

1 **Using the Anchoring Effect and the Cultural Dimensions Theory to Study**

2 **Customers' Online Rating Behaviors**

3 **Abstract**

4 *This study focuses on the effect of prior average ratings of a product on subsequent*
5 *online ratings, and we further analyze whether culture moderates this effect. The*
6 *anchoring effect theory and cultural dimensions theory serve as the theoretical*
7 *foundations for our investigation. To our best knowledge, we are the first to introduce*
8 *the anchoring effect theory into the online review context. This study is also among the*
9 *first to investigate how culture influences customers' online evaluations. Empirical*
10 *results suggest that the prior average rating positively influences subsequent*
11 *customers' posted ratings, and this positive influence is significantly moderated by*
12 *culture. Besides theoretical contributions, our insights may also strategically benefit*
13 *online sellers by increasing customer satisfaction and improving long-term sales.*

14
15 **Keywords:** online rating behavior, online word-of-mouth, e-commerce, anchoring effect
16 theory, culture, Hofstede cultural dimensions theory

17
18 **1. INTRODUCTION**

19 The past two decades have witnessed an increase in customers' reliance on the digital
20 online opinions of others. Online product ratings (hereafter online ratings), which are a
21 quantitative format of user-generated product opinions, are extensively considered by
22 potential buyers as an important source of information on product quality (Gao et al. 2015;

23 Ho et al. 2017; Moe and Trusov 2011). Substantial anecdotal and academic evidence has
24 repeatedly accentuated that customers today rely heavily on online ratings when making
25 purchase decisions, from what film to watch (Dellarocas et al. 2004) to what beer to drink
26 (Clemons et al. 2006) and what books to read (Sun 2012). E-commerce managers are often
27 interested in customers' online rating behaviors because customers' posted ratings are an
28 important driver of product sales and success (Chang et al. 2010; Hsu et al. 2004; Lee et al.
29 2015; Li and Hitt 2008; Moe and Schweidel 2012).

30 The past two decades have witnessed scholars' interest to investigate the impact of prior
31 ratings on customers' subsequent rating behaviors. Research in this realm has suggested that
32 customers' posted ratings are socially influenced by existing ones owing to various
33 mechanisms, such as, life-cycle process (Li and Hitt 2008), increased purchase errors (Godes
34 and Silva 2012), differentiation effect (Schlosser 2005), information seeking (Moe and
35 Trusov 2011), selection and adjustment effects (Moe and Schweidel 2012), thereby leading to
36 opinion dynamics (e.g., a downward trend) in online product ratings.

37 Three related studies in the discussed strand have particularly focused on the positive
38 impact of customers' observed prior average ratings on their posted ones (Guo and Zhou
39 2016; Ma et al. 2013; Sridhar and Srinivasan 2012). These studies have been generally
40 theorizing within a social influence framework, and suggested that the presence of social
41 influence results in the tendency of subsequent reviewers to conform to the opinions
42 generated by prior customers. In general, this social influence stems from two sources: (1) the
43 case that customers tend to think that an aggregated evaluation generated by a majority of
44 customers is relatively correct and (2) customers' tendency to conform to legitimate

45 information (Guo and Zhou 2016). Although the adoption of social influence theories in the
46 three studies provide an ideal framework to conceptualize the discussed positive impact, we
47 note that if the social influence mechanism is the only mechanism that drives the impact, then
48 this impact should be further strengthened when a customer's observed prior average rating is
49 generated by numerous customers, but Guo and Zhou (2016) found an opposite effect. They
50 empirically determined that the volume of prior ratings tends to mitigate the positive impact
51 of the prior average ratings on the subsequent ones.

52 The preceding paradox motivates us to further clarify the mechanism that drives the
53 positive impact of customers' observed prior average ratings on their posted ones. We
54 particularly infuse our theory with customers' common rating behaviors. To simplify, we
55 consider the context that a customer is rating a hotel via an online travel agency. In the
56 customer's purchase stage, it was a nearly impossible scenario that he/she directly booked a
57 hotel without disregarding the real-time prior average rating of the hotel at all (Israeli 2002;
58 Moe and Trusov 2011). The customer's observed prior average rating should have played a
59 significant role in shaping her prior expectations and determined the corresponding purchase
60 decision. Then, when entering the rating stage, the customer is highly likely to use such an
61 important and aggregated information (Ma et al. 2013; Sridhar and Srinivasan 2012), and
62 consider it a starting point for evaluating the related experiences, thereby involuntarily
63 undergoing a series of comparative thinking (e.g., "why prior customers posted 8 for such a
64 bad hotel," "why an 8-rated hotel does not provide WiFi!" or "the prior customers are right;
65 the hotel surely only deserves 8"). Eventually, the customer may reject such a prior average
66 rating as being considerably high or low, and post an entirely different rating to reflect her

67 true experience. However, anchoring effect theory suggests that the customer's observed
68 prior average rating has already served as an anchor in the rating process, since the customer
69 has already undergone an "anchor-and-adjust" process, in which "people begin with the
70 anchor value and then adjust their answer toward a more plausible value" (Wegener et al.
71 2001, p. 62).

72 Therefore, we analyze the influence of customers' observed prior average ratings on
73 their posted ones on the basis of anchoring effect theory. Anchor effect involves a heuristic
74 processing of presenting a quantitative anchor, in which participants provide quantitative
75 evaluations (Tversky and Kahneman 1974). Consistent with anchoring effect theories, which
76 indicate that participants' evaluations are positively influenced by an initially presented
77 anchor value (Furnham and Boo 2011; Mussweiler and Strack 2001; Wegener et al. 2010;
78 Wegener et al. 2001), we postulate that prior average ratings can positively influence
79 subsequent ratings. Such a postulation is explored via the following research question: *How*
80 *and why does a customer's observed prior average rating influence his/her posted rating?*

81 Within an anchoring effect framework, we argue that the previously mentioned paradox
82 (i.e., prior average ratings generated by only a few customers are found to exert a large
83 impact on subsequent ratings) is justifiable because the anchoring literature has suggested
84 that even uninformative or implausible anchors could induce equal, or even large, anchoring
85 effects (Critcher and Gilovich 2008; Jacowitz and Kahneman 1995; Mussweiler 2001;
86 Tversky and Kahneman 1974). Therefore, the prior average ratings generated by only a few
87 customers are likely to exert an even larger anchoring effect than the ones generated by
88 numerous customers. This evidence has unfolded the aforementioned paradox and further

89 suggested the fitness to answer our research question from an anchoring perspective.

