Understanding the relationships between distances and herd behavior in online reviews: the moderating effects of hospitality experience

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Abstract:

Purpose: This study aims to investigate the determinants of herd behavior in online hotel service evaluations, focusing on the cultural and geographic distance characteristics of customers. **Design/methodology/approach:** On the basis of 381,462 TripAdvisor reviews of hotels in the USA written by more than 100,000 customers from 92 countries, this study uses the empirical analysis to explore the collective roles of cultural distance, geographic distance and hospitality experience on herd behavior in online hotel ratings. **Findings:** Cultural and geographic distances between customers and product and service locations positively affect herding and these two effects are substitutable. The hospitality experience of customers attenuates the impacts of distances on herding. These results are robust for multiple hotel service ratings. **Practical implications:** Findings help hotels understand perceptual biases of customers on hotel services under the social influence and consequently develop effective marketing strategies to boost hotel revenues and increase profitability. **Originality/value:** The research contributes to hospitality and online review literature by understanding how cultural and geographic distances shape online hotel service evaluations under the root of the uncertainty of decision-making and the observation of others' behavior. The research also contributes to the distances in international business literature by deepening the understanding of the substitution and heterogeneity of distance effects. Methodologically, a time-varying and monotonously increasing variable is constructed to depict customers' hospitality experience. The extensive data volume ensures the generalizability of our results.

Keywords: cultural distance | online reviews | herd behavior | geographic distance | hospitality experience

Article:

1. Introduction

Customers' face-to-face communication about products and services, known as word-of-mouth, is an important factor in customers' decisions and behavior (Engel *et al.*, 1969; Richins, 1983). With the rise and development of the internet, customers' online reviews are seen as the electronic word-of-mouth, also greatly affecting the future sales and performance of firms (Hu *et al.*, 2008; Kim and Park, 2017; Chevalier and Mayzlin, 2006). However, these online reviews may not reflect the true overall customer satisfaction as they are subject to various perceptual biases, one of which is customer herd behavior (Ma *et al.*, 2013; Moe and Schweidel, 2012; Muchnik *et al.*, 2013; Lee *et al.*, 2015).

Herd behavior in online reviews, regarded as subsequent customer reviews being influenced by the average of the previous reviews and conforming to the social norm (Moe and Schweidel, 2012; Schlosser, 2005; Lee *et al.*, 2015), is common in the online environment (Krishnan *et al.*, 2014). The conformity to prior average ratings has different impacts on the online reputation of product or service providers based on the different initial average ratings. For instance, if hotels experience initial high average ratings, then customer herd behavior can help hoteliers further consolidate their online reputation status. By contrast, if initial hotel reviews are negative, then subsequent customers tend to leave negative reviews, too; thus, herd behavior may harm hotels' reputation (Ma *et al.*, 2013). Therefore, understanding the contributing factors of herd behavior in online evaluations and taking advantage of it in marketing practices are important for hoteliers (Guo and Zhou, 2016; Ma *et al.*, 2013).

Several recent studies have investigated how different characteristics of customers (i.e. gender, experience, social connectedness and confidence level) influence herd behavior in online ratings (Lee *et al.*, 2015; Ma *et al.*, 2013; Guo and Zhou, 2016; Wang *et al.*, 2018; Wu *et al.*, 2012). However, the roles of customers' cultural and distance characteristics are still largely unknown. The present research aims to fill the gap by investigating the roles of cultural and geographic distances of international customers on their herd behavior in hotel online service evaluations, under the root of the uncertainty of decision-making and the observation of others' behavior.

Cultural distance is the degree of cultural differences between customers' home countries and destinations (Kogut and Singh, 1988; Ghemawat, 2001; Shenkar, 2001). Geographic distance refers to the physical distance (Pirie, 2009; Park *et al.*, 2019). Previous research has indicated that cultural and geographic distances are associated with people having less knowledge, understanding and familiarity with foreign countries (Ghemawat, 2001; Reisinger and Turner, 1998). Theoretically, unfamiliar circumstances or incomplete knowledge can make people feel uncertain in their decision-making, which, in turn, causes people to rely less on their personal knowledge or experiences and more on others' behaviors (Lieberman and Asaba, 2006; Sun, 2013; Shen *et al.*, 2016; Walden and Browne, 2009). Additionally, other people's products or service evaluations are easy to be observed in the online environment, (Shen *et al.*, 2016). Therefore, cultural and geographic distances may affect herd behavior in online products or service evaluations.

Recent studies have highlighted the important roles of different dimensions of Hofstede's cultural values (Gao *et al.*, 2018; Mariani and Predvoditeleva, 2019), geographic and psychic distances (Phillips *et al.*, 2019) of international customers on their tendency to write reviews with

high (i.e. five stars) or low valence (i.e. one star). However, these studies did not take into account the herd behavior in online review platforms. Hong *et al.* (2016) explored the impact of the cultural background (individualism/collectivism) of customers on herd behavior in online ratings, but the effects of distances of customers have not been investigated.

By using 381,462 TripAdvisor reviews of 3,081 hotels written by more than 100,000 customers from 92 countries, this study empirically explores the impacts of cultural and geographic distances between home countries and destinations (the USA in our sample) on customer herd behavior in online ratings. Considering that individuals who experience one form of distance usually reduce their sensitivity to any other distance (Maglio *et al.*, 2013; Burtch *et al.*, 2014) due to the similarity between different distances, we wonder whether the effects of geographic and cultural distances are substitutable when testing them simultaneously.

In addition, people who have rich international travel and hospitality experience have more chances to be exposed to and increase familiarity with various cultural values (Hofstede, 1980; Hong *et al.*, 2016), thus creating different actual perceptions from what is reflected by distance (Cooper and Hall, 2008). The impact of the distances on customer herd behavior may vary because of the heterogeneity among customers. Therefore, this work also proposes and tests the moderating roles of hospitality experience over the effects of cultural and geographic distances on herd behavior. Unlike the traditional measure using the number of cities that customers have visited (Gao *et al.*, 2018), we construct a time-varying and monotonously increasing variable to well depict the hospitality experience of customers.

