

GENDER DIFFERENCE IN RESTAURANT ONLINE BOOKING TIMING AND THE MODERATING EFFECTS OF SELL-OUT RISK AND INFORMATION TYPE

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ABSTRACT

This study investigates a rarely studied topic on gender difference in restaurant online booking timing, and the impact of sell-out risk and online review rating and review text on restaurant booking among males and females. The data were collected from Xiaomishu.com, a leading restaurant reservation website in China. A total of 719,812 reservations for 4,359 restaurants in Shanghai, China, were included in the analysis. The empirical results demonstrate that (1) females tend to make a restaurant booking further in advance than males, and this gender difference is more salient under the condition of high sell-out risk (i.e., big dining group size or weekend meals); (2) general review information (proxied by online average rating) and specific review information (proxied by online review texts) have a positive impact on restaurant online booking; (3) males are more likely to be affected by general review information, whereas females tend to pay more attention to specific review information. These findings shed light on gender differences in the timing of restaurant online booking and provide insights into restaurant booking policy.

Keywords: Restaurant online booking; Gender difference; Sell-out risk; Review information type

1. Introduction

The rapid development of Internet has revolutionized the business environment and marketing strategies [Callahan & Pasternack 1999; Morrison et al. 2001]. One important change is the rapid growth of electronic commerce such as online booking, which has achieved considerable popularity in the past decade. Numerous online booking websites have emerged to provide convenience for customers and save on companies' marketing, selling, and reservation costs. Most of the leading franchised hotels, restaurants, airlines, and car rental companies have their own online booking sites, whereas smaller businesses tend to use third-party platform websites as their booking agents [Morrison et al. 2001]. According to a recent survey, 92 million diners seated through Yelp Reservations in 2016, and 55% of Yelp users searching for restaurants ordered takeout or delivery from a restaurant they found on Yelp [Yelp Official Blog 2017].

The popularity of online booking has sparked academic interest in consumers' online booking behavior [Chen & Schwartz, 2006]. However, to the best of the authors' knowledge, the prior literature mainly focuses on the factors that influence online booking propensity for hotels and airlines. Existing studies of restaurant service have widely discussed consumers' dining experience, satisfaction, recommendation and loyalty [e.g., Hanefors & Mossberg 2003; Andersson & Mossberg 2004; Ladhari et al. 2008], but few studies have examined consumers'

restaurant booking behavior, particularly in the online setting. In fact, a diner's consumption experience may begin with booking a table, followed by the experience of eating out and post-dining behavior. Therefore, restaurant booking is also a critical part of diners' consumption experience and thus deserves more academic attention and research.

Furthermore, to achieve more efficient and effective product and service marketing and selling, it is critically important that companies acquire a better understanding of individual consumers, their diverse online booking behaviors, and the primary motivations driving their choices [Weiser 2000]. Peng et al. [2013] summarize three determinants of online travel booking decisions, including Internet characteristics (e.g., perceived risk and security), suppliers' characteristics (e.g., price), and customers' personal characteristics (e.g., gender and age). Gender difference is an essential market segmentation element [Meyers-Levy & Maheswaran 1991; Kim et al. 2007] that has been extensively examined in consumer behavior studies, and many differences between male and female have been recognized [Lin et al. 2014]. For example, males and females exhibit differences in information processing and hence they tend to reach different judgments [Wolin & Korgaonkar 2003; Okazaki & Hirose 2009]. Gender differences have also been observed in biological and social aspects and have become the basis for market segmentation for a variety of products and services [Putrevu 2001; Kim et al. 2007]. However, within the context of hospitality management, limited research has been conducted on gender differences [Kim et al. 2007], especially regarding restaurant online booking behavior.

In terms of reservation in the hospitality context, Chen and Schwartz [2008b] suggest that timing is important for potential customers who plan to make an advance booking, and it is even of greater importance to consumers' decisions in uncertain environments. Online booking facilitates more accurate cover projections, allowing restaurants more time and better planning for food material purchase, production, and staff scheduling. However, the factors influencing the timing of restaurant online booking, especially the possible gender differences in this aspect, have yet to be examined. To fill this research gap, the current study aims to explore and model the gender differences in the timing of online booking. In addition, this study intends to examine how males and females are affected by (1) different levels of sell-out risk and (2) different types of review information (general vs. specific) with regard to online booking timing. The findings provide insights and new empirical evidence on gender differences in decision-making and online booking behavior in the restaurant setting.

