

Du, Xiaoning; Chung, Jellna

## Article

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## The Hidden Price of Hotel Features Forming Room Rate: Focused on Star-type Segmented Market in China

Du Xiaoning<sup>a</sup>, Jellna Chung<sup>b†</sup>

<sup>a</sup>Department of Hotel Management, Graduate School of Kyung Hee University, Seoul, Republic of Korea

<sup>b</sup>Department of Global Hotel Management, Sol International School, Woosong University, Daejeon, Republic of Korea

### ABSTRACT

**Purpose:** This study is to analyze the price characteristics of three- to five-star hotel room prices in Beijing Central Business District to find the hidden prices of hotel rooms in the area.

**Design/methodology/approach:** This research used the hedonic price model to analyze the data collected by the network search engine to find hidden elements that affect the price of hotel rooms. The feature variables of the hotel are divided into three categories including internal features, external features and time features in two different markets: the overall market and the star-type segmented market in China.

**Findings:** In the overall market, among hotel room interior features, hotel star rating, room area, free breakfast, food & beverage service quality, hotel facilities & equipment and free internet service have an impact on the hotel room price, with an implied price. For the hotel room exterior features, distance and the hotel-owned business district have a significant relationship with the price of the hotel room, with an implied price. In the star-type segmented market, all hotel room interior features have a significant relationship with the hotel price. Also, the features of competitors have very significant implied prices, which will greatly impact the pricing of hotel rooms in the star-type segmented market.

**Research limitations/implications:** Managers can decide whether to improve the investment in a feature to increase the quality of the feature, or to control the cost of the feature to reduce unnecessary expenditure through the calculation results. Since the study was conducted only in the Beijing area, extended research must be carried out beyond Beijing to achieve more universal applicability.

**Originality/value:** This study investigated the pricing of hotel rooms based on the hedonic price method to explore the price elasticity of the relevant features of hotel room products, and understand the needs and preferences of consumers in different market segments. It established different star segment market models and analyzed the differences in the types and elasticity of the features of significant implied prices in different star market models.

*Keywords: Room Rate, Hedonic Price Model, Meta-booking Engine, Star-type Segmented Market*

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† Jellna Chung

E-mail: [jnchung@wsu.ac.kr](mailto:jnchung@wsu.ac.kr)

## 1 . Introduction

With the intensification of market competition, effective revenue management is particularly important for China's full-service hotel industry. The core of revenue management is price segmentation, considering consumers' different preferences and price elasticity. In the traditional sense, the price of a room mainly refers to the price that consumers are willing to pay for a complete stay. This price includes the hidden prices of various hotel facilities and services (Schamel, 2012). If a hotel wants to maximize its revenue through reasonable pricing and meets the needs of different consumers, it needs to understand the willingness of different consumers to express their specific services. Most of the hotel revenue management models assumed that the demand for rooms was independent, that is, the correlation between the pricing strategy of hotel rooms and consumer demand was low (Talluri & van Ryzin, 2004). The popularity of online bookings makes hotel room prices and hotel room information more transparent than ever. Consumers often make price comparisons with travel metasearch engines when making purchase decisions, and then pay for relatively satisfactory prices. Moreover, the rapid development of the Internet and the growing maturity of online booking technology are challenging the traditional booking method. The meta-booking engine brings more potential consumers to the hotel on one hand; on the other hand, it also causes the consumers to produce the contrast behavior of the hotel from the aspects of price and hotel product features, which will make the hotel face greater challenges in setting room prices.

There are three traditional methods for hotel room pricing including cost-oriented pricing, competition-oriented pricing and revenue management-oriented pricing. Recently the cost-oriented pricing and competitive-oriented pricing have gradually been replaced by revenue management-oriented pricing method. In the management-oriented pricing method, the hedonic price model is a method to study the hidden price of hotel room features and provide

reference for hotel room pricing (Zhang et al., 2011). According to Fleischer (2012), the main advantage of the hedonic price model is that this model is based on actual market data. Therefore, this type of model can be used to cover an extremely wide range of targets and destinations. In addition, compared with the data obtained through questionnaires and other means, the data used in the hedonic price model are more authentic and reliable, and the conclusions obtained are more reliable. Through this model analysis, hotel managers can estimate implicit price of characteristics that increase consumer satisfaction from available data (Rigall-I-Torrent et al., 2011).

Now many scholars have used the hedonic price model to analyze the hidden price of a large number of hotel room features. However, they have faced lots of limitations such as research data source and the popularity of online booking. In addition, previous studies pay less attention to the difference in the hidden price of room features in the market class segment (Wuhua, Yanhong & Zhongsheng, 2013). Therefore, the results of those studies explained partially and guided poorly. Previous studies have carried out extensive research on the hidden price of hotel room features, which has great significance for the model construction and variable selection of this paper.

However, due to the popularity of network reservations in the past, previous studies have less reference to the impact of network information. The popularity of web applications and the rise of the travel meta-booking engine have had a huge impact on the way travel is booked, and it has also provided new access to data for the study of room pricing.

Existing studies in the analysis of the hidden price of hotel room features usually use the overall data to establish a single model of the overall market (Taylor, 1995; Papatheodorou, 2002; Becerra, Santaló & Silva, 2013), the model of the hotel peak season and off-season (White & Mulligan, 2002), ignoring the different market segments. Especially, under the star segment market, the preferences of consumers and the willingness to pay may result in differences in the implied prices of hotel room features. Therefore,

it is necessary to establish different star segment market models and analyze the differences in the types and elasticity of the features of significant implied prices in different star market models. Answering these issues is the purpose of this study.

## II. Literature review

### A. Customers' Choices in the Hotel Market

Unless the traveler's intent is to book a hotel they have previously stayed in, they will complete the process of collecting candidate hotel information when booking a hotel. With the Internet becoming an integral part of daily life, the growth of travel review websites has offered customers various alternatives to evaluate hotels. For example, TripAdvisor indicates the experience of millions travelers staying in hotels and shows hotel ratings. These ratings directly represent the value of quality and attributes experienced by the customers (Guillet & Law, 2010; Zhang, Ye & Law, 2011). Many customers nowadays usually browse online travel review websites to find more hotels, compare them, and choose the best choices in their hearts before making the final decision (Rhee & Yang, 2015).