90 Given the potential positive impact of prior average on subsequent ratings, we also aim
91 to provide a fine-grained investigation on the potential moderating roles. Given that
92 anchoring effect theory suggests that the magnitude of anchoring varies along with decision
93 makers' personalities, such as, conscientiousness (Eroglu and Croxton 2010) and openness to
94 experience (McElroy and Dowd 2007), which are fundamentally shaped by individual culture
95 (Bond and Smith 1996; Sussman and Siegal 2003), we argue that further opportunities are
96 available to scrutinize the moderating effects of culture in our context. Accordingly, we
97 propose our second research questions: *How does a customer's culture moderate the*
98 *influence of a customer's observed prior average rating influence on the posted rating?*

99 To summarize, this study aims to analyze the relationships among prior average rating,
100 customer's culture as the moderator, and subsequent rating. The empirical results are obtained
101 by using the longitudinal secondary data collected from *Agoda.com* and *Itim International* for
102 2,451 US hotels with 127,133 observations from 2011 to 2016. Our analysis results show that
103 there exists a significant positive relationship between a customer's observed prior average
104 rating of a product and his/her posted rating, and additionally, this relationship can be
105 considerably moderated by culture.

106 Our study contributes to the literature in several ways. First, we contribute to the
107 research stream on the impact of prior average ratings on subsequent ratings by introducing
108 anchoring effect theory to explain the mechanism of this impact. Our theorizing is distinct
109 from the traditional one, which is based on social influence theory, thereby providing new
110 insights into the potential mechanisms that drive prior average ratings to positively influence

111 subsequent ratings.

112 Second, although previous IS studies have attempted to find ways to recognize the
113 importance of culture in the online behaviors of customers (Chau et al. 2002; Hwang and Lee
114 2012; Ng 2013; Sia et al. 2009; Stafford et al. 2004; Yoon 2009), we note that prior research
115 has generally failed to examine how culture matters to the impact of prior ratings on the
116 subsequent ones. This lack of attention is concerning considering the current exponential
117 growth of globalization and e-commerce. To the best of the authors' knowledge, the current
118 study is among the first to provide insights into how customers' cultures moderate the
119 relationship between their observed prior average ratings and posted ratings. Beyond this
120 perspective, the corresponding analysis may help complement the potential "missing link" in
121 investigating customers' susceptibility to the anchoring effect in the online rating context.

122 Third, we adopt Hofstede's (1984) cultural dimensions theory to capture the
123 discrepancies between cultures in this study. While the uses of the anchoring effect and
124 cultural dimensions theories are both substantially widespread, our study provides an initial
125 linkage between these two classical theories, thereby contributing to the extant understanding
126 of both theories.

127 The remainder of this paper is organized as follows: In Section 2, we describe the
128 research framework and hypotheses. In Section 3, we introduce the data collection, construct
129 the variables, and present our main analysis results. Finally, in Section 4, we present the
130 discussion and conclusions.

131 **2. RESEARCH FRAMEWORK AND HYPOTHESES**

132 **2.1 Prior Average Rating and Subsequent Rating**

133 Research focusing on how prior ratings affect subsequent ratings is growing. Table 1
134 shows a summary of this stream of studies.

Table 1. Literature on the Effect of Prior Ratings on Future Ratings

Literature	Product Type	Effect Type	Cause of Effect	Theoretical Background for Effect	Main Findings
<i>Schlosser (2005)</i>	No specific type	The effect of prior positive or negative reviews on future rating decisions	Differentiation effect	Negative bias theory	(1) Posters tend to negatively adjust their product evaluations after reading negative reviews. (2) Online ratings have a downward trend.
<i>Li and Hitt (2008)</i>	Books	The effect of posted time of prior ratings on posted ratings	Idiosyncratic preferences of early buyers	Information-motivated herding	(1) Initial product ratings tend to be provided by early customers.
<i>Wu and Huberman (2008)</i>	No specific type	The effect of the extremity of prior ratings on posted ratings	Tendency to speak out differently from others	Rational choice theory	(1) An online rating trend occurs wherein extreme views are increasingly involved in the reviews.
<i>Moe and Trusov (2011)</i>	Beauty products	The effect of social dynamics in the ratings environment on subsequent ratings	Selection effect and adjustment effects	Not specifically indicated	(1) The social dynamics of online product ratings have effects on sales and future ratings.
<i>Godes and Silva (2012)</i>	Books	The effect of time and ordinality of prior ratings on posted ratings	Decreased review diagnostic ability	Information-motivated herding and rational choice theory	(1) The self-selection behavior of consumers can cause systematic bias in reviews posted during early periods. (2) The online average numerical value of ratings decreases with the ordinality of the rating rather than with time.
<i>Ho et al. (2017)</i>	No specific type	The effect of disconfirmation from prior ratings on rating decisions	Pre-purchase expectation formulation and disconfirmation bias	Expectation-disconfirmation theory	(1) An individual tends to review highly when his/her encountered magnitude of disconfirmation is large. (2) The direction of the rating based on actual experiences is in accordance with the sign of disconfirmation.

<i>Guo and Zhou (2016)</i>	Restaurants	The effect of the prior average rating on subsequent ratings	Information diagnosticity, social influence	Social influence theory	<ul style="list-style-type: none"> (1) Either of volume or variance of prior ratings exerts a negative moderating effect on the influence of prior average rating on subsequent rating. (2) Such moderating effects are contingent on subsequent reviewers' connectedness and expertise
<i>Sridhar and Srinivasan (2012)</i>	Hotels	The moderating role of prior average rating on the relationship between product features and the posted ratings	Social influence	Social influence theory	<ul style="list-style-type: none"> (3) Other consumers' online ratings moderate the effects of positive and regular negative features of product experience, product failure, and product recovery (to address product failure) on the reviewer's online product rating.
<i>Ma et al. (2013)</i>	No specific type	The effect of the prior average rating on subsequent ratings	Expectation formulation	A mechanism similar to the one of social influence	<ul style="list-style-type: none"> (1) The effect of prior average rating on subsequent ratings can be moderated by the features of the review and the reviewer.

