Hotels competition based on online ranking position

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Abstract

Electronic word of mouth (eWOM) information has become extremely relevant for the reputation of hotels and is a key variable in terms of their capacity to set prices and improve their occupancy rate. However, overall ratings have a bias towards high values; luxury hotels concentrate on a few ranges of values in terms of their rating, making it more difficult for consumers to differentiate among these hotels. In this context, the ranking position that is unique for each hotel is an additional source of information for potential consumers, and it can have a direct impact on the hotel managers' capacity for setting higher prices. This research proposes a theoretical model of vertical differentiation that adds the ranking position as a part of demand function and analyses the optimum strategy in terms of quality investment and prices for hotels in a given destination. The model is empirically tested using a sample of 102 hotels from the city of Barcelona. Our results suggest that the ranking position has a direct effect on higher prices and that this effect is more important and significant than the effects of rating value or the number of stars on prices.

Keywords: Hotel pricing, online rankings, sequential game

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Introduction

The hospitality industry has experienced profound changes in its market structure, from the emergence of new forms of competition, such as Airbnb and other similar platforms, to new forms of booking that use platforms such as Tripadvisor and Booking.com (O'Connor, 2010; Banerjee and Chua, 2016; Mariani and Borghi, 2018). The advent of these innovations and the changes they have brought about within the hotel industry has attracted the attention of scholars and practitioners alike (Guttentag, 2015; Zervas *et al.*, 2017). The importance of electronic word of mouth through these platforms and how they influence the consumers' decision making process is a relevant topic in hospitality (Casalo *et al.*, 2015). This research aims to question the importance of ranking position for an established hotel in terms of its capacity to set a higher price. In a context in which positive reviews and overall ratings concentrate on a few ranges of values, consumers need additional sources of information that can help them to differentiate expected levels of quality for services as well as gauge the consumers' experience associated with each hotel (Sparks and Browning, 2011). The ranking position is unique for each hotel and a better position is a signal of higher quality with potential effects on hotel pricing capacity.

Based on previous models for oligopolistic markets with vertical differentiation, both of which are two characteristics of the hotel industry (Amir *et al.*, 2017; Di Cometi *et al.*, 2014; Matsubayahsi, 2007); this research proposes a theoretical model for hotel decision-making in terms of price and investment in quality that includes ranking position as part of the demand function for each hotel. The model is tested using information from a sample of hotels for the city of Barcelona.

The model

We consider a linear demand function for each hotel that is similar to other models that aim at representing vertical differentiation (Matsubayahsi, 2007). The quantity demanded for each hotel depends negatively on the price (β) and positively on the level of quality (δ). As an addition to previous models in the academic literature, the demand function used in this research includes a new factor, the ranking position (ϕ). The demand is higher as the number of firms with lower ranking than the firm considered increases. For the hotel with the highest position in the ranking, $N_i = n-1$. For the firm with the lowest ranking $N_n = 0$, where n is the number of hotels in the particular destination we are considering. The demand function can be written as follows:

$$q_i = \alpha - \beta P_i + \delta x_i + \phi N_i \quad (1)$$

In terms of cost structure, the model follows previous literature about economic models for quality differentiation, where quality cost can be expressed using a quadratic function, cost, $C_i = \psi_i x_i^2$ (Chaudhuri, 2000). The model assumes that firms have asymmetric costs that are caused by differences in their access to financial resources, size and the advantage of economies of scale, or different levels of efficiency based in management skills. Therefore, the ψ_i coefficient is different for each firm. Hotels want to maximize their profits and this situation is modelled as a sequential game in which, first firms decide simultaneously on the level of quality, and in a second stage, they decide simultaneously on the price. Firms don't decide their position in the ranking, but their position is a consequence of their quality investment level compared with others. For a given hotel, hotel i , profits can be expressed as follows:

$$\Pi_i = (\alpha - \beta P_i + \delta x_i + \phi N_i) \cdot P_i - \psi_i x_i^2 \quad (2)$$