More specifically, McCarthy, Stock & Verma (2010) found out that business travelers often use search engines or online travel agencies for hotel searches, or hotels recommended by the company. Recommendations from friends and colleagues are less important to business travelers than leisure travelers, who cited personal recommendations from friends and family as their main sources of information, followed by travel-related websites, search engines and OTAs. Once the information is collected, all travelers use brand websites, OTAs and TripAdvisor to make final decisions.

Many recent research (Chatterjee, 2001; Gretzel & Yoo, 2008; Zhang et al., 2010; Zhang, Ye & Law, 2011) proved that online customer reviews and ratings are the easiest to access and the most widespread

data for potential hotel customers. Particularly, travel reviews of third-party travel sites (OTAs) are perceived to be more likely to provide up-to-date, enjoyable and reliable information. These online platforms are free to express satisfactory assessments or dissatisfaction with the accommodation experience, but this will have a direct impact on the hotel business. (Rhee & Yang, 2015).

### B. Room Pricing by Using Hedonic Price Model

For consumers, room rate is an important factor to consider when choosing a hotel. And for hotel operators, room rate is a major strategic element of revenue expansion (Jones, Lee & Chan, 2011). According to Espinet et al. (2003), hotel room rate are determined by a combination of specific properties, so the rate of the room can be easily known, but the value of the hotel's special attributes is difficult to calculate. Thrane (2007)'s research found that location, facilities, etiquette, quality of service, grade, atmosphere, etc. are all factors that affect the price of hotel rooms.

Hedonic price model is an environmental indirect valuation method used to test the impact of a particular characteristics or attributes on market commodity prices. As part of the displayed preference valuation technique, hedonic price model is based on the assumption that people's behavior in the composite commodity market, including environmental characteristics, may reveal the value of each particular feature (Pearce & Özdemiroglu, 2002). In this context, hedonic price model has been identified as a very common method of analyzing real estate prices, with the aim of explaining the changes in house prices with various property characteristics. The application of this method has been developed and implemented in the tourism sector to assess the impact of individual characteristics of hotel rooms and facilities on the offered prices (Latinopoulos, 2018). The hotel industry mainly uses this theory to analyze the impact of certain factors in the hotel on room rates.

In particular, it was targeted at various countries in Europe, and in Castro, Ferreira & Ferreira (2016)'s study, suggested that various common characteristics in Lisbon and Portugal have a significant impact on consumers' willingness to pay for hotel accommodation, such as star ratings, consumer ratings and room size. Also, the existence of a fitness center in Portugal and the distance from Lisbon to downtown are also attributes to create a premium for room rates.

Soler et al. (2019) used a database of 9,992 cases from Trip Advisor to evaluate customers' willingness to pay for the various characteristics and attributes of hotels in the Algarve region of Portugal. It showed that hotel positioning as environmentally responsible has no impact on prices, while other positions do influence room prices. However, Sánchez-Ollero et al. (2014) explained that customers are willing to pay a premium price for the services provided by increasing its utility in Spain. Latinopoulos (2017) also examined the effect of sea views on room charges along with other structures in Greece. Using the hotel's online data set in China, Wang, Sun & Wen (2019) investigated the relationship between tourism seasonality, online user rating and hotel pricing factors. High-priced hotels are less sensitive to seasonality, and online user ratings play a more important role in mid- and low-priced hotels by mitigating the negative seasonal impact on hotel prices.

In the analysis of hotel room prices using the hedonic price model, the characteristics of hotels that previous scholars pay attention to include location, sales season, distance, hotel star rating and scale, brand and so on. Regarding the use of the model to study the price of hotel rooms in Beijing, particularly, there is a research conducted by Zhang et al. (2011). This research examined how on-site and situational factors affect the price of hotel rooms in Beijing. They produced a comprehensive reference table in the paper that contained empirical evidence related to the use of different research methods and related site and situation factors to analyze hotel room pricing. In the analysis of hotel room prices using the hedonic price model, the characteristics of hotels that previous scholars pay attention to include location,

sales season, distance, hotel star rating and scale, brand and so on.

### C. Hotel Attribute

The hedonic price model has been widely used to study the attributes (features) that influence differentiation, composite product or commodity prices. These attributes cannot be sold separately, but together they shape the final price of these composite market commodities. Therefore, the purpose of the feature pricing method is to evaluate the relationship between the market value of a composite commodity and each single property by generating a set of implied prices for all of these attributes. The hotel is a composite product made up of many features. Modern hotels are not simply service companies that provide accommodation only for customers. They are constantly evolving to meet the diverse needs of customers.

Since everyone has their own inclinations when making choices, this leads to a large deviation in the direction of hotel attribute selection (Rhee & Yang, 2015). In the existing studies, many scholars have made different classification on the attributes of hotels. For example, in the study by Shanka & Taylor (2004), 18 service and facility factors were categorized. Factors affecting customer choice included friendly front desk staff, efficient check-in and check-out, and internet connectivity. The three factors are divided into three attributes, such as physical facilities, room facilities and hospitality services. But sometimes, too detailed considerations for hotel attributes that influence customer choice can be very confusing for hoteliers, so it may be more practical to focus on a few key attributes. For example, Rhee & Yang (2015) used factors such as value, location, sleep quality, room, cleanliness and service to test the importance of these factors based on the hotel's star rating and overall rating.

In this study, the hotel attributes that affect the price are divided into three categories: hotel room interior features, exterior features, and time characteristics. The interior features affecting the price of hotel rooms

are then classified into eight factors such as star-rating, overall evaluation, room size, breakfast, catering service quality, facilities and equipment, free internet service, number of hotel rooms. The exterior features affecting the price of hotel rooms are divided into three factors such as distance, business district and competitors. Different from previous studies, this study add time characteristics to the hotel attributes that affect the room price in order to reveal the effect of time value of the purchasing. The time characteristics are divided into two factors weekdays and holidays, book in advance.

