Week 8 and the regional maximum is 1.32 in Gwangju-Jeolla in Week 18. The average relative volume of online search for a company is 29.05, meaning that the average weekly search volume per company is 29.05% of the maximum volume of online search for Korean Air. Finally, the relative volume of online search for regional tourist attractions is 76.87 on average, indicating that the average regional search share is 76.87% of the reference search volume of Lotte World.

### 4.2. Estimation results and discussion

The estimated coefficients of variables are shown in Table 3. The first joint model (equations  $g_1$ ,  $g_2$ , and  $g_3$ ) investigated the effect of the pandemic (number of confirmed cases and media coverage on COVID-19) on stock prices of hospitality and tourism companies through mobility and online search. In Equation  $g_1$ , COVID-19 news stories significantly affected mobility. Specifically, when the ratio of the news stories increased 1%, the highway traffic volume decreased 0.43%. These results indicate that as individuals are exposed to more pandemic news stories, risk-averse behavior—social distancing—increases. This



**Fig. 2.** Confirmed cases, pandemic news stories, and mobility, Week 1 to Week 19.



close link between media coverage and social distancing is clearly shown in Fig. 2. While there is an increasing trend in news stories on the pandemic until Week 6, the traffic volume correspondingly drops (increases in social distancing). Since Week 6, traffic volume gradually rises (declines in social distancing) in accordance with the decreasing news stories on the pandemic. On the other hand, confirmed cases are not related to mobility. Although the number of confirmed cases seems to move similarly with individuals' mobility, their movements are often decoupled (e.g., Week 7, Week 8, Week 12, Week 19).

The significant relationship between media coverage and mobility implies that individuals tend to choose social distancing to completely avoid the extreme uncertainty resulting from COVID-19 and that this absolute risk avoidance behavior varies according to the spread of the pandemic and subsequent changes in risk perception. Combined with the insignificance of confirmed cases on mobility, it is noted that individuals' risk perception is shaped mainly via information obtained from the media. News stories from the media provide not only various health and medical issues related to the pandemic, but also its substantial impact on different socio-economic aspects including social well-being and the economy. Hence, the influence of COVID-19 news stories on risk perception can be greater than that of the simple frequency of confirmed cases. Our analysis results confirm such a difference in informational influence between these two types of information.

In Equation  $g_2$ , the effects of confirmed cases and media coverage of COVID-19 on online information search for hospitality and tourism companies were inconsistent. While a 1% increase in COVID-19 news stories was associated with a 0.37% decrease in online search queries, confirmed cases did not have any effects. The former result indicates that as individuals viewed more COVID-19 news stories, people lost their interests in the services or products of hospitality and tourism companies, decreasing their search for those companies. This responsive information search behavior during the pandemic seems reasonable as air-travel, tourism, gambling, and dining-out can all worsen health and financial risks by increasing physical contact.

In Equation  $g_3$ , we investigated the effects of online information search and mobility on hospitality and tourism stock prices. The investigation results revealed that mobility was related to stock prices, but online information search was not. In specific, when the traffic volume increased 1%, hospitality and tourism stocks also increased 0.37%. This indicates that changes in social distancing practices that show consumers' risk aversion level are directly translated into hospitality and tourism firm value. Combined with the results from Equations  $g_1$  and  $g_2$ , it demonstrates that pandemic-induced risk aversion affects hospitality and tourism firm performance. It is noted that individuals' risk perception becomes the main judgement factor in the decision to purchase hospitality and tourism products during the COVID-19 crisis, which corroborates the adverse effect of risk aversion on hospitality and tourism in crises (Kim et al., 2020).