135 According to the literature reviewed in Table 1, the extant studies have presented diverse
136 reasons that future ratings will be affected by prior ratings. The proposed causes may involve
137 customers' different product preferences (Li and Hitt 2008), diverse online WOM perception
138 (Godes and Silva 2012), prior ratings-based pre-purchase expectations of customers (Ho et al.
139 2017), differentiation effect (Moe and Schweidel 2012; Schlosser 2005), and bandwagon effect
140 (Moe and Schweidel 2012), and the effect of consensus (Ma et al. 2013; Moe and Schweidel
141 2012). Furthermore, based on these studies, we also note the possible outcomes stemming from
142 the effects of prior ratings on future ratings. The possible outcomes include the following:
143 Future online ratings display a dynamic trend (Godes and Silva 2012; Li and Hitt 2008;
144 Schlosser 2005; Wu and Huberman 2008), product sales are influenced (Moe and Trusov 2011),
145 customers' willingness to evaluate online is affected (Ho et al. 2017), and customers' posted
146 ratings are different from the actual product experience (Ma et al. 2013).

147 In particular, three studies in the research stream have investigated how customers'
148 observed prior average ratings impact their posted ratings. The referred studies have reach a
149 consensus that such an impact is positive. In terms of the underlying mechanisms of this impact,
150 they have provided explanations on the basis of social influence theory. For example, Sridhar
151 and Srinivasan (2012, p.73) noted that "people experience conformity pressures from other
152 members in a social group. The actions of others have a powerful effect on a given member's
153 behavior." Ma et al. (2014, p282) stated that "without any other dependable and readily
154 available way to assess a product or a service before consumption, consumers tend to build
155 their expectations on the average rating of prior reviews. These prior expectations serve as a
156 foundation, or level of reference, for postconsumption evaluations."

157 We would like to further clarify the mechanism that drives the positive influence of prior
158 average ratings on subsequent ratings within an anchoring effect framework. We adopt such a
159 novel framework in our context because customers tend to retrieve information on prior
160 average ratings during their actual ratings, and use the information as a starting point for
161 adjustment and make comparative assessments (e.g., “why a hotel that rates 8.9 provides no
162 breakfast!” or “oh, the hotel that rates 3 is not quite bad.”). Anchoring effect theory suggests
163 that comparative assessment make individuals generate information consistent with the anchor
164 value in ways that bias the subsequent judgement (Epley and Gilovich 2001; Jacowitz and
165 Kahneman 1995), thus, we argue that prior average ratings play as anchors during such
166 customers’ online rating processes.

167 Anchoring effect represents one of the most robust cognitive heuristics for decision-
168 making that occurs daily and universally (Furnham and Boo 2011). In terms of the source of
169 the anchoring effect, scholars in recent years have widely accepted and cited “hypothesis-
170 testing” conceptualization as an explanation (Chapman and Johnson 1999; Mussweiler 2001;
171 Mussweiler and Strack 1999; Wegener et al. 2010). That is, when a decision-maker considers
172 an initially presented anchor, he/she will use the information as a starting point and tests the
173 hypothesis that this anchor is a plausible answer to the judgment. In doing so, the decision-
174 maker automatically compares the corresponding attributes of the target with his/her existing
175 knowledge and searches for a series of ways in which the target shares commonalities with the
176 anchor. This approach activates his/her ability to access the anchor-consistent knowledge to
177 adjust his/her decision toward the initially presented anchor (Petty and Cacioppo 1986).

178 In the online shopping context, the prior average rating of a product, as an explicitly

179 displayed aggregated numerical opinion, will undoubtedly attract significant attention from a
180 potential customer during his/her purchase (Dellarocas et al. 2007). Then, in the rating stage,
181 the customer tends to use such information that comes to the mind for evaluating the experience
182 and estimating the ratings. In the process, the customer will subconsciously and comparatively
183 test the hypothesis that the prior average rating is a reasonable answer, thereby accessing to
184 anchor-consistent information to bias his/her judgment. Thus, the customer's posted rating will
185 be positively influenced by the anchor of the prior average rating. In other words, a high anchor
186 (i.e., a high prior average rating) initially perceived by a customer will lead to a high evaluation
187 judgment (i.e., a high subsequent rating). Accordingly, we propose the following hypothesis:

188 **HYPOTHESIS 1 (H1).** *A customer's observed prior average rating of a product during*
189 *purchase positively influences his/her posted rating during review process.*

190 **2.2 Moderating Role of Culture**

191 As the prior average rating serves as an anchor when a customer is posting a rating, the
192 key to investigating the moderating role of culture lies in exploring the intervening role of the
193 customer's culture on his/her level of stimulation by the anchoring effect.

194 The level of the anchoring effect is contingent upon the degree of extensive generation of
195 anchor-consistent knowledge in the target subject (Mussweiler and Strack 2001). A primary
196 method proposed to enhance such knowledge generation is elaboration, the level of which
197 varies with the motivation and cognitive efforts a decision-maker devotes to assessment (Petty
198 and Cacioppo 1986; Wegener et al. 2010). The degree of elaboration is high when he/she has
199 additional motivation or effortful thinking. When a decision-maker's degree of elaboration is
200 high, substantial target attributes that are common with the anchor are stimulated in his/her

201 mind to adjust judgment. This highly motivated extensive pool of anchor-consistent
202 information then yields a large anchoring effect. Simply put, significant motivation or further
203 effortful thinking during evaluation will yield high levels of the anchoring effect.

204 Culture is a notion that contains multidimensional interpretations (Weber and Hsee
205 1998). Hofstede's cultural dimensions theory (1984), which represents the most extensively
206 applied theory for capturing cultural differences (Leidner and Kayworth 2006; Steenkamp
207 2001), has been used in many studies. Based on this theory, cultural discrepancies can be
208 captured in four dimensions, namely, power distance, individualism versus collectivism,
209 masculinity versus femininity, and uncertainty avoidance (Hofstede 1984). Given the online
210 WOM context of our study, our model includes three dimensions, namely, power distance,
211 individualism versus collectiveness, and uncertainty avoidance. These three dimensions are
212 selected considering their close linkage with service evaluation (e.g., Donthu and Yoo 1998;
213 Furrer et al. 2000; Malhotra et al. 2005; Mattila 1999), which is the focus of this study. The
214 cultural dimension of masculinity versus femininity, which focuses on how gender roles are
215 stressed and distinctive in a society, is excluded from our model because this relationship is
216 not strongly related to service expectations (Donthu and Yoo 1998).

