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Searching the most valued attributes at hotels: an application of hedonic pricing analysis in the Balearic Islands

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ABSTRACT

Hotel rooms can be conceived as a bundle of tangible and intangible attributes that provide overnight accommodation for travellers visiting a destination away from home. According to hedonic pricing theory, a hotel room is valued for the utility that each of its attributes offers to travellers. The value or implicit price of these attributes can be disentangled and revealed through hedonic price regressions. This project contributes to the hedonic pricing literature estimating the most valued attributes of hotel rooms located in the Balearic Islands. In contrast to previous studies developed in the Mediterranean region, the empirical application benefits from two improvements. On the one hand, data from TripAdvisor's website is used to capture the dynamic pricing strategies taking place in the market through the computation of average prices, as well as to obtain a complete set of explanatory variables including attributes, services and facilities describing both, hotels and hotel rooms. On the other hand, beyond using ordinary least squares regressions to estimate the hedonic price function, quantile regression methods are also used to characterize the behaviour of independent variables at specific points along the price distribution. The results indicate that attributes such as minibar, suites, restaurant, spa, babysitting or location, entail a significant positive value on the rate of a hotel room.

1. INTRODUCTION

The Balearic Islands are one of the most popular tourism destinations in Spain and one of the most visited sun and sand destinations in Europe (Alegre and Cladera, 2006). According to data from the survey of tourist movements at frontiers carried out by the National Statistics Institute of Spain, the islands received more than 15 million of tourists¹ in 2016. Of these, more than 10 millions overnighed in hotels or similar regulated market accommodation.

As a tourism destination that developed a great part of its hospitality infrastructure between 1950 and the early 1980s, the Balearic Islands have been identified as a mature destination coupled with the negative consequence of reduced profitability (Martorell and Mulet, 2009). Following Robledo and Batle (2002), there is a need to carry out a reconstruction of the tourism sector in the Balearic Islands, specifically, of the in many cases obsolescent infrastructure of the hotel industry. Nevertheless, as indicated by Aguiló et al. (2005), the Balearic Islands are currently in a restructuring phase, seeking new strategies of economic competitiveness that modify the classic sun and sand product in order to better cater for the needs and requirements of the market.

In recent years, a great effort has been done by individual hotels and hospitality companies in order to renovate and reposition their product in the market. A proof of the renovation and the repositioning strategies that are taking place in the Balearic Islands is that, according to the Institute of Statistics of the Balearic Islands, from 2010 to 2016, a total of 1,675 building permits were issued for the tourism industry with a budget over 975 millions of euros.

There is no doubt that, given the large amount of money that entails the renovation and repositioning of hospitality establishments in the Balearic Islands, it becomes of interest to investigate about the real value that the attributes of hotel rooms, such as the typology of the rooms, sport, wellness and businesses facilities, or the score obtained from customer reviews, offer to the tourists in order to facilitate and improve investment and pricing decisions finding the attributes and characteristics that allow to increase prices and differentiate from the competitors.

Hotel rooms can be conceived as a bundle of tangible and intangible attributes that provide overnight accommodation to travellers visiting a destination away from home. Therefore, a hotel room is a heterogeneous marketed good for which prices and willingness to pay vary according to the particular bundle of attributes or characteristics that it entangles (Carvell and Herrin, 1990). Since some attributes provide more utility than others (Rosen, 1974), hotels with these attributes will be more valued, and consequently, will reach higher prices in the market.

¹ A tourist is defined as an overnight visitor (International Recommendations for Tourism Statistics, United Nations, 2008)

Hedonic pricing modelling allows to obtain and analyse the impact that the existence or non-existence of a particular characteristic, or the effect that an increase or decrease in the amount of a particular quantitative attribute, will have on the price at which a hotel room can be sold for a particular market (Hartman, 1989). Therefore, this methodology allows to disentangle the implicit prices of significant attributes of hotels at a particular destination through empirical examination.

This project aims to develop an application of the hedonic pricing method aimed at measuring, in economic terms, the effect that hotel and hotel room attributes have on hotel accommodation prices for the specific case of the Balearic Islands. In contrast to previous hedonic pricing studies analysing the Mediterranean region in general (Papatheodorou, 2002; Espinet, et al., 2003; Juaneda et al., 2011) and the Balearic Islands in particular (Aguiló, et al., 2003; Alegre et al., 2013), rather than using data obtained from tour operators brochures and focusing on the prices of advertised tourist packages, the application developed in this project makes use of data on prices and hotel attributes gathered from TripAdvisor's website.

According to Papatheodorou (2002), prices listed in tour operators brochures do not represent actual sales since ex-ante marking does not ensure ex-post sales and do not constitute equilibrium prices since only the most risk-averse and time-constrained customers purchase at these rates. Furthermore, Andersson (2008) indicated that online travel agencies typically offer rates that are substantially lower via various discounts and late offers.

Overall and taking into consideration these studies, it is more accurate to obtain the prices from a meta-searcher rather than from a tour operator brochure due to the fact that the meta-searcher aggregates prices from different sources and reflects the current dynamic pricing that takes place in the hospitality industry computing a price range for a specific room (Abrate et al., 2012). Additionally, the market power of tour operators has decreased in the Balearic Islands in favour to other booking patterns. Proof of this fact is that according to the Institute of Statistics of the Balearic Islands, in 2016, only 40% of the tourists that visited the Balearics Islands came with a touristic package, whereas the remaining 60% came without a touristic package.

That being said, this project addresses the gap in existing literature conducting a hedonic pricing analysis for the hotel rooms located in the Balearic Islands with data that has been obtained from the meta-searcher TripAdvisor reflecting the dynamic pricing strategies that take place in the market of hotel rooms. The results of the estimation of the model can be of great interest for both academia and decision-makers in the hospitality industry since these can act as a guidance in investment and pricing strategies shedding light on the attributes for which customers are willing to pay a higher amount of money, the attributes for which customers are willing to pay a lower amount of money, and the attributes that do not have a significant effect on the determination of hotel room prices.

This paper is structured as follows. The next section presents a review of the literature on hedonic pricing emphasising the studies that have been carried out for the hospitality sector in the Mediterranean area. The data collected for the analysis and the methodology used in the application are described in sections three and four, respectively. The estimated results for the hedonic price model are presented and commented in section five and, finally, the conclusions are discussed in section six.

2. LITERATURE REVIEW

Hedonic pricing theory is based on the hypothesis that products are valued for the utility that their attributes or characteristics offer to the market (Lancaster, 1966). Since products can be described by a vector of objectively measurable attributes, such that $A_i = (a_{ij})$ (Hartman, 1989), the implicit price of each attribute or characteristic can be disaggregated and revealed through hedonic price regressions quantifying the effect of each of the significant variables on the price at which a product is sold in a market in perfect equilibrium, under the assumption of perfect competition (Rosen, 1974).

Hedonic pricing analysis has been widely used in a variety of markets where heterogeneous or differentiated products are sold, such as housing, automobiles, or computers, as well as for environmental services such as coastal landscape attractiveness (Chen and Rothschild, 2010). Whether it is true that applications of this technique in the tourism and hospitality industry have increased along the last decades, existing studies tend to be limited in terms of hotel attributes or number of observations (Zhang et al., 2011).

The first surge of hedonic pricing theory applied to the hospitality sector took place in the United States of America. Hartman (1989), developed a model for identifying optimal pricing and product design strategies for the luxury hotel industry using the hedonic pricing approach and considering production costs, competing products and consumer tastes. Carvell and Herrin (1990) estimated the implicit prices of common hotel amenities for hotels located in San Francisco, both through a linear and a quadratic hedonic function. They found that concierge service, valet dry cleaning service, AAA rating, and food sales added value to the analysed room rates, whereas distance to tourism attractions negatively affected room rates.

Later on, White and Mulligan (2002) introduced situation attributes such as temperature, interstate location, urban setting and specialization of the local economy to a hedonic pricing regression examining room rates for budget hotels and motels in the Four Corners region in the southwestern of the United States. Monty and Skidmore (2003), moved a step forward including timing attributes such as the day of the week and the time of the year in a hedonic price model for bed and breakfast accommodation in southeast Wisconsin.

Within the context of the Mediterranean region, in which is located the destination that is analysed in this project, major contributions come from Papatheodorou (2002), Israeli (2002), Aguiló et al. (2003), Espinet et al. (2003), Juaneda et al. (2011), Fleischer (2012), and Alegre, et al. (2013).

Papatheodorou (2002) performed a hedonic analysis regressing the price on a number of package characteristics and operation and location scaling factors for British summer holiday tour packages in several resorts of 10 Mediterranean countries, which were divided in core and peripheral destinations

samples. A surprising result was that chain affiliation seemed to have a negative effect on price according to the core sample, whereas, it seemed to have a positive effect according to the peripheral sample. The same year, Israeli (2002) assessed the influence of star rating, corporate affiliation and number of rooms in pricing decisions of hotels in various geographical locations in Israel for two different periods of time. Results suggested that the star rating system was a consistent predictor of room prices and explained a large part of the price variation.

