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论文题目：　The impact of time urgency on consumer price sensitivity

The impact of time urgency on consumer price sensitivity

时间紧迫感对消费者价格敏感度的影响研究

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Abstract: This paper examines how time urgency influences consumer price sensitivity in mobile commerce. Previous studies have shown that deadlines boost purchase likelihood and reduce deal-seeking. However, the impact of time urgency on purchase behavior remains underexplored. To examine how time urgency influence consumer price sensitivity, we model consumer choice behavior using a multinomial discrete choice model, and estimate the parameters based on the data from an online hotel booking app. Using coarsened exact matching (CEM) and a method based on the idea of difference-in-differences (DID) technique, we tackle the non-random experience of time urgency among consumers. Findings indicate that time urgency increases price sensitivity because consumers prioritize price information under time constraints. This study enriches our understanding of mobile commerce by demonstrating how time urgency influences consumer decision-making. This insight is crucial for developing targeted marketing strategies in mobile commerce.

Keywords:Time urgency, Price sensitivity, Discrete choice model; Mobile commerce

Contents

1. Introduction

Mobile devices have become widespread globally, making them the main medium for online shopping. By mid-2023, over 96% of the world's digital population used mobile devices to access the internet, dramatically changing the e-commerce landscape. The number of smartphone users has grown to nearly 4.88 billion and is expected to surpass 6 billion by 2027[1]. This huge increase in mobile usage has boosted mobile commerce significantly, with sales projected to hit 3.9 trillion dollars by 2024. This number far exceeds the earlier prediction of 319 billion dollars for 2020, highlighting a major shift in consumer behavior and the growing importance of mobile in online shopping[2].

As mobile commerce grows, the idea of time urgency becomes more important for understanding consumer behavior. Time urgency is a type of constraint that forces people to make decisions within a limited time (Jacoby, Szybillo, and Berning 1976; Zhu, Yang, and Hsee 2018). In mobile shopping, this urgency is heightened by the ability to shop anytime and anywhere, due to always-on nature of mobile devices. This immediacy can lead to quick purchase decisions, often driven by limited-time offers or the fear of missing out on deals. Understanding the role of time urgency in mobile commerce is essential, as it impacts consumer decision-making and influences how firms plan their marketing and sales strategies to attract mobile channel shoppers.

A lot of research has examined how time urgency affects consumer behavior,

[1] Data source: https://www.statista.com/topics/779/mobile-internet/
[2] Data source: https://backlinko.com/smartphone-usage-statistics

showing that deadlines can make people more likely to buy and less likely to look for better deals (Aggarwal, Jun, and Huh 2011; Baek and Yoon 2020; Mogilner, Aaker, and Pennington 2008). Additionally, studies focusing on mobile commerce have identified unique consumer behaviors distinct from traditional PC channels, largely due to the widespread access provided by mobile devices (Bang et al. 2013; Lee, Gopal, and Park 2020; Park, Bang, and Ahn 2020).

Despite these insights, there's still a gap in our understanding of how time urgency impacts consumer decisions in mobile commerce. Most studies focus on traditional urgency triggers such as promotions, and miss how mobile accessibility creates unique urgency features. This gap is significant, and it is important to explore how the immediate access provided by mobile shopping influences consumer decision-making when time is limited. This paper seeks to address this by examining the following research questions: (1) How does consumer price sensitivity change under time urgency? (2) What underlying mechanisms explain this effect?

To explore this research question, we analyze how mobile shopping behavior differs when consumers are under time urgency compared to when they are not. We use a dataset from an online hotel booking app in China that includes detailed clickstream data, transaction data, and hotel information. A key challenge in this research is that consumers do not experience time urgency randomly, which is influenced by differences in both session-related factors and consumer traits. To address this issue of endogeneity, we use coarsened exact matching (CEM) and a method based on the idea of difference-in-differences (DID) to accurately measure the

impact of time urgency on consumer price sensitivity.

Our findings indicate that consumers show greater price sensitivity when they search for hotels under time urgency. The underlying mechanism is that under time urgency, consumers focus more on gathering and processing price information instead of other product details. Since information that is not immediately available is often ignored during the search process (Degeratu, Rangaswamy, and Wu 2000; Granados, Gupta, and Kauffman 2012), consumers prioritize price information over other types of information. As a result, price information carries more weight in their decision-making process, thereby increasing their sensitivity to price.