Proposed research hypotheses are developed as follows:

- H:** In the overall market, hotel features have impact on the hotel room price; with an implied price.
- H-1:** Hotel room interior features have impact on the hotel room price; with an implied price in the overall market.
- H-2:** Hotel room exterior features have impact on the hotel room price; with an implied price in the overall market.
- H-3:** Hotel room time features have impact on the hotel room price; with an implied price in the overall market.
- H:** In the star-type segmented market, hotel features have impact on the hotel room price; with an implied price.
- H-1:** Hotel room interior features have impact on the hotel room price; with an implied price in star-type segmented market.
- H-2:** Hotel room exterior features have impact on the hotel room price; with an implied price in star-type segmented market.
- H-3:** Hotel room time features have impact on the hotel room price; with an implied price in star-type segmented market.

### III . Research Method

#### A. Study Area and Data

##### 1. Study Area

As the national capital, political and cultural center, Beijing has a large number of floating population and huge hotel market demand. According to the incomplete statistics of the third-party hotel reservation platform in real time by Mita Research Institute (MTA), there are a total of 13,541 hotels in Beijing and the income of the accommodation industry above the accumulated quota from January to November 2018 was 45.591 billion Yuan. The room revenue was 25.627 billion Yuan, accounting for 56.83% of the total income, accounting for half of the total; the meal income was 11.277 billion Yuan, accounting for 25.01%. This shows that the hotel's revenue is mainly based on room revenue, so the reasonable pricing of the room is extremely important (Sina Finance).

This study selected the Beijing Central Business District (referred to as Beijing CBD) for several reasons. It is one of the important tourist destinations for Chinese and foreign consumers visiting Beijing. The number of hotels in the area is high and the density is high, and the influence of the location and traffic factors between hotels can be effectively controlled when the sample capacity is relatively sufficient. The business district searched on the "Qunar" search engine with "Tian'anmen Wangfujing" and "Yansha International Trade" keywords is the research scope. The center of the area is 26 kilometers away from Beijing Capital Airport and 5 kilometers away from Beijing Railway Station. The number of foreign financial institutions, fortune 500 companies and multinational corporations' regional headquarters in the region accounts for 65% of Beijing's total market, ranking the forefront of high-end business development. The area is home to foreign embassies, traditional attractions such as Tian'anmen Square, Forbidden City, Beihai Par, Chaoyang Park, CCTV and BTV new buildings and many large shopping malls.

2. Data Acquisition and Processing

(1) Data Acquisition

The hedonic price model is based on real data, so the data for this study come from the data collected in the "Qunar" search engine. From the three- to five-star hotels in the two business districts searched for "Qunar", the hotels that have been closed and the hotels with incomplete information were excluded. The final sample selected is 91 hotels. The data collection time was from December 1 to December 31, 2018. In order to eliminate the influence of seasonal factors, the investigation time range is from December 1, 2018 to February 28, 2019. The investigation time involved two major holidays in China: New Year's Day and Spring Festival. The type of room surveyed was a standard twin bed room.

(2) Data Processing

Variables selected in this study are diversified, so they were grouped according to the characteristics of variables. The statistical descriptions of continuous

variables can be referred to Table 1 and statistical results of dummy variables can be referred to Table 2. Table 2 shows that the number of three-star, four-star and five-star hotels in the sample data is

**Table 2.** Dummy variables descriptive statistics

Variable	Code	5star	4star	3star	Total
Breakfast	0	3	16	17	36
	1	24	17	14	55
	Total	27	33	31	91
F-Wifi	0	7	2	0	9
	1	20	31	31	82
	Total	27	33	31	91
BusiDist	0	15	17	14	46
	1	12	16	17	45
	Total	27	33	31	91
Holiday	1	54	66	62	182
	0	81	99	93	273
Advance1	1	27	33	31	91
Advance2	1	27	33	31	91

\* Data from Qunar.com

**Table 1.** Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Ptotal	2912	116.70	3640.41	899.116	693.70	481,223.74
P0	91	110.42	3558.21	888.69	690.06	476,177.05
P1	91	109.64	3495.43	877.50	663.99	440876.18
P2	91	130.03	3960.90	931.16	728.54	530,774.51
Pnew	91	145	4,191	1,007.67	775.29	601076.47
Pspri	91	150	4,745	1,113.02	871.63	759736.84
Pholiday	91	147.50	4,468	1,060.35	822.00	675682.09
Size	91	15	82	32.91	13.92	193.86
Num	91	14	829	192.58	167.33	27,999.45
OverRat	91	3.60	4.90	4.47	.201	.04
FaciSco	91	2.90	5.00	4.42	.30	.09
FbSco	91	3.40	4.90	4.39	.25	.07
Nummof3	91	14	17	15.48	1.51	2.28
Nummof4	91	16	17	16.51	.50	.253
Nummof5	91	12	15	13.52	1.51	2.28
dis1	91	18	25.40	21.66	2.51	6.30
dis2	91	.90	7.60	3.98	2.09	4.36
dis3	91	4.80	13.4	9.05	2.83	8.02

\*Data from Qunar.com

31, 33 and 27. The number of hotels in Yansha International Trade Business District is 45 and the number of hotels in Tian'anmen Wangfujing Business District is 46. There are 55 hotels offering free breakfast, the remaining 36 do not offer breakfast; there are 82 hotels with free internet access, and 9 hotels are available at an additional cost. It can be seen that the higher the hotel star rating, the higher the proportion of free breakfast, the higher the proportion of Internet access fees. The holiday price includes the New Year's Day and Spring Festival prices of 91 hotels, a total of 182 data; weekday prices include December, January, February average price, a total of 273 data; among them, the average price in December of the weekday price is regarded as the current price, a total of 91 data; the average price in January is regarded as the price scheduled one month in advance, a total of 91 data; the average price in February is regarded as the price scheduled two months in advance, a total of 91 data.

## B. Proposed Hedonic Price Model

Based on literature reviews for the internal, external and time characteristics of hotel room products, this study proposes the following hedonic price model of hotel room products:

$$P = f(Z_{ik}, Z_{iik}; Z_{iik})$$

$Z_{ik}$  is hotel room internal features, includes: star-rating, overall evaluation of the hotel, room size, breakfast, hotel food & beverage service quality, facilities and equipment, free internet service, number of hotel rooms.  $Z_{iik}$  is hotel room exterior features, includes: distance, business district, competitors.  $Z_{iik}$  is time features, includes: weekdays and holidays, advance booking (1 month), advance booking (2 months). The specific form of the model and the determination of the parameters are based on the specific study area.