Aguiló et al. (2003) analysed the British and German tour operator market structure and the role of hotel chains for setting prices examining package holidays to the Balearic Islands through hedonic pricing modelling. They found that the identification of tour operators was a significant attribute for both nationalities and that the strategies and price structures followed by tour operators were in line with those of an oligopolistic market.

Espinet et al. (2003), found through a hedonic pricing approach by means of random effect models that there were huge price differences among 4 star hotels and the rest, whereas there was practically no difference between 1 star and 2 star hotels for the sun and beach segment at the southern Costa Brava. Additionally, they found that hotel size, distance to the beach and availability of parking were significant attributes.

In 2011, Juaneda et al. analysed physical characteristics and location of apartments and hotels in several Mediterranean sun and sand resorts taking into account seasonality. According to their results, the number of rooms had a negative effect on the price for hotels whereas it had a positive effect for apartments.

Fleischer (2012), estimated through fixed effects regression the value of a sea view for hotels located in 10 different resorts of the Mediterranean, among them, the Balearic Islands. She found that a room with a sea view was valued around a 10% higher than a room without a view, and that there was no significant difference among regions. Therefore, a view of the Mediterranean Sea was equally valued in each of the 10 resorts that were analysed.

Alegre et al. (2013) focused on the effect of locational attributes on package holiday prices for German and British tour operators in several resorts across the island of Mallorca. Results pointed out that even that there were differences between German and British tourists, there was a negative impact on prices for distance to the beach and the airport, and there was a positive impact on prices for having a room with sea views.

In contrast to sun and sand destinations in the Mediterranean, other authors applied hedonic pricing theory to the hospitality sector at European capital cities. Thrane (2007) regressed the attributes of hotel rooms in the region surrounding Norway's capital for both single and double rooms finding that minibar, hairdryer and free parking were relevant attributes for the determination of prices. Öğüt and

Onur Taş (2012) analysed the effect of star and customer rating on hotel rooms located in Paris and London. Results indicated that both attributes lead to increases in the prices of hotel rooms.

For the Asiatic region, Andersson (2008) estimated the implicit prices for hotel room attributes in Singapore including objective attributes and consumer perceptions obtained from an online travel agency. Chen and Rothschild (2010), performed a similar hedonic pricing regression for hotel rooms in Taipei using two specifications, one for weekend prices and another one for weekday prices. They found that the relative importance of most explanatory variables changed according to the specification.

Hung et al. (2010), innovated applying a quantile regression analysis rather than just an ordinary least squares regression (OLS), as the majority of previous authors did (such as Papatheodorou, 2002; White and Mulligan, 2002; Aguiló et al., 2003; Monty and Skidmore, 2003; Thrane, 2007; Öğüt and Onur Taş, 2012), in order to investigate the major determinants of hotel rooms pricing strategies in Taiwan. The quantile regression approach provides a more flexible and complete characterization of the determinants of hotel room prices at the higher and lower tails of the price distribution since it estimates the behaviour of specific points in the conditional distribution rather than just approximating the conditional mean and conditional median located at the centre of the distribution. The justification to implement this regression was that the assumption of normal distribution error terms did not hold since hotel prices showed a skewed distribution.

3. DATA

All the data required to develop this study has been collected from TripAdvisor's website¹ for all the hotels advertised in the meta-searcher and located in the Balearic Islands. TripAdvisor is the world's largest travel website² and allows to obtain standardized attributes and prices for all the hotels located at a particular destination, whether at national, regional or local level. Since it is a meta-searcher engine, it offers an exhaustive search list of hotels aggregating data form other sites, such as online travel agencies or the hotel's own website, offering in real time all the current prices at which a particular hotel room is sold in the online market.

For the case of the Balearic Islands, TripAdvisor's webpage listed a total of 1,613 hotels³. For each of the listed hotels, a set of variables including services and facilities both in the hotel room and in the hotel itself, was extracted and collected in a datasheet. It is important to notice that there are many hotels that are listed in TripAdvisor's webpage providing information about the services, costumer reviews and pictures, but that are not commercialized by the partners of the meta-searcher. Consequently, these hotels do not offer information regarding room prices. Incomplete observations for this reason and for missing information in other observed variables were removed from our datasheet leading to a final datasheet of 1,092 hotels.

According to the Institute of Statistics of the Balearic Islands, in 2015, there were a total of 725 accommodation establishments registered as hotels in the Balearic Islands. Differences in the total number of hotels registered by both sources might be due to the fact that some accommodation registered as hotels by TripAdvisor, might be officially registered as other types of accommodation such as city hotels, rural hotels or hostels, or might not be officially registered.

Table 1 shows the total number of hotels located in the Balearic Islands classified by category according to both our dataset collected form TripAdvisor, once missing observations were removed, and the Institute of Statistics of the Balearic Islands. As we can observe, the percentages are very similar between both sources. The most relevant difference is that according to TripAdvisor, the majority of hotels belong to the four star category, whereas according to the Institute of Statistics of the Balearic Islands, the majority of hotels belong to the three star category. Nevertheless, in general, the results are very similar and we can assume that our database obtained form TripAdvisor is representative for the real hotel population that is located in the Balearic Islands.

¹ <https://www.tripadvisor.com/>

² Source: comScore Media Metrix for TripAdvisor Sites, worldwide, November 2016

³ Data was gathered in March 2017

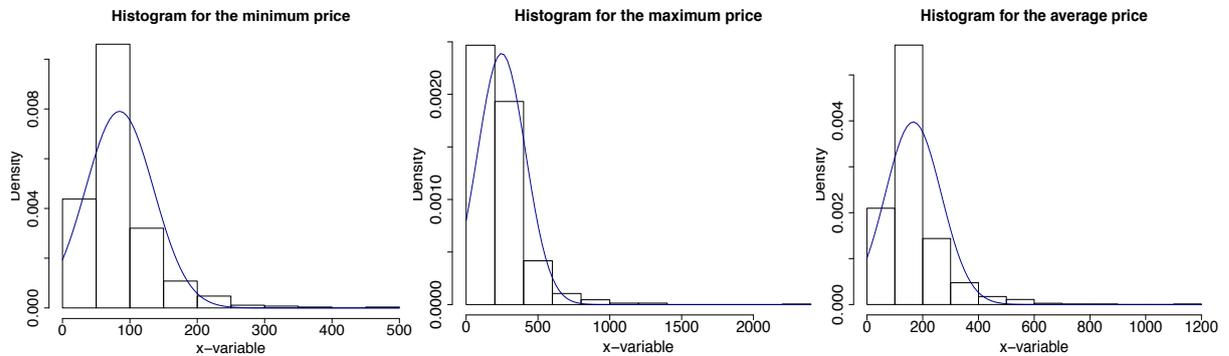
Table 1: Comparison of the number and percentage of hotels in the Balearic Islands by source

TripAdvisor			Institute of Statistics of the Balearic Islands		
Category	Number	Percentage	Category	Number	Percentage
1 star	42	3.85%	1 star	34	4.67%
2 star	141	12.91%	2 star	77	10.58%
3 star	413	37.82%	3 star	327	44.92%
4 star	431	39.47%	4 star	253	34.75%
5 star	65	5.95%	5 star	37	5.08%
Total	1,092	100%	Total	728	100%

Source: own elaboration with data from TripAdvisor and the Institute of Statistics of the Balearic Islands

For each observation, TripAdvisor provides accurate information about prices as well as relevant hotel attributes. Concerning the price variable, TripAdvisor computes a price range in euros indicating a minimum and a maximum price based on average rates for a standard room. As a result, our database includes three different price variables: the minimum, the maximum, and an average price that we have calculated from the previous ones. The distributions of these price variables are reported in Figure 1. As we can observe, all the distributions are asymmetric presenting a positive skew.

Figure 1: Distribution of the price variables



Source: own elaboration

TripAdvisor’s website provides an exhaustive list of standardized attributes and characteristics of the hotel that is being analysed, together with user-generated content in the form of reliable customer reviews that are reflected in the average score that is computed for each hotel. We considered crucial to include the score from customer reviews as an attribute in our analysis due to the importance of electronic word of mouth in the hospitality sector (Ye et al. 2011) and due to the fact that it reflects a subjective quality dimension signalling whether the seller is trustworthy or not (Öğüt and Onur Taş, 2012).

Although TripAdvisor provides a very large list of variables, only 36 of them were considered in the application as explanatory variables in the hedonic pricing model. The decision on reducing the number of independent variables is justified on the need of avoiding correlation issues among them. Descriptive statistics for both the dependent and the independent variables are reported in Table 2.