This research contributes to the understanding of consumer behavior and time urgency in mobile commerce by empirically investigating how time urgency affects consumer price sensitivity. We find that under time urgency, consumers demonstrate increased price sensitivity. This is due to consumers prioritize gathering and processing of price information over other product attributes. Additionally, our study highlights the unique aspects of mobile commerce, such as its immediacy and accessibility, which redefine time urgency not as a response to external deadlines like sales or promotions but as a reaction to situational pressures from immediate needs. This perspective sheds light on the context-specific pressures that shape consumer behavior in the dynamic environment of mobile commerce, offering insights into how mobile technology influences consumer decisions.

2. Literature review

2.1 The effect of time urgency

Time urgency is often defined as a particular type of pressure that requires decisions to be made quickly (Jacoby, Szybillo, and Berning 1976; Zhu, Yang, and Hsee 2018). It becomes more intense when deadlines are near, rather than far off. Faced with limited time, people usually prefer to act quickly rather than delay, primarily to avoid any negative outcomes from missing deadlines (Landy et al. 1991). This mindset encourages individuals to make decisions faster under time pressure, trying to prevent any potential penalties for being late (Bento 2021; Reiff et al. 2023).

Time urgency significantly influences judgment and decision-making processes (Aggarwal, Jun, and Huh 2011; Mogilner, Aaker, and Pennington 2008; Swain, Hanna, and Abendroth 2006). Many studies have explored how time urgency affects the completion of tasks (Waller et al. 2001). As deadlines get closer, the urgency to complete tasks increases, leading to psychological tension and discomfort. This state of mind often makes people focus more on urgent tasks and take actions to reduce their discomfort, thereby making these tasks seem more important (Zhu, Yang, and Hsee 2018). As a result, limited time periods make people concentrate more on deadline-driven tasks, increase their sense of urgency and motivation to process information quickly, and encourage them to complete these tasks (Suri and Monroe 2003; Zhu, Yang, and Hsee 2018).

Several studies have examined how time urgency affects consumer behavior,

finding that consumers often view promotion expiration or coupon redemption dates as similar to deadlines, which affects how much effort they put into shopping (Baek and Yoon 2020). Research shows that when these promotion or redemption deadlines are near, they create a sense of urgency and push consumers to make quick purchases (Aggarwal, Jun, and Huh 2011; Ching and Osborne 2020). This urgency not only boosts consumers' willingness to buy but also reduces their desire to look for better deals (Aggarwal and Vaidyanathan 2003; Coey, Larsen, and Platt 2020; Swain, Hanna, and Abendroth 2006).

Current research on time urgency mainly focus on how external deadlines, like promotion or coupon expiration dates, affect consumer behaviors. However, these studies neglect the unique aspects of the mobile channel, where easy and immediate access greatly helps with time-critical activities and offers contextual factors that may influence consumers' sense of urgency(Bang et al. 2013).

2.2 Consumer behavior in mobile channel

The rise of mobile commerce arises researchers' interest in consumers' purchase behavior when using mobile Internet. A rich literature focuses on comparing consumers' purchase behavior between the PC channel and the mobile channel and finds that consumers' purchase behaviors on these channels are different. These behavior differences primarily associate with the extent to which each channel provides ubiquitous access and is usable for application (Bang et al. 2013; Lee, Gopal, and Park 2020; Xu et al. 2017).

Ubiquity is a major advantage of the mobile channel over the PC channel (Bang et al. 2013). The widespread and immediate access provided by mobile internet makes it much easier to obtain information compared to PCs, allowing consumers to use mobile platforms anytime and anywhere. This exposure to diverse contexts makes consumer behavior on mobile devices more dependent on factors like time of day or location, which can significantly affect their purchasing decisions (Bang et al. 2013; Ghose, Ipeirotis, and Li 2019; Phang, Luo, and Fang 2019; Son et al. 2020; Wang, Malthouse, and Krishnamurthi 2015).

Despite the rich understanding from research on consumer behavior in mobile commerce, there is still a clear gap in the literature concerning the specific impact of time urgency, which is particularly prominent due to the instant nature of mobile channels. This gap is crucial because the immediate access to services offered by mobile commerce can create a unique type of time urgency, possibly changing consumer decision-making more significantly than we previously realized. Exploring this gap could enhance our understanding of mobile commerce dynamics, especially how time-critical situations affect purchasing decisions.