Some variables such as distance, room area and other data are continuous, and since they can directly

reflect the connotation of variables, it is necessary to take the actual value of the variable or carry out the basic transformation (in the logarithmic model need to be converted to the corresponding logarithmic form). Other variables such as holidays, advance booking, hotel star rating, business district, free internet service and free breakfast, their values are discrete, non-continuous variables. Among them, whether it is a holiday including yes or no; advance booking includes current price, booking one month in advance and two months in advance; hotel star rating includes three-star four-star five-star; business circle includes Tian'anmen Wangfujing Business District and Yansha International Trade Business District; free Internet service is divided into free internet access and paid internet access; free breakfast can be categorized as providing breakfast or not. Since the hedonic price model requires variables to be continuous, this study uses the quantitative method of dummy variables. The specific variables are described in the following Table 3.

The data was fitted in a linear, semi-logarithmic and logarithmic form. In the linear function form, both the independent variable and the dependent variable enter the model in a linear form, and the regression coefficient corresponds to the implicit price of the feature, which is a constant. In the semi-logarithmic function form, the independent variable adopts a linear form, the dependent variable adopts a logarithmic form and enters the model separately, and the regression coefficient corresponds to the semi-elastic coefficient of the characteristic. In the logarithmic function form, both the independent variable and the dependent variable enter the model in logarithmic form, and the regression coefficient corresponds to the price elasticity of the feature.

From the variable setting part, there are some dummy variables in this study. Considering the dummy variable as a 0-1 variable, if the logarithm is taken, its logarithmic value does not exist or is 0, which is meaningless for the model, so for the hedonic price model, the dummy variable does not take a logarithm and still takes the form of a 0-1 variable. At this point, the logarithmic model becomes:



**Table 3.** Variable names and descriptions

Dependent variable	Description	Abbreviation
<b>Room price variables</b>		
Price	The lowest daily price of the hotel twin bed room price	Ptotal
Average holiday price	Average price of hotel twin bed room on New Year's Day and Spring Festival	Pholiday
Price of New Year's Day	Average price of hotel twin bed room on New Year's Day	Pnew
Price of Spring Festival	Average price of hotel twin bed room on Spring Festival	Pspri
Average weekday price	Average price of hotel twin bed room in December, January, February	Pweekday
Average weekday price in December	The lowest daily price of the hotel twin bed room price in December	P0
Average weekday price in January	The lowest daily price of the hotel twin bed room price in January	P1
Average weekday price in February	The lowest daily price of the hotel twin bed room price in February	P2
Independent variable	Description	Abbreviation
<b>Hotel room interior features</b>		
Star-rating		
Four Star	1 if the hotel is 4-star (no = 0)	4Star
Five Star	1 if the hotel is 5-star (no = 0)	5Star
Free Wifi	1 if free wifi is included (not included = 0)	F-Wifi
Breakfast	1 if breakfast is included (not included = 0)	Breakfast
Room size	The area of hotel twin bed room	Size
Number of hotel rooms	Total number of twin bed rooms owned by the hotel	Num
Overall Rating	'Qunar' users of the overall rating of the hotel, out of 5	OverRat
Overall rating of facilities	'Qunar' users of the overall rating of hotel facilities, out of 5	FaciSco
overall rating of food & beverage service	'Qunar' users of the overall rating of hotel food & beverage service, out of 5	FbSco
<b>Hotel room exterior features</b>		
Distance		
Distance1	Distance in km to Beijing Capital International Airport	Dist1
Distance2	Distance in km to Beijing Station	Dist2
Distance3	Distance in km to Beijing South Station	Dist3
Business district	1 if the hotel belongs to Yansha CBD (not = 0)	BusiDist
Competitors		
Number of 3-star hotels	Number of three-star hotels within a kilometer	NumOf3
Number of 4-star hotels	Number of four-star hotels within a kilometer	NumOf4
Number of 5-star hotels	Number of five-star hotels within a kilometer	NumOf5
<b>Hotel room time features</b>		
Holiday	1 if the price is holiday price (no = 0)	Holiday
Booking in advance		
Book one month in advance	1 if book one month in advance (no = 0)	Advance1
Book two months in advance	1 if book two months in advance (no = 0)	Advance2

$$\ln P = \alpha_0 + \sum \alpha_j \ln Z_j + \alpha_n \ln Z_n + \epsilon$$

Where  $\alpha_0$  is a constant term,  $Z_j$  ( $j=1, 2, 3...j$ ) is the feature value of the  $j$  features of the hotel

room,  $Z_n$  ( $n=j + 1, j + 2...n$ ) is the feature value of the dummy variable,  $\alpha_n$  ( $n=1, 2, 3...n$ ) is the estimated parameter, and  $\epsilon$  is the random error term.

A more common problem of the hedonic price

**Table 4.** Regression results of three models of the hedonic price model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
linear model	.898 <sup>a</sup>	.806	.802	149.402	.003	7.983	1	558	.005
Semi-logarithmic model	.930 <sup>a</sup>	.865	.863	.218	.001	4.479	1	559	.035
Logarithmic model	.933 <sup>a</sup>	.871	.869	.213	.003	11.418	1	552	.001

model is multi-collinearity, that is, there is a correlation between the independent variables and the estimation result of the model is not credible. Therefore, it is necessary to analyze whether the model has multi-collinearity. The Variance Inflation Factor (VIF) is usually used to test whether the model has multi-collinearity. The formula is as follows:

$$VIF = \frac{1}{1 - R^2}$$

Among them, R<sup>2</sup> is the coefficient of determination of the model. If the VIF is greater than 10, it indicates that there is more serious multi-collinearity, and the model needs to be adjusted. Otherwise, no adjustment is needed. For the model used in this study, the multi-collinearity problem of the model will be tested by the variance inflation factor (VIF).