217 The three dimensions identify systematic differences in national cultures in different
218 aspects. First, the dimension of power distance is defined as "the extent to which the less
219 powerful members of organizations and institutions (like the families) accept and expect that
220 power is distributed unequally" (Hofstede 1994, p. 2). Consumers in a high-power distance
221 culture tend to perceive a person with a high job position as an individual who possesses a
222 high level of power, status, and authority (Ngai et al. 2007). Second, the dimension of

223 individualism versus collectivism focuses on individuals' relationships with others (Hofstede
224 1991). Individuals with high individualism tend to be substantially independent, have self-
225 orientation and fairness, and primarily pursue their own interests but not others'; by contrast,
226 individuals with high collectivism will display a high level of group loyalty and are ready to
227 protect the interests of the members of their own group (Donthu and Yoo 1998). Third, the
228 dimension of uncertainty avoidance describes a society's tolerance of ambiguity (Hofstede
229 1984) and deals with the way a society accommodates high levels of uncertainty and
230 ambiguity in the environment (Hofstede 1984; Soares et al. 2007). People from high-
231 uncertainty avoidance cultures tend to be more resistant to change, more fearful of failure,
232 and less likely to take risks than people from low-uncertainty avoidance cultures (Huang et
233 al. 1996).

234 First, we consider how the influence of the prior average rating on subsequent ones is
235 contingent upon the cultural dimension of power distance. Low power distance is shown to
236 be positively related to the personality trait of conscientiousness (Hofstede and McCrae 2004;
237 McCrae and Terracciano 2005). Therefore, reviewers in low-power distance societies are
238 prone to feeling responsible for expressing their real product experiences to future customers
239 through online evaluation, and these serious attitudes increase their degree of effortful
240 thinking when posting evaluations. According to the anchoring effect theory, the stimulated
241 extensive pool of anchor-consistent information during effortful thinking enhances the
242 stimulated anchoring effect of a reviewer. Thus, ratings posted by customers who score low
243 in power distance can be intensively affected by the prior average rating. Accordingly, we
244 propose the following hypothesis:

245 HYPOTHESIS 2 (H2). *The positive influence of a customer's observed prior average rating*
246 *on his/her posted rating is strengthened when the focal customer is from a society that ranks*
247 *low on power distance.*

248 Second, in terms of the cultural dimension of individualism versus collectivism,
249 individuals from individualistic societies tend to express their emotions to others, whereas
250 those from collectivist societies do not prefer to express their emotions outwardly (Watkins
251 and Liu 1996). Similarly, consumers from individualistic cultures are more likely to engage
252 in voice behaviors than individuals from collectivistic cultures (Liu and McClure 2001).
253 Therefore, individuals who score highly in individualism are likely to view online evaluation
254 as a readily available way to engage in voice behaviors, and they tend to spend substantial
255 effortful thinking in numerically evaluating their product experience online as feedback on
256 their purchases. According to the anchoring effect theory, involvement in high levels of
257 elaboration during their evaluation will enhance customers' susceptibility to the anchoring
258 effect. Therefore, the ratings posted by customers from individualistic cultures can be
259 intensively influenced by the initially presented anchors (i.e., prior average ratings).

260 Accordingly, we propose the following hypothesis:

261 HYPOTHESIS 3 (H3). *The positive influence of a customer's observed prior average rating*
262 *on his/her posted rating is strengthened when the focal customer is from a society that ranks*
263 *highly on individualism.*

264 The third cultural dimension considered in this study is uncertainty avoidance.
265 Individuals who score highly on the uncertainty avoidance dimension seek to preclude
266 ambiguity and prefer to engage in thorough information-searching processes before making

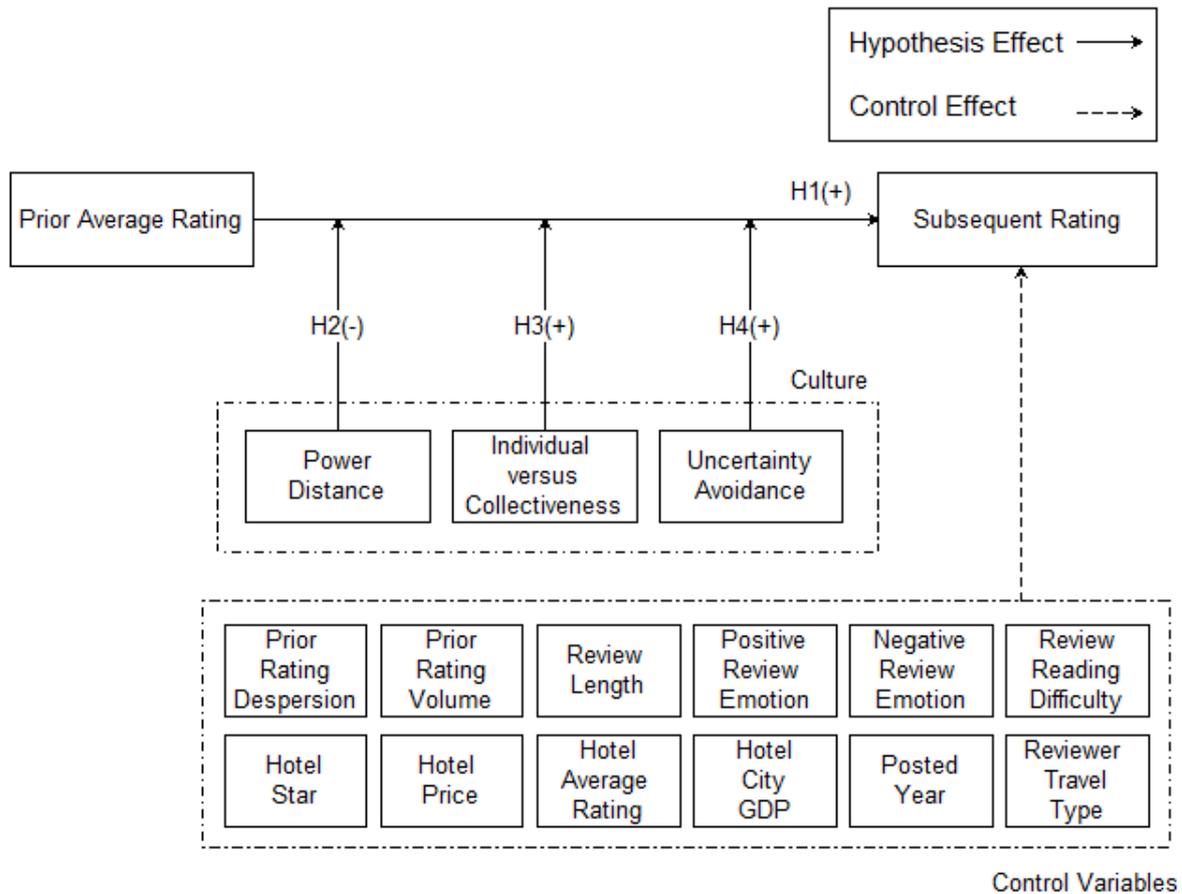
267 judgments (Hofstede and McCrae 2004). Thus, when rating a product, customers in high-
268 uncertainty avoidance cultures seek to engage in highly effortful thinking for evaluation,
269 thereby stimulating a large pool of anchor-consistent information to increase their
270 susceptibility to the anchoring effect.