3. Model

3.1 Discrete choice model

To study how time urgency affects consumers' price sensitivity, we model consumer choice behavior using a multinomial discrete choice model based on the

random utility theory. Specifically, we model the utility of consumer *n* choosing hotel *i* on choice occasion *t* using the following equation:

$$U_{int} = \alpha_{in} + \lambda_{ni} Price_{it} + \sigma_{nt} Urgency \cdot Price_{it} + \omega_{ni} H_{it} + \varepsilon_{int}, \quad \forall i \in M \tag{1}$$

In equation (1), U_{int} indicates the utility of consumer *n* choosing hotel *i* on choice occasion *t*, $Price_{it}$ is the price of hotel *i* on choice occasion *t*, $Urgency$ represents whether consumers are under time urgency or not, H_{it} indicates other hotel attributes that may influence consumers' hotel choices. We use θ to present a vector of parameters, i.e. $\theta = (\alpha_{in}, \lambda_{ni}, \sigma_{nt}, \omega_{ni})'$, and X_{it} to present all hotel attributes including P_{it} and H_{it}. The effect of time urgency is measured by σ_{nt}, and we anticipate this parameter to be negative, suggesting that consumers become more price sensitive when they are under time urgency compared to when they are not.

Under the assumption that ε's in equation (1) are conditionally distributed Gunbel random variates, the corresponding choice probability for alternative $i \in M$ can be specified as follows (Erdem, Swait, and Louviere 2002):

$$P_{int} = \int \left(\frac{\exp(\theta X_{it})}{\sum_{j \in M} \exp(\theta X_{jt})} \right) f_\theta(\theta)\, d\theta, \quad \forall i \in M \tag{2}$$

In equation (2), $f_\theta(\theta)$ indicates the multivariate pdf for coefficient vector θ. To examine the impact of time urgency on consumer price sensitivity, we estimate the parameters of equation (2) based on maximum likelihood estimation using the following log likelihood function:

$$L(\Theta) = \sum_{n} ln(\int (\prod_{t=1}^{R} P_{i*nt}(\theta)) f_{\theta}(\theta)\, d\theta) \quad (3)$$

In equation (3), $i*$ indicates the chosen alternative on choice occasion *t*, the estimator is the value of Θ that maximizes the equation (3). As $L(\Theta)$ is globally concave for linear-in-parameters utility, the maximum likelihood estimates are therefore the values of Θ that satisfy the first-order condition (Train 2009). Equation (4) in the following shows the first-order condition of equation (3):

$$\frac{dL(\Theta)}{d\Theta} = 0 \quad (4)$$

3.2 Data

To estimate the choice model, we use the data from a leading online hotel-booking app in China. The data set consists of observations from July 2016 to March 2017, which includes: 1) click-stream data detailing consumer searches, clicks, and purchases; 2) transaction data with historical hotel transaction information; 3) hotel information such as brand, location, and rating.

We use the session as the unit of empirical analysis to model consumer utility during the choice process. We organize our click-stream data into sessions based on specific criteria: 1) each action in a session must occur within 30 minutes of the next; 2) all hotel searches within a session must be for the same city; 3) the check-in date for all actions in a session must be the same. Additionally, each session is required to contain only one purchase and at least two alternative options.

3.2 Variables

Table 1 presents a summary of variables and descriptive statistics. We construct variable $Urgency$ and categorize consumers under time urgency as those who book hotels on the same day they search for them. These consumers must complete their bookings within hours to secure accommodation for the same day, creating explicit deadlines and imposing significant pressure that could affect their decision-making. To identify sessions under time urgency, we calculate the number of days between the booking date and the check-in date. If this duration is zero, meaning the booking and check-in occur on the same day, the session is classified as under time urgency.

For the hotel attributes X_{it} that influence consumers' utilities, we use the following variables: *Price*, which represents room price; *Rating*, indicating overall consumer review ratings; *ReviewNum*, showing the total number of reviews; *HotelStar*, which denotes the star rating of the hotel; *Distance*, which demonstrates the distance between hotels and the location of users' query words.

Table 1 also presents a summary of the data, indicating that the average price per night is 202.62 RMB, the average hotel review rating is 2.83, and hotels have an average of 607.65 reviews. The average hotel star rating is 1.46, and the average distance from hotels to consumers' destinations is 12.52 kilometers. On average, consumers book hotels 2.38 days before their check-in dates and stay for 1.25 days per booking. In summary, our dataset comprises 78003 sessions. Of these, 47476 sessions (61.86%) are under time pressure, while 30527 sessions (39.14%) are not.