Table 2: Descriptive statistics for dependent and independent variables

Attribute	Minimum	Maximum	Average/ Proportion	Attribute	Minimum	Maximum	Average/ Proportion
Minimum price	16	470	84.66	Restaurant	0	1	0.85
Maximum price	40	2,241	247.00	Free parking	0	1	0.37
Average price	40	1,148	166.10	Paid Wi-Fi	0	1	0.28
Number of rooms	3	1,468	134.90	Laundry	0	1	0.60
Score	1	5	3.96	Room service	0	1	0.28
Stars				Multilingual staff	0	1	0.57
1	0	1	0.03	Babysitting	0	1	0.14
2	0	1	0.12	Activities for children	0	1	0.31
3	0	1	0.37	Breakfast included	0	1	0.28
4	0	1	0.39	Beach front	0	1	0.39
5	0	1	0.05	Area			
Suites	0	1	0.32	<i>Palma</i>	0	1	0.12
Family rooms	0	1	0.44	<i>Es Pla</i>	0	1	0.02
Minibar	0	1	0.22	<i>Formentera</i>	0	1	0.01
Kitchen	0	1	0.26	<i>Ibiza</i>	0	1	0.18
Pool	0	1	0.88	<i>Llevant</i>	0	1	0.14
Gym	0	1	0.37	<i>Menorca</i>	0	1	0.09
Spa	0	1	0.23	<i>Migjorn</i>	0	1	0.07
Business center	0	1	0.14	<i>Nord</i>	0	1	0.11
Tennis court	0	1	0.20	<i>Ponent</i>	0	1	0.18
Golf course	0	1	0.01	<i>Tramuntana</i>	0	1	0.04
Bar lounge	0	1	0.86				
Observations							1,092

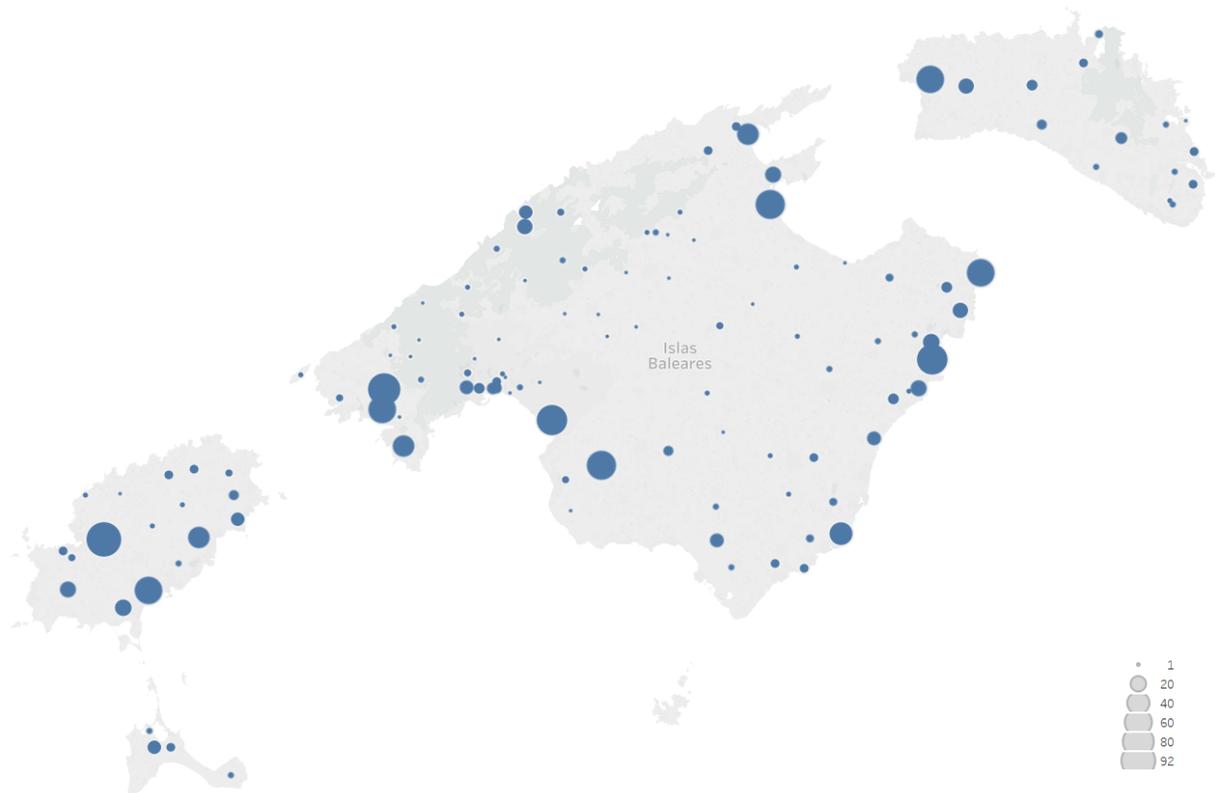
Source: own elaboration

The explanatory variables that were introduced in the hedonic pricing model provide a compelling characterization of the hotel. A general description of the hotel in regards to size and quality is captured through the attributes of number of rooms, score, and stars. The segmentation at which the hotel is targeted, is captured through the availability of suites and family rooms. General characteristics of the hotel room are captured through the attributes of minibar and kitchen. Common shared facilities are captured through the attributes of pool, gym, spa, business center, tennis court, golf course, and free parking. Food and beverage facilities are captured through the attributes of restaurant and bar lounge. The services that the hotel provides to the customers are captured through the attributes of laundry, room service, babysitting, activities for children, and multilingual staff. Breakfast included was introduced in order to capture the room board that the hotel offers, and beach

front location was introduced in order to consider the effect of a prime location in a sun and sand tourism destination.

In order to capture the effect of the location of the hotel and discover whether there are differences among islands and touristic resorts, we created a new variable called area. This variable was created clustering all the hotels' localities into 10 different areas. A detailed list with of the localities that are encompassed in each area can be found in the appendix section.

Figure 2: Map of hotel's location



Source: own elaboration

Figure 2 presents a map¹ indicating the frequencies of hotels located at different areas across Mallorca, Menorca, Ibiza and Formentera islands. As we can observe, the majority of hotels are located in areas close to the coastline rather than the plain (named es Pla) of Mallorca. The areas with the higher frequencies are Ponent (encompassing 18% of the total accommodation offer analysed in the Balearic Islands), Ibiza (18%), Llevant (14%), and Palma (12%).

¹ The location of each hotel was approximated through postal codes

4. METHODOLOGY

Following the hedonic pricing hypothesis, a hotel room can be characterized in terms of its objectively measurable attributes, such that:

$$Z = (Z_1, Z_2, Z_3, \dots, Z_n) \quad (1)$$

where n represents the number of objectively measurable attributes and characteristics, and Z represents the amount of each attribute contained in the hotel room that is being analysed (Thrane, 2005). Consequently, since the price of a hotel room is assumed to be a function of its attributes and characteristics, the hedonic price function can be expressed as follows:

$$P(Z) = P(Z_1, Z_2, Z_3, \dots, Z_n) \quad (2)$$

Even though hedonic pricing theory does not propose any specific functional form, there are well known findings indicating that the functional form of the hedonic price function is non linear (Juaneda et al., 2011). Rosen (1974) recommended to use the log-linear form rather than the linear form and most of the literature has followed his advice. Consequently, the dependent variable was introduced as the natural logarithm of price since the log-linear functional form was selected following the convention and because this specification provided the best goodness-of-fit and the higher number of statistically significant explanatory variables.

In this way, the estimated function in our model can be written as:

$$\begin{aligned} \log(\text{price}) = & \alpha + \beta_1 \text{number of rooms} + \beta_2 \text{score} + \beta_3 \text{2 star} + \beta_4 \text{3 star} + \beta_5 \text{4 star} \\ & + \beta_6 \text{5 star} + \beta_7 \text{suites} + \beta_8 \text{family rooms} + \beta_9 \text{minibar} + \beta_{10} \text{kitchen} \\ & + \beta_{11} \text{pool} + \beta_{12} \text{gym} + \beta_{13} \text{spa} + \beta_{14} \text{business centre} + \beta_{15} \text{tennis court} \\ & + \beta_{16} \text{golf course} + \beta_{17} \text{bar longue} + \beta_{18} \text{restaurant} + \beta_{19} \text{free parking} \\ & + \beta_{20} \text{paid Wi-Fi} + \beta_{21} \text{laundry} + \beta_{22} \text{room service} + \beta_{23} \text{multilingual staff} \\ & + \beta_{24} \text{babysitting} + \beta_{25} \text{activities for children} + \beta_{26} \text{breakfast included} \\ & + \beta_{27} \text{beach front} + \beta_{28} \text{es pla area} + \beta_{29} \text{formentera area} + \beta_{30} \text{ibiza area} \\ & + \beta_{31} \text{llevant area} + \beta_{32} \text{menorca area} + \beta_{33} \text{migjorn area} + \beta_{34} \text{nord area} \\ & + \beta_{35} \text{ponent area} + \beta_{36} \text{tramuntana area} + \varepsilon \end{aligned} \quad (3)$$

where α is the constant, β_1 to β_{36} are the coefficients of each attribute that has been introduced as an independent variable, and ε represents the error term. The error term of the model is random, independent and identically distributed with zero expectation and constant variance (Espinet et. al., 2003).

