REGIONAL ECONOMIC STATUS AND ONLINE RATING BEHAVIOR

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ABSTRACT

Understanding the mechanisms underlying consumers' evaluation behavior is a critical task for practitioners to gain benefits from online customer reviews. Our study aims to investigate the influence of regional economic status on consumers' online rating behavior in the Chinese catering sector. Using online review data collected from Dianping, we conduct multiple regressions to test our hypotheses. The key findings of our study are as follows. First, consumers from cities with a higher economic status tend to write online restaurant reviews with lower ratings. Second, consumers' economic status has a weaker negative effect on their ratings when restaurants are more popular. Third, the negative effect of consumers' economic status on their ratings is stronger for consumers with richer online review experience, but weaker for consumers with richer travel experience. Our findings provide helpful insights to researchers as well as practitioners.

Keywords: Economic status; Service evaluation; Review behavior; Online rating

1. Introduction

With the rapid development of information technologies, the role of Internet users has fundamentally changed. Users are increasingly interacting with the Internet by generating rather than just accessing online content [Gretzel et al. 2006; Hu et al. 2016], making online reviews a prominent type of electronic word-of-mouth (eWOM) [Gottschalk & Mafael 2017]. An online review, which often includes an overall rating and a detailed text comment [Duan et al. 2008], is defined as a peer-generated evaluation of a product or service posted on a retailer or third-party website [Mudambi & Schuff 2010]. Many studies have shown that online reviews can facilitate product sales [Dellarocas et al. 2007; Duan et al. 2008; Liu 2006], improve the efficiency of consumers' decision making [Hu et al. 2008], affect firms' market competition [Kwark et al. 2014], and impact firm value [Luo & Zhang 2013; Luo et al. 2013]. Given their considerable value, online reviews are receiving increasing attention from e-commerce researchers and practitioners.

To extract maximum value from online reviews, it is vital for practitioners and researchers to understand the mechanisms by which they are generated [Gao et al. 2018]. A review rating, which is usually an integer between 1 and 5, is a core component of an online review. Hence, review ratings are often used to scale online review characteristics [Gao et al. 2018; Ho et al. 2017; Li 2016; Zhang et al. 2016] when investigating the mechanism of

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online review generation. Review ratings are undoubtedly essential to review helpfulness [Baek et al. 2015; Chua & Banerjee 2015; Kwok & Xie 2016; Liu & Park 2015; Pan & Zhang 2011; Park & Nicolau 2015], and can also influence product sales [Duan et al. 2008]. Therefore, we study consumers' online evaluation behavior by investigating their online rating behavior. Gao et al. [2018] find a negative relation between reviewers' power distance and online ratings. Sridhar and Srinivasan [2012] find that a consumer's online ratings are subject to social influence from other reviewers' ratings. Furthermore, Ma et al. [2013] point out that both reviewer- and review-related features significantly moderate the influence of preceding reviews on subsequent ones.

In the context of product evaluation, price can be regarded as an indicator of product quality [Kirchler et al. 2010] and customer satisfaction [Wang et al. 2018b]. Product price can be divided into objective price (i.e., the real price paid for the product by a consumer) and perceived price (i.e., the price perceived by the consumer) [Jacoby & Olson 1977]. Consumers' economic status, which is defined as their economic circumstances, plays an important role in price perception [Sauer et al. 2018], which in turn impacts consumers' product assessment. However, the influence of consumers' economic status on their product evaluation activities (i.e., review rating behavior) has received almost no attention. To fill this research gap, we ask the following research questions in the online restaurant review context. (1) Does a reviewer's economic status influence his/her online rating behavior? As economic status is a regional factor, the relation between reviewers' economic status and rating behavior may be dependent on environment- or context-related moderators. For example, consumers from the same region may behave differently due to their personal characteristics, and the same consumer may generate different ratings for different restaurants due to restaurants' particular characteristics. We identify three contextual factors as potential moderators, namely restaurant popularity, reviewer travel experience, and reviewer online experience. To explore the influence of reviewers' economic status on their rating behavior, we focus on the next two research questions. (2) Does restaurant popularity moderate the relation between economic status and online ratings? (3) Is this relation moderated by reviewer experience, including travel experience and online review experience?

As of late 2018, the number of Internet users in China had reached 0.829 billion [CNNIC 2019]. It is common for Chinese online users to generate online content, such as online reviews, after consuming products or services. The influence of eWOM on consumers are especially important in the hospitality and tourism industry because their products are intangible products, which are more difficult to evaluate before consumers' consumption [Litvin et al. 2008]. Due to the huge number of Internet users in China and great potential value of their online reviews, it is necessary to investigate the online rating behavior in the Chinese hospitality and tourism industry (e.g., catering industry). Using a large volume of review data collected from Dianping, which is a most popular online restaurant review platform, we conduct multiple regressions to answer the above mentioned research questions. The results indicate that consumers' economic status negatively affects their online ratings, and such a relation is moderated by restaurant popularity and consumers' online and travel experience. Our work adds new knowledge into the domain of eWOM by investigating consumers' online rating behavior from the macro perspective of economic status, an important social dimension that has not been investigated. Our work enriches the literature on consumer behavior and hospitality management by assessing the moderating effects of restaurant and reviewer diversity on the influence of consumers' economic status on their online rating behavior. Our work also provides new insights into the distinction of online experience and travel experience by demonstrating that these two variables moderate the relation between economic status and online ratings in opposite directions. All of these novel findings can provide new help for consumers, online platforms, and restaurant managers in their daily decisions.

The remainder of this paper is structured as follows. First of all, we clarify the concept of consumers' online rating behavior and economic status, and then develop our hypotheses and research model in Section 2. We describe the data and research methodology in Section 3. In the next section, we report the empirical results and our main findings. Finally, we conclude the research, discuss the implications and limitations of the findings, and suggest future directions for research.

