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How hotel managers react to rating fluctuation?

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Abstract

Rating fluctuation is inevitable for hotels listed on hotel booking platforms, which induces potential consumers' perception of uncertainty and risk. Managerial response is expected to be effective in enhancing the interaction between hotels and consumers. However, how hotel managers react to rating fluctuation remains unclear. In order to fill this gap in the literature, we collect customer reviews and managerial responses from a leading hotel booking platform and build a panel dataset (hotel*month). The empirical results suggest that (1) rating fluctuation induces more managerial responses and requires more response time; (2) upscale hotels are more likely to conduct frequent and timely responses when facing rating fluctuation; and (3) hotels tend to respond more frequent and timely once rating fluctuation is observed by a larger audience. This study concludes by presenting theoretical contributions to the literature and practical implications for operators of hotel booking platforms and hotel managers.

Keywords: managerial response; rating fluctuation; hotel category; pageview

1. Introduction

Online reviews have become one of the most important sources for consumers to seek product information and make purchase decisions. Online ratings greatly improve consumers' ability to evaluate products, especially for revealing the unobservable quality of experience goods like hotels to make informed booking decisions (Fang, Ye, Kucukusta, & Law, 2016; Liu, Schuckert, & Law, 2018; Zhao, Wang, Guo, & Law, 2015). However, inconsistent ratings (rating fluctuation) on a product or service increase potential consumers' perception of uncertainty and risk, and thus hinder their further consideration and purchase intention of it (Langan, Besharat, & Varki, 2017; Wang, Liu, & Fang, 2015). Therefore, rating fluctuation could exert a negative influence on hotel performance, which may cause reputation damage and revenue shrinkage. What should hotel managers do when encountering rating fluctuation?

Given the tremendous importance of managerial response, hotel managers increasingly and closely monitor and interact with their customer reviews to enhance their competitiveness (Cantallops & Salvi, 2014; Gu & Ye, 2014; Li, Cui, & Peng, 2017). The popularity of managerial response in practice has attracted significant academic attention, which mainly investigated the effect of managerial response on customer satisfaction and hotel performance (Chen, Gu, Ye, & Zhu, 2019; Gu & Ye, 2014; Lui, Bartosiak, Piccoli, & Sadhya, 2018). Yet, whether and how hotel managers react to rating fluctuation remains unclear, which is crucial in business practice. It is crucial because managerial response provides additional information and signals a positive attitude to customers, which relieves the negative influence of rating fluctuation on potential consumers' perception of uncertainty when evaluating the product or service to make purchase decisions. We thus propose the first research question: How do hotel managers react to rating fluctuation?

Managerial response also entails extra cost (e.g., if new hires are needed) and extra time (e.g., if some staff has to devote time to this task). Therefore, considering these critical implications for a hotel, it is surprising that the literature has focused directly only on the hotel's performance (Chen et al., 2019; Gu & Ye, 2014; Lui et al., 2018) -be it either financial or a customer-centric measure of performance such as customer satisfaction (Kozak, 2002)- without analyzing the hoteliers' willingness to tackle rating fluctuation. Accordingly, in order to fill this gap in the literature, this study uses two measures of managerial responses: response frequency and response time. The former shows the coverage of managerial responses to customer reviews; the latter indicates the speed of hotel managers in conducting managerial responses.

Because the managerial response to rating fluctuation depends on the hotel's characteristics and the visibility of the reviews, we investigate the impact of two moderators in our study. On the one hand, we consider the moderating effect of hotel category. Upscale hotels possess high position and reputation in the industry and are perceived as more reliable by consumers (Abrate, Fraquelli, & Viglia, 2012; Akbaba, 2006; Langan et al., 2017), thus the negative influence of rating fluctuation can be more salient and severe for these hotels. In other words, the cost of rating fluctuation and inefficient managerial response is more expensive for upscale hotels (Rhee & Haunschild, 2006; Wang, Wezel, & Forgues, 2016). In addition, the awareness of providing high-quality experience is stronger for upscale hotels (Wu & Liang, 2009). Therefore, the second research question is: Whether managers of upscale hotels conduct more frequent and timely responses when confronting rating fluctuation.

On the other hand, to account for the dependence of managerial response on the visibility of the reviews, we explore the moderating effect of pageview. Pageview of online reviews is a direct indicator of consumer attention and consideration on a product or service, which is closely

associated with product popularity and sales (Cui, Lui, & Guo, 2012; Gunter & Önder, 2016; Zhang, Ye, Law, & Li, 2010). Therefore, once observed by a larger online audience, the negative influence of rating fluctuation on potential consumers' perceived uncertainty of the hotel can be aggravated, because reading online reviews to make informed purchase decisions is a common practice for most consumers (Mudambi & Schuff, 2010; Park & Park, 2013; Zhao et al., 2015). Under this situation, managerial response is more necessary and beneficial for a hotel since the cost of no action is huge. Therefore, the third research question is: Whether hotel managers employ more frequent and timely responses when rating fluctuation was observed by a larger online audience.

The paper continues with an overview of the literature on rating fluctuation and managerial response and a discussion on the research gaps in Section 2. Research hypotheses with theoretical foundations are proposed in Section 3. Section 4 introduces data collection, variable definition, and econometric models. Section 5 presents the empirical results with robustness checks. Section 6 concludes by a discussion of the findings and its implications to research and business practice.