The present research contributes to hospitality and online review literature by enriching our understanding of how cultural and geographic distances of customers shape their online hotel service evaluations under the root of the uncertainty of decision-making and the observation of others' behavior. We also contribute to distance literature by deepening the understanding of the substitution and heterogeneity of distance effects. Methodologically, we construct a new variable to proxy the hospitality experience of customers, and the extensive data volume ensures the generalizability of our results. In practice, understanding herd behavior in online ratings of different customer groups will enable practitioners to understand the perceptual biases of customers on hotel services under the social influence of other people's behavior and consequently develop effective marketing strategies to boost hotel revenues and increase profitability.

2. Literature review

2.1 Herd behavior in online reviews

Krishnan *et al.* (2014) documented that herd behavior in online reviews is pretty common; specifically, 35% of users adjust their ratings after observing the median value and their final ratings are near the median.

The information cascade theory, proposed by Bikhchandani *et al.* (1992), can provide a theoretical explanation of how such a herd behavior occurs. The theory states that once others' behavior is perceived more informative than one's own, people tend to defer to predecessors'

behavior without considering their own information, and thus, a cascade occurs. On this basis, Sun (2013) proposed that for herd behaviors to occur, two primary conditions must be met, namely, the uncertainty of decision-making and the observation of others' behavior. First, people tend to herd when they are uncertain about decisions to be made due to either incomplete or asymmetric information (Walden and Browne, 2009; Shen et al., 2016; Lieberman and Asaba, 2006). Second, individuals must observe others' actions first to imitate their behavior (Sun, 2013; Shen et al., 2016).

Much research has explored the drivers of herd behavior in online product or service evaluations. For example, Ma et al. (2013) suggested that limited experience, social connectedness and male reviewers are likely influenced by previous average ratings. Guo and Zhou (2016) argued that customers' experience and prior rating context factors jointly influence their tendency to conform to prior average ratings. Wang et al. (2018) and Lee et al. (2015) found that ratings posted by friends who have high social connectedness always induce herd behavior in online reviews. Hong et al. (2016) found that customers from collectivist cultures tend to conform to average prior ratings. However, whether and how cultural and geographic distances affect herd behavior in online reviews have not been explored.

2.2 Geographic and cultural distances

Various forms of distances have been shown to affect a wide range of outcomes in international business, from country perception (Håkanson and Ambos, 2010), international trade to foreign market entry mode selection (Kogut and Singh, 1988), interpersonal conflict and cooperation (Stahl et al., 2010), to customer satisfaction (Park et al., 2019; Phillips et al., 2019) and customer behavior (Crotts, 2004; Ng et al., 2007; Larsen and Guiver, 2013). Three concepts are most commonly used to measure distance within the tourism and international business context: geographic distance (Lee et al., 2012; Park et al., 2019; Phillips et al., 2019), cultural distance (Ng et al., 2007; Crotts, 2004) and psychic distance (Håkanson and Ambos, 2010; Phillips et al., 2019; Stamolampros and Korfiatis, 2018).

Geographic distance is the physical distance between customer's home countries and their destinations; such distance is often measured in units on the basis of the inherent spatial dimension and objective physical world, such as miles or kilometers (Pirie, 2009; Park et al., 2019).

Cultural distance refers to the degree of differences, including cultural values, norms and traditions between countries (Kogut and Singh, 1988; Ghemawat, 2001; Shenkar, 2001). Kogut and Singh (1988) developed the most popular operationalization of cultural distance; their main underlying idea is to aggregate all culture dimensions of Hofstede's (1980) culture framework (i.e. power distance, individualism/collectivism, uncertainty avoidance and masculinity/femininity) to arrive at a unique composite index, which can quantify cultural differences on a dissimilar–similar basis. Specifically, the cultural distance of the two countries is measured by dividing the deviation of each cultural dimension by the variance, and then arithmetically averaging it. On the basis of the underlying idea of Kogut and Singh (1988), subsequent researchers have proposed additional cultural distance indexes according to other frameworks of cultural dimensions, such as those developed by the Schwartz

(1992), Trompenaars (1993) and Global Leadership and Organizational Behavior Effectiveness team (House *et al.*, 2004). However, these later indexes are based on a larger number of cultural dimensions, and, thus, Hofstede's simpler four-dimensional model is more commonly used.

"Cultural distance" and "psychic distance" are often used interchangeably (Håkanson and Ambos, 2010). However, several differences between the two terms have been highlighted in recent literature on international business. Cultural distance is documented as only one of the psychic distance's many components (Håkanson and Ambos, 2010; Sousa and Lages, 2011). Except for geographic and cultural differences, psychic distance comprises several other aspects, such as differences in temporality (tomorrow and in a year), social (friend and enemy), hypotheticality (sure and maybe), education level, economic situation, politics and language (Sousa and Lages, 2011; Håkanson and Ambos, 2010; Stamolampros and Korfiatis, 2018; Phillips *et al.*, 2019). Given that the measures of psychic distance at the individual level are complex, and the changes in other kinds of psychic distance are relatively rapid, the collection of large amounts of reviewers' psychic distance data is difficult. In addition, cultural and geographic distances are comparative exogenous measures. Therefore, we focus on the cultural and geographic distances of international customers to conduct our analysis.

2.3 Hypothesis development

Prior research has suggested that tourists from distant locations tend to be unfamiliar with their destinations and feel uncertain when they travel to foreign countries (Reisinger and Turner, 1998; Ghemawat, 2001). The distance can be geographic or cultural. The greater the geographic distance, the harder it is to reach a destination because of great transportation cost, and thus, the less direct or indirect contact one has with the destination (Larsen and Guiver, 2013; Lee *et al.*, 2012). The greater the cultural distance, the differences in language, thinking style and beliefs, the greater the communication and understanding costs, and thus, the more difficult it is for people to obtain knowledge and be familiar with the new environment (Reisinger and Turner, 1998; Ghemawat, 2001; Crotts, 2004; Ng *et al.*, 2007).