However, there was no relationship between online search for

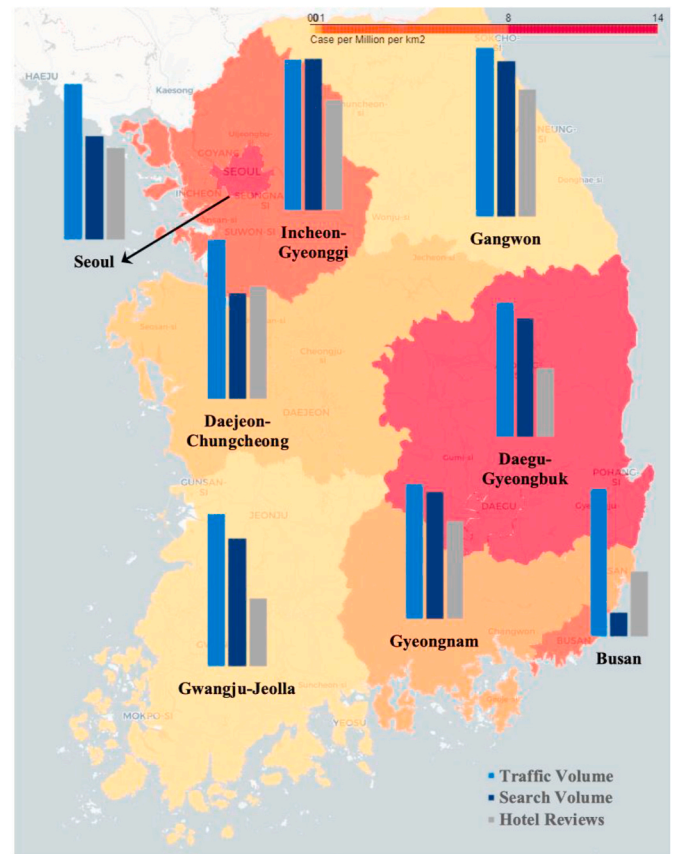


Fig. 3. Confirmed cases per million per km<sup>2</sup>, mobility, online search, hotel reviews by region.

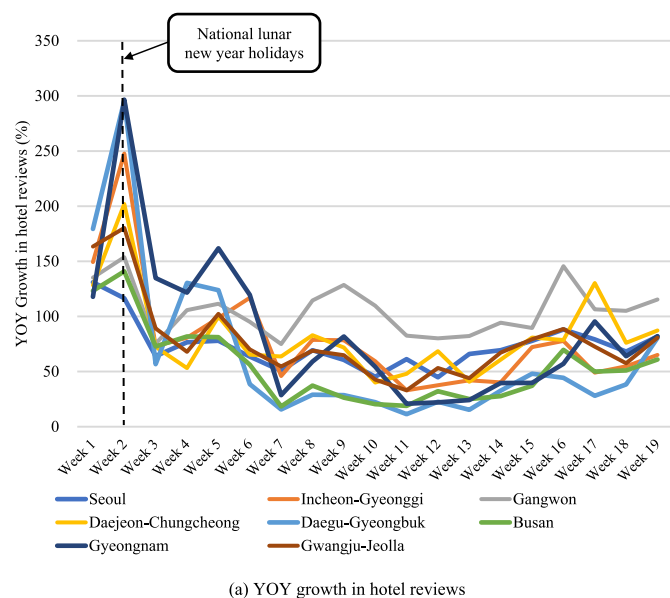
Table 4  
Confirmed cases, traffic volume, and online search in regions.

Region	Confirmed Case	Case per Million per km <sup>2</sup>	Traffic Volume (%)	Online Search (%)
Busan	145	5.46	102.32	18.44
Daejeon-Chungcheong	251	0.30	104.46	70.05
Gangwon	56	0.22	106.61	98.36
Incheon-Gyeonggi	815	0.58	103.20	103.75
Daegu-Gyeongbuk	8259	8.06	95.22	83.82
Gyeongnam	123	0.35	97.93	92.66
Gwangju-Jeolla	69	0.09	106.82	90.01
Seoul	846	14.07	103.58	69.43