2. Literature review

2.1. Literature on rating fluctuation

eWOM (electronic Word Of Mouth) plays a crucial role during consumers' decision making (Liu et al., 2018). Among the indicators of eWOM, review volume, valence (rating score from one to five), and variance are numeric, which can be easily observed and evaluated by consumers, and thereby can affect online sales significantly (Viglia, Minazzi, & Buhalis, 2016; Ye, Law, & Gu, 2009). For instance, high review volume for a hotel enhances its popularity and boosts online booking (Torres, Singh, & Robertson-Ring, 2015; Ye et al., 2009), and review valence is positively associated with consumer sentiment and booking intention (Viglia et al., 2016; Ye, Law, Gu, &

Chen, 2011). Existing studies have verified the positive effect of review volume and valence on purchase intention. However, the function of review variance remains controversial.

Statistically, review variance is referred as rating fluctuation or rating inconsistency, namely, the degree of consensus among consumers' evaluations of a product or service (Chang, Lin, & Luarn, 2014; Zhu & Zhang, 2010). Research has shown that the increase of review variance has a negative impact on hotel sales (Ye et al., 2009). Langan et al. (2017) found that the negative effect of rating fluctuation on consumer purchase intention is more prominent for utilitarian than hedonic products. Other studies further proposed that review variance is a double-edged sword that can either hurt or promote product sales (Sun, 2012; Wang et al., 2015). In particular, while high review variance indicates uncertain quality of a product which may not match potential consumers' preference and scare them away, high review variance may also reflect product uniqueness and enhance purchase intention when combining with high critic review variance (Wang et al., 2015). In addition, Sun (2012) found that under the situation of a low rating, high review variance corresponds to high customer demand. Park & Park (2013) suggested that high review variance hurts product evaluation more when consumers have unfavorable prior expectation. These studies mainly focused on the influence of rating fluctuation on purchase intention and product evaluation from the perspective of buyers (consumers), lacking research on how sellers (e.g., hotel managers) react to or deal with rating fluctuation.

2.2. Literature on managerial response

As online reviews become increasingly important among consumers who search information to make purchase decisions, sellers such as hotel managers attempt to manage their customer reviews (Park & Allen, 2013). Managerial response is one of the most effective strategies as it benefits hotel reputation and promotes hotel performance by suggesting that managers are willing to

improve or correct their products or services (Baka, 2016; Proserpio & Zervas, 2017; Xie, So, & Wang, 2017). Responding to positive reviews strengthens customers' pleasant experiences and reinforces the compliments (Hennig-Thurau et al., 2010; Xie, Zhang, & Zhang, 2014). When dealing with negative reviews, managerial response helps hotels recover from service failure and restore customer satisfaction as it is a guarantee that this kind of negative experience will not happen again (Chevalier, Dover, & Mayzlin, 2018). Research has shown that responding to negative reviews brings more benefit than replying to positive reviews (Anderson & Han, 2016), thereby hotels are motivated to respond to negative shocks (Park & Allen, 2013). However, Lappas, Sabnis, & Valkanas (2016) found that a large portion of reviews does not receive responses, especially for negative ones. As Chen et al. (2019) discussed, the target and style of managerial responses are much more nuanced.

Response frequency and response time are two important elements related to the idea of feedback such as managerial response (Sparks, So, & Brandley, 2016; Xie et al., 2014). In the context of hotel booking platforms, response frequency suggests the number of managerial responses a hotel conducted during a certain period (Li et al., 2017). Many studies have examined the effect of managerial response on hotel performance, customer satisfaction, and online engagement (Gu & Ye, 2014; Lui et al., 2018). By initiating frequent responses, hotels can provide further information and reduce consumer perception of uncertainty, which is helpful to motivate online engagement and high ratings from consumers. Response time refers to how quickly a hotel responds to its customer reviews (Li et al., 2017). Rapid response offers greater value as it reduces ambiguity and helps information seekers solve the particular problem in a relatively short time (Weiss, Lurie, & MacInnis, 2008). For instance, an immediate response to a customer review is more likely to satisfy the customer and to exert a positive effect on the following potential consumers (Istanbulluoglu,

2017; Xie et al., 2017). However, slow response is also beneficial. By responding more slowly, hotels can gather more information and organize their opinions in a more clear and appropriate way with enough time to prepare their responses (Weiss et al., 2008). Existing studies mainly discuss how managerial response affects hotel performance and customer satisfaction, however, what drives managerial response (e.g., response frequency and response time) remains unclear.

3. Hypothesis development

3.1. Rating fluctuation and managerial response

Managerial response is a convenient and timely channel to maintain hotel-customer relationship and increase the competitiveness of a hotel (Baka, 2016; Proserpio & Zervas, 2017). However, conducting managerial responses is costly, which requires resource allocation, especially human resources because hotels need to closely monitor their reviews and select the ones to respond (Li et al., 2017). Therefore, hotels may weigh the benefit and cost of managerial response before they actually respond to customer reviews (Peteraf, 1993). Managerial response not only restrains service failure and reduces customer dissatisfaction, but also reinforces hotel-customer relationship and enhances customer loyalty, both of which benefit hotels. As aforementioned, the cost of managerial response mainly involves the occupation of human resources.