271 Moreover, individuals with high uncertainty avoidance thinking are proposed to be open
272 to experiences (Hofstede and McCrae 2004). This notion is corroborated by McElroy and
273 Dowd (2007), who note that individuals with high openness to experience are more sensitive
274 to anchoring cues and can be more influenced by the presented anchors than those who have
275 low openness to experience. Given all the evidence presented, we may infer that the effect of
276 the prior average rating on subsequent ratings is escalated if the reviewer is from a high-
277 uncertainty avoidance society. Thus, we present the following hypothesis:

278 HYPOTHESIS 4 (H4). *The positive influence of a customer's observed prior average rating*
279 *on his/her posted rating is strengthened when the focal customer is from a society that ranks*
280 *highly on uncertainty avoidance.*

281 Figure 1 illustrates the conceptual model with the proposed hypotheses.

282



Control Variables

283
284
285

Figure 1. Research Conceptual Model

286 **3. DATA AND ANALYSIS RESULTS**

287 **3.1 Data Description**

288 The data we use to provide empirical evidence for the hypotheses originate from two
289 public sources. The first is a leading online travel agency website (*Agoda.com*),¹ from which
290 we collected hotel online WOM data from 2011 to 2016. In particular, hotels evidently
291 represent one of the products that are most frequently purchased by customers from all over
292 the world. Given the present study focuses on the cross-cultural difference of customers'
293 online rating behaviors, online WOMs for hotel products is highly fit for such an

¹ Through *Agoda.com*, a customer who books a hotel will receive a survey from Agoda very soon after his/her hotel stay as an opportunity to rate the hotel property and write about his/her experience. Review and rating submission behaviors are totally voluntary and self-driven.

294 investigation.

295 We targeted hotels in six cities (i.e., New York, Boston, San Francisco, Honolulu,
296 Chicago, and Washington), which are all representative US metropolises or well-known
297 tourist cities. These hotels were chosen because the cities where they are located have
298 numerous customers from different countries, thus ensuring the cultural diversity of the
299 collected sample in this study.

300 On the basis of the abovementioned criteria, our data involve 2,451 hotels. For each
301 hotel, the complete WOM histories from 2011 to 2016 were obtained. The information
302 collected from the data source mainly consists of three categories. The first category refers to
303 individual-level online WOM records concerning customer-reported reviews in the following
304 typical format: review title, review body, submission date, and overall product rating on a
305 continuous scale ranging from 0 to 10. The second category includes individual-level
306 reviewer characteristic records, which consist of reviewer's name, travel type, and
307 nationality. The third category involves hotel characteristic records, which contain
308 information about prices for each hotel room type, the hotel's location, its star level, and its
309 total number of reviews. Hotels with fewer than 15 reviews were removed.² 127,790
310 observations were obtained.

311 The second data source we used is *Itim International* (<http://www.geert-hofstede.com>).
312 We followed several prior studies (e.g., Rai et al. 2009) in collecting cultural dimension data
313 from *Itim International*. Specifically, we collected cultural values involving three cultural

² Given the unavailability to collected data on prior average ratings during customers' purchase, we assume that customers' observed prior average ratings during their purchase are equal to the ones during ratings. Accordingly, we removed the hotels with fewer than 15 reviews from our dataset to avoid the significant fluctuate of values of average ratings during the period between a customer's purchase and his/her rating.

314 dimensions, namely, power distance, individualism versus collectivism, and uncertainty
315 avoidance. Each dimension value is measured on a 100-point scale using items from *Itim*
316 *International*. We merged the data collected from the two data sources according to
317 nationality. Because the Itim International data do not contain the cultural dimensions of all
318 countries in the world, 657 reviews for which the reviewer's cultural dimensions could not be
319 found in the data were excluded from our study. The abovementioned process enabled us to
320 derive our final data, which contain 127,133 observations.

321 **3.2 Variable Descriptions**

322 The dependent variable ($Rating_{ij}$) in our research is defined as reviewer i 's online rating
323 of hotel j . For each customer i of hotel j , his/her posted $Rating_{ij}$ is a value between 0 and 10.

324 In terms of the independent variables, we define $Pri_AveRating_{ij}$ as the prior average
325 rating of hotel j for customer i , which is calculated by the mean of all the ratings of hotel j
326 that were posted before customer i posted his/her rating.

327 Cultural factors serve as moderators in this study. The three focused-on cultural
328 dimensions in this study are power distance, individualism versus collectivism, and
329 uncertainty avoidance. A customer's power distance value (PDI_{ij}) is equal to Hofstede's
330 corresponding power distance value for his/her country/region of origin and then divided by
331 100. Values of individualism versus collectivism (IDV_{ij}) and uncertainty avoidance (UAI_{ij})
332 are measured using a similar process.

333 To guarantee the empirical rigor of this study, we include 12 controls to account for the
334 potential unobserved heterogeneity that may bias estimation. First, given that the features of
335 prior ratings can influence a customer's online rating evaluation (Ho et al. 2017; Li and Hitt

2008), a first set of controls contains the dispersion ($Pri_Dispersion_{ij}$) and volume (Pri_Volume_{ij}) of the prior ratings for customer i who experienced hotel j . Second, we control a set of variables concerning the hotel-specific features because they may directly influence the overall level of ratings. These features include the economic performance of the city that the hotel located ($H_City_Eco_j$), star level (H_Star_j), average price (H_Price_j), and total number of ratings ($H_Ratingnum_j$) of hotel j . We also control a set of variables concerning the features of the online WOM, which are suggested to exert a direct influence on the rating levels (Yin et al. 2016). The controls in this category are the percentage of positive words in the review posted by customer i for hotel j (R_Posemo_{ij}), the percentage of negative words in the review posted by customer i for hotel j (R_Negemo_{ij}), the reading difficulty measured by the Gunning-Fog index of the review posted by customer i for hotel j (R_Diff_{ij}), the number of words in the review contents posted by customer i for hotel j (R_Length_{ij}), and the year of the rating posted by customer i for hotel j (R_Year_{ij}). Third, to control for heterogeneity across reviewers, we control the travel type of customer i who experienced hotel j ($C_Traveltype_{ij}$).