2. Literature Review

2.1 Perceived Risk, Online Reviews, and Online Booking

The theory of perceived risk has been used to explain consumers' decision making and purchase behavior [Taylor 1974; Forsythe & Shi 2003]. Perceived risk is a function of consumers' uncertainty about the loss or gain of a particular decision and the possible unpleasantness that could result from the outcome [Murray 1991; Forsythe & Shi 2003; Nan et al. 2017]. Perceived risk has a negative impact on the consumer's perceived value and in turn, the consumer's propensity of booking online [Peng et al. 2013; Hu et al. 2008]. Nowadays, Internet enables people to react proactively to minimize potential risks of decision-making through information seeking [Garbarino & Strahilevitz 2004]. As the information can be searched and used to reduce perceived risks, electronic word-of-mouth (eWOM) has been recognized as an influential path in affecting consumers' purchase intentions and decisions [Sparks & Browning 2011; Wang et al. 2015; Choi et al. 2017; Gavilan et al. 2018]. Among a variety of eWOM, online reviews actually serve as informal communications between consumers and producers as well as among consumers [Litvin et al. 2008; Duan et al. 2009; Li et al. 2017]. Research has found that online reviews are an important factor which influences consumers' booking intention. Specifically, both review valence and review quantity have an effect on booking intention, and positive and negative reviews prove to display different degree of effect [Tsao et al. 2015; Gavilan et al. 2018]. For example, Liu [2006] and Llach et al. [2013] suggest that positive online reviews can enhance the perceived quality of a product, leading to more favorable attitudes toward and willingness to purchase the product, and vice versa for negative reviews.

Perceived risk is critical in tourism and hospitality industry, as the nature of intangibility of service increases the difficulty of evaluating the service/experience quality and the purchasing risk [Kim & Damhorst 2010]. Park and Tussyadiah [2016] analyse various perceived risks in mobile travel booking, including time risk, financial risk and psychological risk. Based on Facebook reviews, Ladhari and Michaud [2015] focus on how online reviews influence the users' decision-making process, and how reviews written by Facebook friends impact consumers' trust in the hotel and their booking intention. Online review is one of the most important factors for online hotel booking [Dickinger & Mazanec 2008], and positive reviews increase consumers' trust and hotel booking intention [Sparks & Browning 2011]. Similarly, Ye et al. [2011] indicate that review ratings can significantly boost online hotel bookings. Therefore, online reviews are likely to enhance consumer awareness of a reviewed restaurant and to reduce perceived risk, potentially facilitating booking decisions.

2.2 Gender Differences in Consumer Research

Gender differences in consumer behavior have been widely recognized in the extant literature. For example, females pay greater attention to personal interactions and interpersonal relationships than males [Gilbert & Warren 1995; Konrad et al. 2000]. In terms of automobile sales, the influence of satisfaction with the sale process on

repurchase intention is stronger for females than males [Homburg & Giering 2001]. Regarding gender differences in decision making, Mitchell and Walsh [2004] report that females are much more experienced in purchasing than males, so females know how to make a final purchasing decision. This notion is further validated by a recent study, which reveals that within a family, mothers have a stronger influence on dining decisions than fathers in Taiwan [Chen et al. 2015].

Experimental studies have also revealed differences between males and females, indicating that women are more risk averse in their decision making [e.g., Miller & Uberda 2012; Kamas & Preston 2012; Charness & Gneezy 2012]. Most of previous consumer research has focused on gender differences in perceived online shopping risk. Studies suggest that women have a stronger influence on the purchasing decision process [Wang et al. 2004]; however, women hold “unfavorable attitudes” toward online shopping mainly because of the higher perceived risk [Bae & Lee 2011]. Forsythe and Shi [2003] associate online shopping with four types of perceived risk: financial, psychological, time/convenience loss and product performance. Specifically, females generally have a stronger risk perception than males with respect to online shopping, particularly on financial risks such as the misuse of credit card information. In addition, women tend to be more concerned that their private information, such as addresses, phone numbers and names, may be disclosed when using the Internet [Bae & Lee 2011]. Even after controlling for Internet usage experience, females still perceive higher levels of negative outcomes from purchasing online than males [Garbarino & Strahilevitz 2004].

Gender difference-related consumer studies have been conducted in the hospitality management field. McCleary et al.'s [1994] empirical study suggests that male and female business customers have different criteria for hotel selection; specifically, females place more importance on security, low price, and personal services than males. Oh et al. [2002] demonstrate that there are significant gender differences in lodging service expectations and perceptions between male and female travelers, although their satisfaction with and behavioral intentions toward lodging services are similar. Moreover, research also reports that females are more involved in conducting research than males when booking a hotel room and finding a good deal [Toh et al. 2011]. In addition, gender plays a moderating role in the relationship between customer satisfaction and repeated visitation to an upscale restaurant, while satisfaction exerts a stronger influence on revisit intention for females than for males [Han & Ryu 2007]. In the campus dining context, Kwun [2011] proposes a framework to examine how foodservice attributes affect perceived value, satisfaction, and consumer attitude; the empirical results support the proposed relationship and identify a significant gender difference in the customer attitude formation process. However, not all studies suggest gender differences. For instance, Mattila [2000] identifies no gender differences in an evaluation of service encounters in the hotel and restaurant setting. Han et al. [2009] examine hotel customers' eco-friendly decision-making processes and report that the influence of attitude toward green behaviors on overall image is not gender differentiated, although gender differences exist in the relationship between overall image and customers' behavioral intention.