Managerial response becomes more important when confronting rating fluctuation, which is found to be negatively associated with consumer attitude and hotel performance (Chang et al., 2014; Langan et al., 2017). In this case, managerial response functions as an alternative information source and communication channel, which mitigates the perceived risk and uncertainty of potential consumers (Sparks et al., 2016). Consequently, rating fluctuation makes managerial response more necessary as the benefit of providing managerial response is more likely to exceed the cost; thus, the probability of conducting managerial response should increase. Hence, we propose the

following hypothesis:

H1a: Response frequency increases as rating fluctuation increases.

Since the negative impact of rating fluctuation mainly lies in arousing consumer perception of uncertainty (Ye et al., 2009), managerial response should focus on providing consumers with more information to reduce uncertainty. In order to provide more comprehensive information and help potential consumers reduce uncertainty and doubts, hotel managers should better understand what consumers care about through careful reading their reviews and be cautious before responding. A comprehensive response that is well prepared and organized is more likely to be recognized by the potential consumers in this situation than an arbitrary response (Weiss et al., 2008). For instance, some divergent comments from customers should be verified and discussed by hotel managers and staffs before taking actions to respond. This process costs more time and may reduce response speed. Therefore, we propose the following hypothesis:

H1b: Response time increases as rating fluctuation increases.

3.2. Moderating effect of hotel category

A star-rated system, issued by hotel associations, is usually used to categorize hotels and represents identity and status of each hotel (Liu, Schuckert, & Law, 2015). The popularity of online booking platforms makes customer ratings increasingly important, which can be a threat to this system. Perception discrepancy will appear once there is significant difference between online customer ratings and offline hotel star ratings. This discrepancy is called "organizational identity threat" and can trigger organizational changes to maintain a positive sense of organizational identity (Elsbach & Kramer, 1996; Martins, 2005). Managers of upscale hotels may have a perception that the hotel is among the top position and perception discrepancy occurs once customer ratings fluctuate wildly.

Under this situation, managerial response, one of the most effective approach to build and improve hotel-customer relationship, is required and benefits hotels significantly (Chevalier et al., 2018; Proserpio & Zervas, 2017). Therefore, upscale hotels are more motivated to make frequent managerial responses when encountering rating fluctuation which is more likely to trigger perception discrepancy. Hence, we propose the following hypothesis:

H2a: Upscale hotels are more likely to conduct frequent responses when facing rating fluctuation.

Upscale hotels possess a good reputation in the industry that signals their ability to satisfy consumer needs and increases consumer trust (Love & Kraatz, 2009; Rindova, Williamson, Petkova, & Sever, 2005). However, in the context of online booking platforms, hotels may encounter significant rating fluctuation, which indicates high uncertainty and triggers negative emotions from potential consumers. This negative effect can be more salient and severe for hotels with high reputation (e.g., five-star hotels) because consumers perceive that high-quality experiences should be ensured and provided for these hotels (Daft -Pérez, Arbelo, & Pérez-Gómez, 2017; Núñez-Serrano, Turrión, & Velázquez, 2014). Under this situation, timely responses are more necessary and the cost of delayed actions is huge for upscale hotels, urging them to take actions to deal with the detrimental situation (Wang et al., 2016). Furthermore, upscale hotels possess professional management team and expert staff who are capable of speeding up managerial responses to mitigate the negative influence of rating fluctuation on their online reputation. We thus propose the following hypothesis:

H2b: Upscale hotels are more likely to conduct timely responses when facing rating fluctuation.

3.3. Moderating effect of pageview

Given the explosive growth of online reviews, consumers can only view a small fraction of them

due to their limited time and attention (Liu, Karahanna, & Watson, 2011; Singh et al., 2017). The pageview of online reviews is a direct indicator to measure traffic volume and consumer attention on a product or service, because searching information before making purchase decisions is a common practice for most potential consumers (Luo & Zhang, 2013). Therefore, pageview is an important and direct measure of the influence of customer reviews, and attracts hotel managers' attention (Cui et al., 2012; Gunter & Önder, 2016).

As discussed, rating fluctuation reflects inconsistent evaluations from customers and produces uncertainty for potential consumers to make decisions. Once observed by a larger online audience (potential consumers who are reading reviews for online booking), the negative consequences of rating fluctuation (e.g., reputation damage and revenue shrinkage) can be aggravated. Because the cost of no or belated managerial responses to rating fluctuation would be greater with a larger range of online audiences, the benefit of employing frequent and immediate responses is significant. In such case, hotels are motivated to allocate more resources (e.g., priority, staff, and effort) to speed up their responses to customer reviews. Therefore, hotel managers are expected to provide frequent and timely responses to reduce inconsistent interpretations and evaluations of their products or services when facing a larger audience (Istanbulluoglu, 2017; Xie et al., 2017). We then propose the following hypotheses:

H3a: Hotels tend to respond more frequent once rating fluctuation is observed by a larger audience.

H3b: Hotels tend to respond more timely once rating fluctuation is observed by a larger audience.

Figure 1 summarizes the research hypotheses in this study. In particular, H1a and H1b document the direct effect of rating fluctuation on managerial response. H2a and H2b examine the moderating effect of hotel category on the direct effect, and H3a and H3b investigate the

moderating effect of pageview on the direct effect.