## IV. Results

### A. Overall Market Hedonic Price Model

#### 1. Model Fitting

According to the three forms of the hedonic price model, the room prices of the hotel were fitted respectively and the results were summarized as shown in Table 4. The statistical correlation coefficient R=0.933 of the logarithmic model is the highest, which shows that there is a strong linear relationship between independent variables and dependent variables. The determination coefficient R squared and the adjusted R squared is 0.871 and 0.869, the

percentage that the logarithmic model can explain the difference of dependent variables is about 86.9%. In general, the logarithm model has the best fitting effect on the relationship between independent variables and dependent variables and has a strong explanatory ability. The significance test value of the logarithm equation is less than 0.05. Therefore, the logarithm model is adopted as the research model in this study.

Through the statistical analysis of the variables, the variables that have no significant relationship with the hotel price were removed, and the variables that have significant relationship with the hotel price are made into Table 5. It can be seen that the variables that have an impact on the hotel price are facilities and equipment ratings, food & beverage service quality score, the distance from Beijing station, room size, number of 4 or 5 star hotels, breakfast, business district, star-rating. And VIF values are all less than 10, so it can be considered that there is no collinearity between these variables. From this, the pricing formula of the hedonic price model can be obtained as follows:

$$\ln P = 3.201 + 0.940 * \ln \text{FacSco} + 0.670 * \ln \text{FbSco} - 0.266 * \ln \text{Dis2} + 0.481 * \ln \text{Size} + 0.069 * \ln \text{NumOf4} + 0.183 * \ln \text{NumOf5} + 0.154 * \text{Breakfast} + 0.384 * \text{BusiDist} + 0.355 * 4\text{Star} + 0.600 * 5\text{Star}$$

*\*Note*

- FaciSco: Overall rating of facilities
- FbSco: Overall rating of food & beverage service
- Dis2: Distance in km to Beijing station
- Size: Room size
- NumOf4: Number of 4-star hotels
- NumOf5: Number of 5-star hotels
- Breakfast: Breakfast (1 if the breakfast is included)
- BusiDist: Business district (1 if the hotel belongs to Yansha CBD)
- 4Star: Four star (1 if the hotel is 4-star)
- 5Star: Five star (1 if the hotel is 5-star)

According to the pricing formula of the hotel room

**Table 5.** Logarithmic model regression coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	3.201	.325		9.852	.000		
lnFaciSco	.0940	.121	.174	7.762	.000	.465	2.150
lnFbSco	.670	.114	.123	5.871	.000	.535	1.870
lnDis2	-.266	.048	-.110	-5.594	.000	.603	1.658
lnSize	.481	.035	.298	13.532	.000	.502	1.922
lnNumOf4	.069	.021	.080	3.379	.001	.417	2.401
lnNumOf5	.183	.023	.182	8.115	.000	.462	2.165
Breakfast	.154	.024	.131	6.495	.000	.603	1.658
BusiDist	.384	.028	.326	13.611	.000	.407	2.165
4Star	.355	.026	.284	13.532	.000	.530	1.886
5Star	.600	.035	.487	17.075	.000	.286	3.492

**Table 6.** Elasticity/semi-elasticity coefficients of independent variables

Variable	Coefficients	Elasticity/Semi-elasticity Coefficients%	Implied Price
(Constant)	3.201	—	—
lnFaciSco	.940	<i>.940</i>	—
lnFbSco	.670	<i>.670</i>	—
lnDis2	.266	<i>.266</i>	—
lnSize	.481	<i>.481</i>	—
lnNumOf4	-.069	<i>-.069</i>	—
lnNumOf5	.183	<i>.183</i>	—
Breakfast	.154	<i>.166</i>	149.243
BusiDist	.384	<i>.468</i>	420.786
4Star	.355	<i>.426</i>	383.023
5Star	.600	<i>.822</i>	739.073

price, the non-standardized regression coefficient corresponds to the characteristic price elasticity coefficient or semi-elasticity coefficient. In the elasticity/semi-elasticity coefficient section, the variable corresponding to the orthodox price elasticity coefficient is a continuous variable, and its value is equal to the corresponding regression coefficient. However, for independent variables that are not continuous variables, the price semi-elasticity coefficient cannot be directly used as the regression coefficient value, and it needs to be converted ( $e\beta-1$ ), as shown in Table 6.

In the column of elasticity/semi-elasticity coefficients

in Table 6, bold italic said elastic coefficient, the coefficient represents the percentage change in dependent variable when the independent variable changes by 1%. For example, the elasticity coefficient of the room size is 0.481, which means that under the condition of maintaining the same values of other characteristic variables if the room size increases by 1%, the room price will increase by 0.481%. The same is true for other elasticity coefficients. The other is the semi-elasticity coefficient, which means that if other variables remain unchanged, owning such a variable can increase the room price by a corresponding percentage. The implied price of the dummy variable

can be obtained by multiplying the semi-elastic coefficient by the average price of the room. For the 0-1 variable, the implied price represents the change range of the price with this variable compared with that without this variable, for 5-star variables, if the hotel is 5-star hotel, the price will be 739.073 Yuan higher than three-star hotel. For 4-star variables, if the hotel is a 4-star hotel, the price will be 383.023 Yuan higher than the 3-star hotel. For the implied price of the business district variable, it means that the average price of the hotel in yansha international trade business district is 420.786 Yuan higher than that in Tian'anmen Wangfujing business district.

## 2. Hypotheses Testing for the Overall Market

### (1) Hotel room interior features

Hotel star-rating has a significant implied price, which is consistent with previous research. Hotel star-rating reflects the rating of the industry organization, with strong authority, so consumers are willing to pay a higher implied price for the hotel star rating. This is also the most common conclusion of previous studies, supporting the research hypothesis of this study that hotel star rating has an impact on the hotel room price, with an implied price.

There was no significant relationship between overall rating and room price of the hotel, which may be related to the data source of Qunar's overall rating. According to the statement of Qunar.com, this overall rating is based on the historical rating of Qunar.com and the ratings of new users. And hotel facilities and service rating have no direct corresponding relationship, which makes the concept of the overall rating is relatively fuzzy; the user can't perceive this score with hotel quality or other characteristics of the contact, so this feature reference is of little significance when making decisions. Hotel operators will not refer to this feature when setting the price, so the research results negate the hypothesis of this study, the hotel overall rating has no impact on the price of the hotel, there is no implied price. Qunar should reposition the overall rating to make clear the correlation between the overall rating and

hotel quality, so as to make the overall rating more instructive.