When individuals face unfamiliar circumstances or have incomplete knowledge, they feel uncertain and tend to disregard their own knowledge or experience when making decisions (Walden and Browne, 2009; Lieberman and Asaba, 2006; Sun *et al.*, 2013). In our context, international customers from countries with high cultural or geographic distance compared to their destination country will be less familiar with hotel services. As a result, these customers are less certain when making rating evaluations, satisfying the first condition of herd behavior and increasing the possibility of imitating others. In addition, information about other people's service evaluations in the online environment is easy to identify (Shen *et al.*, 2016). These foreign customers can easily observe the decisions of others (prior average ratings), meeting the second condition of herd behavior. Consequently, customers with high cultural or geographic distance tend to discount their private experience and conform to the social norm or previous average ratings when posting their own ratings. Thus, we hypothesize the following:

> *H1a–b* (cultural and geographic effects). The greater the a) cultural distance and b) the geographic distance between the home countries of international customers and their

destination countries, the more likely international customers display herd behavior when posting online ratings of products or services received in destination countries.

Furthermore, the effects of cultural and geographic distances may be substitutable. Both distances signify differences between countries, and thus, may be intercorrelated, suggesting that great geographic distance tends to be associated with great cultural differences, and the other way around. In addition, great geographic distance probably results in less frequent travel to destinations, and thus, less exposure to and familiarity with foreign cultures. The limited exposure and familiarity due to geographic distance exacerbate uncertainty invoked by cultural differences. By contrast, great cultural differences require a great frequency and duration of interactions to achieve familiarity and certainty. Thus, geographic and cultural distances are substitutes because a similar level of exposure to a geographically close but culturally different country may result in the same level of uncertainty as in the case of a geographically distant but culturally similar country.

This substitution effect has been observed in different contexts. For instance, Burtch *et al.* (2014) suggested that a substitution effect exists between geographic and cultural distances on lender decisions. Ragozzino (2009) also found that cultural distance interacts with geographic distance in their impacts on international firm expansion strategies. We argue that geographic and cultural distances can be substitutes in their effects on herd behavior exhibited by international customers who have limited knowledge about their destination countries. Geographic and cultural distances create uncertainty due to a lack of knowledge. Thus, the mechanism through which cultural and geographic distances lead to herd behavior in online ratings is similar and substitutable. Therefore, we hypothesize that:

> *H2 (substitution effect).* The effects of cultural and geographic distances on the herd behavior of international customers in online ratings are substitutable.

Although customers from countries with high distances tend to display herd behavior when posting ratings, variations may still exist among customers from the same country. Those people who have rich travel experience may have different actual perceptions from what is reflected by distance (Cooper and Hall, 2008). An increased number of international travel experience can expose people to and increase familiarity with various cultural values (Hofstede, 1980; Hong *et al.*, 2016). Such an exposure provides customers with additional knowledge about destination countries, a deep understanding of cultural differences and further sociocultural adjustment capacity to such countries (Lee and Sukoco, 2010; Takeuchi *et al.*, 2005). Thus, as travel experience increases, the uncertainty arising from differences between home and destination countries decreases. Due to that hospitality experience is an important component of travel experience, unfamiliarity and uncertainty about product and service situations in destination countries should consequently lessen with hospitality experience increases.

Moreover, customers with rich experience often exhibit high self-confidence and self-esteem, indicating a lower need for social approval (Guo and Zhou, 2016; Cox and Bauer, 1964). These customers are less likely to rely on others when submitting service reviews (Ma *et al.*, 2013; Wu *et al.*, 2012). Conversely, customers with less experience usually tend to adopt safe strategies, such as conforming to previous majority opinions to avoid social disapproval (Guo

and Zhou, 2016; Clark and Goldsmith, 2005), particularly, in unfamiliar and uncertain circumstances. Consequently, the understanding of real distance perception and self-confidence may weaken the impacts of cultural and geographic distances on the uncertainty and behavior of customers. Hence, hospitality experience moderates the effects of distance-related biases:

> *H3a–b.* Hospitality experience weakens the positive impacts of a) cultural distance and b) geographic distance on the tendency of international customers to display herd behavior when posting online ratings.

3. Methodology

3.1 Data collection and sample construction

To test our hypotheses, we used Hofstede's national cultural scores, as currently published at GeertHofstede.com and data from TripAdvisor.com. Figure 1 exhibits the data collection and analysis process in this study.

Figure 1. Data collection and processing
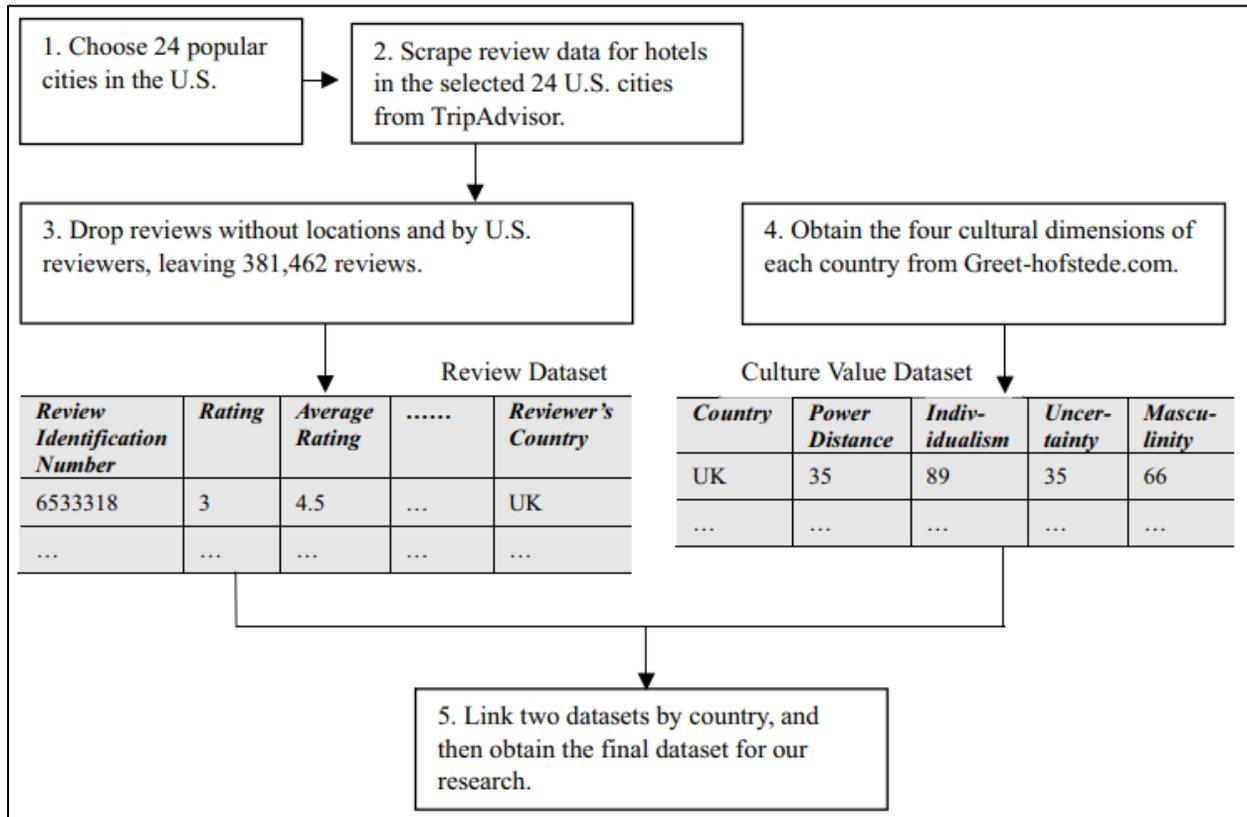
First, we determined our sample range. To improve the generalizability of the results, following Gao *et al.* (2018), we concentrated on hotels in the 24 most popular US cities, given that they exhibit greater economic development and attract the largest number of international customers from different cultural backgrounds than other cities. These 24 cities are identified as