Table 2 summarizes all the variables involved in the empirical analysis, while Table 3 presents the summary statistics and correlations between the selected variables. In the variable descriptions that follow, i indexes a reviewer, and j indexes a hotel.

Table 2. Variable Descriptions

Variables	Description	Source
<i>Rating_{ij}</i>	Online rating provided by customer <i>i</i> for hotel <i>j</i> .	<i>Agoda.com</i>
<i>Pri_Average_{ij}</i>	Average of all the prior ratings of a hotel <i>j</i> before customer <i>i</i> posted a rating.	<i>Agoda.com</i>
<i>PDI_{ij}</i>	Power distance value of customer <i>i</i> who evaluated for hotel <i>j</i> , and then then divided by 100.	<i>Itim International</i>
<i>IDV_{ij}</i>	Individualism value of customer <i>i</i> who evaluated for hotel <i>j</i> , and then then divided by 100.	<i>Itim International</i>
<i>UAI_{ij}</i>	Uncertainty avoidance value of customer <i>i</i> who evaluated for hotel <i>j</i> , and then then divided by 100.	<i>Itim International</i>
<u>Controls</u>		
<i>Pri_Dispersion_{ij}</i>	Standard deviation of all the prior ratings of hotel <i>j</i> before customer <i>i</i> posted a rating.	<i>Agoda.com</i>
<i>Pri_Volume_{ij}</i>	Rating volume of all the prior ratings of hotel <i>j</i> before customer <i>i</i> posted a rating, and then divided by 100.	<i>Agoda.com</i>
<i>R_Length_{ij}</i>	Number of words in the review posted by customer <i>i</i> for hotel <i>j</i> .	<i>Agoda.com</i>
<i>R_Posemo_{ij}</i>	Percentage of words indicating positive emotions in the review posted by customer <i>i</i> for hotel <i>j</i> .	<i>Agoda.com</i>
<i>R_Negemo_{ij}</i>	Percentage of words indicating negative emotions in the review posted by customer <i>i</i> for hotel <i>j</i> .	<i>Agoda.com</i>
<i>R_Diff_{ij}</i>	Gunning-Fog index of the reading difficulty of the review posted by customer <i>i</i> for hotel <i>j</i> .	<i>Agoda.com</i>
<i>H_Star_j</i>	Star level of hotel <i>j</i> .	<i>Agoda.com</i>
<i>H_Price_j</i>	Average price of all room types of hotel <i>j</i> , and then divided by 100.	<i>Agoda.com</i>
<i>H_Rating Number_j</i>	Total cumulative number of ratings of hotel <i>j</i> at the time we collected the sample, and then divided by 1000.	<i>Agoda.com</i>
<i>H_City_Eco</i>	The natural logarithm of the gross domestic product (GDP) of the city that the focal hotel located.	<i>U.S. Bureau of Economic Analysis (BEA) dataset</i>
<i>Year_{ij}</i>	Year (2011/2012/.../2016) customer <i>i</i> posted a rating for hotel <i>j</i> .	<i>Agoda.com</i>
<i>Traveltype_{ij}</i>	Travel type (single/couple/family/business) of customer <i>i</i> who evaluated hotel <i>j</i> .	<i>Agoda.com</i>

Table 3. Descriptive Statistics and Correlations

	Variables	Mean	Standard Deviation	1	2	3	4	5
1	<i>Rating</i>	7.76	1.76	1.00				
2	<i>Pri_AveRating</i>	7.75	0.85	0.46	1.00			
3	<i>PDI</i>	0.50	0.18	-0.05	-0.02	1.00		
4	<i>IDV</i>	0.65	0.26	0.06	0.01	-0.71	1.00	
5	<i>UAI</i>	0.60	0.20	-0.04	0.03	0.32	-0.35	1.00
6	<i>Pri_Deviation</i>	1.23	0.96	-0.34	-0.14	-0.01	0.04	-0.03
7	<i>Pri_Volumn</i>	3.96	5.13	0.04	0.06	-0.01	0.00	0.09
8	<i>R_Length</i>	51.57	35.34	-0.08	-0.08	-0.01	-0.03	-0.05
9	<i>R_Posemo</i>	10.32	9.56	0.29	0.13	-0.01	-0.01	-0.05
10	<i>R_Negemo</i>	1.31	3.47	-0.32	-0.14	0.01	-0.01	0.03
11	<i>R_Diff</i>	9.09	8.39	0.04	0.03	0.08	-0.09	0.06
12	<i>H_Star</i>	3.07	0.87	0.29	0.59	-0.01	0.01	-0.01
13	<i>H_Price</i>	1.87	0.89	0.21	0.44	-0.01	0.02	0.01
14	<i>H_RatingNumber</i>	1.56	1.61	0.06	0.10	0.01	-0.01	0.13
15	<i>H_City_Eco</i>	20.40	0.82	0.08	0.17	0.03	-0.01	0.05

359

	Variables	6	7	8	9	10	11	12	13	14
6	<i>Pri_Deviation</i>	1.00								
7	<i>Pri_Volumn</i>	0.01	1.00							
8	<i>R_Length</i>	0.01	-0.13	1.00						
9	<i>R_Posemo</i>	-0.15	0.02	-0.34	1.00					
10	<i>R_Negemo</i>	0.22	0.01	-0.06	-0.15	1.00				
11	<i>R_Diff</i>	0.00	0.01	-0.23	0.22	0.07	1.00			
12	<i>H_Star</i>	-0.07	0.01	-0.01	0.07	-0.08	0.03	1.00		
13	<i>H_Price</i>	-0.06	0.02	-0.02	0.04	-0.06	0.03	0.59	1.00	
14	<i>H_RatingNumber</i>	0.01	0.76	-0.17	0.01	0.00	0.03	0.04	0.03	1.00
15	<i>H_City_Eco</i>	-0.02	0.25	-0.09	0.03	0.00	0.02	0.22	0.25	0.31

3.3 Methodology

To test the hypotheses in this study, we formulate the following equation:

$$\begin{aligned}
 \text{Rating}_{ij} = & \theta_0 \text{Pri_AveRating}_{(i-1)j} + \text{Pri_AveRating}_{(i-1)j} \left(\sum_{m=1}^3 \beta_m \text{CultureDimensions}_{mij} \right) \\
 & + \sum_{n=1}^3 \kappa_n \text{CultureDimensions}_{nij} + \sum_{r=1}^{12} \alpha_r \text{Controls}_{rij} + \varepsilon_{ij}
 \end{aligned} \tag{1}$$

where θ_0 indicates the main effect of *Pri_AveRating*. In addition, κ_n , $n \in [1, 2, 3]$ captures

the main effects of *CultureDimensions*, $m \in [1, 2, 3]$, where $\text{CultureDimensions}_{1i} = \text{PDI}_i$,

$\text{CultureDimensions}_{2i} = \text{IDV}_i$, and $\text{CultureDimensions}_{3i} = \text{UAI}_i$.