Table 1 Variables and Descriptive Statistics

Variables	Definition	Number of observations	Mean	Standard deviation	Minimum	Maximum
Urgency	Dummy variable indicating whether consumers book hotels in the same day as the check-in date.	77752	Urgent(=1): 47476(39.14%); Not urgent(=0):30527(60.86%)			
Price	Daily room price.	78003	202.62	180.11	11.88	4751.33
Rating	Overall consumer review ratings.	78003	2.83	0.68	0.0	4.73
ReviewNum	The total number of reviews.	78003	607.65	690.10	0.0	12537
HotelStar	The star rating of hotels.	78003	1.46	1.32	0.0	5
Distance	Distance between hotels and location of users' query words (in kilometers), if consumers have no query words, we use the location of the destination city downtown.	78003	12.52	39.78	0.05	353.47
StayNights	The number of days between the check-in date and the check-out date.	77752	1.3	0.8	1.0	39.0
SameCity	Dummy variable indicating whether consumers book hotels in the same city they locate in.	78003	Same city(=1): 16478(21.12%); Not same city(=0): 61525(78.88%)			
CityTier	Categorical variable for the city tier of the destination city.	78003	Including 1 to 6 levels, with 1 being the city with the lowest economic activities and 6 being the premier city. City tier 1: 3766(4.83%); city tier 2: 7445(9.54%); city tier 3: 10978(14.07%); city tier 4: 16499(21.15%); city tier 5: 22148(28.39%); city tier 6: 17167(22.01%).			
PayOnline	Dummy variable indicating whether consumers pay online or pay upon arrival. 0 indicates pay online; 1 indicates pay upon arrival.	78003	Pay online(=1): 61504(78.85%); Pay upon arrival(=0):16499(21.15%)			

4. Analysis

4.1 Identification

When studying how time urgency influences consumer price sensitivity, especially in hotel bookings, a major issue of selection bias arises. This bias occurs because not all consumers end up in urgent situations randomly. Factors that affect their price sensitivity might also influence their need for urgency. For instance, consumers who often book at the last minute due to personal or professional reasons might show different pricing behaviors than those who plan in advance (Nair 2007). Past studies suggest that such consumers might value convenience over cost, which could impact their price sensitivity differently compared to those with more time (Chevalier and Goolsbee 2009). Therefore, it is challenging to determine whether it is the time urgency affecting price sensitivity or it is just an inherent characteristic of the consumer that influences both their urgency and their response to pricing.

To address this concern, we use coarsened exact matching (CEM) to pair similar sessions, whether under time urgency or not. When employing CEM, we include hotel prices and review ratings as matching variables, we also construct other matching variables: *StayNights*, which represents the number of days between the check-in date and the check-out date; *SameCity*, a dummy variable indicating whether consumers book hotels in the same city they are located in; *CityTier*, a categorical variable for the city tier of the destination city; *PayOnline*, a dummy variable indicating whether

consumers pay online.

Table 1 above present the summary statistics of these variables. About 21.12% of sessions involve booking hotels in the same city where the consumers are located, while 78.88% involve bookings in different cities. Additionally, 21.15% of bookings use the pay-upon-arrival method, and 78.85% use the pay-online method. The distribution of city tiers for the destination cities is also detailed in Table 1.

By employing CEM to process the factors which influence consumers' sense of urgency, every matching variable is coarsened into several bins, and each observation can be exactly matched on a comparable observation by placing these observations into relative strata which created according to those bins (Blackwell et al. 2009). Each session under time urgency (treated session) is matched with a session that is not under urgency (control session) but is similar in other respects, as both are placed in the same strata formed by these matching variables. With the matched samples after applying CEM, the difference between these two groups of sessions can be an estimator of the treatment effect of time urgency.

Table 2 presents summary statistics for sessions before and after matching. Results indicate that before matching, urgent sessions and non-urgent sessions are significantly different from the perspective of the six matching variables, while no significant difference after matching between sessions under time urgency or not in terms of these matching variables. As a result, we obtain 76144 matched sessions with 47287 urgent sessions (62.10%) and 28857 non-urgent sessions (37.90%).