a collection of "the top 10 America's most-visited cities" by Murray (2010) and "the top 20 popular USA destinations" by TripAdvisor travelers, 6 of which are duplicates.

Second, we acquired reviews from TripAdvisor. TripAdvisor is the world's leading travel data platform, collecting numerous online hotel reviews and has become an important data source for considerable prior research (Banerjee and Chua, 2016; Gao *et al.*, 2018; Hu *et al.*, 2019; Lee *et al.*, 2019; Liu *et al.*, 2020; Gao *et al.*, 2020; Gao *et al.*, 2017). The information we recorded from each review included their reviewer-, review- and hotel-level attributes. Reviewer-level items reflect customer characteristics, such as age, gender, location and travel type. Review-level items cover received service ratings, review lengths and review dates. Hotel-level items include hotel grades and chains they are part of.

Third, we filtered our obtained data. Considering that this research focuses on international customers, we removed reviews from customers who did not reveal their location or customers from unrecognized home countries. To avoid home country bias, we also removed reviews from US customers, as they are domestic, not international travelers. Doing so yielded a total of 381,462 reviews suitable for our analysis.

Fourth, we acquired Hofstede's (1980) four-dimensional cultural scores on power distance, individualism/collectivism, uncertainty avoidance and masculinity/femininity from GeertHofstede.com. The list of dimensions was later expanded first to five (Hofstede and Bond, 1988) and later to six (Hofstede and Minkov, 2010), but consistent with Kogut and Singh's (1988) model, we also operationalize our cultural distance based on the four original dimensions listed above.

Ultimately, our empirical analysis included 381,462 reviews of 3,081 hotels in the USA, covering international customers from 92 countries from 2002 to 2015.

3.2 Variable definition and description

Rating_Deviation: Lower *Rating_Deviation* indicates that customers likely conform to previous average ratings when posting ratings (Hong *et al.*, 2016) that is they likely herd in online reviews. Equation (1) defines that *Rating_Deviation* is calculated by the absolute difference between the posted rating of a customer and the previous average rating of a hotel that the customer observed:

$$Rating\_Deviation_{i,j,t} = abs\big(Rating_{i,j,t} - Average\_Rating_{i,j,t}\big). \qquad (1)$$

In equation (1), *i* means the index of individual customers, *j* implies the index of individual hotels and *t* refers to time.

Culture_Dist: *Culture_Dist* is calculated based on the cultural distance index developed by Kogut and Singh (1988) as follows:

$$Culture\_Dist_j = \sum_{i=1}^{4} \left\{ \frac{(I_{ij} - I_{ia})^2}{V_i} \right\} / 4, \tag{2}$$

where *Culture_Dist_j* stands for the cultural distance between country *j* and the USA, I_{ij} refers to the value for the *i*th cultural dimension of the *j*th foreign country. I_{ia} refers to the value for the *i*th cultural dimension of the USA. V_i means the variance of the index of the *i*th dimension.

Geo_Dist: Another main independent variable in our study is geographic distance. Following previous research (Park *et al.*, 2019; Pirie, 2009), we calculated *Geo_Dist* by using the great-circle geographic distance (in units of 1,000 km) between the home places of customers and the USA.

Experience: Previous literature has used the number of cities that international customers have visited to capture their hospitality experience (Gao *et al.*, 2018). However, this measurement is a time-invariant snapshot that only reflects the final status of customers at the time of data scraping. Thus, we constructed a time-variant and monotonously increasing variable to map the hospitality experience of international customers in the USA at the time they posted their reviews. The specific steps are as follows: After retrieving the full review profile of each international customer involved in our sample, we initially grouped the customer reviews and sorted them in ascending order by their rating date. Subsequently, we assigned each customer review to an increasing sequential number, and customer reviews posted in the same year and month were assigned the same number. We used this sequential number to measure the hospitality "experience" of international customers in the USA. Notably, we coded the experience by months, rather than by days. This strategy allowed us to roughly measure the number of independent trips of each international customer in the USA, given that most trips are within one month. To ensure the robustness of our results, we also coded the experience by days, and the results remained consistent.

Controls: Reviewer-level control variables cover the gender, age, member age and travel type of customers (Banerjee and Chua, 2016; Gao *et al.*, 2018; Ma *et al.*, 2013). In addition, considering that identity disclosure can influence customer online reviews (Gao *et al.*, 2018; Forman *et al.*, 2008), we added a binary variable, *Not_Disclosure*, to our model to capture whether international customers posted their age and gender. Importantly, customers' rating behavior may differ according to their cultural values (Hong *et al.*, 2016; Huang and Crotts, 2019; Mariani and Predvoditeleva, 2019), which simultaneously influence cultural and geographic distances. Therefore, to exclude that our results are influenced by these cultural values (i.e. *power, individualism, uncertainty* and *masculinity*), we added them to our control variables.