3. Research Hypotheses

3.1 Gender Differences in Restaurant Online Booking Timing

Females are more risk averse in their decision making than males [Kamas & Preston 2012; Charness & Gneezy 2012]. Three possible explanations have been proposed regarding the reasons for this gender difference in risk taking [Croson & Gneezy 2009]. The first explanation is gender difference in reactions to risky situations. Loewenstein et al. [2001] propose the concept “risk as feelings”, which refers to people's intuitive reactions to the risk. Prior research in psychology demonstrates that females typically experience stronger emotions than males [Harshman & Paivio 1987], which can affect the utility of a risky choice. Therefore, if a negative consequence is predicted, females tend to be more risk averse than males. The second explanation for gender difference in risk taking is related to confidence. Previous studies suggest that both males and females are often overconfident, with males being more overconfident regarding their success than females in uncertain/risky situations [Estes & Hosseini 1988; Niederle & Vesterlund 2007]. The third explanation is gender difference in the interpretation of a risky situation. Arch [1993] finds that males tend to treat a risky situation as a challenge, which encourages participation; by contrast, females tend to treat risky situation as a threat that requires avoidance. Regarding the restaurant booking context examined in this study, all consumers face the risk that a restaurant will sell out if they book too late, especially during the restaurants' busy hours. To avoid this risk, females may tend to book restaurants earlier than males.

The gender difference in online booking can also be explained by the theory of reasoned action (TRA). According to TRA, a person's online booking behavior is predominantly determined by the person's behavioral intentions, which are further explained by two key factors: the person's attitude toward the behavior and subjective norms [Ajzen & Fishbein 1980; Sheppard et al. 1988; Lee et al. 2007]. The TRA has been applied to studies of online travel shopping [Njite & Parsa 2005; Lee et al. 2007], and many report that a person's behavior is generally more influenced by his/her attitude than by his/her perception of social influence [Lee et al. 2007]. In addition, attitude and social influence are likely to generate different impacts on men and women. As men are perceived as more “autonomous and independent” than women, men's attitude (personal) toward a specific behavior largely

affects their behavior; women typically consider themselves more relational than men, and subjective norms (social influence) are thus dominant influences on their behavior [Williams & Best 1990; Garbarino et al. 1995; Konrad et al. 2000; Van Hooft et al. 2006]. Subjective norms influence men's and women's opinions differently in that women are more likely to comply with others' opinions about what they should do [Ryu & Han 2010]. In the restaurant booking context, women may believe that they are expected to successfully book a table and consequently make the booking further in advance than men. Therefore, we propose the following hypothesis:

H1: Females tend to make online restaurant booking further in advance than males.

3.2 Moderating Effects of Sell-out Risk

Due to the experiential nature and the intangibility and variability characteristics of hospitality products and services, consumers' purchase decision making involves risks. To the best of the authors' knowledge, most previous studies of online reservations have been conducted in the hotel and airline sectors, and timing has been considered a key influential factor in the purchase decision [Lynch & Zauberman 2006]. To secure a good deal and reduce uncertainties during online booking, timing becomes critically important in decision making [Chen & Schwartz 2008b]. Hotel guests often make a reservation before they experience a hotel's products/services. During the period before the guests' arrival date, the room rate may change, and the room may also become unavailable if the hotel sells out [Schwartz 2000; Chen & Schwartz 2008b]. Similarly, Chen and Schwartz [2006] and Chen and Schwartz [2008a] state that two important factors primarily affect customers' booking timing decision and the propensity to book a room: the perceived likelihood of finding a better deal in the future and the perceived risk of the hotel's selling out before the customers' arrival date. Specifically, as the probability of obtaining a better deal (lower price) decreases or perceived sell-out risk increases, consumers are more likely to cease waiting and book a room further in advance.

In this study, we propose that several factors may affect customers' perceived sell-out risk when they decide the timing of restaurant online booking. The first factor is the size of the dining group. As dining group size increases, it becomes harder to successfully book a table in a specific restaurant due to the limited number of large tables. In big cities, especially places like Shanghai, renting normally accounts for a big portion of the operation cost in restaurants. To optimize the space usage and increase the table turnover rate, it is a common practice for restaurants to minimize the number of large-size tables. Furthermore, as the size of a dining group increases, more people in the group are affected if the party fails to book a table; thus, perceived social influence increases correspondingly. The second factor is the dining day. Due to the high pressure associated with work, people tend to place higher weight on the time they spend relaxing and entertaining during their weekends. In some cultures, having a gathering in a restaurant is an important leisure activity for weekends, which causes restaurants to be extremely busy during the weekend. With the importance placed on the weekend dining out and the high probability of failing to book a table, customers consequently are likely to perceive more sell-out risks associated with booking a table. Especially, as females are more risk averse than males [Kamas & Preston 2012; Charness & Gneezy 2012], there may exist gender differences in their perception of sell-out risk when making booking decisions. On this basis, we propose the following hypothesis:

H2: Sell-out risk moderates the influence of gender on the timing of online restaurant booking. Specifically, females tend to make restaurant bookings more further in advance than males, with increasing dining group size (H2a) and for weekend dine-out (H2b).