Table 2 matching urgent and non- urgent samples

Matching variables	Before Matching			After Matching		
	Urgent sample	Non-urgent sample	difference	Urgent sample	Non-urgent sample	difference
Price_mean	187.99	225.38	-37.39*** (0.00)	186.77	188.31	-1.54 (0.23)
Rating_mean	2.82	2.85	-0.03*** (0.00)	2.82	2.83	-0.01 (0.59)
Stay_nights	1.04	1.58	-0.54*** (0.00)	1.04	1.04	-0.002 (0.37)
Same_City	0.26	0.14	0.12*** (0.00)	0.25	0.25	0.00 (1.00)
City_tier	4.13	4.43	-0.30*** (0.00)	4.13	4.14	-0.01 (0.67)
Pay_online	0.83	0.73	0.10*** (0.00)	0.83	0.83	0.00 (1.00)
N(number of sessions)	47476	30527	-	47287	28857	-

Note: 1) *p*-value measures the probability that the differences between the means of the urgent and non-urgent samples are statistically significant, under the assumption that there is no actual difference (null hypothesis). 2) ***p<0.01; **p<0.05; *p<0.1.

4.2 Estimation results

Table 3 shows results of how price and other hotel attributes influence consumers' utilities, and also presents the impact of timer urgency on consumer price sensitivity. The results are as expected: the coefficient for price is negative and significant (β = -0.390, p < 0.01), meaning that higher prices reduce how much consumers value the hotel. The negative and significant coefficient for interaction term of *Price* and *Urgency* (β = -0.613, p < 0.01) indicates that consumers become more price sensitive when under time urgency compared to not under time urgency. This finding is significant as it highlights how time urgency profoundly influence consumer purchasing behaviors, especially consumer price sensitivity. As time urgency is associated with consumer purchase behavior, this impact can also result in changes in

hotels' revenue. In this sense, understanding the underlying mechanism regarding the relationship between time urgency and consumers' price sensitivity can be meaningful.

For other hotel attributes, the positive and significant coefficients for review ratings (β = 0.356, p < 0.01) and the number of reviews (β = 0.046, p < 0.01) show that better ratings and more reviews increase consumer value. Also, the negative and significant coefficient for the distance from the search location (β = -0.021, p < 0.01) shows that consumers prefer hotels closer to their specified destination.

Table 3 Modeling Consumers' Utility with Hotel Attributes

	Utility (U_{int})
Price	-0.390***
	(0.035)
Price × Urgency	-0.613***
	(0.060)
Rating	0.356***
	(0.018)
ReviewNum	0.046***
	(0.006)
Distance	-0.021***
	(0.001)
HotelStar	Yes
Brand dummies	Yes
Log-likelihood	-107320.06282
Number of sessions	76144

Note: 1) ***p<0.01; **p<0.05; *p<0.1. 2) Standard errors are shown in parentheses.3) Brand fixed effects for the top 15 hotel brands in China are also included.

4.2 Results interpretation

Based on the results of Table 3, we conclude that when consumers are under time urgency, they become more sensitive to price. Following this conclusion, a natural question arises: to what extent will the sensitivity to price change if the intensity of

time urgency is altered? To further interpret the impact of time urgency on consumer price sensitivity, we differentiate the utility function in equation (1) (Erdem, Swait, and Louviere 2002; Train 2009). The change in the utility that consumer *n* choosing hotel *i* on choice occasion *t* given a change in $Urgency$ are expressed as marginal impact of time urgency (*MarginImpact*), and we measure this construct using equation (5). Based on the estimation results, we derive Equation (6) and draw Figure 1.

$$MarginImpact = \frac{\partial U_{int}}{\partial Urgency} = \sigma_{nt} Price_{it} \quad (5)$$

$$MarginImpact = \begin{cases} -0.613 Price_{it}, & \text{if time urgency} = 1 \\ 0, & \text{if time urgency} = 0 \end{cases} \quad (6)$$

