



A demand-driven analysis of tourist accommodation price: A quantile regression of room bookings



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ABSTRACT

Tourist accommodation expenditure is a widely investigated topic as it represents a major contribution to the total tourist expenditure. The identification of the determinant factors is commonly based on supply-driven applications while little research has been made on important travel characteristics. This paper proposes a demand-driven analysis of tourist accommodation price by focusing on data generated from room bookings. The investigation focuses on modeling the relationship between key travel characteristics and the price paid to book the accommodation. To accommodate the distributional characteristics of the expenditure variable, the analysis is based on the estimation of a quantile regression model. The findings support the econometric approach used and enable the elaboration of relevant managerial implications.

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1. Introduction

Tourist expenditure represents an important topic in the tourism research agenda, and several studies on this topic have analyzed the determinant factors (see [Brida and Scuderi, 2013](#) for a comprehensive review). The general interest of most studies is to develop a better understanding of the total tourist expenditure, which by definition includes the spending for all the different products that comprise the travel experience. In this context, accommodation is a major component of tourist expenditure ([Laesser and Crouch, 2006](#)), and the investigation therefore facilitates both direct implications for the hospitality industry and indirect implications for the tourism industry as a whole.

Generally speaking, the quantitative analysis of tourist accommodation is based either on supply (room price) or demand (tourist expenditure) data. In particular, accommodation pricing is mainly investigated from a supply perspective through the estimation of hedonic regression. In this approach, the publicized room prices are regressed on a set of hotel characteristics and hotel room attributes that are assumed to determine the price of the room ([Espinete et al., 2003](#)). On the other hand, the analysis of demand data typically allows the investigation of the factors influencing tourist revealed

expenditure, including economic constraints, socio-demographic, travel-related and psychographic factors ([Brida and Scuderi, 2013](#)).

The condition of market equilibrium is barely supported in the hospitality industry ([Chen and Chiu, 2014](#)), and the use of supply-driven data for the analysis of accommodation price comes with a limitation as the room price levels do not necessarily reflect the actual tourist expenditure for accommodation. In this regard, demand-driven data, in the form of actual accommodation bookings, can provide an alternative source of information for the analysis of price dynamics by focusing exclusively on tourists' effective expenditure. The current study proposes the analysis of accommodation price based on data generated from actual demand behavior. The investigation focuses on major travel characteristics (such as length of stay, travel party size, advance booking, selected sales channel, season, and purpose of travel) and their relationship with the price paid is modeled through regression techniques.

The distribution of the tourist expenditure is generally characterized by a long tail ([Huan et al., 2008](#)) because of the concentration of large values on the right tail of the distribution. Hence, the traditional Ordinary Least Square (OLS) regression methods, which are commonly used in the tourist expenditure literature, present the risk of undesirable estimate results. Quantile regression has therefore been used increasingly in the past decade in a variety of contexts, and is especially suitable for the analysis of asymmetric variables and long-tail distributions because the method reduces the weight placed on extreme observations ([Koenker and Bassett, 1978](#)). Quantile regression further increases the interpretability of the results as separate coefficients are estimated for different quan-

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tiles of the dependent variables. Nevertheless, the application of quantile regression in the tourism context is quite recent (Brida and Scudieri, 2013), and is limited to only few instances.

This paper contributes to the current literature by proposing a quantile regression model for the investigation of tourist accommodation price from a demand-driven perspective. In particular, the spending of tourists for accommodation at the destination refers to actual bookings registered from different online and offline booking sources through a channel manager. By comparing the estimates from OLS and quantile regressions, this paper provides additional evidence on the use of quantile regression for a tourist expenditure model and investigates key travel characteristics and variables of interest.

To the best of the authors' knowledge, the proposed analysis represents the first demand-driven application that estimates a quantile regression model on tourist accommodation bookings. The findings enhance the understanding of the role played by the variables included in the analysis. In particular, the estimation of a quantile regression allowed the identification of a differentiated effect in the conditional distribution of accommodation expenditure for variables such as star classification, distribution channel and travel party size.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes the data and outlines the methodology. Section 4 presents the results, and Section 5 concludes the paper by discussing the theoretical and managerial implications of the study and directions for future research.

2. Literature review

Hospitality and tourism researchers have largely examined the effects of hotel room rates and the determining factors. Generally, previous studies in the area fall into two major categories, namely, the analysis of the factors that influence hotel room rates, and that of the pricing strategies of the hotel management.