3.3 Moderating Effects of Review Information Type

Various typologies of online review information sources are provided to consumers. There is general consensus that characteristics of online review information have important influences on customers' online purchase decision-making [Ruth & York 2004; Kim et al. 2007; Wei et al. 2013; Liu et al. 2017]. Two dimensions of online review information are considered in this study: general review information and specific review information. The general review information refers to the information that helps consumers get product information in one visual sweep without requiring much cognitive efforts [Ruth & York 2004] and processing time [Viswanathan & Childers 1996], such as the average review rating in a numerical scale shown on the product review webpage. Extant literature suggests the persuasive effect of online average rating on consumers' booking and purchase decision, with higher average rating increasing consumers' booking/ purchasing propensities and intentions [Liu 2006; Chen et al. 2011; Zhang et al. 2018]. On the other hand, the specific review information refers to the information that is more informative and more detailed, such as the review textual content [Chen & Xie 2008; Liu et al. 2017; Wei et al. 2013]. It helps consumers to learn different aspects of restaurants, including service quality, environment, cuisine style, and whether or not the restaurant fits their preferences [Kwark et al. 2014; Chen & Xie 2008]. Prior studies have reported that abundant context of restaurants' reviews exerts positive and effective influence on reducing consumers' perceived uncertainty of product quality, and promote their online booking intention and behavior [Hu et al. 2014; Gavilan et al. 2018; Teas & Agarwal 2000].

Regarding the gender difference, males and females are likely to employ significantly different processing strategies to process different types of online review information [William & Robert 1995; Kim et al. 2007]. Females tend to be more evaluative and attentive to a broad scope of information, even some seemingly tangential and delicate details [Meyers-Levy & Maheswaran 1991], to decrease the perceived risk and uncertainty [William

& Robert 1995]. Females are also more likely to engage in detailed elaboration of specific message content [Krugman 1966; Meyers-Levy & Maheswaran 1991]. Accordingly, they exhibit greater sensitivity to the particulars of message claims when making judgments [Lenney 1977; Meyers-Levy & Sternthal 1991; Meyers-Levy & Maheswaran 1991]. When it comes to searching for review information on the website, the more context-specific, particular, and individualized information is provided, the more perceived ease of use and less perceived risk for females to make a dining reservation in advance [Teas & Agarwal 2000]. On the contrary, males tend to use heuristics processing and miss subtle cues [Darley & Smith 1995], and rely on the observable and tangible cues merely when they are making purchase decision [Meyers-Levy & Maheswaran 1991]. In other words, males have more confidence and aggression to make decisions without specific review information [Kamas & Preston 2012; Miller & Ubeda 2012]. The observable information cues reflecting important characteristics of the restaurant will promote males to reserve a table ahead of time [Kim et al. 2007]. Therefore, for females, specific review information rather than general review information would be more influential in reducing perceived risk, and vice versa for males. On this basis, we propose the following hypothesis:

H3: Review information type moderates the influence of gender on the timing of online restaurant booking. Specifically, males tend to be more affected by general review information (H3a), while females tend to be more affected by specific review information (H3b).

4. Research Method

4.1 Study Set and Data Collection

This research used Shanghai, China, as the study set. Dining out in China is considered an essential social activity, which is reflected in household expenditures as food-away-from-home (FAFH). Since the 1990s, Chinese people have begun to dine out more often, and this change is mainly attributed to economic and income development and urbanization in China [Dong & Hu 2010].

The empirical data were collected from Xiaomishu (www.xiaomishu.com), a leading dining reservation website in China that provides a fast, efficient way to find available tables that meet desired criteria for cuisine, price and location at a specified time. By March 2014, over 3 million users had made dining reservations in over 2.7 million restaurants scattered across 400 cities in China (Xiaomishu, 2015)¹. The city of Shanghai was selected as it is the headquarter of Xiaomishu and contains the largest number of users. There were over 60,000 restaurants in Shanghai at the time of data collection on this website. We gathered booking information for all restaurants in Shanghai on a daily basis from July 2016 to March 2017, and obtained 719,812 booking records across 4,359 restaurants. Each record includes the name of the booking customer (from which customer gender can be extracted as the name is entered in the form of Mr. XX or Mrs. XX), booking time, dining group size, and dining start date and time (see Figure 1). Xiaomishu is also a third-party platform that allows diners to post restaurant reviews which can be seen when peer consumers want to make a restaurant reservation. We collected all available reviews posted prior to March 2017, for the 4,359 restaurants. For each review, the time the review was posted, the review rating on a scale of 1-5 (1 = poor to 5 = excellent) and the review text were extracted.