By applying the first and second condition for the maximum profits in terms of price, the optimum price for each firm can be expressed as follows:

$$P_i = \frac{\alpha + \delta x_i + \phi N_i}{2\beta} \quad (3)$$

Considering equation 3 the profit function can be expressed as a function of the quality investment level (x_i), and, by applying the maximization conditions again, the optimum level of quality for each firm is:

$$x_i = \frac{\delta}{2\psi_i\beta - \delta^2} (\alpha + \phi N_i) \quad (4)$$

Firms differ in their optimum level of investment as a consequence of asymmetric costs. Hotels with lower costs for a given level of quality (ψ_i) have a higher investment in quality, and therefore, better ranking positions. A less elastic demand measured by the β coefficient reduces the necessity to invest in quality and, finally, the parameter δ captures the elasticity demand related to higher levels of quality. If the optimum level of quality is included in the price expression, the optimum price for each hotel is:

$$P_1 = \frac{\alpha}{2\beta} + \frac{\alpha}{2\beta} \left(\frac{\delta}{2\psi_1\beta - \delta^2} \right) \alpha \quad (5)$$

$$P_n = \frac{\alpha}{2\beta} + \frac{\alpha}{2\beta} \left(\frac{\delta}{2\psi_n\beta - \delta^2} \right) (\alpha + (n-1)\phi)$$

According to this model, we expect that price differences between hotels will increase as the importance consumers give to the ranking as a signal for quality increases (ϕ). The model also predicts that as the number of hotels increase in a given market (n), the price heterogeneity increases, thus, giving more options for consumers with different willingness to pay or different levels of income. The coefficients related to the quality elasticity of demand (δ) and the price elasticity of demand (β) have the expected positive and negative effect for prices. Future developments of this model can include the effect of hotel location in the quantity demanded or a dynamic approach to modelling that considers as endogenous the number of firms (n) depending on the hypothesis about entry barriers.

Empirical evidence: Data and methodology

A database with information from the hotel industry in the city of Barcelona has been used in order to test the theoretical model proposed. The city of Barcelona has experienced an exponential growth in the number of international tourists that visit the city yearly. From 1990 to 2017, the number of international tourists staying at hotels has increased from 1.73 million to 8.8 million, and it has become one of the top ten cities in number of tourists in Europe. The information for each hotel in the database is available at Booking.com, one of the most popular websites for online booking of hotels. The database includes information for 102 hotels. The sample represents 22.77% of the hotels in the city. The hotels included in the sample were selected from applying random sampling to the set of hotels for which all the information was available, and that were present at Booking.com the eight times in which the information was gathered. For each hotel the information gathered includes: the number of stars according to regional government regulation, from 1 to 5, the distance to the centre of the city measured in kilometres, the average rating (from 0 to 10) it has in the website, the ranking position in the website and the price for two nights. The Booking.com allows the potential customer to order hotels according to different criterion, it could be according to prices, it could be according to the distance to the city centre or by the overall valuation from past customers. This paper considers ranking position the order of hotels one overall valuation by past customers is selected as the criteria to order hotels. The overall

valuation is the average of the valuation for six categories: location, cleanliness, comfort, value, facilities and staff, customers that review the hotel can value each category with a value from 1 to 10. Booking includes reviews for a period of 24 months, and the platform has the right and the capacity to exclude the comments that use rude language, give specific employees names or comment sensitive political issues. The Price for a two-night booking depends on the day of the week. To capture this weekly seasonality, two options have been considered, a Wednesday and Thursday night stay and a Friday and Saturday night stay. The dates in which this information was collected are 29 of July, 12 of August, 26 of August, 9 of September, 23 of September, 7 of October, 21 of October, and 4 of November. The database includes a total of 725 individual observations.

The main descriptive statistics for the sample are summarized in Table 1. The data concur with previous literature. The price for two nights in a weekend are on average 192€ more expensive than two nights during the week (Aznar *et al.*, 2018). It is also worthy to mention that the average ratings for hotels are high (Stringam and Gerdes, 2010), with an average value of 8.6. In fact, more than 42% of the hotels are rated between 9 and 10. Hotels differ quite widely in terms of the number of comments or reviews from past customers they have in the booking website. The average number of comments is 1414, with a standard deviation of 960.