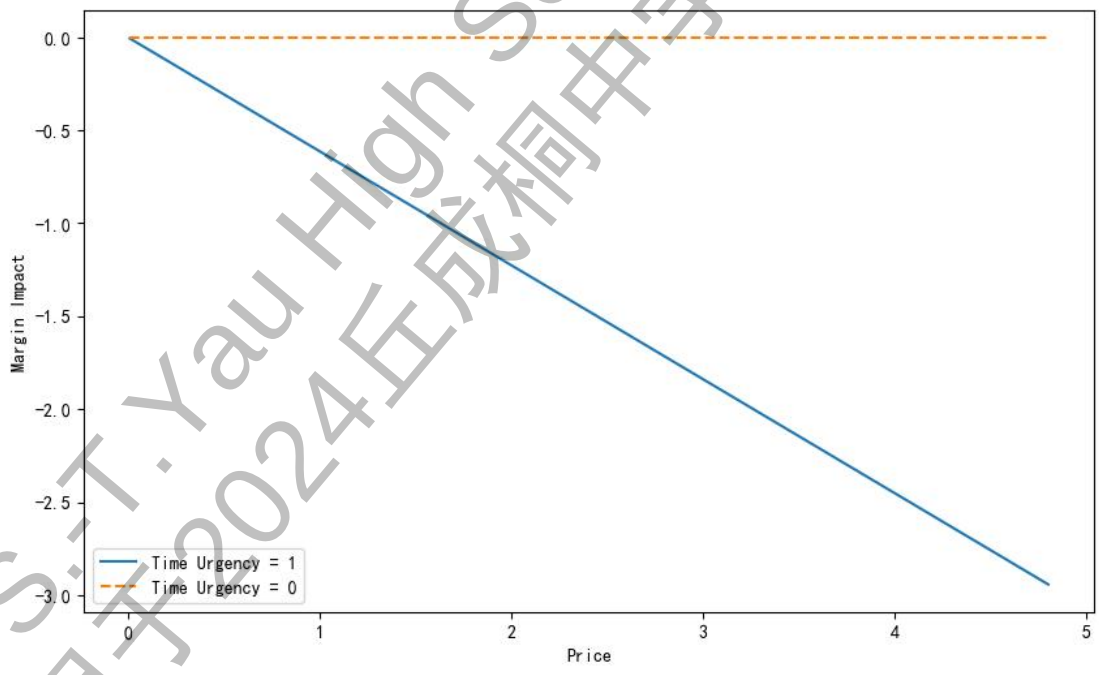

Figure 1 Margin Impact vs Price when under Time Urgency or not

According to Figure 1, the marginal impact of time urgency increases as the hotel

price increases. This figure suggests that time urgency plays a more important role in higher-priced hotels, further supporting our findings that consumers become more price-sensitive when under time urgency.

4.4 Robustness checks

4.4.1 Analysis based on DID idea

To further ensure the reliability of our findings, we examine how time urgency impacts consumer behavior in different settings using a method based on the idea of difference-in-difference (DID) technique. DID is an econometric model that measures the effect of a specific treatment by comparing changes in outcomes between a treated group and a control group (Xu et al. 2017). By using pairs of urgent and non-urgent sessions matched through the coarsened exact matching (CEM) strategy, we minimize potential biases from endogeneity and differences between sessions. This approach helps us accurately determine the causal effect of time urgency on consumer price sensitivity.

We take advantage of concert events as a natural experiment to examine changes in time urgency using the method based on the idea of DID. When a popular concert happens in a city, it usually increases the demand for local hotels, causing consumers to book rooms quickly due to fears of missing out on good options. Because of this, even people who aren't checking in right away feel a strong need to secure their accommodation. Therefore, in cities with concerts, all consumers, whether they book in advance or just before check-in, experience a high level of time urgency. On the

other hand, in cities without concerts, this time urgency is more pronounced among those who book on their arrival day compared to those who book early. We theorize that this induced urgency affects how sensitive consumers are to hotel prices. Specifically, we expect no notable difference in price sensitivity among consumers booking on the same day versus those booking ahead in cities with concerts. However, in cities without concerts, we anticipate a clear difference in price sensitivity between these two groups.

We gather data on concert events to facilitate this analysis. Specifically, we focus on nine popular singers who held concerts in China during 2016-2017[3]. We obtain information on the dates and locations of 114 concerts. We hypothesize that time urgency increases as a concert date approaches. Therefore, we categorize sessions where consumers book hotels in cities with concerts occurring within the next three days as the treatment group. For the control group, we choose sessions in cities where concerts have occurred in the past but with no concerts scheduled in the next three days. This approach allows us to examine how the pressure of upcoming events influences consumer booking behaviors.