366 3.4 Tests of Hypotheses

367 Equation (1) is estimated using an ordinary least-squares regression model, and the
368 results are presented in Table 3. The results are based on 127,133 ratings for which all control
369 and focal variables are available.

370 We include three models. Model 1 (Table 4) introduces the control variables. According
371 to the results (Table 3), as expected, several factors, such as review length (*R_Length*), hotel
372 star level (*H_Star*), total number of hotel ratings (*H_RatingNumber*), and degree of positive
373 emotion in reviews (*R_Posemo*), are all related to high ratings.

374 Model 2 (Table 4) introduces the *Pri_AveRating_{ij}* variable to test the main effects of the
375 independent variable, that is, prior average rating (*Pri_AveRating_{ij}*). The coefficient for
376 *Pri_AveRating_{ij}* is positive and significant ($\beta=0.726, p<0.01$), thus indicating that a one-unit
377 increase in the prior average rating increases the subsequent rating (*Rating_{ij}*) by 0.726.
378 Therefore, H1, which states that the prior average rating will positively influence the
379 subsequent rating, is supported.

380 Model 3 (Table 4) introduces the interaction terms of *Pri_AveRating_{ij} × PDI_{ij}* to examine
381 how power distance can moderate the relationship between the prior average rating
382 (*Pri_AveRating_{ij}*) and subsequent ratings (*Rating_{ij}*). The coefficient of *Pri_AveRating_{ij} × PDI_{ij}*
383 is significantly negative ($\beta=-0.183, p<0.01$), thereby indicating that the positive effect of
384 *Pri_AveRating_{ij}* on *Rating_{ij}* is weak when *PDI_{ij}* is high. Therefore, H2, which states that
385 power distance will weaken the relationship between the prior average rating and the
386 subsequent rating, is supported.

387 Model 4 (Table 4) introduces the interaction terms of *Pri_AveRating_{ij} × IDV_{ij}* to examine

388 how individualism can moderate the relationship between the prior average rating and
 389 subsequent ratings. The significantly positive coefficient ($\beta=0.115, p<0.01$) of
 390 $Pri_AveRating_{ij} \times IDV_{ij}$ indicates that the positive effect of $Pri_AveRating_{ij}$ on $Rating_{ij}$ is
 391 strong when IDV_{ij} is high.

392 Model 5 (Table 4) introduces the interaction terms of $Pri_AveRating_{ij} \times UAI_{ij}$ to examine
 393 how individualism can moderate the relationship between the prior average rating and
 394 subsequent ratings. The significantly positive coefficient of $Pri_AveRating_{ij} \times UAI_{ij}$ ($\beta=0.036,$
 395 $p<0.1$) indicates that the positive effect of $Pri_AveRating_{ij}$ on $Rating_{ij}$ is strong when UAI_{ij} is
 396 high, thereby supporting H4, which states that uncertainty avoidance can strengthen the
 397 relationship between the prior average rating and subsequent ratings.

398 At last, Model 6 (Table 4) includes all the moderators and shows entirely consistent
 399 moderating effects.

400
 401

Table 4. Estimation Results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Pri_AveRating</i>		0.726*** (120.54)	0.816*** (57.51)	0.649*** (47.65)	0.709*** (47.23)	0.727*** (19.50)
<i>Pri_AveRating</i> × <i>PDI</i>			-0.183*** (-7.09)			-0.193*** (-5.16)
<i>PDI</i>			1.075*** (5.35)			1.700*** (5.82)
<i>Pri_AveRating</i> × <i>IDV</i>				0.115*** (6.34)		0.038* (1.74)
<i>IDV</i>				-0.467*** (-3.30)		0.149 (0.72)
<i>Pri_AveRating</i> × <i>UAI</i>					0.036* (1.84)	0.124*** (4.96)
<i>UAI</i>					-0.734*** (-4.07)	-1.268*** (-6.56)
<i>Pri_Deviation</i>	-0.447*** (-99.30)	-0.395*** (-92.23)	-0.396*** (-92.42)	-0.399*** (-93.32)	-0.399*** (-93.31)	-0.402*** (-93.99)

<i>Pri_Volumn</i>	-0.021*** (-14.00)	-0.010*** (-7.29)	-0.011*** (-7.70)	-0.010*** (-7.40)	-0.011*** (-7.67)	-0.010*** (-7.52)
<i>R_Length</i>	0.001*** (4.50)	0.001*** (5.89)	0.001*** (5.60)	0.001*** (6.30)	0.001*** (5.32)	0.001*** (6.12)
<i>R_Posemo</i>	0.038*** (77.65)	0.034*** (73.86)	0.034*** (73.50)	0.034*** (73.87)	0.033*** (72.17)	0.034*** (72.82)
<i>R_Negemo</i>	-0.109*** (-86.92)	-0.096*** (-80.37)	-0.096*** (-80.44)	-0.096*** (-80.32)	-0.095*** (-80.07)	-0.095*** (-80.12)
<i>R_Diff</i>	0.000 (0.66)	-0.000 (-0.07)	0.001 (1.19)	0.001*** (2.59)	0.001 (1.36)	0.001*** (2.93)
<i>H_Star</i>	0.424*** (70.70)	0.077*** (12.03)	0.077*** (12.05)	0.076*** (11.98)	0.071*** (11.17)	0.073*** (11.45)
<i>H_Price</i>	0.114*** (19.20)	0.014** (2.54)	0.014** (2.40)	0.012** (2.07)	0.016*** (2.89)	0.014** (2.43)
<i>H_RatingNumber</i>	0.082*** (18.25)	0.044*** (10.27)	0.047*** (10.89)	0.048*** (11.25)	0.052*** (12.01)	0.053*** (12.31)
<i>H_City_Eco</i>	-0.024*** (-4.34)	-0.019*** (-3.49)	-0.018*** (-3.30)	-0.017*** (-3.28)	-0.017*** (-3.28)	-0.019*** (-3.68)
<i>Year Dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>TravelType Dummy</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.255*** (50.75)	2.023*** (16.60)	1.499*** (9.60)	2.390*** (15.46)	2.414*** (14.70)	1.885*** (6.06)
<i>N</i>	126358	126358	126358	126358	126358	126358
<i>R</i> ²	0.293	0.366	0.368	0.370	0.369	0.371

t statistics in parentheses (* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$)