<Insert Figure 1 about here>

4. Data and methodology

4.1. Data and Variables

Qunar.com is one of the largest and most popular hotel booking platforms in China, which was merged by Ctrip.com (NASDAQ: CTRP) in 2015 and operates independently. According to a real-time retrieve on Qunar.com, it covers over 730,000 hotels across 71,360 cities by the end of May 2019. We thus collect data from Qunar.com regarding hotel reviews and managerial responses. First, we develop a Python-based crawler to automatically collect the information of reviews and managerial responses for hotels listed on Qunar.com in Beijing, the capital city of China. Second, in order to measure rating fluctuation over a suitable time window, we aggregate these reviews (1,152,635 observations) into monthly samples (January 2015 - June 2018) by hotels and construct a panel dataset (hotel*month). The data collection task is conducted in July 2018.

The dependent variable in this study is the response behavior of hotel managers, measured by response frequency (*RespFreq*) and response time (*RespTime*). Response frequency indicates the coverage of managerial responses to customer reviews, measured by the proportion of customer reviews that received managerial response. Response time reflects the speed of managerial responses, evaluated by the time interval between the publication and response date of a review. The explanatory variable of interest is rating fluctuation (*RF*), which is measured by the variance of customer ratings. To test H2 and H3, two moderators are introduced. The category (from one- to five-star) of a hotel (*HotelStar*) signals the position and reputation of a hotel in the industry, while the pageview of customer reviews (*Pageview*) reveals potential consumers' attention on a

hotel. Therefore, upscale hotels are expected to be capable in providing better experience and high pageview of customer reviews captures more potential consumers' purchase attention. We also control for seasonality (dummy variable that denotes each season) in this study, which is influential in the hotel industry (Juaneda, Raya, & Sastre, 2011). Length of review texts and the photos uploaded may also exert effects on managerial responses and are usually working as controls when involving online reviews (Fang et al., 2016; Filieri, 2016), we thus control these two factors in the following analysis. Table 1 presents the descriptions of the main variables used in this study.

<Insert Table 1 about here>

4.2. Econometric models

To test the three research hypotheses proposed in Section 3, panel regressions based on Models 1-6 are employed. The dependent variable is *RespFreq* and *RespTime*, the explanatory variable of interest is *RF*, and the moderator in Models 3-4 is *HotelStar* and *Pageview* in Models 5-6. Control variables are *Length* and *Photo*; *Spring*, *Summer*, and *Autumn*. To account for hotel-specific attributes and time-variant factors, which are very potential to affect the behaviors of hotel managers, we use hotel and month fixed effects in the main analysis. In Models 1-6, *i* stands for hotel and *t* represents month, μ_i is hotel fixed effect, v_t is month fixed effect, and ε_{it} is the idiosyncratic error term.

$$RespFreq_{it} = \beta_0 + \beta_1 RF_{it} + \beta_2 Controls_{it} + \mu_i + v_t + \varepsilon_{it} \quad (1)$$

$$RespTime_{it} = \beta_0 + \beta_1 RF_{it} + \beta_2 Controls_{it} + \mu_i + v_t + \varepsilon_{it} \quad (2)$$

$$RespFreq_{it} = \beta_0 + \beta_1 RF_{it} + \beta_2 RF_{it} * HotelStar_{it} + \beta_3 HotelStar_{it} + \beta_4 Controls_{it} + \mu_i + v_t + \varepsilon_{it} \quad (3)$$

$$RespTime_{it} = \beta_0 + \beta_1 RF_{it} + \beta_2 RF_{it} * HotelStar_{it} + \beta_3 HotelStar_{it} + \beta_4 Controls_{it} + \mu_i +$$

$$v_t + \varepsilon_{it} \quad (4)$$

$$RespFreq_{it} = \beta_0 + \beta_1 RF_{it} + \beta_2 RF_{it} * Pageview_{it} + \beta_3 Pageview_{it} + \beta_4 Controls_{it} + \mu_i + v_t + \varepsilon_{it} \quad (5)$$

$$RespTime_{it} = \beta_0 + \beta_1 RF_{it} + \beta_2 RF_{it} * Pageview_{it} + \beta_3 Pageview_{it} + \beta_4 Controls_{it} + \mu_i + v_t + \varepsilon_{it} \quad (6)$$

Models 1-2 are used to test H1a and H1b, which aim to identify β_1 as it represents the direct effect of rating fluctuation on response frequency (Model 1) and response time (Model 2). We employ Models 3-4 to test H2a and H2b, and examine the sign and significance of β_2 which captures the moderating effect of hotel category on the main effect analyzed in Models 1-2. By the same token, Models 5-6 are utilized to test H3a and H3b and estimate the moderating effect of pageview on the direct effect.

5. Results and discussion

5.1. Descriptive statistics

Table 2 reports the summary statistics of the main variables used in this study. According to the mean of *RespFreq*, about 31.8% of customer reviews received managerial responses. The average response time for hotel to conduct managerial response is approximately 36 days, indicating that most of customer reviews are responded after one month since they were posted, which is seriously lagged. The monthly variance of customer ratings ranges from 0 to 8 with an average of 1.241. The average pageview of customer reviews in our dataset is 15, suggesting that each review was read for about 15 times by information searchers (potential consumers). Additionally, the average length of the reviews is about 46 and the average number of photos uploaded in each review is only 0.37, implying that many customers tend to post short reviews without photos. Among all the

observations, about 25% are distributed in each season, suggesting that the research samples are almost evenly distributed across seasons.