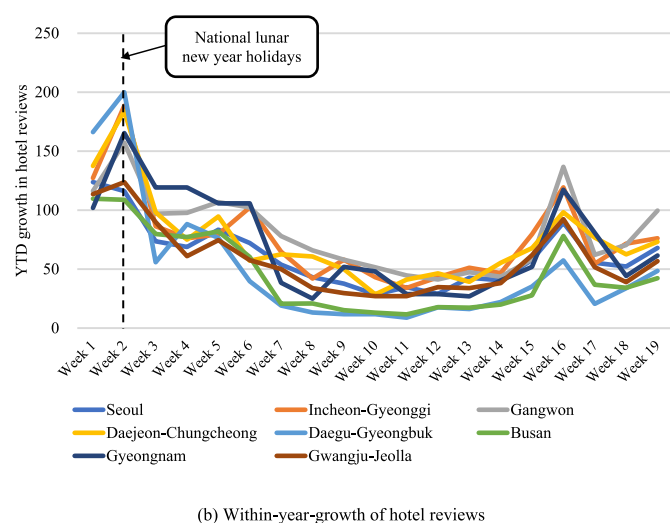
Note: Confirmed cases in thousands.

companies and their stock prices. This can be understood from an investor perspective. Online search queries not only include information search by potential hospitality and tourism consumers, but also investors' search for company stocks. The consumers' information search behavior clearly reflects their interest in the products, but the purpose of investors' search behavior may be different because their search behavior emerges for both buying and selling decisions. Moreover, the increased volatility of the stock market after the outbreak of COVID-19 also polarized investors' market outlook. Indeed, since the day when the first case was confirmed in South Korea, the stock market plunged 35.6% as the pandemic rapidly spread. After the market bottomed out, it rebounded 48.7% with the news of reduced new infections and an unprecedented large scale of the economic stimulus packages by the government. These drastic fluctuations might provide a rare opportunity for potential investors or make existing shareholders reconsider whether to hold the stocks. In this reasoning, the effect of online information search can be insignificant on stock prices of hospitality and tourism companies.

The second joint model (Equations  $h_1$ ,  $h_2$ , and  $h_3$ ) investigated the effect of the pandemic on the volume of hotel reviews through mobility and online search for tourist attractions at the regional level. The results of Equation  $h_1$  showed the negative effect of both confirmed cases and COVID-19 news stories on mobility. When regional confirmed cases and news stories increased 1% each, the traffic volume to the region decreased 0.01% and 0.45%, respectively. Compared to the results of the first joint model (in particular, Equation  $g_1$ ) that used nationwide data, this indicates that the effect of media coverage on mobility was significant at both national and regional levels, but the effect of confirmed cases on mobility changed to be significant when considering the geographic effect. Along with the insignificant effect of confirmed cases in Equation  $g_1$ , the latter result means that individuals' risk perception is



(a) YOY growth in hotel reviews



(b) Within-year-growth of hotel reviews

Fig. 4. Growth in hotel reviews.

more sensitive to regional confirmed cases than to national confirmed cases. Indeed, we found that *Gangwon* and *Gwangju-Jeolla* with the lowest number of confirmed cases had higher traffic volume than other regions (see *Table 4* and *Fig. 3*). On the contrary, *Daegu-Gyeongbuk*, which accounted for 78.2% of the total cases in South Korea had the lowest traffic volume.

These inconsistent results between regional and nationwide analyses suggest that risk perception is affected by the spatial distance from real health risk (*Zwickle & Wilson, 2014*), which supports construal-level theory (CLT). According to CLT, when events occur in spatially proximal areas, the events are construed concretely so that their impact is vividly recognized without being discounted (*Perrings & Hannon, 2001; Trope & Liberman, 2010*). Thus, regional confirmed cases are perceived as proximal events compared to national confirmed cases. The perceived risk of regional cases becomes real and specific enough to trigger social distancing, an absolute risk avoidance strategy for the pandemic.

In Equation  $h_2$ , the coefficients of confirmed cases and media coverage were significant on online information search for tourist attractions. A 1% increase in regional confirmed cases and COVID-19 news stories led to a 0.03% decrease and a 0.20% decrease in online search queries for regional attractions, respectively. This relationship is also

observed in *Table 4* and *Fig. 3* both of which show a substantial drop in online search for *Busan*, *Daegu-Gyeongbuk*, and *Seoul* that have the highest cases per million per km<sup>2</sup>. These regional-level analysis results indicate that pandemic-induced risk aversion significantly reduces consumer intentions to travel to destinations at high risk and as a result, online search queries for their tourist attractions decline. This reveals that consumers consider regional pandemic status seriously in the destination selection process, suggesting that they may employ a geography-based partial risk avoidance strategy which is to consume hospitality and tourism products while minimizing pandemic risk via targeted geographical screening.