The semi-elasticity coefficient (0.481) of the room size means that for every 1% increase in room size, the room price increases by 0.481%. The larger the area is, the higher the price will be. Such results are in line with the hotel cost and consumers' perception of comfort, and also support the hypothesis of this study that the hotel room area has an impact on the hotel room price, with an implied price.

In Table 6, the implied price of free breakfast is 149.243 Yuan, which supports the hypothesis of this study that free breakfast has an impact on hotel room price and has an implied price.

The food & beverage service quality score of the hotel is significantly correlated with the room price of the hotel, and its elasticity coefficient is 0.670. It supports the hypothesis that the hotel's food & beverage service quality score has an impact on the room price of the hotel, with an implied price. A 1% increase in the food & beverage service quality score will result in a 0.670% increase in the room price. The hotel needs to make corresponding efforts in food & beverage services, improve consumers' impression of the high quality of the hotel, and strive to cultivate potential consumers.

The rating of facilities and equipment has a significant implied price, and its elasticity coefficient is 0.940%, which supports the hypothesis of this study that the score of hotel facilities and equipment has an impact on the room price of the hotel, has an implied price.

There is no significant correlation between free Internet service and hotel price. It supports the hypothesis of this study that free Internet service for hotel rooms has no impact on the room price of the hotel, and there is no implied price. Free Internet access for hotels has become very common, the cost of free Internet access is very low, and almost all hotels offer this service. In addition, the popularity of mobile wireless Internet technology has reduced customers' demand for free Internet service. So it is not unexpected to come up with such a result.

The variable number of hotel rooms has no

significant implied price in the hedonic price model, which does not support the hypothesis proposed in this study that the number of hotel rooms has an impact on the price of hotel rooms.

### *(2) Hotel room exterior features*

The distance from the Beijing station in the distance variable has a significant relationship with the hotel's room price, with a significant implied price. This study focuses on the Beijing Central Business District, but the results indicate that the implied price of the location variable still exists, supporting the hypothesis proposed in this study that distance has an impact on the hotel's room price and has an implicit price. In the hedonic price model, the elastic coefficient of the  $\ln\text{Distance}^2$  (distance from Beijing station) is 0.266%. It shows that for every 1% increase in distance from the Beijing station, the hotel room price has increased by 0.266%. From the geographical location of Beijing station, the closer to Beijing station, the more it is in the center of Beijing Central Business District, so the results show that if the hotel is located in the core business area, the higher the implied price.

The semi-elasticity coefficient of the business district in the hedonic price model is 0.468, and the implied price is 262.63 Yuan. Supporting the hypothesis of this study, the hotel-owned business district has a significant relationship with the price of the hotel room, with an implied price. It shows that the average hotel room price in Yansha International Trade District is 262.63 Yuan higher than the price of Tian'anmen Wangfujing Business District. Yansha International Trade District is located in the core area of Beijing Central Business District once again verifying if the hotel is located in the core business area, the higher the implied price. Among the competitors variable, there is a significant relationship between the number of 5-star hotels within 1 km and the number of 4-star hotels within 1 km and the price of hotel rooms, with a significant price elasticity of 0.183% and 0.069%. It supports the hypothesis that the number of 5-star and 4-star hotels within one kilometer has an impact on the hotel room

price, but does not support the hypothesis that the number of 3-star hotels within one kilometer has an impact on the hotel room price. The results show that in the central business district, the higher the concentration of 4-star hotels and 5-star hotels, the higher the room price. The possible reason is that the more concentrated the 4 & 5-star hotels are, the higher the demand and payment ability of the target consumers in this region are, the better the location is, and the room price is increased from both the market demand and cost. On the other hand, it also shows that 4 & 5-star hotels cannot attract more consumers simply by price competition.

### *(3) Hotel room time features*

There was no significant implied price in the room time features. The results do not support the hypothesis that holidays and the advance booking have a significant relationship with hotel room prices. The possible reason is that the price selected is already lower after the comparison of the travel meta-booking engine, and the hotel has not made corresponding more detailed price difference in this channel.

## **B. Star-type segmented market hedonic price model**

### *1. Model Fitting*

For the premise of the overall market, it was concluded that feature variables including the hotel star-rating, room size, free breakfast, food and beverage service quality score, facilities and equipment ratings, distance, business district, number of 5-star hotels within 1 km, and the number of 4-star hotel within 1 km have significant relationships with the hotel room price, and these feature variables have an implicit price. However, it is necessary to conduct further research on star-type segmented market. This is because the competition in the hotel market segment is more intense. They provide relatively homogeneous products facing a similar customer group. It is believed that analyzing the market segmentation by star-rating

**Table 7.** Regression results of three models of the hedonic price model

Star Hotel	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
						R Square Change	F Change	df1	df2	Sig. F Change
3-star Hotel	linear model	.850 <sup>a</sup>	.722	.584	81.90600	.722	5.204	10	20	.001
	Semi-logarithmic model	.741 <sup>a</sup>	.550	.324	.28535	.550	2.441	10	20	.043
	Logarithmic model	.739 <sup>a</sup>	.546	.283	.29401	.546	2.075	11	19	.078
4-star Hotel	linear model	.711 <sup>a</sup>	.505	.280	279.71104	.505	2.246	10	22	.055
	Semi-logarithmic model	.709 <sup>a</sup>	.502	.276	.28789	.502	2.222	10	22	.057
	Logarithmic model	.749 <sup>a</sup>	.560	.330	.27697	.560	2.434	11	21	.038
5-star Hotel	linear model	.859 <sup>a</sup>	.737	.573	560.08225	.737	4.490	10	16	.004
	Semi-logarithmic model	.856 <sup>a</sup>	.733	.567	.32818	.733	4.400	10	16	.004
	Logarithmic model	.868 <sup>a</sup>	.753	.573	.32592	.753	4.167	11	15	.006

**Table 8.** (3-star hotel) Elasticity/semi-elasticity coefficients of independent variables

Variable	Coefficients	Elasticity/Semi-elasticity Coefficients%	Implied Price
(Constant)	-3.451	—	—
lnFaciSco	.556	.556	—
lnFbSco	.743	.743	—
lnDis1	1.300	1.300	—
lnSize	.692	.692	—
lnNumOf4	-.129	-.129	—
lnNumOf5	.228	.228	—
BusiDist	.476	.610	548.461

is more instructive. Following Table 7 is the results of analysis for the star-type segmented market and the implied prices of different features of the hotels.