2. Theoretical Background and Hypotheses

2.1. Online Rating Behavior

To better utilize online reviews, it is critical for researchers and practitioners to study the mechanisms involved in online review generation process [Gao et al. 2018]. Review ratings are often used to scale review characteristics in studies of the generation of online reviews [Gao et al. 2018; Ho et al. 2017; Li 2016; Zhang et al. 2016]. A review rating is typically an integer, and often ranges from 1 to 5 based on a five-star rating scale, with one star representing the worst evaluation and five stars the best. Review rating is essential to online review helpfulness [Chua & Banerjee 2015; Kwok & Xie 2016; Liu & Park 2015; Pan & Zhang 2011; Park & Nicolau 2015] and can impact product sales [Duan et al. 2008]. In line with existing studies (e.g. Gao et al. [2018], Gu and Ye [2014], Li [2016], Zhang et al.

[2016], and Zhang et al. [2013b]), we use review rating as the focal feature of a review to scale consumers' service evaluation behavior.

2.2. Economic Status

From a macro perspective, economic status represents regional economic conditions, which can be measured by per capita GDP [Zhang et al. 2013a], per capita gross regional product, or average regional household consumption [Ji et al. 2018]. Regional economic status can be regarded as a crucial signal that may influence customers' evaluation process. Consumers living in areas with better economic conditions tend to be less satisfied with products or services than those living in areas with a lower economic status [Morgeson et al. 2010]. Therefore, the economic status of an area influences the satisfaction of consumers living in that area [Zhang et al. 2013a]. From a micro perspective, economic status can be measured by an individual's monthly spending money, entertainment expenses, etc. [Byrne et al. 1966]. Consumers with a higher personal economic status more frequently encounter a greater range of restaurants, giving them richer experience of evaluating restaurants [Ji et al. 2018]. Drawing on prior research, we believe that both macro and micro economic status influence consumers' evaluation of products and services in the service industry. Due to the availability of the data, following Zhang et al. [2013a] and Ji et al. [2018], we use regional economic status to measure economic status in a macro perspective in this study.

There is no doubt that the micro economic status around reviewers will influence consumers' perceived price of the product or service, and then impact their product assessment behavior. However, no study has investigated the influence of micro economic status on consumers' assessment behavior and the influence mechanism using real online review data. Hence, we will investigate the above two research questions in the following sections.

2.3. Hypotheses Development

(1) Economic Status and Online Rating Behavior

A reviewer's economic status is defined as the level of regional economic development of the reviewer's residential location in our research context. Consumers living in regions with a higher economic status may have higher expectations of goods and services [Zhang et al. 2013a] and be more critical in their evaluations [Zeithaml et al. 1993]. Therefore, the economic status of a region is regarded as an antecedent of consumer satisfaction [Zhang et al. 2013a]. As the review ratings given by a reviewer indicate his/her overall satisfaction with products or services [Gu & Ye 2014], and review rating can thus be used as a proxy for user satisfaction, consumers' rating behavior can be influenced by their economic status.

Zhang et al. [2013a] confirm the influence of regional economic factors on consumers' satisfaction with food services. A reviewer's economic status can impact his/her assessment of a restaurant through the status disparity between the customer and service provider. Within our research context, China, which is a typical society with a very high power distance cultural value [Hofstede et al. 2010], customers are used to the idea of "the customer is king" and always feel superior to service providers in the social hierarchy [Gao et al. 2018; Nelder 1998]. Under such circumstances, customers expect the status gap between them and service providers to be reflected in the service processes. Customers with a higher economic status tend to expect services to be delivered with a higher level of quality that they deserve, considering that economic status plays a most important role in social status system. Given their higher service expectations, they are more likely to perceive the quality of a service as bad and thus give lower ratings for service providers. Therefore, we believe that consumers' online rating behavior can be influenced by their economic status and posit the following hypothesis:

H1: *Reviewers' economic status is negatively related to their online ratings.*

(2) The Moderating Effect of Contextual Factors

According to the psychological choice model [Hansen 1976], environmental or contextual factors can moderate the effectiveness of an influencer, and the interactions between such factors may also influence consumers' responses. As economic status is a regional characteristic, consumers from the same region may exhibit different behaviors due to their personal characteristics, and the same consumer may generate different ratings for different restaurants due to the particular characteristics of the restaurants as well. Thus, the relation between reviewers' economic status and rating behavior may thus be dependent on environment- or context-related moderators. To explore the mechanisms underlying the influence of reviewers' economic status on their rating behavior, we identify three contextual factors as potential moderators, namely restaurant popularity, reviewers' online experience, and reviewers' travel experience.

Restaurant popularity is a restaurant-related context variable that may influence the relationship between consumers' economic status and their rating behavior, as consumers' expectations and perceived quality of the restaurant are different across different levels of restaurant popularity. Reviewer experience is a reviewer-related context variable that may influence the relationship between consumers' economic status and their rating behavior. Reviewer experience can further be divided into travel experience and review experience. Reviewers with the same economic status but with different experience levels may have different assessment responses to the same restaurant. Therefore, restaurant popularity, reviewers' online experience, and reviewers' travel experience are included as

context-related moderator in this study, and we will explain their moderating effects with detail in the remainder of this section.