From Equation  $h_3$ , this study found that regional mobility and online information search for tourist attractions were positively related to hotel reviews. While a 1% increase in the regional traffic volume was associated with a 1.09% increase in the volume of hotel reviews in a region, a 1% increase in online search queries for regional tourist attractions was associated with a 0.56% increase in hotel reviews. The results demonstrate that voluntary social distancing practices against the pandemic are translated into actual product consumption in the hospitality and tourism industries. Their significant relationship confirms that pandemic-induced risk aversion leads to the absolute risk avoidance strategy and so affects the purchase of hospitality and tourism products at the regional level, which is consistent with the national-level analysis in the first joint model.

In addition, the significant effect of online search on hotel reviews reveals that information search for regional tourist attractions is an antecedent of actual travel to the regions. Combined with the results from Equation  $h_2$ , this relationship indicates that as confirmed cases decrease in a region, consumers conduct more information search for tourist attractions of the region and further the actual use of lodging services in that region increases. This implies that as a partial risk avoidance strategy, consumers opt out of hotels in the regions at high risk of infection and look for hotels in less risky regions for their travels. This risk avoidance strategy taken by hotel consumers is well presented in *Fig. 4*. Graphs (a) and (b) show the YOY growth in weekly hotel reviews and their changes compared to the first week of 2020 (within-year-growth hereafter), respectively. In these graphs, *Gangwon* with the lowest confirmed cases had highest growth rates consistently: +5.54% in the YOY growth and -19.12% in the within-year-growth on average. On the contrary, lowest growth rates were seen in *Busan* (-45.73% in YOY and -54.02% in the within-year-growth) and *Daegu-Gyeongbuk* (-34.68% in YOY and -50.39% in the within-year-growth) which had higher cases per million per km<sup>2</sup> following *Seoul*. However, *Seoul*, the capital of South Korea, did not see the decline as much in the growth rates as *Busan* and *Daegu-Gyeongbuk*. This could be because *Seoul* is the centre of socio-economic, political, cultural, and transportation activity in South Korea so that a number of different types of activities would essentially occur, some of which would need accommodations.

In sum, it is noted from the results and graphs that hotel consumers utilize partial risk avoidance considering regional pandemic risk. This suggests that even when the pandemic risk lessens, individuals' risk aversion does not fade away completely in the absence of medical treatment and vaccines. Thus, consumers continue to find alternative ways to enjoy products with minimal risk.

### 5. Conclusions and implications

As the COVID-19 crisis has unfolded at an extreme speed, preventive measures including compulsory public health interventions have been imposed as mitigation and containment strategies. Some individual preventive actions are likely to persist voluntarily even after an easing of extensive interventions, depending on individuals' risk perception. Further, these voluntary preventive behaviors have led to substantial changes in consumer demand and preferences. Thus, it is imperative to understand how pandemic-induced risk averse behavior affects the hospitality and tourism industries. We tested this relationship in two

separate analyses. The first analysis looked at the link among COVID-19, social distancing and information search, and stock performance of hospitality and tourism companies. The results demonstrate that news coverage on COVID-19 affects social distancing and information search. However, only social distancing, in turn, exerts an impact on stock performance. The second analysis explored the pandemic effect on hotel reviews through social distancing and information search for tourist attractions at the regional level. The results show that when considering the geographical effect, the number of confirmed cases and news coverage both lead to changes in social distancing and information search for attractions and that these behavioral changes are influential in hotel selection.