The estimation of the coefficients of the linear regression model was carried through two different methods. On the one hand, the model was estimated by OLS since this method was employed in the majority of the literature that was reviewed (such as Papatheodorou, 2002; White and Mulligan, 2002; Aguiló et al., 2003; Monty and Skidmore, 2003; Thrane, 2007; Öğüt and Onur Taş, 2012). On the other hand, the model was also estimated by quantile regression analysis, as it was done by Hung et al. (2010), in order to improve our estimates.

Whereas, OLS regression provides an incomplete description of a distribution because it only approximates the conditional mean and the conditional median located at the center of the distribution, quantile regression provides a more flexible and complete description as it estimates the conditional quantile functions fully representing the conditional distribution (Mosteller and Tukey, 1977). Since the distribution of our prices, not only for the average but also for the minimum and the maximum, is asymmetric with a positive skew, the quantile regression complements and improves the results of our hedonic pricing model.

As indicated by Hung et al. (2010), the quantile regression presents other useful characteristics because it employs a linear programming representation that simplifies examination, the objective function is a weighted sum of absolute deviations, so that the estimated coefficient vector is not sensitive to outliers, and finally, the estimators might be more efficient when the error term is non-normal.

According to Hung et al. (2010), the basic quantile regression can be written as:

$$y_i = x'_i \beta_\theta + u_{\theta i} \quad \text{with} \quad \text{Quant}_\theta(y_i | x_i) = x_i \beta_\theta \quad (4)$$

where x'_i denotes a vector of regressors, β_θ represents the vector of parameters to be estimated, and $u_{\theta i}$ is a vector of residuals. $\text{Quant}_\theta(y_i | x_i)$ represents the θ^{th} conditional quantile of y_i given x'_i . The θ^{th} regression quantile solves the following problem:

$$\min_{\beta} = \sum_i \theta |y_i - x_i \beta| + \sum_i (1 - \theta) |y_i - x_i \beta| = \min_{\beta} \sum_i \rho_\theta u_{\theta i}, \quad \theta \in (0,1) \quad (5)$$

where ρ_θ is known as the “chek function” and defined as:

$$\rho_\theta(\mathcal{E}) = \theta \mathcal{E} \quad \text{if } \mathcal{E} \geq 0$$

$$\rho_\theta(\mathcal{E}) = (\theta - 1) \mathcal{E} \quad \text{if } \mathcal{E} < 0$$

Linear programming solves the second equation. The median regression is obtained by setting $\theta = 0.5$ and other quantiles of the conditional distribution are obtained via variation of θ (Hung et al., 2010). In this application three quantiles of the conditional distribution of the dependent variable, the hotel room price, are obtained by setting $\theta = 0.25, 0.5$ and 0.75 .

5. RESULTS

The free statistical software R has been used to estimate the hedonic price model described above (see equation 3) using two methods, OLS and quantile regression. In both cases, three different specifications have been considered, each one associated to a different definition of the dependent variable of the model. The first specification introduces the minimum price, the second specification introduces the maximum price, and the third specification introduces the average price. Results from the OLS regressions are first explained in section 5.1 to draw a simplified picture of the most valued attributes of hotel rooms located in the Balearic Islands. Section 5.2 presents the results from the quantile regression providing a more detailed picture of the effects of the explanatory variables in each quartile on the distribution of prices.

5.1. Ordinary least squares regression

The results of the estimation of each specification through OLS are presented in Table 3. The first specification of the model (using minimum price) achieves the highest goodness-of-fit since it explains the 62% of the variation in prices as measured by the adjusted R^2 . The second specification of the model (maximum price) only explains the 44% of the variation in prices, whereas the third specification (average price) explains the 50%, also measured by the adjusted R^2 . As indicated by Monty and Skidmore (2003), there are many intangible characteristics embodied in a hotel room that are not easily measured. Consequently, the explanation of the variation in prices as measured by the adjusted R^2 tends to be low for hedonic pricing modelling in the hospitality sector. A total of 17 explanatory variables are significant for the first specification of the model, 9 for the second, and 8 for the third.

As we can observe in Table 3 significant attributes in our model can have a positive implicit price or a negative implicit price. Attributes with a positive implicit price include score, 3, 4 and 5 stars, suites, minibar, spa, restaurant, free parking, laundry, babysitting, breakfast included and to be located in Formentera, Ibiza or Tramuntana area rather than in Palma area. Attributes with a negative implicit price include family rooms, gym, bar longue, paid Wi-Fi and to be located in the Nord area. Nevertheless, some significant attributes revealed a different sign according to the specification. Therefore, these cannot be classified as positive or negative. Examples of these are kitchen, multilingual staff, and to be located in Menorca area. The estimations of the model revealed that number of rooms, pool, business center, tennis court, golf course, room service, beach front location and to be located in certain areas of the Balearic Islands are non significant variables, and consequently, do not affect the price at which a hotel room that contains these attributes is sold in the market.

Table 3: OLS estimates

	log(Min Price)	log(Max Price)	log(Mean Price)
	β	β	β
Intercept	3.31 ***	4.27 ***	3.92 ***
Number of rooms	-0.00	0.00	0.00
Score	0.15 ***	0.08 **	0.10 ***
Stars			
2	0.09	0.04	0.05
3	0.31 ***	0.27 ***	0.28 ***
4	0.52 ***	0.39 ***	0.42 ***
5	0.94 ***	0.89 ***	0.90 ***
Suites	0.11 ***	0.18 ***	0.16 ***
Family rooms	-0.07 **	0.01	-0.01
Minibar	0.08 *	0.04	0.05
Kitchen	-0.15 ***	0.08 *	0.02
Pool	0.01	0.08	0.06
Gym	-0.08 **	-0.03	-0.04
Spa	0.06 *	0.06	0.06
Business center	0.04	-0.01	-0.00
Tennis court	-0.02	-0.02	-0.02
Golf course	-0.00	-0.05	-0.04
Bar lounge	-0.08 **	-0.04	-0.05
Restaurant	0.08 *	0.16 ***	0.14 ***
Free parking	0.05 *	0.02	0.03
Paid Wi-Fi	-0.05 *	-0.00	-0.02
Laundry	0.06 **	-0.00	0.01
Room service	0.05	0.02	0.02
Multilingual staff	-0.06 **	0.07 *	0.04
Babysitting	0.07 *	0.11 **	0.10 **
Activities for children	0.05	-0.02	0.00
Breakfast included	0.09 ***	0.04	0.06 *
Beach front	0.00	0.04	0.03
Area			
<i>Es Pla</i>	0.06	0.03	0.05
<i>Formentera</i>	0.30 ***	0.55 ***	0.48 ***
<i>Ibiza</i>	0.08 *	0.30 ***	0.23 ***
<i>Llevant</i>	-0.01	0.01	0.00
<i>Menorca</i>	-0.12 **	0.12 *	0.06
<i>Migjorn</i>	-0.06	0.01	-0.01
<i>Nord</i>	-0.11 **	-0.00	-0.03
<i>Ponent</i>	-0.05	0.06	0.03
<i>Tramuntana</i>	0.14 *	0.01	0.05
Observations	1,092	1,092	1,092
R ² / adj. R ²	.632 / .619	.454 / .436	.514 / .497
F-statistics	50.294***	24.396***	30.963***

Notes* $p < .05$ ** $p < .01$ *** $p < .001$

Source: own elaboration

The exponential of the intercept provides information about the mean price of a hotel in the reference category for categorical variables, without the specified attribute for dummy variables, and with respect to the minimum amount for quantitative variables (Espinete et al., 2003). Therefore, the mean price for a hotel with 1 point of score from customers' reviews, 1 star, located in Palma area and with none of the specified attributes that are significant for each specification is 27.39€ for the first specification of the model, 71.52€ for the second, and 50.40€ for the third.

As it was explained in the previous section, the dependent variable was introduced as the natural logarithm of price. Consequently, in a log-linear hedonic price regression, the estimated coefficient of the dummy variables needs to be transformed by $(e^\beta - 1)$, where β is the coefficient and e is the base of the natural logarithm (Halvorsen and Palmquist, 1980). Once, this transformation has been applied to all the dummy variables, we obtain the estimated effect of the dummy variables in percentage terms. In order to obtain the monetary amount that this percentage represents, the transformed coefficient of the dummy variables and the raw coefficient of the quantitative variables must be multiplied by the average value of the dependent variable of the model. The comprehensive results of the above transformation are reported in the annex section, showing the effect of each variable both in percentage and in monetary terms, measured in euros.