2.1. Room rate determining factors

Considering that lodging is an industry that is appropriate for hedonic analysis, Zhang et al. (2011a) examined how site and situation attributes can affect room prices and the lodging industry in Beijing. The fitting coefficient of geographically weighted regression demonstrates the importance of the global modeling framework. Specifically, star rating, hotel age, and location can influence hotel room prices, whereas room number and distance from the hotel to transportation hubs have negatively significant effects on room prices. The findings, according to the authors, can help hotel managers understand the determining factors of room price, consumer choice, and behavior. Hotel managers can subsequently respond by improving room quality and hospitality service.

Using a hierarchical regression procedure, Thrane (2005) developed hedonic price models that enable the tracking of possible indirect effects of attributes on overall package tour prices through hotel star ratings. The findings allow consumers to determine the attributes for which they have to pay more, and practitioners can set strategic pricing accordingly. In another study, Thrane (2007) used log-linear regression to analyze the relationship between room rates and the existence of hotel facilities in Oslo's hotels. Findings of single rooms and double rooms revealed comparable results. Similarly, Monty and Skidmore (2003) stated the importance of evaluating willingness to pay for specific characteristics of B&B accommodations. Their findings showed that based on the data collected from Southeast Wisconsin, customers were willing to pay for hot tub, private bath, and a larger room, but not for fire-

places, themes, scenic views, and room service. Likewise, Chen and Rothschild (2010) examined the effects of different variables on hotel room rates in Taipei by employing a hedonic pricing method. Empirical findings showed that the individual importance of most dependent variables changes, based on whether the stay is on a weekend or a weekday.

Abbruzzo et al. (2014) used graphical models to evaluate the relationships of different factors of tourist expenses. Based on the findings, accommodation expenditure was related to place of stay, accommodation type, transportation, and food & beverage expenses. In another study, Mottiar (2006) analyzed the average total expenditure of tourists based on different type of accommodations. Empirical findings showed the tourists who stayed with friends/relatives and those stayed in their own holiday homes spent, respectively the least and most amounts during their visits. Moreover, Lee and Jang (2011) applied household bid-rent function to examine the relationship of room rates in airport hotels in the US and their proximity to the city center. Findings showed room rates are simultaneously affected by the distance to the airport and the city center.

Schwartz (2000) stated that the customers who book their hotel rooms closer to the time of their stay are usually willing to pay more. According to his findings, although willingness to pay increases as time gets closer to the date of stay, the extent of the change depends on the customer's search cost. In particular, customers with a low search cost had significantly higher willingness to pay as the date of stay comes closer. Another behavioral study investigated customer willingness to pay in green hotels. Kang et al. (2012) found a positive relationship between the customer level of environmental concern and the willingness to pay for the green initiatives of a hotel. The findings of the study indicated the positive relationship between the hotel category and the willingness to pay, and the willingness of male customers to pay more for a premium than female customers. In their studies, Nicolau and Más (2005) as well as Perez and Sampol (2000) found hotel accommodation is directly associated with higher tourist expenditure. As such, destination promotions should be developed with special attentions to long-haul travelers who usually spend more money during their trips.

For the determinants of hotel room prices, Zhang et al. (2011b) used regression models to analyze whether and how hotel class, attributes of the room, and other factors influence room rates. Using data from New York, the researchers found that room quality and location are important determinants of room prices. However, the factors that can influence room rates differ greatly among the various segments of the analyzed hotels. In another study, Hung et al. (2010) applied quantile regression to examine the major determinants of hotel room pricing strategies. The results showed that the number of rooms, age of hotel, market condition, and number of housekeeping staff per room are the major determining attributes of hotel room rates. These results, however, did not apply to low hotel prices at the low price quantile. In addition, the proportion of foreign individual travelers positively and significantly influences room prices for high-priced quantile hotels, and allows hotel managers to setup pricing strategies accordingly.

Juaneda et al. (2011) conducted a comparative study of the price components of physical characteristics and hotel and apartment locations to compare their effects on the final price of both types of accommodation. The seasonality effect of price for hotels was lower than the apartments throughout the study period. In another study, Lee (2011) used a volatility clustering modeling framework to analyze the determining factors of hotel room rates in Singapore. The findings suggested that total inbound tourists and economic performance have positive effects on hotel room rates, which indicate that the volatility of hotel room rates has a positive effect on hotel room rates.

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