A product's online review volume, which is often represented by the number of reviews generated, can signal the degree of popularity of the product [Lu et al. 2013]. Online review volume can thus be used to measure product popularity [Zhang et al. 2013b; Zhu & Zhang 2010]. In our research context, the restaurant industry, the popularity of a restaurant may be reflected in the related online activities of its customers [Zhang et al. 2013b]. Therefore, restaurant popularity is measured by the volume of online reviews of a given restaurant. The direct effect of product popularity on consumers' satisfaction, which may be reflected in review ratings, is inconsistent. From the quality perspective, product popularity has a positive influence on consumers' satisfaction; from the herd perspective, however, it has a negative influence on consumers' satisfaction [Wang et al. 2018b]. From the product quality perspective, review rating typically indicates product quality [Forman et al. 2008]. As a larger number of reviews tend to reflect the quality of a product or service more accurately, products or services with more reviews are treated as more trustworthy by consumers [Zhu & Zhang 2010]. Consequently, for a popular restaurant, review ratings indicating restaurant quality are provided by a larger number of consumers and are perceived to accurately reflect the quality of the restaurant. Furthermore, restaurants with accurate review ratings are perceived by consumers to be less subject to quality bias, leading consumers to provide higher ratings for popular restaurants. Conversely, consumers tend to provide lower ratings for less popular restaurants, as the observed review ratings provided by a relatively small number of consumers diverge from the true value, leading consumers to perceive evaluations of restaurant quality as biased and to feel disappointed with the restaurant. However, from the psychological perspective, popularity may induce herd behavior, which refers to consumers' tendency to subjugate personal needs to follow the majority [Banerjee 1992]. Herd behavior may increase the likelihood of disconfirmation, as it ignores consumers' personal needs and discounts consumers' own information [Sun 2013]. As a result, popularity may play a role of decreasing consumers' review ratings.

Consumers' review ratings of restaurants with different levels of popularity may vary. Zhang et al. [2013b] find that more popular restaurants have more routine customers (i.e., regular customers). Routine customers, i.e., customers who regularly visit a restaurant, are believed to have richer experience of assessing the quality of the restaurant based on their own experiences of eating at the restaurant instead of the economic status or other external factors. In addition, most regular customers live locally and are thus used to the local economic environment; therefore, they are not sensitive to the influence of economic status. Thus, the influence of economic status on consumers' rating behavior is smaller for more popular restaurants with more regular customers. In contrast, those who eat at a less popular restaurant with fewer regular customers will rely more on external information cues, such as price relative to the local economic status, than on their own dining experience when assessing the restaurant. Hence, we argue that restaurant popularity moderates the relationship between economic status and online ratings and propose our second hypothesis:

H2: *The popularity of a restaurant mitigates the negative effect of reviewers' economic status on their online ratings, i.e., the negative effect becomes weaker for more popular restaurants.*

Reviewers' experience is a reviewer-related factor that can stimulate reviewers to express their comments online and provide high-quality user-generated content [Schuckert et al. 2015]. In the context of the tourism and catering industry, reviewers' experience can be divided into travel experience and online experience (i.e., online review experience). A reviewer with higher status in the review system is assumed to have more travel experience or online experience [Wang et al. 2017]. The impact of consumers' economic status on their review ratings depends on their experience, as the rating behavior of consumers from the same place (i.e., with the same economic status) may differ based on their travel or review experience. Therefore, we argue that reviewers' experience moderates the relation between economic status and online ratings.

Travel experience is found to have a significant influence on tourists' satisfaction and their behavioral intentions [Liu et al. 2016]. Reviewers' rating behavior is influenced by their travel experience [Liu et al. 2015], as travel experience can help customers to accept cultural diversity [Chen & Starosta 1996] and economic differences. Consumers with more travel experience have had more opportunities to visit different countries or cities and experience restaurants in regions with different levels of economic development. Consumers with more travel experience are also likely to have experienced a greater range of cultures, improving their intercultural awareness [Hong et al. 2016] and encouraging them to respect cultural [Chen & Starosta 1996] and economic differences. In short, travel experience makes it easier for consumers to understand and adapt to regional dissimilarity. The acceptance of regional dissimilarity may alleviate the effect of economic status on the process of evaluating a restaurant. Therefore, we argue that the travel experience of a reviewer mitigates the negative influence of the reviewer's economic status on his/her online rating and put forward H3:

H3: *The travel experience of a reviewer mitigates the negative influence of reviewer's economic status on online rating behavior, i.e., the negative influence of economic status becomes weaker when the reviewer's travel experience is richer.*

Reviewers' online experience also affects their rating patterns [Schuckert et al. 2015]. Wang et al. [2017] find a negative relation between consumers' online experience and their satisfaction (as reflected in their review ratings). Goes et al. [2014] argue that reviewers' rating behavior may change as they gain more online experience, and Hong et al. [2016] find that consumers with greater online experience exhibit more extreme rating behavior. Due to the influence of review experience on consumers' rating behavior, it cannot be ignored when studying consumers' online rating behavior [Gao et al. 2018; Hong et al. 2016]. Consumers with more experience of reviewing restaurants have had more opportunities to experience different restaurants, giving them more knowledge of the process of evaluating a restaurant. From a cognitive perspective, consumers tend to deal with information based on their existing knowledge. Thus, consumers' online experience is found to moderate their reliance on different sources of information [Klein & Ford 2003]. For example, experienced reviewers rely more on their own experiences than on existing reviews [Ma et al. 2013] or other information cues such as the economic status of their hometowns. It is thus reasonable to argue that experienced reviewers with richer online experience rely more on their own knowledge than on the information cue of regional economic status. Hence, we propose that reviewers' online experience mitigates the negative effect of their economic status on their online ratings and posit the following hypothesis:

H4: *Online experience of reviewers mitigates the negative effect of reviewers' economic status on online ratings, i.e., the negative effect is weaker when reviewers' online experience is richer.*

Visually, the research model is summarized as Figure 1.