¹ <http://www.xiaomishu.com/about/aboutus/>

订餐小秘书 www.xiaomishu.com

餐厅 搜索餐厅名、路名、商圈名等

所有分类 首页 餐厅预订 婚宴预订 会员活动 积分兑换 手机版下载

上海首页 > 浦东新区 > 陆家嘴 > 淮扬菜 本帮菜 > 苏浙总会 > 订单记录

分享: 微信 微博 人人网

苏浙总会--订单记录

时间: 10月07日今天 19:00 餐位: 大厅(有空位) 包房(有空位) 立即预订

近期订单152笔/累计订单11387笔

预订人	预订时间↓	状态	就餐人数	就餐时间
金女士	2015年10月07日 11时27分	已预订		
邵女士	2015年10月07日 11时27分	已预订		
赵先生	2015年10月07日 11时27分	已预订		
褚女士	2015年10月06日 11时27分	已预订	3	2015年10月06日 17时30分
朱女士	2015年10月06日 10时11分	已预订	14	2015年10月06日 17时00分
汪女士	2015年10月06日 09时35分	已预订	3	2015年10月06日 17时30分
蔡女士	2015年10月04日 10时56分	已预订	2	2015年10月08日 12时00分
邵女士	2015年10月04日 09时46分	已预订	9	2015年10月08日 11时45分

Figure 1: Screenshot of a Restaurant Booking Page

In summary, our dataset includes two parts: daily restaurant reservation records (e.g., booking and dining times) and consumer restaurant review information (e.g., review ratings and review text). Then the disparate data sets were compiled to create one comprehensive dataset. Specifically, for a restaurant, each record consists of a booking and the review information accumulated prior to the booking.

4.2 Measures

The dependent variable is the time interval from the booking time to the start time of dining (*BookTiming*), in the unit of day. The explanatory variables include: gender of the booking customer (*Gender*); dining group size or the number of dining persons (*DinerSize*); weekend meal (*WkendMeal*); and the type of review information before the focal booking record for a specific restaurant, including general review information (*PreRating*) and specific review information (*PreText*). Mackiewicz [2015] and Hong et al. [2012] argue that the simplest way to operationalize review informativeness is through review length, as a longer review may offer more wealth of product information [Hong et al. 2012]. Review length is also used to measure review depth [Mudambi & Schuff 2010], as prior studies also report that review length influences perceived review helpfulness significantly [Mudambi & Schuff 2010; Pan & Zhang 2011]. Following these studies, we use the length of review text to measure specific review information. Moreover, since it is very likely that recent reviews have a stronger impact on consumer booking decisions than distant reviews [Sahin & Robinson 2002], we used the one hundred most recent reviews before a booking record (ten webpages in Xiaomushu.com) to measure the review effects in the main test. The measurements of all variables in this study are shown in Table 1.

Table 1: The Definitions of Variables

Variables	Definitions
<i>BookTiming</i>	The interval between the booking time and dining time, in the unit of day.
<i>Gender</i>	The gender of the booking customer with “1 = female” and “0 = male”.
<i>DinerSize</i>	The number of dining persons.
<i>WkendMeal</i>	Weekend meal was coded as “1 = weekend meal (Saturday, Sunday, or Friday night after 5pm)” and “0 = otherwise”.
<i>PreRating</i>	The average rating of the latest one hundred reviews before a reservation of a specific restaurant, which is used as a proxy of general review information.
<i>PreText</i>	The total length of textual content (in characters) in the latest one hundred reviews before a reservation of a specific restaurant, which is used as a proxy of specific review information.

4.3 Descriptive Analysis

A descriptive analysis was firstly conducted to present a general profile of variables. Figure 2 shows the number of restaurant online bookings by the dining day of a week, which reveals that weekend meals had a significantly higher number of online bookings than weekday meals. Therefore, in order to successfully book a table in a popular restaurant, consumers may plan their weekend meal much earlier, and make the reservation further in advance. As shown in Table 2, the standard deviation of *BookTiming*, *DinerSize* and *PreText* are relatively high; therefore, we took the logarithm of the three variables (*LnBookTiming*, *LnDinerSize*, and *LnPreText*) in the model to slow the fluctuation of the sample data and to encourage the normal distribution of the data. The results in Table 3 indicate that the correlations among the variables in this study are rather weak. The weak correlations among the independent variables reduce multi-collinearity and improve the reliability and validity of the estimation results.

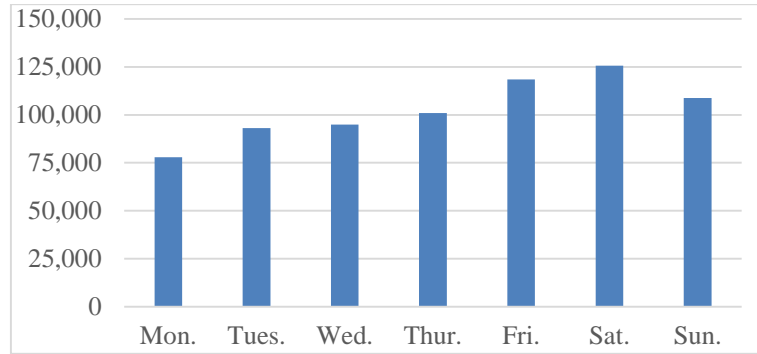


Figure 2: Number of Restaurant Online Bookings by Dining Day of a Week (Average Number Per Day)