Theoretically, this study is one of the first to empirically investigate the link from pandemic diseases to social distancing to the hospitality and tourism industries. Their significant relationships show that the spread of the novel pandemic prompts individuals to adopt absolute risk avoidance strategies (social distancing), which significantly reduce hospitality and tourism firm performance. This finding highlights that risk perception becomes a key determinant of hospitality and tourism product demand during a pandemic crisis. Further, this study contributes to the literature by demonstrating that social distancing practices vary according to the spatial distance to actual health risk. Our regional-level analysis shows the significant relationship between confirmed cases and mobility, which was found to be insignificant in the national-level analysis. This indicates that when risks are spatially proximate, they are perceived vividly and, thus, increase protective behaviors. The finding provides evidence that CLT applies to individual behaviors in a pandemic. In addition, this study sheds some lights on the effect of risk aversion on hospitality and tourism consumption preference. Our findings demonstrate that even when the pandemic risk diminishes and consumers gradually resume hospitality and tourism product consumption, they prefer to choose products that would help avoid risk in the absence of medical treatment and vaccines for COVID-19. This illustrates that with a decreasing pandemic risk, consumers' risk reduction strategy changes from absolute avoidance to partial avoidance in the hospitality and tourism context. It is, thus, noted that pandemic-induced risk aversion is persistently pivotal in selecting hospitality and tourism products. In sum, this study opens a venue for further investigation of changes in customer behaviors and firm performance triggered by the pandemic by providing concrete, initial evidence of such changes in the early days of the pandemic.

Methodologically, this study provides a proxy for social distancing by using transportation data. We also introduce a way of using Google Trends to measure online search for specific topics (e.g., companies, tourist attractions). These new variable development methods can expand hospitality and tourism research into areas that are untapped due to limited data availability. For example, market-level analysis can be conducted at a granular level. This study used regional-level weekly data on traffic volume, online information search behavior, and online customer reviews for the analysis. A few years ago, such high frequency data were not segmented into this level. However, these types of daily observations are now available at a more granular geographical level (e.g., county, city). As society and businesses become more data driven, more and more segmented data in a short window will become available. In such a situation, it is essential in understanding diverse and rapidly changing consumer preferences to identify and convert dynamic raw information into analyzable data for research. Our data-related suggestions can help researchers use and develop various variables for rigorous granular analysis.

Practically, our findings provide valuable guidance for risk mitigation strategies in the hospitality and tourism industries. First, the close relationship between COVID-19, social distancing, and hospitality and

tourism product consumption shows that individuals' behavior and consumption preferences are subject to their risk perception of the pandemic crisis. While the crisis is ongoing, the influence of risk perception is also expected to continue to some extent and consumers will keep seeking ways to reduce health and subsequent financial risks. Indeed, our findings show that many consumers have selected hotels located in destinations with relatively low confirmed cases. Thus, hospitality and tourism businesses in regions and countries at low risk of infection are advised to advertise this geographical advantage to attract consumers. Given that the hospitality and tourism industries mainly consist of small and mid-sized operations that are likely to lack resources, they should collaborate to promote their destinations and businesses. In addition, it would be desirable to systematically cooperate with the local and national tourism offices for effective destination promotion. The active tourism promotion campaigns of New Zealand, which was the first country to be declared "virus-free" in the world are a good example of this strategy.

Second, the significant relationship between social distancing and the hospitality and tourism industries suggests that hospitality and tourism product consumption entails human mobility that inevitably generates physical contact. Since COVID-19 is transmitted through physical contact, consumers are more reluctant to purchase hospitality and tourism products. Thus, hospitality and tourism businesses need to address consumers' health concerns by offering contactless or limited-contact services and products. These health-protective services and products include 1) back-to-front boarding, blocking middle seats, and capping the number of seats in airlines, 2) limiting the number of players at tables and out-of-service slot machines in casinos, 3) separation of occupied rooms, rental of private and secluded properties (e.g., cabins, villas), and buyout offers for lodging operations or booking agencies, 4) curbside pickup service, drive-through service, food delivery option, and dine-in table separation for restaurants, and 5) road trips in wide-open outdoor spaces and individual tours in wide-open destinations like Mongolia and Tibet for travel agencies. Apart from these, contactless technologies that automate services and replace face-to-face contacts, such as mobile applications, robots, and self-service kiosks should also be utilized for the entire hospitality and tourism industries.