As it was mentioned above, results indicate that the number of rooms has no significant effect on the price of a hotel room. Therefore, we can assume that for tourists there is no difference in the utility that they perceive from a hotel with few rooms in comparison to a hotel with a large number of rooms.

The score that customer's reviews post on TripAdvisor's webpage, is significant in each of the three specifications of the model. For the first specification, an increase of 1 point in the score, involves an increase of 14.82% on the average price *ceteris paribus*, which in monetary terms equates to 12.55€. For the second specification, it involves an increase of 8.44%, which equates to 20.83€. Finally, for the third specification, it involves an increase of 10.19%, which equates to 16.92€.

In regards to the category of the hotel, there is a non significant effect for a 2 star hotel, whereas there are positive significant effects for hotels of 3, 4 and 5 stars in comparison to a 1 star hotel. As we expected, the effect increases as the category of the hotel also increases. For a 5 star hotel, the specification that leads the highest percentage increase is the first one with the minimum price. As results indicate, for this specification, an increase of 155.53% on the average price takes place for a 5 star hotel in comparison to a 1 star hotel, which equates to an increase of 131.68€.

We were interested in analysing the effect that the existence of different types of rooms could have on prices, even that the captured price was for a standard room. For this purpose, suites and family rooms were introduced as a dummy variable. The attribute of suites is significant for the three specifications of the model, whereas the attribute of family rooms is only significant for the first specification. The most remarkable trait is that the existence of the attribute of suites has a positive

effect on price whereas the existence of family rooms has a negative effect on the price. Therefore, we can assume that tourists visiting the Balearic Islands value in a negative manner a segmentation towards families, and are willing to pay a higher price for hotels without family rooms, probably in order to avoid the typology of costumers that purchase this type of rooms, which tend to be families with kids.

The attribute of having a minibar in the room of a hotel is only significant for the first specification. In which this attribute, increases the average price a 7.84%, that is equivalent to 6.63€. Having a kitchen in the room, is significant for both the first and the second specification. A susprising result is that a kitchen decreases the average price a 13.84% for the first specification, whereas it increases the price a 7.99% for the second specification.

In a sun and sand destination as the Balearic Islands, we expected that the attribute of pool would be positively significant. Nevertheless, this attribute is non significant for all the specifications of the model. This results are in line with previous studies of the Mediterranean area in which this particular attribute also showed up to be non significant (Juaneda et al., 2011). Nevertheless, the non-significance of this attribute might be because of the fact that the proportion of hotels with pool is of 88%.

The attributes of gym and spa are significant for the first specification of the model, even that each of them presents a different sign. The attribute of gym decreases the price of a hotel room a 7.32% (which equates to 6.20€), whereas the attribute of spa increases the price of a hotel room a 6.51% (which equates to 5.51€).

Facilities targeted to the MICE¹ segment were introduced in the model through the variable of business center, which resulted to be non significant for all the specifications of the model. We would like to point out that the initial database, had more attributes targeted to the MICE segment, such as conference rooms, meeting rooms, banquet rooms, nevertheless, all these variables were not introduced in the model because they were highly correlated among them. Sports facilities such as tennis court and golf course also turned out to be non significant for all the specifications of the model. Thus, according to our results, we can conclude that the existence of the attributes of business center, tennis court and golf course are not intrinsically valued and have no effect on the price at which a hotel room is sold in the market of the Balearic Islands.

The existence of a restaurant at the hotel is significantly positive for all the specifications of the model, whereas the existence of a bar longue is only significant for the first specification of the model and it influences in a negative manner. A restaurant increases the average price by 8.18% for the first specification (which equates to 6.92€), by 16.87% for the second specification (which equates

¹ MICE stands for Meetings, Incentives, Conferences and Events (World Tourism Organisation)

41.66€), and by 14.84% for the third specification (which equates to 24.64€). A bar longue decreases the average price of the first specification by a 7.97%, which equates to a decrease of 6.75€.

Free parking and paid Wi-Fi attributes are only significant for the first specification of the model. As it was expected, the attribute of free parking increases the average price by 5.25% (which equates to 4.44€), whereas the attribute of paid Wi-Fi decreases the average price by 4.82% (which equates to 4.08€).

The existence of laundry service is positively significant for the first specification. Concretely, it increases the price by 6.44%, which equates to 5.46€. The attribute of room service is not significant in all the specifications of the estimated model.

The attribute of multilingual staff provides surprising results. It is significant for both the first and the second specification. Nevertheless, it decreases the average price by a 5.57% for the first specification, whereas it increases the average price by a 6.77% for the second specification.

Babysitting is significant for all the specifications of the model whereas activities for children for no one. The attribute of babysitting increases the average price of the first specification of the model by 6.93% (which equates to 5.86€), by 11.37% (which equates to 28.09€) for the second specification, and by 10.58% (which equates to 17.57€) for the third specification.

Regarding room boards, the attribute of breakfast included was introduced in the model as an explanatory variable and resulted to be positively significant for the first and the third specifications. For the first specification, it increases the average price by 9.76% (which equates to 8.27€), whereas for the third specification, it increases the average price by 5.75% (which equates to 9.54€).

Surprisingly, the attribute of beach front location is not significant for all the specifications of the model. Thus, according to our estimates, the fact of being located in the beach front has not effect on the hotel room price.

Regarding location, a total of 10 areas were delimited. The base category that was set in order to make comparisons was the capital of the Balearic Islands, which is Palma. According to results, Es Pla, Llevant, Migjorn and Ponent were non significant, thus, there is no difference in price for being located at one of these areas in comparison to Palma area. Formentera area, which is the fourth largest island of the Balearic Islands, was positively significant for each specification of the model. For the first specification, the fact of being located in Formentera, increased the price by a 35.49% (which equates to 30.05€) in comparison to begin located in Palma *ceteris paribus*. For the second and the third specification, the increase was higher, being 73,55% (which equates to 181.65€), and 62.05% (which equates to 103.04€) respectively. Ibiza, which is the third largest island, also was also positively significant for each specification of the model even that the implicit value was lower than in

Formentera. For the first specification, it increased the price by a 8.35% (which equals to 7.07€), for the second by a 34.42% (which equals to 85.02€), and for the third, by a 26.31% (which equals to 43.69€). Menorca, which is the second largest island, was negatively significant for the first specification and positively significant for the second specification. Concretely, it reduces the price by a 11.38% and increases the price by 12.62% respectively. Finally, the fact of being located in the Nord area, decreased the price by a 10.40% for the first specification of the model, whereas the fact of being located in the Tramuntana area, increased the price by a 15.19% for the first specification of the model.

5.2. Quantile regression

The results generated through the quantile regression, allow to obtain a more comprehensive characterization of the behaviour of explanatory variables throughout the distribution of the dependent variable, specifically, at the higher and lower tails (quantiles obtained by setting $\theta = 0.25$ and 0.75 , respectively). Therefore, these results allow us to complement the general findings of our hedonic pricing model that were generated through the OLS regression.

The results of the estimation of each specification through quantile regression are presented in Table 4. A pseudo R^2 was calculated following Koenker and Machado (1999) suggestion to measure the goodness-of-fit by comparing the sum of weighted deviations for the model of interest with the same sum from a model with the intercept as the only explanatory variable. The pseudo adjusted R^2 is around 39% in the first specification, around 39% in the second, and around 34% in the third. As in the previous section, the transformation of the coefficients into percentages and monetary measures are reported in the annex section.

The OLS regression did not identify the number of rooms as a significant attribute. Nevertheless, a more comprehensive examination of the behaviour of the explanatory variables throughout the distribution of price reveals that this attribute is negatively significant in the first quartile of the first specification, and positively significant in the second quartile and in all the quartiles of the third and the second specification. As it can be observed in Table 4 and in the percentage and monetary transformation provided in the annex, the effect of an additional room is around 0.04%.

The attribute of score, turned out to be positively significant as in the OLS regression. Nonetheless, quantile regression reveals that, for all the specifications, the effects in percentage terms are larger in the first quartile. Therefore, an increase of one point in the score of customer reviews has a higher impact for the hotels with lower prices. For example, in the first specification, which is the one that produces the highest valuation of this attribute, an increase in the score, increases the price by 18.86% for hotels with prices in the first quartile, whereas it increases the price by 14.33% for hotels with prices in the third quartile. This implies that probably, customers with lower purchasing power that

look for cheaper prices are more concerned regarding the online reputation of a particular hotel establishment, than customers with a higher purchasing power.