Table 2: Variable Descriptive Statistics

Variable	Obs	Mean	SD	Min	Max
<i>LnBookTiming</i>	719812	1.056233	0.9699993	0.0009995	5.835287
<i>Gender</i>	719812	0.4856351	0.499794	0	1
<i>LnDinerSize</i>	719812	1.878713	0.6105172	0	7.313221
<i>WkendMeal</i>	719812	0.3256392	0.4686135	0	1
<i>PreRating</i>	719812	4.117769	0.2607155	1	5
<i>LnPreText</i>	719812	7.574072	1.004036	0	9.699165

Table 3: Correlation Analysis

	<i>LnBookTiming</i>	<i>Gender</i>	<i>LnDinerSize</i>	<i>WkendMeal</i>	<i>PreRating</i>	<i>LnPreText</i>
<i>LnBookTiming</i>	1					
<i>Gender</i>	0.0391	1				
<i>LnDinerSize</i>	0.155	0.00930	1			
<i>WkendMeal</i>	0.125	0.0105	0.0330	1		
<i>PreRating</i>	0.00380	0.0105	-0.0502	-0.0333	1	
<i>LnPreText</i>	0.0822	-0.00800	0.0409	0.00880	-0.0413	1

4.4 Model Specification

Let $BookTiming_{ijt}$ represent the time interval between booking and dining for customer i ($i = 1, \dots, I$) for restaurant j ($j = 1, \dots, J$) at time t . Therefore, based on our research hypotheses, the econometric model to be estimated is as follows:

$$\begin{aligned}
 LnBookTiming_{ijt} = & \beta_0 + \beta_1 Gender_{ijt} + \beta_2 LnDinerSize_{ijt} + \beta_3 WkendMeal_{ijt} + \beta_4 PreRating_{ijt} \\
 & + \beta_5 LnPreText_{ijt} + \beta_6 LnDinerSize_{ijt} * Gender_{ijt} + \beta_7 WkendMeal_{ijt} \\
 & * Gender_{ijt} + \beta_8 PreRating_{ijt} * Gender_{ijt} + \beta_9 LnPreText_{ijt} * Gender_{ijt} + RestFE_j + \varepsilon_{ijt}
 \end{aligned}$$

To avoid spurious regression, we controlled for booking tendencies for different restaurants with a set of dummy variables for restaurants ($RestFE_j$). These controls will absorb any systematic differences due to the general booking tendency of a restaurant (e.g., popular restaurant gets booked up early) that may affect restaurant online reservations.

5. Results

The results shown in Table 4 were stable and consistent across four models. We used Model (4) as the final estimation results. Model (4) reveals a significant effect of *Gender* on the restaurant online booking timing ($p < 0.05$). That is, females book restaurants further in advance than males when all other variables were held constant, indicating that H1 was supported. The positive and significant coefficients of *LnDinerSize* ($p < 0.01$) and *WkendMeal* ($p < 0.01$) reveal that consumers tend to book restaurants in advance when the dining group size is bigger and when the booking is for a weekend meal. These results support our argument that the risk of failing to book a table affects consumers' decisions on the timing of restaurant online booking. The influences of *PreRating* ($p < 0.01$) and *LnPreText* ($p < 0.01$) were also significantly positive, suggesting that online reviews are likely to enhance consumers' perceived restaurant quality and reduce perceived uncertainty, potentially leading to booking decisions further in advance.

Table 4: Estimation Results

	(1)	(2)	(3)	(4)
<i>Gender</i>	0.061050*** (0.0021)	0.025479*** (0.0070)	0.139638*** (0.0349)	0.095796** (0.0357)
<i>LnDinerSize</i>	0.189545*** (0.0018)	0.182957*** (0.0025)	0.189518*** (0.0018)	0.183514*** (0.0025)
<i>WkendMeal</i>	0.230798*** (0.0022)	0.218440*** (0.0030)	0.230755*** (0.0022)	0.218711*** (0.0030)
<i>PreRating</i>	0.110759*** (0.0194)	0.110451*** (0.0194)	0.128169*** (0.0197)	0.126288*** (0.0197)
<i>LnPreText</i>	0.044837*** (0.0073)	0.044952*** (0.0073)	0.040303*** (0.0073)	0.040588*** (0.0073)
<i>LnDinerSize*Gender</i>		0.013353*** (0.0036)		0.012169*** (0.0036)
<i>WkendMeal*Gender</i>		0.025443*** (0.0044)		0.024802*** (0.0044)
<i>PreRating*Gender</i>			-0.034610*** (0.0076)	-0.031427*** (0.0076)
<i>LnPreText*Gender</i>			0.008434*** (0.0019)	0.008124*** (0.0019)
<i>Constant</i>	-0.220053* (0.1060)	-0.202259 (0.1061)	-0.257233* (0.1074)	-0.235475* (0.1074)
<i>Restaurant FE</i>	Yes ^a	Yes ^a	Yes ^a	Yes ^a
Observations	719812	719812	719812	719812
Adjusted R-Squared	0.1608	0.1609	0.1608	0.1609
F-Test	4553.945341	3256.360301	3254.704934	2534.200976

Note: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. ^a The estimates of the category dummy variables for restaurant fixed effect are omitted due to page limits and they are available from authors upon request.

