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An **online hotel demand model** for two resort hotels in Mallorca

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Keywords | Price elasticity of demand, pricing, hotel revenue management, demand, booking horizon

Objectives | This work presents a specific demand model for measuring own-price elasticity values throughout different seasonal demands and across booking horizons. The availability of price elasticity of demand values will allow the analysis and comparison across the different booking times, seasonal demands and among different hotels. We present a case study application of this demand model, using data for two resort hotels in Mallorca and estimating different seasonal elasticities for the online booking segment.

Literature review | Revenue management deals with the application of and information system and pricing that guarantees to sell the right capacity at the right time in the right place in order to maximize revenue (Ivanov and Zhechev, 2012; Legohérel et al., 2013; Padhi and Aggarwal, 2011). Through price variations the demand can be adjusted when the hotel available occupancy differs from the occupancy that allows the revenue maximization. One basic revenue management tool is price discrimination (Ivanov & Zhechev, 2012), where the prices vary according to the type of guest as opposed to the type of room or the cost of the service, which is based on the different willingness to pay of each market segment. Therefore, the estimation of the hotel demand function is a direct way of obtaining price elasticity of demands (Shy, 2008). The price elasticity of demand is something difficult to measure in the sectors using revenue management techniques (Vinod et al., 2009; Jacobs et al., 2010).

Methodology | We define different demand functions for homogeneous stay periods and booking periods, allowing for time differences within these periods, so as to capture the temporal and price effects

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on reservations. The hotel demand function used can be defined as a function of P and RES:

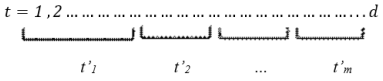
$$Q_t^d = f(P_t^d; RES_t^d)$$

Where Q represents the daily room reservations made across the booking horizon; t is the booking horizon (t=1, 2,. . . , d where d is a specific date of stay); P is the price on the booking date and RES is the gap between the booking date and date of stay t – where the booking time period is a continuous interval.

As the demand for date of stay d might be very similar to the demand for d+1, d+2, d+3. . . , all these demands can be grouped together in a homogeneous group, D, as in Shy (2008).

$$Q_t^D = f(P_t^D; RES_t^D)$$

The next step is to transform the daily room reservations (Q) into the average daily room reservations (q) for the period of time across the booking horizon where P remains constant:



Then we can define the average daily room reservation as

$$q_{t'}^D = f(P_{t'}^D\ ;\ res_{t'}^D; D)$$

Where res is the average gap between the booking date and the date of stay during the period of time that P remains constant; and days are the number of days that P remains constant.

The demand model specification used is a log-linear functional form, where its coefficient is the price elasticity of demand (Canina & Carvell, 2005; Shy, 2008; Thrane, 2006).

$$\ln q_{t'}^D = \alpha_0 + dummies + \beta_p \cdot lnP_{t'}^D + \beta_{RES} \cdot ln\, res_{t'}^D + \beta_{DAYS} \cdot ln\, days_{t'}^D$$

where the dummies included are similarly defined as in Tran (2015).
The case study focuses on two resort hotels in Mallorca belonging to a multinational hotel chain. Three sources of information were used:

- Contract information: It makes reference to the seasonal prices. The prices fluctuate according to the stay period, type of room, type of board, guest type, booking date, length of stay and method of payment.
- Online reservations: It makes reference to the online reservation data.
- RM price variation: At short run the revenue manager can change the price depending on the booking date, sales rate and occupancy level.

Main Results and Contributions | The main findings are: (i) the price elasticity of demand values displayed by both hotels are more elastic as those reflected in the literature; (ii) the two hotels present completely different elasticity patterns during peak season; meanwhile in the low season, demand both

hotels show a quite inelastic demand; (iii) the early booking strategy is identical across the season, while elasticity values are completely different between low and peak season; therefore, the fact of setting different early bookings discounts during the seasons and among hotels is highly appropriate; and (iv) having estimates of the price elasticity of demand from past seasons can also be used on the long- to medium-run pricing strategy.
The model simplicity makes it easily applicable to other type of hotels as well as it allows the data aggregation to estimate joint demand functions and the comparability among them. A second contribution of the paper is the process proposed to transform, simplify, and harmonize the hotel data variables, which enables the application of this demand model to other hotels.

Limitations | The study does not include additional data from the hotel or competitor prices, which could improve elasticity estimations. Furthermore, the availability of additional hotel booking information – such as number of guests, room type, board, and etc. –, or information on other segment data different from the online segment – such as Tour Operator demand – could allow the original price elasticity of demand to be split into different elasticity values.

Conclusions | Knowledge of hotel price elasticity of demand is a key tool in hotel sector pricing management, especially in the emerging online demand segments for resort hotels in mature destinations needing to diversify in order to maintain competitiveness.
This empirical study presents a demand model that the measurement of the seasonal and booking horizon variation of different price elasticities of demand at hotel level. Additionally, an empirical application to establish the best pricing strategy for online demand for two resort hotels is presented. The demand estimations enable the comparison of own-price elasticity across the different stay dates and booking times.
The results could be useful in the short-run pricing focused on the optimal pricing that allows the revenue maximization and in the definition of an appropriate pricing strategy in the medium and long-run for online demand in resort hotels.

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