Review-level control variables indicate the average hotel rating and review volume before customers submit their reviews (Muchnik *et al.*, 2013; Gao *et al.*, 2018; Guo and Zhou, 2016). Considering the prior review volume skewed to the right, we defined *Prior_Volume* as the logarithmic value of prior review volume. Moreover, we used two categorical variables, *city* and *Hotel_Grade*, to denote, which city and grade hotels are in. We added a binary variable, *chain*, to our model to control the impact of hotel chains. We also included the months when the reviews were posted in our model to control for the time effect.

Table 1. Summary statistics and correlations

Variable	Mean	SD	Min	Median	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Rating_Deviation	0.712	0.564	0.000	0.587	4.000	1												
(2) Culture_Dist	0.948	1.115	0.027	0.258	6.534	–0.015	1											
(3) Geo_Dist	8.348	3.081	0.770	7.865	18.860	–0.005	–0.100	1										
(4) Average_Rating	3.969	0.460	1.000	4.023	5.000	–0.179	–0.051	–0.038	1									
(5) Prior_Volume	6.161	1.357	0.693	6.263	9.348	–0.056	0.010	0.054	0.175	1								
(6) Experience	1.575	1.261	1.000	1.000	33.000	–0.028	0.019	–0.006	0.053	0.044	1							
(7) Power	43.890	15.060	11	38	100	–0.010	0.718	0.181	–0.045	0.042	–0.001	1						
(8) Individualism	73.920	20.910	6	88	90	0.012	–0.884	–0.185	0.060	–0.026	–0.008	–0.752	1					
(9) Uncertainty	54.410	20.000	8	48	100	–0.023	0.646	0.217	–0.062	0.044	0.011	0.581	–0.599	1				
(10) Masculinity	58.990	14.100	5	61	100	–0.001	–0.049	–0.261	–0.003	–0.001	0.012	–0.131	0.097	–0.013	1			
(11) Women	0.294	0.456	0	0	1	–0.014	–0.042	–0.002	–0.010	0.008	0.014	–0.030	0.045	–0.020	0.045	1		
(12) Member_Age	4.864	2.359	1	5	12	0.021	–0.186	–0.108	0.006	–0.317	0.168	–0.189	0.203	–0.243	0.020	0.082	1	
(13) Not_Disclosure	0.399	0.490	0	0	1	0.031	–0.043	0.019	0.012	0.006	–0.106	–0.031	0.029	–0.034	–0.022	–0.525	–0.119	1

Table 1 shows the statistics and correlations of the main variables in our empirical model. This table reveals that the maximum and minimum values of the cultural distance of international customers are 6.534 and 0.027, respectively, thus providing cultural diversity for our study. The maximum and minimum values of the geographic distance of international customers are 18.860 and 0.770, respectively, therefore ensuring geographic diversity. The maximum and minimum values of the rating deviation are 4 and 0, respectively, and the median of the rating deviation is 0.587. In addition, Table 1 presents that most correlation coefficients between variables are less than 0.3, which indicates that their correlations are small.

3.3 Empirical model

Following previous literature (Hong *et al.*, 2016), we used the following linear regression model in equation (3) to empirically test our hypotheses. The coefficients of the regression model are estimated using Stata based on the ordinary least squares method:

$$
\begin{aligned}
Rating\_Deviation_{i,j,t} \\
= \alpha_0 + \beta_1 Culture\_Dist_{i,t} + \beta_2 Geo\_Dist_{i,t} \\
+ \beta_3 Culture\_Dist_{i,t} \times Geo\_Dist_{i,t} + \beta_4 Culture\_Dist_{i,t} \times Experience_{i,t} \quad (3) \\
+ \beta_5 Geo\_Dist_{i,t} \times Experience_{i,t} + \beta_6 Average\_Rating_{i,j,t} \\
+ \beta_7 Prior\_Volume_{i,j,t}
\end{aligned}
$$

where i and j indicate the customer and the hotel, respectively. *Culture_Dist$_{i,t}$* and *Geo_Dist$_{i,t}$* indicate cultural distance and great-circle geographic distance, respectively. *Experience$_{i,t}$* indicates the customer's hospitality experience. We focus on $\beta_1 - \beta_5$, which capture the main effects of the two distance metrics, their interaction (*Culture_Dist$_{i,t}$* × *Geo_Dist$_{i,t}$*) and the potential moderating impact of hospitality experience. We also controlled variables, including hotel-, reviewer- and review-levels. All estimates also controlled for the time, city, hotel grade, customer age and travel type fixed effects. In addition, we used robust standard errors to estimate the model to avoid the heteroscedasticity problem. Moreover, we standardized all continuous variables to transform variables into a common format.

The dependent variable, *Rating_Deviation$_{i,j,t}$*, indicates the overall rating deviation. After obtaining the basic results on the basis of the overall rating deviation, we replaced *Rating_Deviation$_{i,j,t}$* with a six-dimensional rating deviation on service features and repeated the analysis.

4. Results

4.1 Hypothesis testing

Table 2 shows the estimated results of our proposed model.

H1a and *H1b* predict a significantly positive relationship between distances and customer herd behavior in online ratings. The estimated coefficients of *Culture_Dist* and *Geo_Dist* in each column of Table 2 are negative at the 0.001 significance level. This finding suggests that customers from countries with high cultural or geographic distance to the USA less likely deviate

from previous average ratings. That is, they tend to herd and conform to the consensus more than those with low cultural or geographic distance. Thus, *H1a* and *H1b* are supported.

Table 2. Impacts of cultural and geographic distances on herd behavior in online ratings