In addition to these corporate-level protective measures, it is critical for hospitality and tourism businesses to assure their consumers that the premises are clean and disinfected and, hence, it is safe to return (Tse et al., 2006). Accordingly, hospitality and tourism businesses should develop and implement enhanced cleaning and disinfection protocols (e.g., Marriott's Global Cleanliness Council, Hilton's CleanStay, TGI Friday's Welcome Back into the Game 2020) to attract consumers by making them feel confident that businesses are taking elaborate care of their health.

Third, hospitality and tourism businesses need to communicate with consumers regarding hygiene policies and strict cleaning and disinfection practices. When consumers perceive risk, they require more information about products and operations and increase their information search for purchase decisions (Gursoy & McCleary, 2004). Thus, the communication of health protective actions should be made through as many online and offline channels as possible such as email, social media, advertisement, press release, and in-store signage. Considering our finding that online information search precedes product purchases, hospitality and tourism businesses should stay connected with consumers online to share how they respond to the pandemic risk to protect employees and consumers and to update new protective operational procedures and services.

Fourth, hospitality and tourism firms should consider survival strategies such as the change of the business models as the pandemic crisis is prolonged. Our findings demonstrate that as the pandemic situation



becomes dire with increasing confirmed cases, customers are more likely to use complete risk avoidance strategy so that corporate stringent measures may be no longer effective in attracting them. In this case, firms may need to completely pivot their business in the direction where customer demand is increasing. For example, Airbnb has earned sales growth in the second half of 2020 by shifting their focus to long-term stays in remote locations from short-term stays in crowded popular locations (Taulli, 2020). Yum! Brands which operates major franchise brands including KFC, Pizza Hut, and Taco Bell has effectively dealt with the pandemic situation by closing their operations with physical dining space and opening new operations that only offer drive-through and delivery services (Haddon, 2021).

Fifth, the support of governments is essential for the survival of many hospitality and tourism firms that require customers' physical presence on the premises for the consumption of their products. Complete risk avoidance strategy based on social distancing prevents customers from using such hospitality tourism products as airlines, casinos, theme parks, cruise lines, and observatories. These businesses cannot but help counting on governments for their survival. Thus, it is of great importance for distressed hospitality and tourism businesses to effectively communicate their financial difficulties with governments through collective efforts with business associations so that governments can provide financial aid.

This study presents several limitations. First, the magnitude of the impact of COVID-19 on firm performance could vary according to extrinsic cues that signal product quality. For example, firm performance might be different with brand reputation and product prices,

which can serve as a quality signal that alleviates the perceived risk. However, this study did not include these cues in the data analysis. Second, this study is limited in its geographical and industry scope. This study focused only on hotels in South Korea for the online review analysis. Future research can expand the understanding of the pandemic effect by checking the external validity of the findings with further consideration of extrinsic cues in different geographical and industry contexts. Third, the study period is relatively short so this study can only highlight consumers' drastic temporary responses to the pandemic. Thus, it would be interesting to explore the long-term impact of pandemic-induced risk aversion on consumer demand and product selection. Fourth, this study analyzed the financial impact of the pandemic with stock prices. Although this measure is useful in estimating the overall financial impact of unexpected events (e.g., Kim et al., 2020), accounting measures such as sales and profitability can show such events' accurate financial impact in a specific period of time. Further, these accounting performance measures allows to track changes in the financial impact of events over time. Lastly, but not least, this study investigated large public hospitality and tourism firms to explore the financial impact of the pandemic. This sampling approach could limit the applicability of our findings to small- and mid-sized firms that consist of the majority of the industry. Future research should use a comprehensive set of firms to test the generalizability of the findings.

**Declaration of competing interest**

None.

**Appendix A. Public hospitality and tourism companies**

Industry	Company	Industry	Company
Airline	Air Busan	Casino	Kangwon Land
	Asiana Airlines		GKL
	Jin Air	Tour Agency	Good Travel
	Jeju Air		Hana Tour
	Korean Air		Lotte Tour Development
Hotel & Resort	T'way Airlines	Modu Tour	
	Hotel Shilla	Redcap Tour	
	Paradise	Sejoong Tour	
	Yongpyung Resort	Yellow Balloon Tour	

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**Author statement**

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