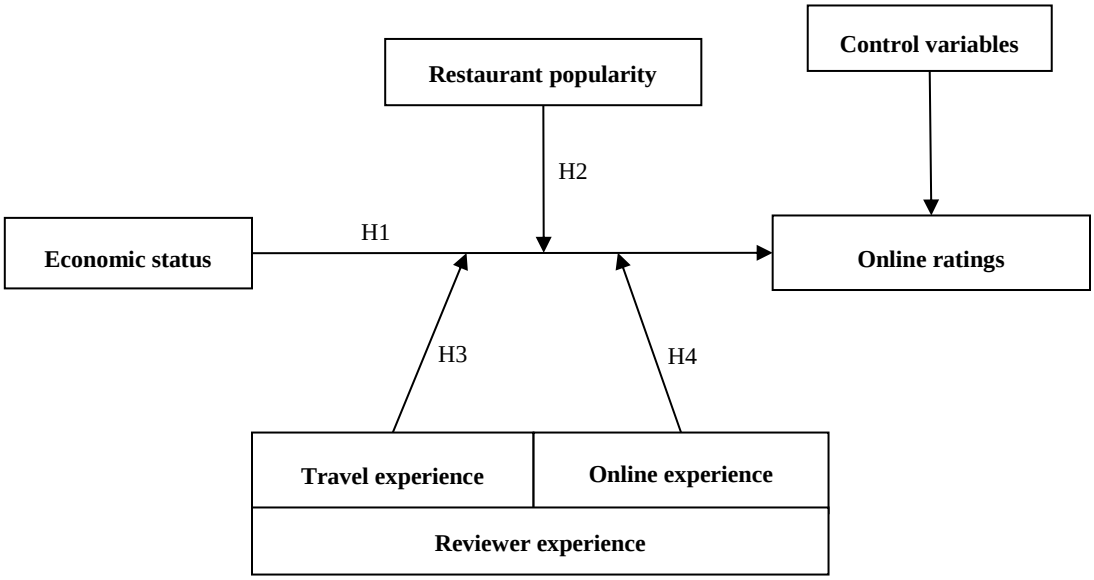

Figure 1: Research Model

3. Research Methodology

3.1. Data

Dianping (www.dianping.com) provides an ideal research context in which to investigate our research questions. Dianping was founded in 2003, and is currently the most popular restaurant review website in China. Any registered user can post an online review on any restaurant. In addition to providing review comments and an overall rating of a restaurant, users can also report the average cost per person of their meal. Ratings are provided in three dimensions: service quality, environment, and taste of the food. By late 2015, Dianping had accrued over 200 million monthly active members and more than 100 million user-generated reviews across over 3,300 cities worldwide [Dianping 2015].

In this research, we developed a crawler to collect data on restaurant reviews of a matched set of restaurants from Dianping. The data collection was conducted in December 2017. We randomly selected 10 major cities (Changsha, Chengdu, Dalian, Harbin, Kunming, Qingdao, Sanya, Xiamen, Xi'an, and Xining) from the total list of mainland Chinese cities reviewed on Dianping. For each city, we collected data on the 10 most popular restaurants (using the

total number of reviews a restaurant had received from reviewers to scale its popularity; that is, the more reviews a restaurant has, the more popular it is). Every consumer review for each restaurant since the restaurant joined Dianping was collected. The data contained time stamps and review content (ratings and texts), in addition to reviewer profiles and restaurant information.

3.2. Variables

(1) Dependent Variable

Most studies of online review generation focus on online rating behavior and use review rating to scale review characteristics [Gao et al. 2018; Ho et al. 2017; Li 2016; Zhang et al. 2016]. In line with them, we adopt review rating as the review feature used to scale consumers' online review behavior. On Dianping, a review rating is an integer given on a five-level scale from 1 to 5. The rating given by a consumer indicates his/her evaluation score for a certain product or service [Gu & Ye 2014].

(2) Independent Variable

As mentioned above, a reviewer's economic status is defined as the level of regional economic development of his/her residential location. This is measured by the location's gross domestic product (GDP) per capita. Here, to reflect long-term economic development while considering data availability, a reviewer's economic status is measured by the average value of annual GDP per capita (in CNY) from 2005 to 2015 of his/her city of residence. These economic data are obtained from the CEIC database (https://insights.ceicdata.com/).

(3) Moderating Variables

Restaurant popularity, reviewer's online experience and travel experience are treated as moderating variables in our study. A restaurant's popularity is defined as the degree to which it is welcomed by customers; the more popular a restaurant is, the more customers it has [Zhang et al. 2013b]. Accordingly, we regard the number of reviews posted on Dianping related to a restaurant when we collected the data as a proxy measure for the popularity of the restaurant [Zhang et al. 2013b]. Following existing studies [Gao et al. 2018; Hong et al. 2016], we use the total number of restaurant reviews published by a reviewer on Dianping to measure his/her online experience. Following Hong et al. [2016] and Ma et al. [2013], we use the number of cities to which a reviewer has traveled to measure the reviewer's travel experience. The number of cities reviewed by the reviewer, which can be obtained from the reviewer's personal profile, can be used as a proxy for the number of cities to which the reviewer has traveled. The more cities a reviewer has visited, the more experience he/she has [Liu et al. 2015].

(4) Control Variables

To robustly test the research hypotheses, we also include a comprehensive set of review-, restaurant-, and reviewer-related control variables.

The review-related control variable is the average rating observed by the reviewers before writing online reviews (*Obs_Avg_Rating*). It is treated as a control variable in studies of online rating behavior because it can be used to capture the effect of social influence among users [Gao et al. 2018; Hong et al. 2016; Ma et al. 2013; Sridhar & Srinivasan 2012].

The reviewer-related control variables are *Gender*, *VIP*, *Social_Capital*, and *Travel*. Following the literature [Ma et al. 2013], we further include the effects of the reviewer's gender and VIP identity. We use a binary variable, *Gender* (equaling 0 for women and 1 for men), to reflect the gender effect. Whether a reviewer is a VIP user may affect his/her online rating behavior, so we also take this factor into account. The VIP effect is reflected in another binary variable, with 0 indicating that the reviewer is not a VIP user and 1 otherwise. Social capital has also been found to influence the sharing of user-generated content [Munar & Jacobsen 2014], because online users increasingly establish and maintain their social capital by building connections with other users [Chang & Chuang 2011]. For example, Dianping allows users to follow other users' postings and to be followed by others. To capture the social capital effect, following the previous literature on social media [Kang et al. 2017; Wang et al. 2018a], we use a reviewer's number of followers to measure his/her social capital. *Travel* is a binary variable used to represent whether a reviewer is traveling when he/she experiences a restaurant; it is determined by the city where the restaurant is located and the reviewer's city of residence. A consumer is assumed to be traveling if these two cities are different.