	(1) Rating_Deviation	(2) Rating_Deviation	(3) Rating_Deviation
Culture_Dist	–0.025*** (0.005)	–0.022*** (0.005)	–0.024*** (0.005)
Geo_Dist	–0.010*** (0.002)	–0.020*** (0.003)	–0.020*** (0.003)
Culture_Dist × Geo_Dist		0.011*** (0.002)	0.010*** (0.002)
Culture_Dist × Experience			0.007*** (0.002)
Geo_Dist × Experience			0.003* (0.002)
Average_Rating	–0.200*** (0.002)	–0.200*** (0.002)	–0.200*** (0.002)
Prior_Volume	–0.017*** (0.003)	–0.017*** (0.003)	–0.017*** (0.003)
Experience	–0.009*** (0.002)	–0.008*** (0.002)	–0.010*** (0.002)
Power	0.010*** (0.003)	0.012*** (0.003)	0.012*** (0.003)
Individualism	–0.012** (0.005)	–0.009** (0.005)	–0.010** (0.005)
Uncertainty	–0.018*** (0.003)	–0.018*** (0.003)	–0.017*** (0.003)
Masculinity	–0.007*** (0.002)	–0.006*** (0.002)	–0.007*** (0.002)
Women	0.005 (0.004)	0.006 (0.004)	0.006 (0.004)
Member_Age	–0.015*** (0.002)	–0.015*** (0.002)	–0.015*** (0.002)
Not_Disclosure	0.075*** (0.005)	0.077*** (0.005)	0.076*** (0.005)
Chain	–0.005 (0.003)	–0.005 (0.003)	–0.005 (0.003)
Constant	–0.130*** (0.014)	–0.131*** (0.014)	–0.130*** (0.014)
Time fixed effects	Yes	Yes	Yes
City and hotel grade effects	Yes	Yes	Yes
Age and travel type effects	Yes	Yes	Yes
Adjusted R_2	4.32%	4.33%	4.34%
F-value	246.83***	243.01***	234.74***
Number of observations	381,462	381,462	381,462

Notes: (1) This table presents robust standard errors in parentheses. (2) All continuous variables are standardized to bring variables into a common format. (3) Time, city, hotel grade, customer age and travel type are coded as a set of dummy variables. Estimates of these variables are not presented for brevity. (4) ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

H2 posits a substitution effect between cultural and geographic distances. The estimated coefficient of the interaction between *Culture_Dist* and *Geo_Dist* in Columns (2)–(3) is significantly positive. Given the negative main effects of cultural and geographic distances on rating deviation, the positive interaction term indicates the existence of a substitution effect between the two distances. Specifically, as cultural (geographic) distance increases, the impact of geographic (cultural) distance on customer herd behavior in online ratings decreases. Hence, *H2* is supported. To visually examine the nature of the interaction, we plotted a simple slope analysis diagram for the model in Column (3) on the basis of the method of Aiken and West (1991). Figure 2(a) illustrates that when *Geo_Dist* is perceived to be low, the effect of *Culture_Dist* on rating deviation is strong. Figure 2(b) depicts that when *Culture_Dist* is perceived to be low, the effect of *Geo_Dist* is strong. Hence, these results support our hypotheses.
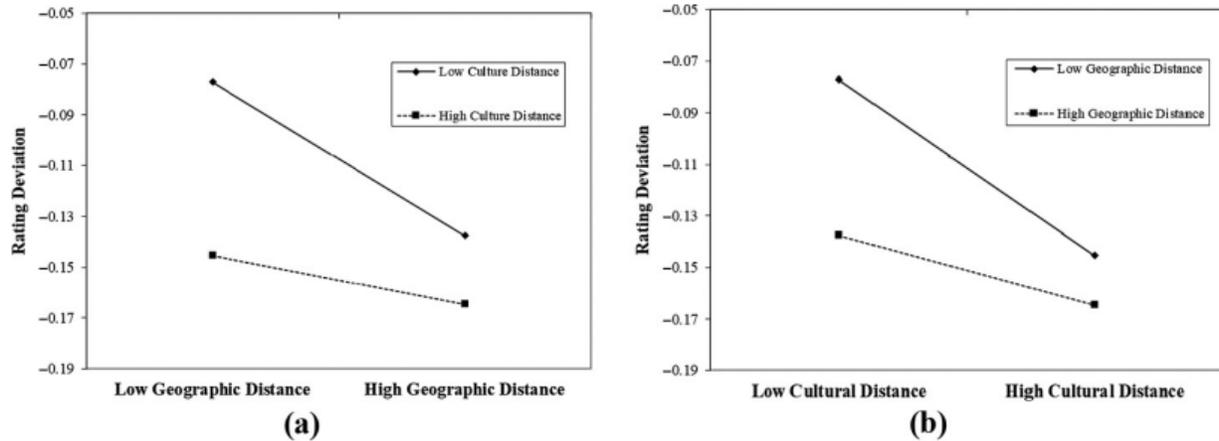
Figure 2. Interaction effects of cultural and geographic distances on herd behavior in online ratings

H3a and *H3b* propose a weak relationship between distances and herd behavior in online ratings for customers with rich hospitality experience. Results in Column (3) of Table 2 display a significantly positive two-way interaction effect of *Experience* and *Culture_Dist (Geo_Dist)* on the rating deviation (*p*-value < 0.001). Figure 3 visualizes the moderating roles of *experience* by using the method of Aiken and West (1991) and exhibits that when the hospitality experience of international customers is high, the effects of cultural and geographic distances are weak. Thus, *H3a* and *H3b* are supported.
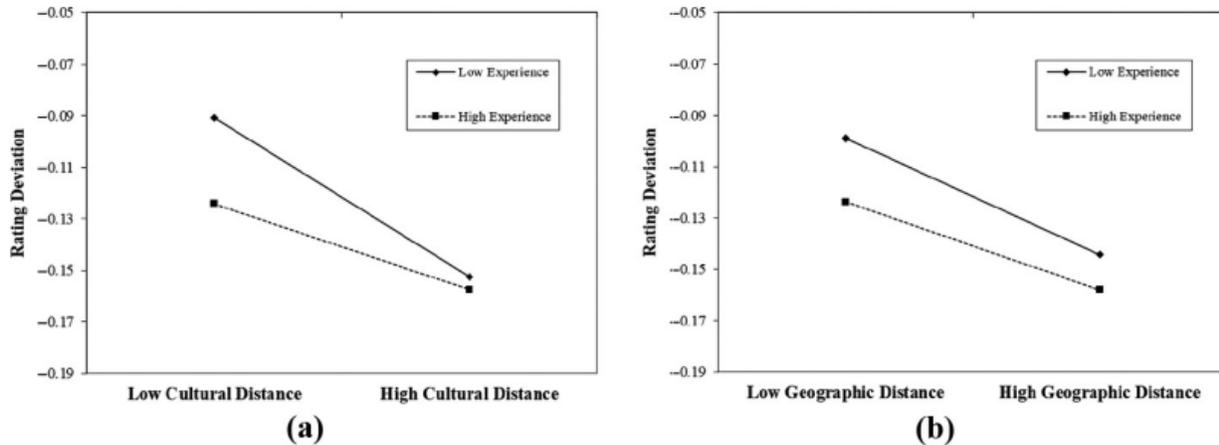