402
403

404 We summarize our results in Table 5.

405 **Table 5. Summary of Results**

Hypothesis	Result
<i>H1: A customer's observed prior average rating of a product during purchase positively influences his/her posted rating during review process.</i>	Supported
<i>H2: The positive influence of a customer's observed prior average rating on his/her posted rating is strengthened when the focal customer is from a society that ranks low on power distance.</i>	Supported
<i>H3: The positive influence of a customer's observed prior average rating on his/her posted rating is strengthened when the focal customer is from a society that ranks highly on individualism.</i>	Supported
<i>H4: The positive influence of a customer's observed prior average rating on his/her posted rating is strengthened when the focal customer is from a society that ranks highly on uncertainty avoidance.</i>	Supported

406 **4. DISCUSSIONS AND IMPLEMENTATIONS**

407 **4.1 General Discussion**

408 The current study presents the following research questions:

409 (1) *How and why does a customer's observed prior average rating influence his/her posted*
410 *rating?*

411 (2) *How does a customer's culture moderate the influence of a customer's observed prior*
412 *average rating influence on the posted rating?*

413 We exerted theoretical and empirical effort to answer our research questions. For the
414 theoretical aspect, we synthesized the extensive anchor effect theory literature and applied it
415 in the online rating context.

416 We used the anchoring effect framework as the basis to propose that a customer's
417 observed prior average rating plays as an anchor during a customer's rating process and thus
418 drives the assimilation of his/her posted rating to the average one that he/she observed
419 during the purchase. In addition, within the anchoring effect framework, we also propose
420 that culture moderates such a positive effect via intervening customers' generated anchor-
421 consistent knowledge.

422 For the empirical aspect, we tested our hypotheses based on 127,133 observations from
423 2,451 hotels, covering the years from 2011 to 2016. Accordingly, we achieved empirical
424 results that are entirely consistent with our predictions. That is, we found that customers'
425 observed prior average ratings positively influence their posted ratings. Such an influence is
426 strengthened by customers' low power distance, high individualism, or high uncertainty
427 avoidance.

428 Our findings yielded substantial theoretical and practical implications, which are
429 discussed as follows.

430 **4.2 Theoretical Implications**

431 The present study has several contributions to the academic literature. First, our study
432 may advance the literature on the impact of prior ratings on subsequent customers' online
433 behaviors. To the best of our knowledge, this study represents the first attempt to introduce
434 the anchoring effect, a very robust cognitive heuristic, to individual online WOM behaviors.
435 We draw on the anchoring effect to offer a novel theoretical explanation to analyze the
436 influence of prior average ratings on subsequent ratings. Such investigation may remind
437 future researchers that anchoring effect theory may serve as the theoretical foundation when
438 exploring the influence of certain numerical contents on customers' online numerical
439 evaluations.

440 Second, this study is among the first to investigate the effects of cultural differences on
441 customers' online evaluation behaviors. We reinforce the notion that customers' online
442 behaviors are distinct across cultures by demonstrating that culture can moderate the
443 relationship between prior average and subsequent ratings. Therefore, future online rating

444 researchers should incorporate the influence of culture into their models if they target cross-
445 cultural studies. In addition, given that culture plays a fundamental role in molding
446 individuals' personal characteristics (Hinde 1987; Judge and Cable 1997; Saffold III 1988),
447 our results echo the findings of Ma et al. (2013), in which the influence of the prior average
448 and subsequent ratings was moderated by individual features.

449 Third, to the best of our knowledge, this study is also the first to link the anchoring
450 effect and cultural dimensions theories, thereby providing new insights into both theories.
451 Our findings demonstrate that cultural dimensions may act as moderators in stimulating the
452 anchoring effect in the online WOM context. At the same time, our results may provide new
453 insights into anchoring effects when targeting cross-cultural studies in other contexts.

454 **4.3 Practical Implications**

455 Apart from the theoretical implications, the empirical results also present several
456 managerial implications. The results can remind managers of the important role of products'
457 average ratings, as this study demonstrates that prior average ratings can significantly
458 influence subsequent ratings, which are significant for product success (e.g., Moe and Trusov
459 2011; Sun 2012). Furthermore, the findings, which indicate that the positive influence of
460 prior average rating on subsequent ratings can be strengthened in low-power distance, high-
461 individualism, or high-uncertainty avoidance societies, are beneficial for managers' decision-
462 making: If the average rating of a product is high, then managers may consider repeatedly
463 highlighting such rating in a prominent position on the website to enhance the anchoring
464 effects on future customers, particularly in countries with low power distance, high
465 individualism, or high uncertainty avoidance. This strategy may help online sellers to achieve

466 increased customer satisfaction and improved long-term sales.

467 **4.4 Limitations and Future Research**

468 Like the results of other empirical studies, the outcomes of the current research are
469 subject to limitations, thereby possibly providing avenues for future research. First, cultural
470 discrepancy exists among individuals within the same society. Hui and Triandis (1986) noted
471 that cultures labeled as individualistic (or collectivistic) are simply cultures in which the
472 majority of individuals have the corresponding personal features of individualism (or
473 collectivism). Even in the same country, the cultural dimension values for different regions
474 may exhibit distinctive qualities. Thus, the culture-related findings in this study can be used
475 to indicate an overall societal trend, which may be valuable for managers when placing their
476 products or services into diversified markets in different countries. Future studies may also
477 investigate how the influence of prior ratings on future ratings is contingent upon certain
478 individual-level factors, such as the five-factor model of personality (Costa Jr and Widiger
479 1994).

480 Second, our context is specific to the product type of hotels, which inherently suggests
481 that customers' average anchoring effect on hotels may be dissimilar to that on other
482 products. The generalizability of our findings might also be limited to similar products.
483 Therefore, future studies may concentrate on whether our constructs and relationships are
484 available for other product types or categories (e.g., "experience goods" and "search goods").

485 Third, in this study, we only focus on the influence of the prior average rating on
486 subsequent ratings. However, due to the specific, unique features of prior average ratings
487 (e.g., numerical, explicit, and prominently displayed), we include other statistical features

488 (e.g., deviation) of prior ratings as control variables in our model. Therefore, future studies
489 may also investigate how other statistical features of prior ratings (e.g., deviation of prior
490 ratings) matter to subsequent ratings as well as how the relationship can be moderated by
491 culture.

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