As revealed in Table 4, the coefficient of the interaction term *LnDinerSize*Gender* was significantly positive ($p < 0.01$), suggesting that the influence of *Gender* on booking timing is strengthened with the increase of dining group size. In other words, the difference in the time that females book in advance relative to males increases as the dining group size grows, thereby supporting H2a. The significant and positive coefficient of *WkendMeal*Gender* ($p < 0.01$) suggests that the gender difference in the timing of restaurant online booking increases if the booking is for a weekend dine-out. Therefore, H2b was supported. These results indicate that sell-out risk does moderate the influence of gender on the timing of restaurant booking.

In addition, an interesting finding shows that the moderating effect of *PreRating* was significantly negative ($p < 0.01$), while the moderating effect of *LnPreText* was positive ($p < 0.01$). This result suggests that males are more likely to be affected by general review information, whereas females tend to pay more attention to specific review information, supporting the H3.

Table 5: Robustness Check

	(1)	(2)	(3)	(4)
<i>Gender</i>	0.061041*** (0.0021)	0.025441*** (0.0070)	0.127108*** (0.0341)	0.084386** (0.0349)
<i>LnDinerSize</i>	0.189557*** (0.0018)	0.182961*** (0.0025)	0.189519*** (0.0018)	0.183571*** (0.0025)
<i>WkendMeal</i>	0.230783*** (0.0022)	0.218421*** (0.0030)	0.230731*** (0.0022)	0.218647*** (0.0030)
<i>PreRating</i>	0.102670*** (0.0201)	0.102341*** (0.0201)	0.118485*** (0.0205)	0.116665*** (0.0205)
<i>LnPreText</i>	0.055888*** (0.0073)	0.055997*** (0.0073)	0.051708*** (0.0074)	0.051989*** (0.0074)
<i>LnDinerSize*Gender</i>		0.013367*** (0.0036)		0.012057*** (0.0036)
<i>WkendMeal*Gender</i>		0.025448*** (0.0044)		0.024882*** (0.0044)
<i>PreRating*Gender</i>			-0.031288*** (0.0076)	-0.028282*** (0.0076)
<i>LnPreText*Gender</i>			0.007765*** (0.0015)	0.007451*** (0.0015)
<i>Constant</i>	-0.295265** (0.1114)	-0.277370* (0.1115)	-0.326443** (0.1126)	-0.305135** (0.1127)
<i>Restaurant FE</i>	Yes ^a	Yes ^a	Yes ^a	Yes ^a
Observations	719812	719812	719812	719812
Adjusted R-Squared	0.1608	0.1609	0.1608	0.1609
F-Test	4557.203334	3258.687587	3257.011882	2535.974499

Note: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. ^a The estimates of the category dummy variables for restaurant fixed effect are omitted due to page limits and they are available upon request.

To examine the robustness of our results, we re-estimated the model with different calculations for variables *PreRating* and *PreText*. More specifically, these two variables were carried out based on the two hundred most recent reviews prior to a reservation. The findings in Table 5 reveal that the re-estimation results are consistent with those reported in Table 4.

6. Conclusion and Implication

6.1 Conclusion

This study investigates the gender difference in the timing of restaurant online booking and the impacts of sell-out risk and review information type on gender difference with regards to online booking timing. We drew on the theory of perceived risk, the theory of reasoned action, and the gender difference literature to formulate the hypotheses and tested them using a timely dataset including a large number of restaurant online booking records. On this basis, we reach the following conclusions.

Females tend to make restaurant online bookings further in advance than males, and this gender difference is more salient when they make reservations for big dining group size or weekend meals. As dining group size increases, consumers are likely to face more difficulties to successfully find a suitable table and more people will be affected by the booking result, since many restaurants have only a few large-size tables. Moreover, people tend to place great weight on the time they spend on relaxing and entertaining during their weekends, and they are reluctant to see the results of failing to book a table. Therefore, consumers are likely to perceive high sell-out risk associated with big dining group size or weekend meals, and females are more easily affected by the sell-out risk than males because females are more risk averse.

High online rating and informative online review texts of a restaurant are likely to increase consumers' perceived restaurant quality and reduce their perceived risk, thus influencing their booking time further in advance. Furthermore, online average rating as general review information is remarkably different from online review text representing specific review information. The latter provides more delicate details, from which consumers are able to get a comprehensive understanding of a restaurant, while the former is more of observable and tangible cues. Our results reveal that males and females tend to be affected by different types of review information. Females are more attentive to details to help them remove uncertainty and risks; on the contrary, males are more likely to rely on general or summary review information in making decisions.