To analyze how different levels of time urgency affect consumer price sensitivity, we start by estimating the choice model separately for each group. Next, we assess the importance of the differences in how time urgency influences price sensitivity between these groups. We do this using the entire sample, adding a three-way interaction term among *Price*, *Urgency* and *Concert*. Here, *Concert* is a dummy

[3] The popular singers include: Jay Chou, Mayday, Jacky Cheung, Faye Wong, Jason Zhang, Eason Chan, Chris Lee, Alan Tam, Jolin Tsai.

variable indicating whether the booking session is in a city with a scheduled concert within the next three days. This method helps us systematically evaluate how upcoming concerts influence consumer booking behaviors and their price sensitivity.

The results of this analysis are displayed in Table 4. The coefficient for interaction term of *Price* and *Urgency* (β = -0.472, p < 0.01) in Column (1) is negative and significant, suggesting that in cities without upcoming concerts, there is a significant difference in price sensitivity between those who book on the same day and those who book in advance. In contrast, the coefficient for interaction term of *Price* and *Urgency* (β = 0.140, p =0.65) in Column (2) is not significant, indicating that in cities with upcoming concerts, there isn't a significant difference in price sensitivity between these two groups. Additionally, the coefficient for the three-way interaction term of *Price, Urgency* and *Concert* (β = 0.673, p <0.1) in Column (3) is positive and significant, showing that the gap in price sensitivity is smaller when consumers book hotels in cities with upcoming concerts compared to cities without such events. These findings support our hypothesis and add strength to our causal conclusions.

Table 4 Effects of Time Urgency on Price Sensitivity:
Cities with Concerts vs Cities with no Concerts

	(1)	(2)	(3)
DV: Utility (U_{int})	Cities with no Concerts	Cities with Concerts	Pooled sample
Price	-0.484***	-0.933***	-0.484***
	(0.052)	(0.214)	(0.052)
Price × *Urgency*	-0.472***	0.140	-0.472***
	(0.082)	(0.308)	(0.082)

Concert	-	-	-0.537** (0.249)
Price × Urgency × Concert	-	-	0.673* (0.347)
Other attributes	Yes	Yes	Yes
Log-likelihood	-57050.9766	-3127.6226	-59744.428
Number of sessions	45641	2194	47835

Notes: 1) ***p<0.01; **p<0.05; *p<0.1. 2) Standard errors are included in parentheses. 3) Other hotel attributes such as review rating, the number of reviews, hotel distance, hotel star rating, and brand fixed effects for the top 15 hotel brands in China are also included.

4.4.2 Subsample analysis

To ensure the reliability of our main findings, we perform a subsample analysis specifically on hotel bookings in high-tier cities. There is a concern that consumers booking hotels on the same day they arrive might experience limited options due to high occupancy rates. This situation could mean that observed differences in consumer behavior are due to limited availability rather than time urgency. To tackle this issue, we focus on high-tier cities, defined as the top 19 developed cities in China where there is usually enough hotel supply. This particular subsample includes 39315 sessions, with 21898 being urgent and 17417 non-urgent sessions.

We estimate our choice model using this subsample, and the results are presented in Table 5. The negative and significant coefficient for interaction term of *Price* and *Urgency* (β = -0.481, p <0.01) confirms that even in high-tier cities, consumers become more price sensitive when they are under time pressure. This supports our primary findings and further proves that time urgency greatly affects consumer price sensitivity, regardless of the availability of hotels.

Table 5 The impact of time urgency on consumers' price sensitivity using subsample

	Utility (U_{int})
Price	-0.475*** (0.047)
Price × Urgency	-0.481*** (0.078)
Other attributes	Yes
Log-likelihood	-56616.732
Number of sessions	39315

Notes: 1) ***p<0.01; **p<0.05; *p<0.1. 2) Standard errors are included in parentheses. 3) Other hotel attributes such as review rating, the number of reviews, hotel distance, hotel star rating, and brand fixed effects for the top 15 hotel brands in China are also included.

5. Underlying mechanism

5.1 Time urgency and information gathering

Our results suggest that consumers become more price sensitive when under time urgency compared to not under time urgency. In this following, we propose an underlying mechanism to explain this finding.

In a highly differentiated market like the hotel search market, a variety of hotels with a bunch of hotel feature information such as price and hotel attribute (e.g. reviews, class, or location), can be used for consumers to evaluate how much a certain hotel matches their needs. Ideally, consumers are motivated to exert search effort to acquire and process hotel information from each available hotel by the intention of finding the most satisfying hotel (Ghose, Ipeirotis, and Li 2019; Park, Bang, and Ahn 2020).