The restaurant-related control variables comprise restaurant chain brand, restaurant location fixed effect (*City*), and restaurant fixed effect (*Restaurant*). *Chain* is a binary variable for measuring whether a restaurant is a chain restaurant; it equals 1 if the restaurant is a chain restaurant and 0 otherwise. Consumers' online rating behavior can also vary between geographical locations [Gao et al. 2018; Hong et al. 2016], so restaurant location is used to control for the effect of the city in which the restaurant is located, and it is measured by a set of dummy variables. Similar to the restaurant location fixed effect, we also control for the restaurant fixed effect measured by a set of dummy variables.

A detailed description of all of the variables included in this study is summarized in Table 1.

Table 1: Description of Variables

Variable Type	Variable Name	Description
Dependent variable	*Rating*	The overall rating for the restaurant given by the reviewer (ranges from 1 to 5).
Independent variable	*Economic_Status*	Measured by the average annual GDP per capita (in CNY) from 2005 to 2015 of the consumer's residence city.
Moderating variable	*Popularity*	The total number of online reviews of a given restaurant.
	Online_Experience	The number of restaurant reviews the reviewer has posted on Dianping, which can be obtained from the reviewer's personal profile.
	Travel_Experience	The number of cities to which the reviewer has traveled, as indicated in the reviewer's personal profile.
Control variable	*Obs_Avg_Rating*	The restaurant's average rating just before the reviewer wrote his/her review.
	Travel	Whether the reviewer was traveling when reviewing the restaurant.
	Chain	A binary variable equaling 1 if a restaurant is a chain restaurant and 0 otherwise.
	VIP	A dummy variable used to indicate whether a reviewer is a VIP user of Dianping.
	Gender	A binary variable indicating the gender of the reviewer.
	Social_Capital	The number of fans the reviewer has.
	City	The city in which the restaurant is located.
	Restaurant	The fixed effect of the restaurant.

3.3. Empirical Model

Considering the properties of the dependent variable, ordinary least squares estimation may be biased. For the *Rating* variable, which comprises censored and ordered data, it is advisable instead to estimate an ordered logit regression model [Gao et al. 2018; Huang et al. 2016; Zhang et al. 2016].

We define *R* as a continuous latent variable, and it linearly depends on the explanatory variables (**X**):

$$R_j = \beta \mathbf{X}_j + \varepsilon_j \tag{1}$$

where *j* stands for the observation, and ε is the random disturbance term. The observed *r* (i.e., the online rating between 1 and 5 posted by a reviewer on Dianping) is determined by *R* with a rule:

$$r_j = k = \begin{cases} 1 & \text{if} \quad R_j \le \lambda_1 \\ 2,3,4 & \text{if} \quad \lambda_{k-1} < R_j \le \lambda_k \\ 5 & \text{if} \quad R_j > \lambda_4 \end{cases} \tag{2}$$

where *k* stands for the ordinal value, which in our study is the online rating posted by a reviewer, and the cut-point λ_1 through λ_4 are estimated ($\lambda_0 = -\infty$, $\lambda_5 = +\infty$).

The probability of *r* for a given **X** is the region of the probability distribution where *R* falls in (λ_{k-1} , λ_k]:

$$\Pr(r = k \mid \mathbf{X}) = \Pr(\lambda_{k-1} < R \le \lambda_k \mid \mathbf{X}) \tag{3}$$

As *R* is equal to $\beta \mathbf{X} + \varepsilon$, we can deduce the standard formula for the predicted probability:

$$\Pr(r = k \mid \mathbf{X}) = F(\lambda_k - \beta \mathbf{X}) - F(\lambda_{k-1} - \beta \mathbf{X}) \tag{4}$$

where *F* is the cumulated density function for ε. The random disturbance term ε is assumed to follow a logistic distribution, and the model is estimated using the maximum likelihood estimation method. The observed rating *r* will be more likely to take a larger value as the **X** becomes larger if the coefficient β is significantly positive; and it will be more likely to take a smaller value as the **X** becomes larger if the coefficient β is significantly negative.

4. Results

4.1. Descriptive Analysis

Descriptive statistics and a correlation matrix for the key variables are provided in Table 2 and Table 3. We report the original values of *Economic_Status*, *Social_Capital*, and *Online_Experience* in Table 2 to provide a more intuitive description of our data set. However, to reduce skewness, we use the logarithmic values of these variables in the correlation matrix and the regression analysis. As shown in Table 2, the mean value of *Rating* is 4.35. *Economic_Status* ranges from 6813.91 to 139080.30. More than half of the reviews (57%) were written by reviewers while traveling, and 23% of the reviewers are VIP users of Dianping. The travel experience of the reviewers has a large variance, ranging from 1 to 268, with an average value of 5.63. Most (72%; i.e., 1 - 0.28 = 0.72) of the reviewers are women. Chain restaurants make up 37% of the restaurant sample. Popularity (i.e., restaurant review volume) has a large variance, ranging from 0.47 to 22.38, and its mean value is 8.27. There are large differences in both the reviewer-related variables (such as Experience_Travel, Experience_Online, and Social_Capital) and the restaurant-related variables (e.g., *Popularity*), so the selected sample is diverse and representative.