6.2 Theoretical Implication

First, the prior literature has primarily focused on online booking in the hotel and airline industries, but it has rarely examined restaurant online booking. This study, using a data analytical approach, extends the literature on

online booking behavior by considering the effect of gender and the moderating effects of sell-out risk and review information type in the context of restaurants. Second, prior research tends to conclude that females and males exhibit different behaviors in certain consistent ways, in which females are portrayed as more cautious, risk averse and avoiding. In this study, our empirical results support the existence of risk-taking differences between male and female customers in the timing of online bookings, and this gender difference is more salient under the condition of high sell-out risk for a restaurant. Third, this study develops an understanding of how male and female use different types of review information when they make a reservation. In this regard, our study provides new theoretical support for gender differences in decision-making and information processing.

6.3 Managerial Implication

Restaurant marketers and operators would benefit from gaining a better understanding of the timing of online booking in the current e-commerce environment. Online booking provides useful information for restaurant in terms of cover prediction and cover turnover management to achieve higher sales revenue. In contrast, no booking or the last-minute booking may bring restaurants difficulties on the operation, sales forecasting, and managing simultaneously both the booking customers and walk-in diners waiting in the restaurants, particularly for the popular restaurants.

By acknowledging the direct and/or indirect effects of a few important factors that shape timing of restaurant online booking, managers can manipulate a series of policies, marketing efforts and actions to increase booking propensity and advance booking. First, to deliver differentiated services that cater to the unique needs and aspirations of each gender, it is critically important for marketers to understand gender differences in online advance booking behavior and create correspondingly differentiated marketing strategies. For example, to address the stronger risk aversion of females, promotional campaigns targeting on females should be launched earlier as this particular group tend to make online reservations more in advance than male customers.

Second, as customers intend to book a table in advance for weekend rather than weekday meals, encouraging advance bookings for weekday dine-out would help restaurants better manage and allocate limited resources. It is suggested that restaurants, especially those with low cover turnover, may provide a certain discount to customers who book online in advance for weekday dine-out. Based on the findings of this study, customers, especially females, are more risk averse concerning dining group size and weekend meals. Currently there is no pre-charge fee for restaurant online booking and the reservation cancellation is also free for restaurants in China. This encourages a common phenomenon of “booking several alternative restaurants, and choosing one of them and cancelling other reservations just before dining start time”, which can bring trouble or revenue loss to restaurants, especially to popular ones. Therefore, restaurants can implement a pre-charge or “down payment” to guarantee and confirm tables for large dining groups and weekend meals. Restaurants may also carry out policies that are being adopted by hotel industry in recent years, for example, “free cancellation before certain days or hours” or “non-refundable” or “credit card guarantee required”. Actually, such policies have only been implemented in recent years for online travel agencies in China (e.g., Trip.com). If this is one possible and right direction, we believe that our study provides scientific empirical support for implementing this policy. For example, popular restaurants can be ready to embark on such policies for large dining groups and/or weekend meals, or make different reservation policies in terms of dining group size and dining time.

Third, our results reveal that general review information (i.e., online average ratings) and specific review information (i.e., online review text) are both likely to reduce perceived risk of customers and increase their booking in advance. It is suggested that restaurants with low ratings and short review text should make more efforts to satisfy walk-in dinners, and as ratings and review text increase, they may shift their focus from meeting real-time demand to online reservation management. In practice, many managers tend to be more concerned about online customer ratings rather than review text. Our results suggest that the length of review text, which largely represents the amount of specific review information is also crucial important to promote a restaurant’s advance booking. Therefore, restaurants should motivate their customers to post not only favorable ratings but also detailed review texts. We believe a better understanding of the effect of review information type and its moderating effect on gender difference in online booking behavior will help managers make restaurant operation more effective.

6.4 Limitations

This study has the following limitations and accordingly calls for additional research. First, the restaurant booking data were obtained from a single dining reservation website in China and included restaurants in only one city (Shanghai). Although the sample includes 719,812 booking records, the data may only represent booking patterns in large cities in China. Future studies should use restaurant booking records from other large, medium and small cities in China and in other countries to check the robustness of our results. Second, consumer behavior, especially gender differences, is often associated with the cultural background and societal norms of a studied area or country. Therefore, the findings of this research on gender differences and the moderating effects of sell-out risk and review information types may reflect the culture and social norms in China. This cultural background may or may not be applicable to other study settings in western society; future research should examine this particular aspect by exploring other cultural settings. Third, due to limitations of the secondary data, only variables that were available from this specific restaurant reservation website (Xiaomishu.com) were used in the study

model. Other additional factors and interesting questions that may reveal gender differences in the decision-making process have yet to be explored. It would be interesting for future research to explore and examine the internal processes that cause gender differences in the timing of restaurant online booking. Finally, additional factors which may reflect the informativeness of specific reviews should be explored in the future.

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