However, when decision-makers are under time constraints, they often use

simpler decision rules that focus on a single important attribute rather than multiple attributes across all options (Zhu, Yang, and Hsee 2018). Since price is a crucial factor in purchasing decisions, consumers under time pressure tend to focus more on price while neglecting other product attributes. As a result, when faced with time urgency, consumers put more search effort into gathering and processing price information rather than considering other details about the product.

According to information integration theory, consumers only consider the product attributes they can access, assign importance to these, and then use them to evaluate products and make decisions. Thus, any information not readily available isn't weighted in their decision-making process (Degeratu, Rangaswamy, and Wu 2000; Granados, Gupta, and Kauffman 2012). Because consumers often focus more on gathering price information than on other product details, price information becomes more significant during the decision-making process while other product attributes are overlooked. This emphasis on price leads to increased price sensitivity, as consumers primarily compare prices without taking into account the different attributes of the products (Brynjolfsson and Smith 2000; Degeratu, Rangaswamy, and Wu 2000; Granados, Gupta, and Kauffman 2012).

5.2 Search effort difference

Our mechanism suggests that the difference in price sensitivity between consumers under time urgency and those who are not is caused by the different levels of search effort in these two situations. To test this idea, we use two variables to

measure consumers' search effort: the number of hotels viewed and the time spent searching. We then compare the search effort between urgent sessions and non-urgent sessions.

Columns (1) and (2) in Table 6 show the average for these two variables in urgent and non-urgent sessions, respectively. Column (3) displays the difference between them. The negative and significant differences in Column (3) suggest that, compared to non-urgent consumers, consumers under time urgency put in significantly less search effort. These results support our argument that time urgency limits consumers' effort to gather hotel product information, causing them to focus more on price information and become more sensitive to price.

Table 6 Search Effort Difference between when under Time Urgency or not

search effort	(1)	(2)	(3)
	Urgent	Non-urgent	Difference
Hotel number	4.78	6.51	-2.21*** (<0.01)
Search time	10.45	15.20	-4.75*** (<0.01)

Notes:1) ***p<0.01; **p<0.05; *p<0.1. 2) *p*-value of the *t*-test is shown in parentheses.

6. Conclusion and implication

6.1 Conclusion

In this study, we investigate how time urgency affects consumer price sensitivity in mobile commerce. We find that consumers become significantly more price sensitive when they are under time urgency. This increase in sensitivity mainly comes from consumers focusing on price information rather than other details about the

hotels, because they need to make quick decisions. This behavior highlights how consumers prioritize the most accessible information when they have limited time, supporting the idea that limited access to information affects how consumers weigh their options during decision-making.

6.2 Implication

Our research helps to better understand consumer behavior in mobile commerce by showing how time urgency changes decision-making due to the instant access provided by mobile platforms. Unlike earlier studies that looked at deadlines from promotions or coupons, our work focuses on the natural urgency that comes from the mobile shopping setting. This gives a new view on the spontaneous pressures that are common in today's online shopping world.

The implications of our study are significant, providing both theoretical and practical insights. Theoretically, it adds to the discussion on time urgency by including the unique features of mobile commerce. Practically, it suggests that businesses could develop strategies to address or use the effects of time urgency on consumer decisions. This might influence when promotions are offered or how information is shown to consumers shopping under time urgency. Overall, this research highlights the important role of mobile technology in shaping consumer behavior and offers useful insights for marketers looking to improve interactions in the mobile shopping world.

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The idea for this paper was inspired by my travel experiences. I have traveled to more than a dozen countries, and after starting high school, I often booked hotels with assistance from my parents. I noticed fluctuations in hotel prices, particularly when booking close to the desired date, where prices often increased. Additionally, my feelings differed when booking a hotel for the upcoming days versus booking a month in advance. These observations and experiences sparked my interest, leading me to consider whether search and purchase behaviors would vary under different time constraints. This curiosity led to the start of this research.

To explore different consumer decision-making behaviors under various time constraints, I began a research study using data from a hotel booking app. I am profoundly thankful to my high school economics teacher, Ms. Hang Yin, for her invaluable assistance. Her guidance helped me refine research questions based on my initial ideas, learn how to write a research paper, and transform the first draft into a complete research paper. Without Ms. Yin's generous instruction, provided without any compensation, this paper would not have reached its current form.