<Insert Table 2 about here>

5.2. Estimation results

Table 3 presents the direct effect of rating fluctuation on managerial response based on Models 1-2. As column 1 shows, the coefficient (0.003^{***}) on *RF* is significant and positive at the 0.01 level, indicating that hotels tend to conduct more managerial responses when confronting higher rating fluctuation. In other words, rating fluctuation induces uncertainty for potential consumers to evaluate the hotel and thus push the mangers to conduct frequent responses. Therefore, H1a is supported. The coefficient (0.036^{***}) on *RF* in column 2 suggests that a hotel will take more time to conduct managerial responses as rating fluctuation increases. That is, hotel managers need more time to prepare and organize their responses when experiencing severe rating fluctuation. Hence, H1b is supported. Please note that the R-square reported in all tables is the within R-square using "xtreg" and the R-square increases to over 0.5 when employing "areg" to handle fixed effects (https://www.stata.com/support/faqs/statistics/areg-versus-xtreg-fe/).

<Insert Table 3 about here>

We then add *HotelStar* and *RF*HotelStar* into Models 3-4 to test the moderating effect of hotel category on the direct effect analyzed in Models 1-2. The results are reported in Table 4 (*HotelStar* is omitted due to the hotel fixed effect in columns 1-2). The coefficient (0.011^{***}) on the interaction term in Model 3 is significant and positive, suggesting that upscale hotels tend to respond more frequent when encountering rating fluctuation, which supports H2a. As the coefficient (-0.105^{***}) on the interaction term in Model 4 shows, upscale hotels are more likely to reduce their response

time when encountering rating fluctuation. Thus, H2b is supported. Upscale hotels possess high reputation and position in the industry, and the costs of rating fluctuation for them are more expensive in comparison with downscale hotels. Once experiencing rating fluctuation, upscale hotels are more likely to conduct frequent and timely responses to reduce the loss. To test the robustness of the above results, we also conduct regressions without hotel fixed effect. As columns 3-6 show, the coefficients on *RF*HotelStar* remain positive (negative) and significant in Model 3 (4), again supporting H2a and H2b.

<Insert Table 4 about here>

To explore the moderating effect of pageview on the direct effect documented in H1a and H1b, we add *Pageview* and its interaction term with *RF* in Models 5-6. The regression results are presented in Table 5. As the coefficient (0.013^{***}) on *RF*Pageview* in Model 5 suggests, hotels tend to conduct more frequent responses if rating fluctuation is observed by a larger online audience. Therefore, H3a is supported. The significantly negative coefficient (-0.089^{***}) on the interaction term in Model 6 indicates that hotel managers speed up their responses (reduce the response time) once rating fluctuation is observed by a larger online audience. Therefore, H3b is supported. Pageview is a direct measure or indicator of consumer attention during their information searching or purchase process. Once rating fluctuation of a hotel is observed by a large online audience, its negative influence on hotel performance would be aggravated, urging hotels to respond more frequent and timely. To further validate the above results, we also employ lagged *Pageview* in Models 5-6 and report the results in columns 3-4. The results remain robust as in columns 1-2, again supporting H3a and H3b.

<Insert Table 5 about here>

6. Conclusion and implications

Online ratings provide peer evaluations on a product or service for potential consumers to make purchase decisions, while managerial responses offer a convenient channel for sellers to interact with their customers and manage their business. Rating fluctuation is inevitable for hotels, which produces uncertainty for potential consumers to make decisions. Managerial responses can be effective in providing additional information and removing doubts, and thus reduce losses and mitigate business risks. In order to explore how managers react to rating fluctuation, we collect the reviews for hotels in Beijing listed on Qunar.com and construct a panel dataset. Our findings derived from regression analysis with hotel and month fixed effects are robust and provide theoretical and practical insights into managerial response in the context of hotel booking platforms.

6.1. Theoretical implications

First, this study differs from previous studies and research on managerial response by shifting attention to how managers react to rating fluctuation rather than focusing on the effect of managerial responses on customer satisfaction (review valence) and customer engagement (review volume). Two dimensions (response frequency and response time) of managerial response are examined and it is observed that rating fluctuation induces more frequent response and takes more response time, which provide normative measures of managerial response for future research.

Second, the findings of this study contribute to and extend theories of cost-benefit and perception discrepancy. Managerial response involves cost and benefit, both of which are critical for hotel operation and performance, especially under the situation of rating fluctuation that causes uncertainty for potential consumers to make purchase decisions. Rating fluctuation makes managerial response more functional and highlights the cost-benefit principle in business practice.

Perception discrepancy occurs once rating fluctuation threatens the position of a hotel in the industry, particularly for upscale hotels. In such cases, frequent and timely managerial responses are more motivated and beneficial because the costs of no or delayed responses for upscale hotels are higher.

Third, this study sheds light to the power of pageview in urging managerial response, which is undocumented in previous literatures. As a direct measure of potential consumers' attention on a product or service, more pageview exacerbates the negative influence of rating fluctuation on purchase intention. This study is among the first to provide empirical evidence regarding the moderating effect of pageview on the relationship between rating fluctuation and managerial response, and contributes to the cost-benefit principle in conducting managerial response.

6.2. Practical implications

The findings of this research provide important implications for business practice involving managerial response, such as hotel booking platforms, review sites, and ecommerce platforms. Accordingly, we make the following suggestions for operators of hotel booking platforms and hotel managers.