Figure 3. Moderating effects of hospitality experience on the relationship between distances and herd behavior in online ratings

Our findings on the positive relationships between distances and herd behavior in online ratings are obtained by controlling various dimensional cultural values (i.e. *power, individualism, uncertainty and masculinity*). Notably, unlike the results obtained by Hong *et al.* (2016), who suggested that customers from individualist cultures tend to deviate more from previous average ratings than those from collectivist cultures, our empirical evidence shows a negative relationship between *individualism* and *Rating_Deviation*. This contradictory finding comes from including *Culture_Dist* and *Geo_Dist* into the regression model. Table 1 indicates that the two distance metrics are related to *Individualism* and *Rating_Deviation*. Thus, without

controlling for the effects of *Geo_dist* and *Culture_Dist*, the model may suffer from endogeneity issues and the estimations of the effect of *individualism* may be biased. Our additional analysis indicates that when *Culture_Dist* and *Geo_Dist* are excluded from the model, the effect of *individualism* on *Rating_Deviation* remains positive, as documented by Hong *et al.* (2016). Our results also reveal that the estimated coefficients of *masculinity* and *uncertainty avoidance* are negative, thereby indicating that customers from countries with high masculinity value or high uncertainty avoidance likely conform to the consensus. In addition, the estimated coefficients of *Prior_Volume* and *Average_Rating* in each column of Table 2 are negative at a $p < 0.001$ significance level, which remains consistent with the findings stated by Guo and Zhou (2016) and Muchnik *et al.* (2013).

4.2 Robustness check

In addition to the overall rating, TripAdvisor allows customers to post ratings on multiple dimensions of hotel service, including individual ratings of room, service, value, location, cleanliness and sleep quality (Gao *et al.*, 2018). If the above findings are sufficiently robust, our proposed hypotheses should be applicable to the six service attribute rating deviations. To examine whether our hypotheses still hold for multi-dimensional rating deviations, we substituted the six service attribute ratings for the overall rating, standardized all continuous variables and finally, re-ran the regression of equation (3). Table 3 reports our results.

In Table 3, almost all the coefficients of *Culture_Dist* and *Geo_Dist* are significantly negative, except for that of *Location_Dev*. A possible explanation for this result may be the assumption that compared with other rating dimensions, the perceived quality of location tends to be congruent, which remains unchanged with the backgrounds of customers. Table 3 also suggests that the interaction of the two distance metrics and the cross-terms of distances with hospitality experience are positive and significant in most cases. These results confirm that the hypotheses still hold for the multi-dimensional rating deviations, indicating that our results are robust.

Our data cover independent hotels and hotel chains. Although the hotel chain heterogeneity has been controlled in our model by a binary variable, *chain*, we are still interested in whether the impacts of the distances of international customers on herd behavior are positive for hotel chains. Therefore, we re-ran our model by focusing our sample on hotel chains. The results in Table 4 show that our results are still robust, and our findings can be applied to hotel chains.

The underlying explanation may be that although the services offered by global hotel chains are generally standardized on a global scale, these hotel chains must still realize indigenization to meet local needs in different destination countries. Therefore, for countries that are culturally and geographically different from each other, the services provided by similar hotel chains should also be different. Such differences can make customers feel uncertain, which may result in their herd behavior.

Table 3. Robustness check; dependent variables are the rating deviations for six service features

	(1) Rooms_Deviation	(2) Service_Deviation	(3) Value_Deviation	(4) Location_Deviation	(5) SleepQuality_Deviation	(6) Cleanliness_Deviation
Culture_Dist	–0.011** (0.005)	–0.017*** (0.005)	–0.030*** (0.005)	0.006 (0.005)	–0.019*** (0.006)	–0.013** (0.005)
Geo_Dist	–0.017*** (0.003)	–0.014*** (0.003)	–0.013*** (0.003)	–0.011*** (0.003)	–0.004 (0.003)	–0.010*** (0.003)
Culture_Dist × Geo_Dist	0.009*** (0.002)	0.004** (0.002)	0.004** (0.002)	–0.006*** (0.002)	0.004** (0.002)	0.001 (0.002)
Culture_Dist × Experience	0.007*** (0.002)	0.009*** (0.002)	0.008*** (0.002)	0.006*** (0.002)	0.007*** (0.002)	0.005** (0.002)
Geo_Dist × Experience	0.002 (0.002)	0.005*** (0.002)	0.003* (0.002)	–0.002 (0.002)	0.003 (0.002)	0.004** (0.002)
Constant	–0.115*** (0.016)	–0.112*** (0.016)	–0.035** (0.016)	–0.055*** (0.016)	–0.074*** (0.018)	–0.082*** (0.015)
All controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	4.89%	4.11%	4.22%	11.77%	5.23%	7.49%
F-value	261.78***	221.82***	210.23***	492.16***	200.42***	394.90***
Observations	336,344	355,016	354,639	330,610	276,952	355,106

Notes: (1) This table presents robust standard errors in parentheses. (2) All continuous variables are standardized to bring variables into a common format. (3) All controls are the same as those in Table 2. Estimates of these variables are not presented for brevity. (4) ***p < 0.01; **p < 0.05; * p < 0.1

Table 4. Robustness check and regression analysis of hotel chain samples

	(1) Rating_Deviation	(2) Rating_Deviation	(3) Rating_Deviation
Culture_Dist	–0.018** (0.007)	–0.018** (0.007)	–0.020*** (0.007)
Geo_Dist	–0.003 (0.003)	–0.010** (0.004)	–0.010** (0.004)
Culture_Dist × Geo_Dist		0.006** (0.002)	0.006** (0.002)
Culture_Dist × Experience			0.009*** (0.002)
Geo_Dist × Experience			0.005*** (0.002)
Constant	–0.214*** (0.030)	–0.215*** (0.030)	–0.214*** (0.030)
All controls	Yes	Yes	Yes
Adjusted R^2	3.80%	3.80%	3.82%
F-value	106.57***	105.14***	102.74***
Observations	172,787	172,787	172,787

Notes: (1) This table presents robust standard errors in parentheses. (2) All continuous variables are standardized to bring variables into a common format. (3) All controls are the same as those in Table 2. Estimates of these variables are not presented for brevity. (4) ***p < 0.01; **p < 0.05; * p < 0.1

5. Discussion and conclusions

5.1 Conclusions

This research examined the impacts of cultural differences, geographic differences and hospitality experience on herd behavior in online service evaluations on the basis of TripAdvisor hotel reviews written by international customers. Our findings indicate that cultural and geographic distances increase the probability of herd behavior of international customers in online ratings, the substitution effect between the two distances and the moderating roles of customer hospitality experience. In addition, our results are robust for multi-dimensional ratings, including rooms, service, value, sleep quality and cleanliness.