It can be seen from the Table 7 that the logarithmic model of the four-star and five-star hotels has the best fitting degree, so the 4-star and 5-star hotels should adopt the logarithmic model. The 3-star hotel room price linear model has the best fitting goodness, but in order to be comparable with other models, the three-star hotel also uses a logarithmic model. By taking a procedure of removing the independent variables that have no significant relationship with the dependent variable, following model logarithmic equations for 3-star, 4-star and 5-star are presented. Table 8, 9, & 10 is the regression coefficient statistics of 3-star, 4-star, and 5-star hotel room price.

3-star hotel hedonic price model logarithmic equation:

$$\ln P = -3.451 + 0.556 * \ln FacSco + 0.743 * \ln FbSco + 1.300 * \ln Dis1 + 0.692 * \ln Size - 0.129 * \ln NumOf4 + 0.228 * \ln NumOf5 + 0.476 * BusiDist$$

*\*Note*  
 FaciSco: Overall rating of facilities  
 FbSco: Overall rating of food & beverage service  
 Dis1: Distance in km to Beijing Capital International Airport  
 Size: Room size  
 NumOf4: Number of 4-star hotels  
 NumOf5: Number of 5-star hotels  
 BusiDist: Business district (1 if the hotel belongs to Yansha CBD)

4-star hotel hedonic price model logarithmic equation:

$$\ln P = 4.24 + 1.041 * \ln FacSco + 0.308 * \ln FbSco - 0.504 * \ln Dis1 + 0.141 * \ln Dis2 + 0.444 * \ln Size + 0.164 * \ln NumOf4 + 0.071 * \ln NumOf5 + 0.135 * BusiDist$$

*\*Note*  
 FaciSco: Overall rating of facilities  
 FbSco: Overall rating of food & beverage service  
 Dis1: Distance in km to Beijing Capital International Airport

**Table 9.** (4-star hotel) Table of elasticity/semi-elasticity coefficients of independent variables

Variable	Coefficients	Elasticity/Semi-elasticity Coefficients%	Implied Price
(Constant)	4.24	—	—
lnFaciSco	1.041	.1041	—
lnFbSco	.308	.308	—
lnDis1	-.504	-.504	—
lnDis2	.141	.141	—
lnSize	.444	.444	—
lnNumOf4	.164	.164	—
lnNumOf5	.071	.071	—
BusiDist	.135	.145	130.371

**Table 10.** (5-star hotel) Table of elasticity/semi-elasticity coefficients of independent variables

Variable	Coefficients	elasticity/semi-elasticity coefficients%	Implied Price
(Constant)	.483	—	—
lnFaciSco	.691	.691	—
lnFbSco	-.536	-.536	—
lnDis1	.873	.873	—
lnSize	.515	.515	—
lnNumOf4	.246	.246	—
lnNumOf5	.321	.321	—
Breakfast	.247	.247	222.082
BusiDist	.339	.403	362.343

Dis2: Distance in km to Beijing station  
 Size: Room size  
 NumOf4: Number of 4-star hotels  
 NumOf5: Number of 5-star hotels  
 BusiDist: Business district (1 if the hotel belongs to Yansha CBD)

5-star hotel hedonic price model logarithmic equation:

$$\ln P = 0.483 + 0.691 * \ln FacSco - 0.536 * \ln FbSco \\ + 0.873 * \ln Dis1 + 0.515 * \ln Size \\ + 0.246 * \ln NumOf4 + 0.321 * \ln NumOf5 \\ + 0.247 * Breakfast + 0.339 * BusiDist$$

\*Note  
 FaciSco: Overall rating of facilities  
 FbSco: Overall rating of food & beverage service  
 Dis1: Distance in km to Beijing Capital International Airport  
 Size: Room size  
 NumOf4: Number of 4-star hotels  
 NumOf5: Number of 5-star hotels  
 Breakfast: Breakfast (1 if the breakfast is included)  
 BusiDist: Business district (1 if the hotel belongs to Yansha CBD)

## 2. Hypotheses testing for the star-type segmented market

### (1) Hotel room interior features

The overall rating of hotels has no significant implied price in the hedonic price model of the star-type segmented market, which again negates the hypothesis that the overall rating has an impact on hotel room price. Qunar should reposition the overall rating to make clear the correlation between the overall rating and hotel quality, so as to make the overall rating more instructive. Room size appears in the hedonic price model for all star-type segmented market.

In the logarithmic model of the 3-star hotel room price, the coefficient of elasticity of the room size (0.692) means that for every 1% increase in the room size, the room price increases by 0.692%; in the logarithmic model of the price of a 4-star hotel room, the coefficient of elasticity of the room size (0.444)

means that for every 1% increase in the room size, the room price increases by 0.444%; in the logarithmic model of the price of a 5-star hotel room, the coefficient of elasticity of the room size (0.515) means that for every 1% increase in room size, the room price increases by 0.515%. The higher the hotel's star-rating, the greater the implied price of the room size, which verifies the assumption that the hotel's star-rating and room size have an impact on hotel room prices.

The free breakfast only appears in the price model of the 5-star market segment, supporting the assumption that the free breakfast has a significant relationship with the hotel price. The implied price for breakfast in the 5-star hotel room price model is 222.082 Yuan. The hotel food & beverage service quality rating features have appeared in all three models, validating the hypothesis that the hotel food & beverage service quality rating has a significant relationship with the hotel price. The facilities and equipment rating has significant implied prices in the three price models. The elasticity coefficient in the model is 0.556 (3-star), 1.041 (4-star), and 0.691 (5-star). Supports the hypothesis put forward in this study. The free internet service is the same as in the overall hedonic price model and does not have a significant implied price. In the sample data, most of the 3-star and 4-star hotels provide free Internet access. The 5-star hotels usually adopt a free Internet service for members, which is not directly reflected in the price of the meta-search engine channel.