First, for operators of hotel booking platforms, the website and its functional design are crucial for managing business and providing better customer experience. Both hotel and consumers are the customers of hotel booking platforms, because hotels can choose any platforms (e.g., Booking.com, Expedia, and Agoda) to be listed, and consumers can also select any platforms to book online. The competition among hotel booking platforms is very intense, and website design and functional design play a key role in attracting hotels and consumers. We thus suggest hotel booking platforms as well as review sites and ecommerce platforms to design a new function that automatically

calculates the rating fluctuation (variance) and pageview of customer reviews within a certain period (e.g., monthly or weekly), and notifies the hotels once the indicator reaches a certain value. We also suggest the function could allow hotels to set the calculation period and the warning value of each indicator. This not only enhances the competitiveness of a hotel booking platform (e.g., attract more hotels to join in), but also makes hotels more efficient in conducting managerial response and managing their business, given that only a response button is offered on the existing hotel booking platforms.

Second, this study provides some insights for hotel managers or other practitioners involving managerial response by empirically examining how managerial response functions when confronting rating fluctuation, which is helpful in understanding the mixed strategies of managerial response in practice. In particular, practitioners should figure out whether they conduct managerial response based on consumer behaviors (e.g., rating fluctuation and pageview) or their own situation (the position in the industry). For any hotels that attempt to set or change their response strategies, they need to evaluate the consequences of the strategies by carefully evaluating the benefit and the cost.

Third, this study also suggests a good direction for hotels to conduct their own research and adjust their response strategies. Hotels can gather information from different sources to investigate to what extent managerial response reduces potential consumer' uncertainty and benefits themselves regarding rating fluctuation. Particularly, hotels can design surveys and send them to their guests to answer the above questions and adjust their response strategies. They can also have a short interview or communication with the guests while checking in or checking out. Information collected this way is valuable for quantifying the benefit and cost of conducting managerial response, and help hotels make appropriate response strategies.

6.3. Limitations and future research

This study has several limitations which deserve future research effort. First, this study focuses on how managers react to rating fluctuation, however, how consumers react to managerial response is still unknown. For instance, to what extent the consumers' attitude or sentiment is influenced once they observed the managerial responses? Research on this direction would be meaningful in better understanding consumer behaviors. Second, due to the characteristics of secondary data, some potential factors that may also have an influence on managerial response cannot be examined or observed in this study. On the one hand, the size of the hotel could have an effect and it might be related to the hotel's audience; however, Ctrip.com does not provide this information; still, the hotel fixed effect used is expected to absorb this effect. On the other hand, although hotel fixed effect is employed, hotel managers' preferences and hotels' recent goals could also affect the response strategy of a hotel. For instance, managers who are risk-averse tend to be more sensitive to rating fluctuation and may take more active response strategies. Thus, future research could combine multiple methods, such as survey and interview on hotel managers to overcome the shortcomings of secondary data. Third, this study collects data from a single hotel booking platform in China. Although a large-scale of panel dataset is employed, more comprehensive analyses of data from different cultures are encouraged. We thus suggest future research obtain data from different platforms and cultures to test our findings further.

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Appendix

To further check the robustness of the results in Section 5.2, we use a subsample of 2017-2018 to replicate the results in Tables 3-5. The results based on Models 1-6 are reported in Tables A-C, the first two columns present the OLS regressions with hotel fixed effect and the last two columns report OLS regressions with hotel and month fixed effects. The results are consistent with those in Tables 3-5. Therefore, our results are robust and support H1, H2, and H3 again.

<Insert Tables A-C about here>

Table 1. Description of variables

Variable	Description
Dependent variable	
Response Frequency (*RespFreq*)	The proportion of customer reviews that received managerial responses for a given hotel in a given month.
Response time (*RespTime*)	Monthly average of the time interval (measured in days) between the publication and response date of each review for a given hotel.
Explanatory variable	
Rating Fluctuation (*RF*)	The variance of customer ratings for a given hotel in a given month.
Moderators	
HotelStar	The category (from one- to five-star) of a hotel according to Qunar.com.
Pageview	The average pageview of customer reviews for a given hotel in a given month.
Control variable	
Review Length (*Length*)	The average length of customer reviews for a given hotel in a given month.
Photo Number (*Photo*)	The average number of photos uploaded for a given hotel in a given month.
Spring	Dummy variable that equals 1 for March, April, and May.
Summer	Dummy variable that equals 1 for June, July, and August.
Autumn	Dummy variable that equals 1 for September, October, and November.

Table 2. Descriptive statistics.

Variable	Observation	Mean	S.D.	Min.	Max.
RespFreq	104,689	0.318	0.437	0	1
RespTime	41,693	36.228	64.429	0	365
RF	104,689	1.241	1.450	0	8
HotelStar	104,689	2.108	0.974	1	5
Pageview	104,689	15.338	29.534	0.5	6058.75
Length	104,689	45.638	60.297	0	2386.5
Photo	104,689	0.365	1.157	0	49.5
Spring	104,689	25.6%	-	0	1
Summer	104,689	24.4%	-	0	1
Autumn	104,689	24.5%	-	0	1

Table 3. Estimation results of the direct effect.

Variable	Model (1) *RespFreq*	Model (2) *RespTime*
RF	0.003***	0.036***
	(0.001)	(0.006)
Length	0.005***	-0.038***
	(0.002)	(0.014)
Photo	0.009***	0.087***
	(0.003)	(0.023)
Spring	-0.136***	-2.011***
	(0.027)	(0.140)
Summer	-0.224***	0.778***
	(0.069)	(0.071)
Autumn	0.131***	-2.024***
	(0.010)	(0.077)
Constant	0.239***	3.669***
	(0.009)	(0.076)
Hotel FE	YES	YES
Month FE	YES	YES
R^2	0.051	0.244
Observations	104,689	41,693
Clusters (hotels)	7,385	4,255
F	34.14***	144.00***

Notes. Robust standard errors clustered by hotels are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The ln values of *RespTime*, *Length,* and *Photo* are employed in all regressions.