Table 1. *Descriptive statistics*

Variable	Mean	Std deviation	Minimum	Maximum
Distance to the centre (km)	1.473	1.099	0.10	5.00
Ranking (Booking)	146.75	124.240	1	434
Rating (Booking)	8.604	0.675	7.2	9.6
Number of reviews	1414	960.054	189	5469
Price weekend (€)	386.67	197.566	108	2015
Price weekday (€)	170.88	95.23	42	915

To test the proposed economic model for hotel price as a function of quality levels and the effect of ranking position, two linear regressions with the price as a dependent variable have been performed. The first regression considers the price booking for a weekend while the second regression considers booking for a Wednesday and Thursday night stay. The independent variables are the ranking position (Booking), the rating average value (Booking), the number of comments (Booking), the number of stars, and the distance to the centre of the city. The last two variables have been found significant as explanatory variables for hotel prices in the past (Rigall-I-Torrent *et al.*, 2011; Israeli, 2002). The regression model is:

$$Price = \alpha + \beta_1 stars + \beta_2 distance + \beta_3 ranking + \beta_4 rating + \beta_5 comments + \varepsilon_i(6)$$

Table 2 summarizes the results from the linear regression analysis supporting the main ideas of the theoretical model presented, that price setting depends not only in quality or hotel's location, but also on the ranking position. The dependent variable with a higher impact, measured by the β standardized, is the ranking position. According to the first regression for each position lost in the ranking, the price for a weekend booking is reduced 0.678€. In the case of the price for two weekday nights, the impact is even greater, such that each position lost in the ranking means an average of -2.722€. Contradicting some previous empirical research (Israeli, 2002), in this analysis the number of stars is not significant, distance is significant, but with a coefficient that has not the expected sign. In addition, a higher distance in this sample is correlated with a higher price. A possible explanation for this result requires analysing how the hotel sector has grown in Barcelona. Over the last decade, luxury hotels, which are

well positioned in the ranking, have opened far away from the city centre because of the constraints to find locations in the city centre.

Table 2. *Regression model results*

Price for a two nights weekend regression				Price for a two nights weekday regression			
variable	β	β std	Sig.	variable	β	B std	Sig.
Stars	-3.542	-0.016	0.598	Stars	-1.459	-0.14	0.655
Distance	14.880	0.083	0.008**	Distance	9.026	0.104	0.001**
Ranking	-0.678	-0.426	0.000**	Ranking	-2.722	-0.355	0.003**
Rating	38.358	0.131	0.277	Rating	28.187	0.200	0.100
Comments	-0.23	-0.113	0.000**	Comments	-0.009	-0.095	0.003**
R ² 0.344	R ² adjusted 0.339			R ² 0.336	R ² adjusted 0.331		
ANOVA test F 75.406	Significance 0.000			ANOVA test F 72.619	Significance 0.000		

Discussion

The hotel industry has changed radically in the last two decades. Customers have changed their behaviour (Lien *et al.*, 2015), including how they book hotels and from where they get their information for decision-making. Researchers, but also hotels managers are interested in knowing the key drivers in hotels' guests purchase decision. Traditionally, hotels signalled their quality through the number of stars, but online ratings are more dynamic, less based on administrative rules and much more in customers' experience (Abrate and Viglia, 2016). Future research must explore consumers' behaviour when booking a hotel, to analyse how important different aspects are, such as prices, or ranking or just considering specific comments they read. The rating and the ranking position are subjective values, in fact, some hotels have expressed their concerns to Booking.com. More research about the possible bias and flaws that rankings and ratings have will be add value to the academic literature. This research adds a new perspective in the debate about online reputation, according to our sample the effect of the ranking position is much more important than the rating value. Although this is a first attempt to address the importance of the ranking position, both developing a theoretical model and using empirical data to assess the conclusions of the model, suggest that hotels managers must focuses their marketing and investment quality efforts much more in improving the ranking than just increasing the rating. The idea of how the ranking position helps hotels to increase their price setting capacity is important. Although a good location has a positive impact in prices and hotels profitability (Aznar *et al.* 2017), the data for Barcelona suggest that in big cities with a mature hotel industry, and low attractive locations available, a strategy based in excellent quality service that implies top positions in the most common online rankings (TripAdvisor or Booking) can increase the hotel' price setting capacity compensating the disadvantage of not such a good location.

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