5.2 Theoretical implications

This study contributes to the literature in the following ways.

First, this research adds to the hospitality and online review literature by enhancing our understanding of the hotel service evaluation behavior of international customers on an online review platform when the decisions of others are observed. Unlike most prior studies that focused on the drivers of customer online ratings (Gao *et al.*, 2018; Phillips *et al.*, 2019; Mariani and Predvoditeleva, 2019), this study focuses on the contributing factors of customer herd behavior in online ratings, a unique and important question in online evaluations when the decisions of others are observable. Unlike the study of Hong *et al.* (2016), who suggested that international customers with collectivist cultures tend to herd in online reviews, our research considers international customers and their destination countries and finds that cultural and geographic distances play important roles in customer herd behavior in online reviews. This perspective enhances our understanding of the impacts of customers' distance characteristics. This study also extends our understanding of customers' uncertainty and their decision-making in online hotel service evaluations. Prior studies have recognized that customers' emotions (i.e. positive or negative feelings) in the hotel experiences greatly affect customer satisfaction and decision-making (Bravo *et al.*, 2019; Kandampully *et al.*, 2018; Buehring and O'Mahony, 2019; Lub *et al.*, 2019; Lee *et al.*, 2019). We offer new insights into the role of customers' uncertainty feelings.

Second, this study contributes to the roles of distances in international business literature by extending the substitution effect between cultural and geographic distances to the setting of online service evaluation behavior. Although extensive research has explored the effect of cultural or geographic distance on a wide range of outcomes such as customer satisfaction (Park *et al.*, 2019; Phillips *et al.*, 2019) and customer travel intention and behavior (Crotts, 2004; Ng *et al.*, 2007; Larsen and Guiver, 2013), no research has examined the effects of both distances simultaneously. Consistent with the statement that individuals who experience one form of distance usually reduce their sensitivity to any other distance (Burtch *et al.*, 2014; Maglio *et al.*, 2013), this research indicates that the effects of geographic and cultural distances are substitutable. This finding extends our understanding of the collective effects of multiple distances in online service evaluations.

Third, this research sheds light on the heterogeneity of the service evaluation behavior of international customers by investigating whether their hospitality experience can strengthen or weaken the impacts of distances on herd behavior in online ratings. Prior literature has explored the impacts of distances on customer satisfaction and behavior (Ng *et al.*, 2007; Crotts, 2004; Phillips *et al.*, 2019; Park *et al.*, 2019), but none of them have further investigated the variations among customers with the same distance. This research offers solid evidence to prove the moderating roles of customers' experience on the connection between distances and herd behavior in online ratings. Moreover, this evidence further supports our arguments that distances influence customer herd behavior under the root of the uncertainty of decision-making and the observation of others' behavior.

5.3 Practical implications

The present study provides several practical implications for hoteliers and customers.

First, our research provides guidelines to improve the effectiveness of the marketing strategies of hoteliers who strive to enhance their reputation and promote customer booking. With the increasing number of international customers in the hotel industry, hoteliers need to pay further attention to the characteristics and online rating behavior of international customers. Hoteliers should also establish their marketing activities on different customer groups in accordance with the status of their online reputation. If hotels acquire favorable recognition in online rating systems, and thus, exhibit high average ratings, then hoteliers can expand their marketing scope and attempt to attract additional international customers from countries with high distances. These customers likely herd when they provide their service evaluations online, and these evaluations can help further consolidate hotels' online reputation. On the contrary, if hotels suffer from less-favored situations, but their service quality has been improved, then hoteliers should aim to attract international customers from countries with low distances or customers with rich hospitality experience. These customers, who tend to be independent, rather post ratings objectively than conform to previous average negative ratings. These objective ratings can help hotels reverse less-favored situations. After rating scores reach above average, hoteliers can consider transitioning to marketing strategies that are suitable for the high average rating situation as described above.

Second, online ratings may fail to reflect true overall customer satisfaction due to customer herd behavior. Unlike customers from countries with low distances, customers with high cultural/geographic distances more likely herd than post their independent views. Therefore, customers from countries with high distances should avoid relying on the reviews presented by reviewers from the same country. The good news is that the hospitality experience of customers attenuates the impacts of distances on the tendency of customers to herd in online ratings. Thus, long-distance international customers can follow advise from people who have rich hospitality experience before booking hotels.

Methodologically, compared with previous research related to international customers (Ng *et al.*, 2007; Hong *et al.*, 2016; Phillips *et al.*, 2019; Huang and Crotts, 2019), our study has an extensive data volume, which includes a total of 381,462 reviews for 3,081 hotels located in the USA and involves more than 100,000 international customers from 92 countries. This large data

volume ensures the generalizability of our results. Moreover, we construct a time-varying and monotonously increasing variable to depict customers' hospitality experience at the time they posted their reviews. This metric is better than the traditional hospitality experience measure, for instance, the number of cities that customers have visited (Gao *et al.*, 2018) because such a number is a time-invariant snapshot that merely reflects the final status of customers at the time of data scraping.

5.4 Limitations and future research

Several directions can be further investigated for future research. First, as data scraping, data processing and manuscript writing are all time consuming, constantly updating data to the most recent period is unrealistic. We believe the results cannot change with new data due to the extensive data volume covered. However, we still acknowledge this impossibility as a limitation. Second, future research may explore whether our analysis and model can be applicable to other online review platforms (i.e. booking.com) or review behavior (i.e. herd behavior, particularly emotions in online review texts) to contribute additional ideas to online behavior management. Third, other factors related to distance (i.e. transportation convenience and customer income) may also have moderating effects on the connection between distances and herd behavior in online ratings. Therefore, the impacts of these additional moderators deserve further research.

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