Table 4. Estimation results of moderating effect of hotel category.

Variable	Model (3) *RespFreq*	Model (4) *RespTime*	Model (3) *RespFreq*	Model (4) *RespTime*
RF	0.002***	0.040***	0.000	0.045***
	(0.001)	(0.006)	(0.001)	(0.005)
*RF*Hotelstar*	0.011***	-0.105***	0.016***	-0.125***
	(0.002)	(0.016)	(0.002)	(0.015)
Hotelstar	-	-	-0.087***	-0.033
	-	-	(0.005)	(0.021)
Length	0.007***	-0.048***	0.009***	-0.065***
	(0.002)	(0.014)	(0.002)	(0.013)
Photo	0.008**	0.099***	0.009***	0.093***
	(0.003)	(0.023)	(0.003)	(0.022)
Spring	-0.137***	-2.006***	-0.129***	-1.921***
	(0.027)	(0.141)	(0.026)	(0.131)
Summer	-0.225***	0.776***	-0.216***	-2.457***
	(0.069)	(0.071)	(0.066)	(0.208)
Autumn	0.130***	-2.017***	0.003	-1.921***
	(0.010)	(0.077)	(0.010)	(0.072)
Constant	0.221***	3.830***	0.347***	3.973***
	(0.009)	(0.079)	(0.014)	(0.083)
Hotel FE	YES	YES	NO	NO
Month FE	YES	YES	YES	YES
R^2	0.051	0.245	0.051	0.245
Observations	104,689	41,693	104,689	41,693
Clusters (hotels)	7,385	4,255	7,385	4,255
F (Chi2)	33.88***	142.40***	1774.66***	7658.20***

Notes. HotelStar is omitted due to the hotel fixed effect in the first two columns. Robust standard errors clustered by hotels are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The ln values of *RespTime*, *Length,* and *Photo* are employed in all regressions.

Table 5. Estimation results of moderating effect of pageview.

Variable	Model (5) *RespFreq*	Model (6) *RespTime*	Model (5) *RespFreq*	Model (6) *RespTime*
RF	0.002**	0.041***	0.003***	0.041***
	(0.001)	(0.006)	(0.001)	(0.006)
*RF*Pageview*	0.013***	-0.089***	0.010***	-0.085***
	(0.002)	(0.012)	(0.002)	(0.012)
Pageview	0.002	0.056***	-0.003	0.047***
	(0.002)	(0.015)	(0.002)	(0.013)
Length	0.006***	-0.050***	0.006***	-0.045***
	(0.002)	(0.014)	(0.002)	(0.014)
Photo	-0.002	0.105***	0.006*	0.092***
	(0.004)	(0.027)	(0.003)	(0.024)
Spring	-0.129***	-2.013***	-0.251***	-1.466***
	(0.027)	(0.141)	(0.028)	(0.140)
Summer	-0.217***	0.778***	-0.345***	0.808***
	(0.069)	(0.071)	(0.069)	(0.070)
Autumn	0.113***	-1.788***	0.004	-1.744***
	(0.011)	(0.083)	(0.008)	(0.084)
Constant	0.222***	3.705***	0.347***	3.669***
	(0.009)	(0.077)	(0.011)	(0.080)
Hotel FE	YES	YES	YES	YES
Month FE	YES	YES	YES	YES
R^2	0.052	0.246	0.051	0.245
Observations	104,689	41,693	99,894	40,047
Clusters (hotels)	7,385	4,255	6,859	4,052
F	34.85***	139.10***	33.49***	139.54***

Notes. The lagged *Pageview* is employed in the last two columns. Robust standard errors clustered by hotels are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The ln values of *RespTime*, *Length,* and *Photo* are employed in all regressions.

Table A. Estimation results of the direct effect (subsamples).

Variable	Model (1) *RespFreq*	Model (2) *RespTime*	Model (1) *RespFreq*	Model (2) *RespTime*
RF	0.006***	0.016**	0.004***	0.015**
	(0.001)	(0.008)	(0.001)	(0.007)
Length	0.004	0.010	0.002	-0.002
	(0.003)	(0.018)	(0.003)	(0.017)
Photo	0.019***	0.087***	0.009*	0.060*
	(0.005)	(0.032)	(0.005)	(0.031)
Spring	0.031***	0.201***	-0.278***	-0.448***
	(0.004)	(0.027)	(0.028)	(0.133)
Summer	0.053***	0.136***	-0.365***	-1.173***
	(0.005)	(0.030)	(0.071)	(0.172)
Autumn	0.005	-0.077***	-0.142***	-0.844***
	(0.004)	(0.028)	(0.009)	(0.054)
Constant	0.282***	1.775***	0.419***	2.420***
	(0.010)	(0.066)	(0.011)	(0.075)
Hotel FE	YES	YES	YES	YES
Month FE	NO	NO	YES	YES
R^2	0.011	0.014	0.097	0.094
Observations	37,661	15,257	37,661	15,257
Clusters (hotels)	5,459	2,843	5,459	2,843
F	42.02***	21.27***	52.51***	46.78***

Notes. Robust standard errors clustered by hotels are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The ln values of *RespTime*, *Length,* and *Photo* are employed in all regressions.