Table 4: Quantile regression estimates

	log(Min Price)			log(Max Price)			log(Mean Price)		
	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
Intercept	3.03 ***	3.24 ***	3.52 ***	3.91 ***	4.20 ***	4.23 ***	3.68 ***	3.89 ***	4.00 ***
Number of rooms	-0.00 *	-0.00	-0.00	0.00 *	0.00 **	0.00 *	0.00	0.00 *	0.00
Score	0.19 ***	0.17 ***	0.14 ***	0.13 ***	0.11 ***	0.11 ***	0.12 ***	0.10 ***	0.11 ***
Stars									
2	0.02	0.09 *	0.13	0.10 *	0.00	0.07	0.02	0.06	0.10
3	0.24 **	0.28 ***	0.31 ***	0.32 ***	0.24 **	0.33 ***	0.27 ***	0.29 ***	0.33 ***
4	0.48 ***	0.51 ***	0.51 ***	0.50 ***	0.44 ***	0.44 ***	0.45 ***	0.51 ***	0.47 ***
5	0.89 ***	0.96 ***	0.88 ***	1.01 ***	0.95 ***	0.91 ***	0.91 ***	1.01 ***	0.88 ***
Suites	0.08 ***	0.10 ***	0.13 ***	0.13 ***	0.14 ***	0.22 ***	0.11 ***	0.12 ***	0.23 ***
Family rooms	-0.09 ***	-0.09 ***	-0.06 **	-0.01	-0.00	0.01	-0.04 **	-0.03	0.01
Minibar	0.03	0.07 *	0.09 *	0.01	0.02	0.08 *	0.03	0.04	0.08 *
Kitchen	-0.16 ***	-0.13 ***	-0.14 ***	0.08 ***	0.09 ***	0.13 ***	0.02	0.04	0.06 *
Pool	0.00	0.01	0.07 *	0.09 **	0.06	0.05	0.08 **	0.04	0.01
Gym	-0.04	-0.08 ***	-0.10 ***	0.01	-0.03	-0.10 ***	-0.00	-0.04	-0.09 **
Spa	0.04	0.03	0.10 **	0.04	0.01	0.05	0.03	0.01	0.06
Business center	0.03	0.03	0.05	-0.05	-0.01	0.01	-0.01	-0.04	0.04
Tennis court	-0.05	-0.02	-0.01	-0.01	-0.01	-0.02	0.01	-0.01	-0.00
Golf course	0.05	0.05	-0.01	-0.01	0.01	-0.11	0.06	0.02	-0.08
Bar lounge	-0.04	-0.04	-0.14 ***	-0.04	-0.03	-0.04	-0.04	-0.05	-0.08
Restaurant	0.09 **	0.07 *	0.08 *	0.08 *	0.11 ***	0.17 ***	0.09 *	0.11 ***	0.11 ***
Free parking	0.05 *	0.08 ***	0.03	0.03	0.05 *	0.01	0.02	0.07 **	0.02
Paid Wi-Fi	-0.01	-0.07 ***	-0.09 ***	0.01	-0.03	-0.00	-0.01	-0.03	-0.04
Laundry	0.03	0.06 *	0.07 **	-0.01	0.01	0.06 *	-0.02	0.02	0.04
Room service	0.07 **	0.00	0.06 **	0.01	0.02	0.02	0.03	0.01	0.05
Multilingual staff	-0.06 **	-0.05 *	-0.09 ***	0.03	0.02	0.04	-0.00	0.01	0.02
Babysitting	0.06 *	0.08 *	0.08 **	0.07 **	0.09 *	0.15 ***	0.08 ***	0.08 *	0.12 ***
Activities for children	0.06 **	0.03	0.04	0.01	0.02	-0.01	0.04	0.01	0.02
Breakfast included	0.09 ***	0.09 ***	0.14 ***	0.03	0.04	0.03	0.06 **	0.06 **	0.05 *
Beach front	0.01	-0.00	-0.01	0.04	0.02	-0.00	0.03 *	0.01	0.02
Area									
<i>Es Pla</i>	0.03	0.00	0.02	-0.12	-0.01	-0.00	0.04	-0.01	0.00
<i>Formentera</i>	0.26 ***	0.21	0.37 ***	0.51 **	0.64 ***	0.79 ***	0.54 ***	0.61 ***	0.61 ***
<i>Ibiza</i>	0.03	0.03	0.09	0.29 ***	0.29 ***	0.36 ***	0.22 ***	0.25 ***	0.28 ***
<i>Llevant</i>	-0.07	-0.03	0.03	-0.03	-0.06	0.08	-0.03	-0.01	0.05
<i>Menorca</i>	-0.18 ***	-0.14 **	-0.08	0.14 **	0.11 **	0.24 ***	0.07	0.05	0.12 **
<i>Migjorn</i>	-0.12 **	-0.10 *	-0.07	-0.05	-0.04	0.07	-0.04	-0.03	0.01
<i>Nord</i>	-0.15 ***	-0.13 ***	-0.09 *	-0.07 *	-0.05	0.06	-0.02	-0.05	-0.03
<i>Ponent</i>	-0.08 *	-0.09 ***	-0.03	0.01	0.01	0.10 **	0.01	-0.01	0.06
<i>Tramuntana</i>	0.12 *	0.14	0.19 ***	0.05	-0.00	0.06	0.11	0.06	0.11
Observations	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092	1,092
Pseudo R ² /	.413 /	.412 /	.416 /	.340 /	.326 /	.308 /	.379 /	.356 /	.346 /
Pseudo adj. R ²	.393	.392	.396	.318	.303	.285	.357	.334	.323

Notes* $p < .05$ ** $p < .01$ *** $p < .001$

Source: own elaboration

In regards to the category of the hotel, OLS showed that 2 star hotels were non significant in comparison to 1 star hotels. Nevertheless, quantile regression showed that, there are significant coefficients in the first and the second quartile of some specifications. In the first quartile of the second specification there is a significant 10% increase and in the second quartile of the first specification there is a significant 9% increase. For the remaining categories, all of which were revealed as significant by the OLS regression, all the quartiles of all the specifications were significant. Therefore it is proved through empirical examination that category per se is a relevant factor that is valued by customers that visit the Balearic Islands. As a consequence, it implies that to increase prices, hotels do not only have to focus on tangible attributes and services, but also on official rating classification since there is an implicit willingness to pay for this attribute.

The attribute of suites, which was positively significant for each specification in the OLS regression, turned out to have larger effects in percentage terms for the hotels located in the right tail of the price distribution. Therefore, the attribute of suites is more valued for the customers that look for hotels that are more expensive than the average. For example, according to the third specification, the attribute of suites increases the average price by around 12% for a hotel located in both the first and the second quartile of the price distribution, whereas, it increases by 25.49% for a hotel in the third quartile.

The attribute of family rooms, which was only significant in the first specification through OLS, showed up to be significant in all the quartiles of this specification and in the first quartile of the third specification. In all the cases, the coefficient was negative, and the highest price decrease takes place in the second quartile.

The attribute of minibar turned out to be significant in the third quartile of all the specifications, while it was only significant for the first specification according to the OLS method. This attribute is mainly valued at hotels located in the right tail of the price distribution and makes no difference at hotels that are located in the first. Therefore, this attribute is valued by customers that search for hotels with a price above the average. The highest value is revealed in the third quartile of the first specification, where it increase the average price by 9.44%. The attribute of kitchen provides the same inconsistent results that provided with the OLS being negatively significant in all the quartiles of the first specification and positively significant in all the quartiles of the second specification.

The OLS did not identify the attribute of pool as significant. Nevertheless, the quantile regression analysis proves that this attribute is significant in the third quartile of the first specification and in the first quartile of both the second and the third specifications. The highest effect is generated in the first quartile of the second specification, in which the attribute of pool increases the price by 9.46%.

The attributes of spa and gym showed up to be significant in the right tail of the price distribution. As it happens with the OLS estimation, the attribute of spa turns out to be positive, whereas the attribute of gym turns out to be negative. For example, a spa only has a positive implicit value for the hotels that

are in the third quartile of the price distribution in the first specification. Therefore, the attribute of spa is only valued for tourists that search hotels with prices above the average and not for tourists that search lower prices.

As it happened with the OLS regression, the facilities of business center, tennis court and golf course were non significant for the quantile regression. These results are particularly relevant because these attributes imply high capital investment and tend to occupy large extensions of square meters. Nevertheless, the revealed non significance might be due to the fact that there is a low proportion of hotels with these attributes in the dataset.

Food and beverage facilities, such as the attributes of restaurant and lounge bar, produced results in the same line as those obtained by the OLS method. Restaurant was turned out to be positively significant in all the specification along all the quartiles, achieving the maximum value in third quartile of the second specification, and turned out to be negatively significant only in the third quartile of the first specification.

Free parking turned out to be significant only in the first and second quartiles, reaching the maximum value in percentage in the second quartile of the first specification. Therefore, this attribute only adds value for hotels priced in the central and left side of the price distribution. Paid Wi-Fi turned out to be negatively significant only in the second and the third quartiles of the first specification. This results are in line with the findings from the OLS regression.