Table 2: Descriptive Statistics of Key Variables

Variable	Obs#	Mean	Std.Dev	Min	Max
Rating	330,515	4.35	0.93	1	5
Economic_Status	330,515	65493.01	17427.60	6813.91	139080.30
Obs_Avg_Rating	330,515	4.30	0.37	1	5
Travel	330,515	0.57	0.49	0	1
Chain	330,515	0.37	0.48	0	1
Popularity	330,515	8.27	3.83	0.47	22.38
VIP	330,515	0.23	0.42	0	1
Gender	330,515	0.28	0.45	0	1
Social_Capital	330,515	46.44	131.98	1	9467
Online_Experience	330,515	653.05	2242.16	1	208767
Travel_Experience	330,515	5.63	7.22	1	268

Notes: The unit of *Popularity* is 1000.

Table 3 provides the correlation matrix and variance inflation factor (VIF) values for the main variables in our study. As we can see, all of the correlations between two variables are small, with the exception of the correlation between *VIP* and *Online_Experience* (0.70). To further formally test for multicollinearity, we calculate the VIF values for all of the independent variables. Table 3 shows that the maximal VIF value is below 3.3, indicating that no strong multicollinearity issue exists in the data set [Mason & Perreault Jr 1991].

Table 3: Correlation Matrix and VIF Values of Main Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1.00													
2	0.03	1.00												
3	0.28	0.09	1.00											
4	-0.01	0.38	-0.07	1.00										
5	-0.01	-0.16	-0.04	-0.18	1.00									
6	0.01	0.03	0.03	0.06	-0.19	1.00								
7	0.02	-0.02	0.04	0.01	0.03	-0.16	1.00							
8	-0.10	-0.01	-0.04	0.01	-0.02	-0.00	-0.01	1.00						
9	-0.01	-0.03	0.01	0.03	-0.00	-0.00	0.00	-0.11	1.00					
10	-0.06	0.07	-0.04	0.07	-0.04	0.01	-0.01	0.43	0.00	1.00				
11	-0.18	0.02	-0.17	0.05	-0.05	0.00	-0.01	0.70	-0.16	0.56	1.00			
12	0.00	-0.05	-0.04	0.03	-0.01	-0.01	0.01	-0.03	-0.01	-0.06	-0.08	1.00		
13	-0.15	0.05	-0.17	0.21	-0.05	-0.02	-0.01	0.46	-0.02	0.40	0.65	-0.01	1.00	
14	-0.01	0.00	-0.05	0.01	0.01	-0.01	-0.02	0.01	-0.00	-0.02	-0.01	0.64	0.05	1.00
VIF		1.21	1.08	1.28	1.09	1.07	1.03	2.02	1.05	1.49	3.27	1.74	1.88	1.72

Notes: 1: *Rating*; 2: *Economic_Status*; 3: *Obs_Avg_Rating*; 4: *Travel*; 5: *Chain*; 6: *Popularity*; 7: *Economic_Status*×*Popularity*; 8: *VIP*; 9: *Gender*; 10: *Social_Capital*; 11: *Online_Experience*; 12: *Economic_Status*×*Online_Experience*; 13: *Travel_Experience*; 14: *Economic_Status*×*Travel_Experience*.

4.2. Main Analysis

We use the statistical software package Stata 14.0 to process our research models, and the final results are reported in Table 4. After controlling for the effects of the control variables, we find that the direct effect of economic status on rating is significantly negative ($b = -0.050^{***}$), providing an affirmative answer to our first research question. More specifically, reviewers from cities with a higher level of economic development tend to submit online reviews with lower rating values.

Table 4: Effects of Economic Status on Online Ratings

Variable	Model 1	Model 2	Model 3
Economic_Status		**-0.050(0.015)*****	**-0.054(0.015)*****
Economic_Status×Popularity			**0.008(0.003)*****
Economic_Status×Online_Experience			**-0.058(0.010)*****
Economic_Status×Travel_Experience			**0.008(0.002)*****
Obs_Avg_Rating	1.015(0.017)***	1.015(0.017)***	1.014(0.017)***
Travel	0.082(0.010)***	0.095(0.011)***	0.098(0.011)***
Chain	0.349(0.181)*	0.353(0.181)*	0.360(0.181)**
Popularity	-0.447(0.659)	-0.484(0.658)	-0.547(0.658)
Online_Experience	-0.324(0.005)***	-0.324(0.005)***	-0.327(0.005)***
Travel_Experience	-0.006(0.001)***	-0.006(0.001)***	-0.006(0.001)***
VIP	0.111(0.011)***	0.111(0.011)***	0.113(0.011)***
Gender	-0.177(0.008)***	-0.177(0.008)***	-0.178(0.008)***
Social_Capital	0.071(0.003)***	0.072(0.003)***	0.072(0.003)***
City	YES	YES	YES
Restaurant	YES	YES	YES
λ_1	-1.756(0.372)***	-1.756(0.372)***	-1.837(0.373)***
λ_2	-0.930(0.372)***	-0.930(0.372)***	-1.011(0.373)***
λ_3	0.448(0.372)	0.448(0.372)	0.366(0.373)
λ_4	1.981(0.372)***	1.981(0.372)***	1.900(0.373)***
Obs#	330,515	330,515	330,515
LR Chi^2	47209.91	47221.09	47263.44
Pseudo R^2	0.0654	0.0654	0.0654

Notes: Standard errors are included in parentheses. *: $p<0.1$; **: $p<0.05$; ***: $p<0.01$.

As we can see from the above table, the coefficients of the interaction terms are all significant, implying that the marginal effect of economic status on online ratings indeed depends on the magnitude of restaurant popularity and reviewer's experience (including online review experience and travel experience). Specifically, restaurant popularity and reviewer's travel experience both mitigate the negative impact of regional economic status on online ratings; whereas reviewer's online experience exacerbates the negative influence of regional economic status on online ratings.

4.3. Robustness Checks

We perform the robust test for our results in two different ways.