Table B. Estimation results of moderating effect of hotel category (subsamples).

Variable	Model (3) *RespFreq*	Model (4) *RespTime*	Model (3) *RespFreq*	Model (4) *RespTime*
RF	0.006***	0.019**	0.004***	0.019**
	(0.001)	(0.008)	(0.001)	(0.007)
*RF*Hotelstar*	0.014***	-0.071***	0.012***	-0.083***
	(0.003)	(0.024)	(0.002)	(0.023)
Length	0.006**	0.003	0.003	-0.011
	(0.003)	(0.018)	(0.003)	(0.017)
Photo	0.018***	0.093***	0.008*	0.068**
	(0.005)	(0.032)	(0.005)	(0.031)
Spring	0.031***	0.201***	-0.278***	-0.457***
	(0.004)	(0.027)	(0.028)	(0.133)
Summer	0.053***	0.135***	-0.364***	-1.171***
	(0.005)	(0.030)	(0.071)	(0.169)
Autumn	0.005	-0.078***	-0.142***	-0.847***
	(0.004)	(0.028)	(0.009)	(0.054)
Constant	0.256***	1.890***	0.397***	2.555***
	(0.011)	(0.077)	(0.012)	(0.084)
Hotel FE	YES	YES	YES	YES
Month FE	NO	NO	YES	YES
R^2	0.012	0.015	0.098	0.096
Observations	37,661	15,257	37,661	15,257
Clusters (hotels)	5,459	2,843	5,459	2,843
F	40.42***	19.87***	51.13***	45.57***

Notes. HotelStar is omitted due to the hotel fixed effect. Robust standard errors clustered by hotels are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The ln values of *RespTime*, *Length,* and *Photo* are employed in all regressions.

Table C. Estimation results of moderating effect of pageview (subsamples).

Variable	Model (5) *RespFreq*	Model (6) *RespTime*	Model (5) *RespFreq*	Model (6) *RespTime*
RF	0.004***	0.018**	0.004***	0.019***
	(0.001)	(0.008)	(0.001)	(0.007)
*RF*Pageview*	0.010***	-0.059***	0.010***	-0.061***
	(0.002)	(0.017)	(0.002)	(0.017)
Pageview	0.092***	0.287***	0.043***	-0.004
	(0.004)	(0.023)	(0.004)	(0.029)
Length	-0.000	-0.009	0.001	-0.008
	(0.003)	(0.018)	(0.003)	(0.017)
Photo	-0.033***	-0.026	-0.013***	0.088***
	(0.005)	(0.033)	(0.005)	(0.033)
Spring	-0.013***	0.094***	-0.172***	-0.539***
	(0.004)	(0.026)	(0.029)	(0.143)
Summer	-0.004	0.042	-0.253***	-1.283***
	(0.005)	(0.031)	(0.072)	(0.189)
Autumn	0.002	-0.044	-0.083***	-0.897***
	(0.004)	(0.028)	(0.010)	(0.063)
Constant	0.118***	1.333***	0.279***	2.571***
	(0.011)	(0.074)	(0.016)	(0.105)
Hotel FE	YES	YES	YES	YES
Month FE	NO	NO	YES	YES
R^2	0.092	0.039	0.105	0.096
Observations	37,661	15,257	37,661	15,257
Clusters (hotels)	5,459	2,843	5,459	2,843
F	124.42***	32.36***	51.95***	43.52***

Notes. Robust standard errors clustered by hotels are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The ln values of *RespTime*, *Length,* and *Photo* are employed in all regressions.

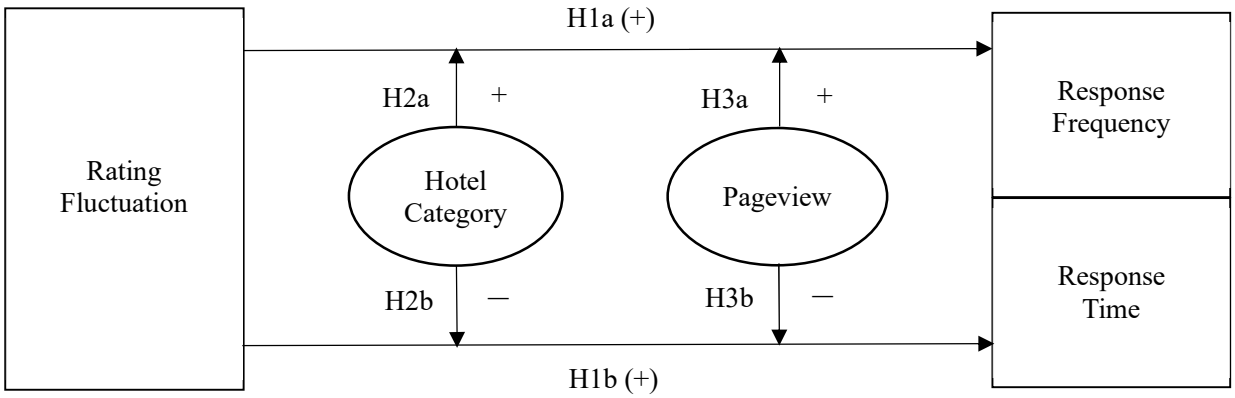

Figure 1. Research hypotheses