The attribute of laundry, which was significant for the first specification of the model through OLS, turned out to be significant only in the second and the third quartile for the first specification and in the third quartile for the second specification. Specifically, it increases the price up to a 7.56% and 5.84% in the third quartile for the first and the second specification, respectively. The attribute of room service, which was non significant through OLS, turned out to be positively significant for the first and the third quartiles of the first specification. The attribute of multilingual staff, that according to OLS results was negatively significant for the first specification and positively significant for the second specification, turned out to only be negatively significant in all the quartiles of the first specification but non significant in all the quartiles of the second specification.

The attribute of babysitting revealed to have a higher effect in percentage terms for the third quartile in all the specifications. Therefore, this attribute is more valued at hotels with prices above average. The highest value in percentage terms is revealed in third quartile of the second specification with an increase of 16.03% over the average price. The attribute of activities for children, which was non significant in the OLS regression, turned out to be positively significant in the first quartile of the first specification. Specifically, it showed up to have an implicit value of 6.52% over the average price.

The attribute of breakfast included showed similar results in both methods and showed up to be positively significant for all the quartiles of the first and the third specification. Therefore, we can assume that this attribute is valued along the entire price distribution. The highest value is revealed in the third quartile of the first specification with an increase of 14.66% over the average price.

Beach front location, which was non significant for the OLS regression, turned out to be positively significant in the first quartile of the third specification with an implicit price of 3.37% over the average price. Therefore, according to our data, this attribute is only entails a positive value for the customers that search prices below the average.

Regarding the area, quantile regression analysis revealed that two areas that were non significant for the OLS regression, Migjorn and Ponent, turned out to be negatively significant for the first and the second quartiles of the first specification. Other significant areas, revealed to have higher implicit values, in percentage terms, in the third quartile of the price distribution, such as Formentera (with an increase of 119.56%), Ibiza (43.69%) and Tramuntana (20.50%). As indicated by (Juaneda et al., 2011) the differences in the intrinsic value of location can be interpreted as an approximation of perceptions of destination quality. However, we consider that the huge increase in the value of hotel rooms located in Formentera area, which only accumulates around 1% of the analysed hotels, is to some extent because of the scarcity of hotels in this island in comparison to the demand, which pushes prices up.

6. CONCLUSION

The Balearic Islands, a leading sun and sand tourism destination, are playing an important role in the renovation and repositioning of a part of the hospitality sector in order to better cater for the needs and requirements of the market (Aguiló et al., 2005). Therefore, it is relevant to analyse the intrinsic value that services and facilities, both in the hotel room and in the hotel itself, offer to the clients in order to facilitate and improve investment and pricing decisions in the sector.

The objective of this project was to conduct a hedonic pricing analysis in order to disentangle which are the significant attributes that affect the prices of hotel rooms at the Balearic Islands. Previous authors that conducted hedonic pricing analysis in the area estimated their models through data obtained from tour operator brochures (Papatheodorou, 2002; Aguiló et al., 2003; Espinet et al., 2003; Juaneda et al., 2011; Alegre et al., 2013). Nevertheless, tour operators' prices do not constitute equilibrium prices (Papatheodorou, 2002), and do not reflect the dynamic pricing strategies that take place in the hospitality industry (Abrate et al., 2012).

In this project, the prices and attributes for our hedonic pricing model were collected from TripAdvisor's website in order to introduce rates based on dynamic pricing strategies that were obtained from a price range that aggregates prices from different sources, such as online travel agencies or the hotel's own website, and for different moments of time. Furthermore, the fact of using TripAdvisor as our source of information allowed us to obtain a large and complete list of standardized attributes and a reliable score based on customer reviews reflecting a subjective quality dimension (Öğüt and Onur Taş, 2012).

We estimated a hedonic pricing model under three different specifications in order to obtain empirical evidence regarding the effect that our set of explanatory variables has on the average price at which hotel rooms are sold at this particular destination. That is, to disentangle the intrinsic value that each attribute adds to the price of the product, named hotel room. The first specification was estimated with the minimum price, the second with the maximum price and the third with the average of these two. A total of 1,092 observations were included in our model, which was estimated both through OLS and quantile regression.

Our results answer to our initial research question indicating that the highest implicit value that was obtained from the price regressions makes reference to the attribute of location. Specifically, the area that entails the highest value is Formentera (which *ceteris paribus* can increase the price of a room up to 119.56% over the average price at a specific quartile along the price distribution), followed by Ibiza (43.69%), and Tramuntana (20.50%). However, location is precisely the only attribute that cannot be changed or modified through a renovation or a repositioning.

The attributes that can be modified through capital investment and therefore should concentrate the efforts concerning renovations and repositionings in the hospitality sector are the availability of suites (which *ceteris paribus* can increase the price of a standard room up to 25.49% over the average price at a specific quartile along the price distribution), restaurant (18.06%), spa (10.01%), pool (9.46%) and minibar (9.44%). The significance of some services proves that a repositioning should not only concentrate the efforts in capital investment decisions but also in the provisioning of intangible attributes that entail a positive value such as babysitting (which *ceteris paribus* can increase the price up to 14.66% over the average price at a specific quartile along the price distribution), or laundry service (7.56%).

The estimation of the results through both OLS and quantile regression allowed to obtain a more flexible and complete characterization of significant attributes along the price distribution shedding light on the fact that there are some attributes, that are more valued or that are only valued in the right tail of the distribution, and therefore, are significant for customers that look for higher prices than the average. This results and conclusions can be of a great interest for both academic and decision-makers in the hospitality industry because, information regarding the attributes that are more valued along the third quartile of the distribution of price, can be used in strategic decisions since it can help to position not only a particular hotel, but also the destination in the segments with a highest purchasing power.

Even that this project contributes to the hedonic pricing literature though both obtaining the data from TripAdvisor's meta-searcher and introducing the quantile regression analysis, we acknowledge that it has some limitations that should be addressed in order to reach definitive conclusions. On the one hand, the representativeness of the data that has been obtained from TripAdvisor over the real population of hotels of located in the Balearic Islands should be checked. On the other hand, the quantile regression analysis could be expanded introducing percentiles rather than just quartiles in order to better model the behaviour of the independent variables throughout the price distribution. Further research could extend this analysis introducing other sun and sand destinations located in the Mediterranean area.

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APPENDIX

List of localities encompassed in each delimited area of the Balearic Islands

Palma	Ponent	Tramuntana	Nord	Llevant
Can Pastilla	Cala Major	Banalbufar	Alcudia	Arta
Palma de Mallorca	Cala Vinyes	Bunyola	Ca'n Picafort	Cala Bona
Playa de Palma	Calvia	Cala Sant Vicenc	Playa de Muro	Cala Mandia
	Camp De Mar	Deia	Pollenca	Cala Mesquida
	Cas Catala	Esporles	Port d'Alcudia Alcudia	Cala Millor
	Costa d'en Blanes	Estellencs	Port de Pollenca	Cala Murada
	El Toro Calvia	Fornalutx	Son Serra de Marina	Cala Ratjada
	Es Capdella Calvia	Galilea		Calas de Mallorca
	Illetes Calvia	Orient		Canyamel
	Magaluf Calvia	Port de Soller Soller		Capdepera
	Palmanova Calvia	Puigpunyent		Costa de los Pinos
	Peguera Calvia	S'Alqueria Blanca		Font de Sa Cala
	Port d'Andratx	Soller		Manacor
	Portals Nous Calvia	Valldemossa		Porto Cristo
	S'Arenal			S'illot
	Sant Elm			Sa Coma
	Santa Ponsa Calvia			Sant Llorenç des Cardassar
				Son Servera

Migjorn	Es Pla	Menorca	Ibiza	Formentera
Cala Blava	Alaro	Alaior	Cala Carbo	El Pilar de la Mola
Cala d'Or	Binibona	Alcaufar	Cala Llenya	Es Calo
Cala Ferrera	Buger	Arenal d'en Castell	Cala Llonga	Es Pujols
Cala Figuera	Caimari	Binibeca	Cala Tarida	La Savina
Cala Mondrago	Campanet	Cala Blanca	Cala Vadella	Sant Francesc de Formentera
Cala Santanyi	Campos	Cala Canutells	Es Canar Santa Eulalia del Rio	
Cala Serena	Cas Concos	Cala Galdana	Ibiza Ciudad	
Colonia de Sant Jordi	Consell	Cala Santandria	Playa d'en Bossa	
Migjorn	Felanitx	Cala'n Blanes	Port d'es Torrent	
Migjorn Gran	Inca	Cala'n Bosch	Port de San Miguel	
Porto Colom	Lloseta	Cala'n Forcat	Portinatx Sant Joan de Labritja	
Porto Petro	Llucmajor	Cala'n Porter	Puig d'en Valls	
Puig de Ros	Maria de la Salut	Ciudadela	San Carlos	
Santanyi	Montuiri	Es Castell	San Juan Bautista	
Ses Salines	Moscari	Ferrerries	San Lorenzo	
	Muro	Fornells	Sant Agusti des Vedra	
	Petra	Mahon	Sant Antoni de Portmany	
	Porreres	Mercadal	Sant Carles de Peralta	
	Ruberts	Punta Prima	Sant Joan de Labritja	
	Santa Eugenia	S'Algar	Sant Josep de Sa Talaia	
	Santa Margalida	Sant Lluís	Sant Miquel de Balansat Sant Joan de Labritja	
	Santa Maria del Cami	Santo Tomas	Santa Agnes de Corona	
	Selva	Son Bou Alaior	Santa Eulalia del Rio	
	Sencelles	Son Parc	Santa Gertrudis	
	Sineu		Talamanca Ibiza Ciudad	