The number of rooms in 4-star, 5-star hotels have different elasticity coefficients in the hedonic price model of the star-type segmented market, supporting the assumption that the number of hotel rooms proposed in this study has an impact on hotel room prices. Comparing the elastic coefficients, it can be found that the lower the star-rating, the higher the implied price of the hotel scale. Such a result can be understood as 3-star or low-star hotels that need to build the brand effect through scale and enhance consumer confidence in its purchase. Consumers of 4- and 5-star hotels want to stay in boutique hotels or hotels with special features. So they are not sensitive to the scale of the hotel.

### *(2) Hotel room exterior features*

The distance variable that has a significant relationship with hotel room price in the star-type segmented market is different from the distance variable in overall market hedonic price model. Among them, the elasticity coefficient of the distance from the Capital International Airport in the 3-star hotel price model is 1.300; the elastic coefficient of the distance from the Capital International Airport in the 4-star hotel price model is -0.504, and the elastic coefficient from the Beijing Station in the 4-star hotel price model is 0.141; the elastic coefficient of the distance from the Capital International Airport in the 5-star hotel price model is 0.837. The semi-elastic coefficient of the business district variable in the 3-star hotel price model is 0.610, the implied price is 548.461 Yuan; in the 4-star hotel price model the implied price is 130.371 Yuan; the semi-elastic coefficient in the 5-star hotel price model is 0.403, the implied price is 362.343 Yuan. The conclusions still indicate that although the two business districts are adjacent, Yansha International Trade District belongs to the core area of Beijing Central Business District, and consumers are willing to pay higher implied prices for this business district. From the data of the competitors in Table 10, it can be seen that in the star-type segmented market, the features of competitors have very significant implied prices, which will greatly impact the pricing of hotel rooms. And the higher the hotel star-rating is, the more competitors it needs to consider.

### *(3) Hotel room time features*

In the star-type segmented market hedonic price model, there is no significant implied price for the time features. This may be related to the flaws in the pricing of the meta-search engine channel.



## V. Conclusion

### A. Summary of Findings and Practical Implications

In this paper, the hedonic price model is used to analyze the main features that affect the price of hotel rooms under two different market models. Through the analysis of the overall market hedonic price model and the star-type segmented market price model of the 3- to 5-star hotels in the Beijing Central Business District, it was defined that the logarithmic form of the hotel room hedonic price model has the best fitting degree and it has the strongest explanatory power to price. Consistent results were also obtained in the study of Zhang et al. (2011). It is indicated that the logarithmic form of the hedonic price model is more applicable in the context of a hotel in the study area.

The pricing model of different markets has different characteristics and the implicit price (elasticity coefficient) of the same characteristics is different. In the overall market, among hotel room interior features, hotel star rating, room area, free breakfast, food & beverage service quality, hotel facilities & equipment and free internet service have an impact on the hotel room price, with an implied price. However, the number of hotel rooms has no impact on the price of hotel rooms. For the hotel room exterior features, distance and the hotel-owned business district have a significant relationship with the price of the hotel room, with an implied price. Moreover, the number of 5-star and 4-star hotels within 1 km has an impact on the hotel room price, but the number of 3-star hotels within 1 km has no impact on the hotel room price. All hotel room time features including holidays and the advance booking have no significant relationship with hotel room prices.

In the star-type segmented market, all hotel room interior features including star-rating, room size, free breakfast, food & beverage service quality, facilities & equipment and the number of hotel rooms have a significant relationship with the hotel price. Also, the features of competitors have very significant

implied prices, which will greatly impact the pricing of hotel rooms in the star-type segmented market. And the higher the hotel star-rating is, the more competitors it needs to consider. Lastly, there is no significant implied price for the time features.

The results of the study indicate the hotel's external business environment determines the real estate value where the hotel is located and the ability of the target consumer to pay. The number of competitors also has an implicit price. In particular, the increase in the number of five-star hotels can indicate that the region has a strong consumption power and a good regional economy.

The results of this study provide theoretical and practical implications. Through the analysis of the hidden price of hotel features under the star-type segmented market, it can be seen that the consumers of different star hotels have different sensitivities and payment intentions for various attributes of the hotel. With the increase of hotel competition, the pure "low price marketing" is not able to maximize revenue. What consumers want is a real "value for money". It is necessary to exceed the value standards of existing products or services to enhance consumer value and competitiveness. Specifically, hotels should conduct market segmentation according to its own positioning and features, and implement different pricing strategies and service plans for different consumer needs. For example, in the competition of five-star hotels, for high-end guests, many hotels offer free brand toiletries, branded bedding equipment, etc.; catering services provide low-fat, organic breakfast series that meet the eating habits of business people. These details make the hotel meet the needs of high-end guests and maximize revenue. In addition, the hotel can calculate the cost of formulating and implementing relevant strategies through the hedonic price model to consider whether it is wise to formulate a corresponding differentiated competition. For example, if the hotel wants to increase hotel revenue by offering free breakfast to consumers, it is necessary to determine the implied price of this feature, and whether the implied price matches the cost. If the expected increase in revenue is less than the cost

of the expenditure, the hotel may need to reconsider other low-cost promotions to stimulate demand.

Regarding the implied price of the exterior features of hotel rooms, it was found that the external features of hotel rooms have a great impact on the price of hotel rooms. Developers must make careful choices about the location, based upon a full analysis of the geographical location and external business environment.

Through the study of the hotel room time features, it can be seen that the current management of Chinese hotels in the operation of revenue management, refined pricing is still insufficient. It is necessary to pay attention to revenue management and improve the pricing system. As the number of guests booking rooms through the meta-booking engine is increasing, it is particularly important to reasonably determine the price of the room that sold through online channels.

## B. Limitations and Further Research

This study analyzes main attributes influencing the room rate of full-service hotel based on hedonic price model. Although this research explored the price elasticity of the relevant features of hotel room products and the needs and preferences of consumers in different market segments, it also left certain deficiencies. Future research should be carried out for expanded research area beyond Beijing in order to achieve more universal applicability. It is also necessary to increase the research variables in order to improve the accuracy and applicability of the model. In China, the five-star hotel market is divided into quasi-five-star, standard five-star, boutique hotels, etc. It would provide more comprehensive information once it analyses more detailed division of the market under the same star rating.

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