(1) Robust Check with an Alternative Method

We examined the robustness of our results using an alternative regression method. Specifically, we apply the Ordinary Least Square (OLS) regression as the alternative regression method. Table 5 presents the results of our model estimated by it. The results are consistent with the results of the previous model. Therefore, the various models demonstrate robustness to different model specifications.

(2) Robust Check with Alternative Dependent Variables

In addition to the robustness check with OLS method above, we also use alternative dependent variables to examine the robustness of the results obtained in the main analysis. In addition to overall restaurant ratings, Dianping offers a three-dimensional sub-rating system that allows reviewers to rate the service quality, dining environment, and taste of the food for the restaurant they have experienced. Intuitively, if our results are robust, then our hypotheses will still be supported in these three dimensions. Therefore, we replace the dependent variable of overall rating with the three sub-ratings and conduct the regression analysis again to check the robustness of the study's findings.

Table 5: Effects of Economic Status on Online Ratings (OLS)

Variable	Model 1	Model 2	Model 3
Economic_Status		**-0.025(0.007)*****	**-0.031(0.007)*****
Economic_Status×Popularity			**0.004(0.001)*****
Economic_Status×Online_Experience			**-0.014(0.005)*****
Economic_Status×Travel_Experience			**0.004(0.001)*****
Obs_Avg_Rating	0.447(0.008)***	0.447(0.008)***	0.447(0.008)***
Travel	0.056(0.004)***	0.062(0.005)***	0.063(0.005)***
Chain	0.164(0.067)**	0.160(0.067)**	0.151(0.067)**
Popularity	0.006(0.004)	0.006(0.004)	0.006(0.004)
Online_Experience	-0.080(0.002)***	-0.080(0.002)***	-0.080(0.002)***
Travel_Experience	-0.007(0.000)***	-0.007(0.000)***	-0.070(0.003)***
VIP	0.040(0.005)***	0.039(0.005)***	0.040(0.005)***
Gender	-0.075(0.004)***	-0.076(0.004)***	-0.076(0.004)***
Social_Capital	0.021(0.001)***	0.021(0.001)***	0.021(0.001)***
City	YES	YES	YES
Restaurant	YES	YES	YES
Obs#	330,515	330,515	330,515
F-Statistics	395.47	391.93	381.53
R^2	0.1126	0.1126	0.1127

Notes: Standard errors are placed in parentheses. *: p<0.1; **: p<0.05; ***: p<0.01.

Table 6 reports the results of our research model estimated by the alternative dependent variables, namely ratings of taste, environment, and service quality. On Dianping, reviewers can see the mean value of ratings in these three dimensions. When they rate a restaurant in one of these dimensions, the influence of other reviewers cannot be avoided [Ma et al. 2013; Sridhar & Srinivasan 2012]. Therefore, we use the average rating of the focal feature rather than the average value of the overall rating to measure social influence. More specifically, for each sub-rating, we obtain the corresponding observed average rating for each review by taking the mean of all prior ratings for that feature. From Column (1) to Column (3) in Table 6, *Obs_Avg_Rating* indicates the average rating corresponding to the dependent variable. As evident from Table 6, the results are consistent with the main analysis, demonstrating the robustness of our results.

Table 6: Results of Economic Status on Multi-Dimensional Rating Items

Variable	DV=Rating_Taste(1)	DV=Rating_Environment(2)	DV=Rating_Service(3)
Economic_Status	**-0.027(0.015)***	**-0.093(0.015)*****	**-0.067(0.015)*****
Economic_Status×Popularity	**0.011(0.003)*****	**0.016(0.003)*****	**0.015(0.003)*****
Economic_Status×Online_Experience	**-0.058(0.010)*****	**-0.083(0.010)*****	**-0.071(0.010)*****
Economic_Status×Travel_Experience	**0.007(0.002)*****	**0.008 (0.002)*****	**0.007(0.002)*****
Obs_Avg_Rating	0.576(0.007)***	0.616(0.006)***	0.587(0.005)***
Travel	0.094(0.010)***	0.069(0.011)***	0.076(0.010)***
Chain	0.168(0.185)	0.206(0.178)	-0.081(0.179)
Popularity	-1.460(0.652)**	-1.362(0.648)**	0.218(0.678)
Online_Experience	-0.302(0.005)***	-0.308(0.005)***	-0.281(0.005)***
Travel_Experience	-0.006 (0.001)***	-0.009(0.001)***	-0.008(0.001)***
VIP	0.053(0.012)***	0.096(0.012)***	0.071(0.011)***
Gender	-0.133(0.008)***	-0.190(0.008)***	-0.188(0.008)***
Social_Capital	0.060(0.003)***	0.061(0.003)***	0.050(0.003)***
City	YES	YES	YES
Restaurant	YES	YES	YES
λ_1	-2.411(0.370)***	-3.148(0.366)***	-1.723(0.378)***
λ_2	-1.164(0.370)***	-1.627(0.366)***	-0.499(0.378)
λ_3	0.176(0.370)	-0.194(0.366)	0.775(0.378)**
λ_4	1.650(0.370)***	1.300(0.366)***	2.125(0.378)***
Obs#	330,029	323,144	330,080
LR Chi^2	53349.38	67977.80	68013.82
Pseudo R^2	0.0717	0.0929	0.0874

Notes: Standard errors are placed in parentheses. *: $p<0.1$; **: $p<0.05$; ***: $p<0.01$.

5. Conclusion and Discussions

5.1. Conclusion

The purpose of this research is to explore the combined influence of economic, restaurant-related, and consumer-related factors on consumers' online rating behavior. Using online review data collected from Dianping, we conduct multiple regressions to test our hypotheses. The key findings of our study are as follows. First, consumers from cities with higher economic status tend to write online restaurant reviews with lower ratings. Second, consumers' economic status has a weaker negative effect on their ratings when restaurants are more popular. Third, the negative effect of consumers' economic status on their ratings is stronger for consumers with richer online review experience, but weaker for consumers with richer travel experience. Our research findings confirm that consumers' regional economic status negatively affects their online ratings, and that this relation is modified by restaurant and consumer characteristics (i.e. restaurant popularity and consumer's online and travel experience). All of these findings are of great significance both in theory and in practice, which we will discuss them in detail in the following section.

5.2. Implications

(1) Theoretical Implications

Our work enriches existing theoretical knowledge in multiple ways.

First, our study is the first work to investigate the effect of reviewers' economic status on their online evaluation behavior. With the increasing prosperity of tourism related industry, service businesses (typically such as restaurants) have to serve more and more customers from different places with different regional economic status. Against this background, it is necessary and important for stakeholders to understand the relationship between reviewers' economic status and their online rating behavior so as to make better decisions. The study utilizes a large restaurant review data set collected from the most popular review website in mainland China. The data set contains more than 330,000 reviews of 100 restaurants in 10 major cities generated over 10 years by more than 100,000 reviewers from over 300 cities. The heterogeneity of the reviewers' economic backgrounds and restaurants' popularity guarantees the generalizability of our findings regarding the influence of consumers' economic status on their online evaluation behavior. This work adds new knowledge to the domain of online reviews by investigating consumers' rating behavior from the macro perspective of economic status, an important social dimension that has not been investigated previously.

Second, our work enriches the literature on consumer behavior and hospitality management by assessing the moderating effects of restaurant and reviewer diversity on the influence of consumers' economic status on their online rating behavior. Our work provides empirical evidence that a restaurant's level of popularity mitigates the negative effect of reviewers' economic status on ratings of that restaurant. Our findings extend existing studies, which argue that consumer features influence the perceived value of online reviews [Fang et al. 2016; Ladhari et al. 2011], by investigating the moderating effects of reviewer experience, including online and travel experience (i.e., specific consumer characteristics). Our work also provides new insights into the difference between online review experience and travel experience by demonstrating that these two variables moderate the relation between economic status and online ratings in opposite directions.

Third, our study opens up a new perspective to investigate the online evaluation behavior. Different from previous studies, which explore the online rating behavior either from a micro perspective (such as reviewer characteristics [Ho et al. 2017; Hong et al. 2018; Wang et al. 2017], retailer action [Li 2016], and platform identity [Zhang et al. 2016]) or from the macro perspective of culture [Gao et al. 2018; Hong et al. 2016; Xu et al. 2018] or social influence [Sridhar & Srinivasan 2012; Wang et al. 2018a], our work builds up a new macro dimension (i.e., regional economic factor) to further investigate the online rating behavior. It is the first attempt to introduce the economic factor into the eWOM field, which may be taken into other related domains in future research.

(2) Practical Implications

From a practical perspective, our research findings can offer helpful insights for multiple stakeholders, especially including online consumers, review platforms, and restaurant managers.

First, our results suggest that consumers should pay attention to the residence of reviewers when reading online reviews. Basing decisions on only one or two reviews is ill-advised, as reviewers from places with a higher economic status tend to provide lower review ratings for restaurants, which leads to a bias for related eWOM. Instead, before choosing a restaurant to dine in or writing an online review themselves, customers should evaluate existing online ratings based on reviews written by reviewers from different places, which can be treated as a more objective reference for their own evaluation decisions.

Our findings also provide useful suggestions for online review platform managers. Given the negative influence of consumers' economic status on review ratings, it is advisable for online review platforms to recommend reviews posted by reviewers from the same city as readers and potential customers or from cities whose economic status is similar to that of readers and potential customers to them, because it will be most helpful for consumers to read reviews by reviewers whose economic status are the same as or similar to their own. Managers are advised to give priority to reviews written by customers with richer travel experience but less online review experience to mitigate the negative effect of economic status on review ratings while aggregating online reviews to predict sales. In addition, managers can build online communities in which users from cities with a high or low economic status and those with rich or poor travel or online review experience can communicate with others with the same backgrounds or preferences.

Our findings also provide helpful insights for restaurant managers. As regional economic status has a negative influence on consumers' online ratings, restaurant practitioners should not pay attention solely to online reviews provided by consumers with a higher economic status. Instead, they are highly suggested to aggregate online reviews written by reviewers from cities with different levels of economic status to obtain accurate and objective feedback from customers. Restaurant managers should also recognize the importance of promoting restaurant popularity by encouraging consumers to provide reviews after dining, because the popularity of a restaurant mitigates the negative influence of economic status on consumers' online ratings. More specifically, the managers of unpopular restaurants should emphasize their positive features and their advantages over popular restaurants to attract consumers.

5.3. Limitations and Future Work

Like any other study, this research inevitably has limitations that indicate directions for further work. First, a convenience sampling method was used. We use 100 popular restaurants in 10 major cities in China as our research sample, which is relatively small compared with the total number of restaurants on Dianping. Future research could increase the restaurant sample size to improve the generalizability of the findings. Second, we test our research model only in the context of the Chinese catering industry. The model should be tested in other domains, such as the hotel industry, and in other cultural settings, such as America or Europe, to increase its external validity. Third, many factors, other than economic status, restaurant popularity, and reviewer experience, may influence consumers' online rating behavior, including some mediators or moderators. For example, comments or recommendations made by a reviewer's friends may influence the reviewer's online review behavior. In addition, culture, the political system, and business freedom have been found to impact consumer satisfaction [Morgeson et al. 2010]. In our future work, we will consider the influence of these factors on reviewers' rating behavior. In short, more factors could be added to our model to further explore the mechanism of online review generation and enrich our findings. Lastly, we remove observations

with missing information before conducting our analysis, which may induce bias. We will try to fill in these missing values in the future work.

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