Source: own elaboration

Estimates of the OLS regression transformed in percentage and euros for all the specifications

	log(Min price)		log(max price)		log(mean price)	
	Effect in %	Effect in €	Effect in %	Effect in €	Effect in %	Effect in €
Intercept	331.13 ***	280.34 ***	427.47 ***	1055.75 ***	392.07 ***	651.04 ***
Number of rooms	-0.02	-0.02	0.01	0.02	0.00	0.00
Score	14.82 ***	12.55 ***	8.44 **	20.83 **	10.19 ***	16.92 ***
Stars						
2	9.51	8.06	3.68	9.09	5.19	8.63
3	36.57 ***	30.96 ***	31.19 ***	77.03 ***	32.60 ***	54.14 ***
4	68.70***	58.16 ***	47.03 ***	116.16 ***	51.67 ***	85.80 ***
5	155.53 ***	131.68 ***	144.08***	355.85 ***	145.59 ***	241.76 ***
Suites	12.12 ***	10.26 ***	20.17 ***	49.81 ***	17.80 ***	29.55 ***
Family rooms	-6.74 **	-5.70 **	1.31	3.23	-1.08	-1.79
Minibar	7.84 *	6.63 *	4.33	10.70	5.48	9.10
Kitchen	-13.84 ***	-11.72 ***	7.99 *	19.75 *	2.45	4.06
Pool	1.48	1.26	8.19	20.24	5.83	9.69
Gym	-7.32 **	-6.20 **	-3.26	-8.06	-4.35	-7.22
Spa	6.51 *	5.51 *	5.97	14.75	6.02	10.00
Business center	3.56	3.02	-1.25	-3.08	-0.11	-0.18
Tennis court	-1.79	-1.52	-1.85	-4.58	-2.19	-3.64
Golf course	-0.44	-0.37	-4.51	-11.13	-4.18	-6.95
Bar lounge	-7.97 **	-6.75 **	-4.36	-10.76	-5.08	-8.44
Restaurant	8.18 *	6.92 *	16.87 ***	41.66 ***	14.84 ***	24.64 ***
Free parking	5.25 *	4.44 *	2.12	5.23	3.05	5.06
Paid Wi-Fi	-4.82 *	-4.08 *	-0.41	-1.01	-1.58	-2.62
Laundry	6.44 **	5.46 **	-0.37	-0.92	1.16	1.93
Room service	5.05	4.28	1.52	3.76	2.07	3.44
Multilingual staff	-5.57 **	-4.71 **	6.77 *	16.73 *	3.64	6.05
Babysitting	6.93 *	5.86 *	11.37 **	28.09 **	10.58 **	17.57 **
Activities for children	5.06	4.29	-1.61	-3.98	0.02	0.03
Breakfast included	9.76 ***	8.27 ***	4.15	10.24	5.75 *	9.54 *
Beach front	0.04	0.04	4.58	11.32	3.37	5.60
Area						
<i>Es Pla</i>	6.15	5.21	2.94	7.25	5.49	9.11
<i>Formentera</i>	35.49 ***	30.05 ***	73.55 ***	181.65 ***	62.05 ***	103.04 ***
<i>Ibiza</i>	8.35 *	7.07 *	34.42 ***	85.02 ***	26.31 ***	43.69 ***
<i>Llevant</i>	-1.21	-1.02	1.12	2.78	0.33	0.55
<i>Menorca</i>	-11.38 **	-9.64 **	12.62 *	31.17 *	5.77	9.58
<i>Migjorn</i>	-5.96	-5.04	1.17	2.90	-0.79	-1.31
<i>Nord</i>	-10.4 **	-8.81 **	-0.24	-0.58	-3.25	-5.40
<i>Ponent</i>	-5.32	-4.51	5.95	14.7	3.32	5.51
<i>Tramuntana</i>	15.19 *	12.86 *	0.84	2.08	5.60	9.30
Observations	1,092		1,092		1,092	
R ² / adj. R ²	.632 / .619		.454 / .436		.514 / .497	
F-statistics	50.294***		24.396***		30.963***	

Notes * $p < .05$ ** $p < .01$ *** $p < .001$

Source: own elaboration

Estimates of the quantile regression transformed in percentage and euros for the first specification

	Q1		Q2		Q3	
	Effect in %	Effect in €	Effect in %	Effect in €	Effect in %	Effect in €
Intercept	303.02 ***	256.53 ***	324.07 ***	274.36 ***	352.31 ***	298.27 ***
Number of rooms	-0.03 *	-0.02 *	-0.01	-0.01	-0.02	-0.01
Score	18.86 ***	15.97 ***	17.30 ***	14.65 ***	14.33 ***	12.13 ***
Stars						
2	2.28	1.93	9.00 *	7.62 *	13.69	11.59
3	26.81 **	22.70 **	31.78 ***	26.91 ***	36.32 ***	30.75 ***
4	61.41 ***	51.99 ***	66.04 ***	55.91 ***	66.01 ***	55.89 ***
5	143.99 ***	121.90 ***	160.48 ***	135.86 ***	141.94 ***	120.16 ***
Suites	8.31 ***	7.04 ***	10.92 ***	9.24 ***	14.34 ***	12.14 ***
Family rooms	-8.31 ***	-7.03 ***	-8.66 ***	-7.33 ***	-6.25 **	-5.29 **
Minibar	2.65	2.24	7.31 *	6.19 *	9.44 *	7.99 *
Kitchen	-14.58 ***	-12.34 ***	-11.75 ***	-9.95 ***	-13.24 ***	-11.21 ***
Pool	0.20	0.17	1.40	1.19	6.83 *	5.78 *
Gym	-4.33	-3.67	-7.76 ***	-6.57 ***	-9.75 ***	-8.25 ***
Spa	4.11	3.48	3.11	2.63	10.01 **	8.48 **
Business center	3.21	2.72	3.31	2.80	4.69	3.97
Tennis court	-4.48	-3.79	-1.66	-1.40	-1.20	-1.02
Golf course	4.86	4.12	4.81	4.07	-0.70	-0.59
Bar lounge	-3.72	-3.15	-4.31	-3.65	-13.34 ***	-11.29 ***
Restaurant	9.51 **	8.05 **	7.34 *	6.22 *	8.31 *	7.03 *
Free parking	5.30 *	4.48 *	8.50 ***	7.19 ***	2.59	2.19
Paid Wi-Fi	-0.99	-0.84	-6.89 ***	-5.83 ***	-8.76 ***	-7.42 ***
Laundry	3.45	2.92	6.34 *	5.37 *	7.56 **	6.40 **
Room service	6.87 **	5.81 **	0.29	0.25	6.30 **	5.34 **
Multilingual staff	-5.37 **	-4.55 **	-4.85 *	-4.11 *	-8.90 ***	-7.54 ***
Babysitting	6.26 *	5.30 *	8.05 *	6.82 *	8.36 **	7.08 **
Activities for children	6.52 **	5.52 **	2.58	2.18	3.85	3.26
Breakfast included	9.56 ***	8.10 ***	9.33 ***	7.90 ***	14.66 ***	12.41 ***
Beach front	0.65	0.55	-0.48	-0.41	-0.79	-0.67
Area						
<i>Es Pla</i>	2.84	2.40	0.11	0.09	1.99	1.69
<i>Formentera</i>	29.44 ***	24.92 ***	22.92	19.41	45.20 ***	38.27 ***
<i>Ibiza</i>	2.77	2.34	2.93	2.48	8.88	7.52
<i>Llevant</i>	-6.34	-5.36	-3.14	-2.65	3.09	2.62
<i>Menorca</i>	-16.37 ***	-13.86 ***	-13.18 **	-11.16 **	-7.66	-6.48
<i>Migjorn</i>	-11.58 **	-9.80 **	-9.26 *	-7.84 *	-6.96	-5.89
<i>Nord</i>	-14.06 ***	-11.91 ***	-12.11 ***	-10.25 ***	-8.39 *	-7.10 *
<i>Ponent</i>	-8.04 *	-6.80 *	-8.87 ***	-7.51 ***	-2.55	-2.16
<i>Tramuntana</i>	12.65 *	10.71 *	14.68	12.43	20.50 ***	17.36 ***
Observations	1,092		1,092		1,092	
Pseudo R ² / Pseudo adj. R ²	.413 / .393		.412 / .392		.416 / .396	
Notes	* p<.05 ** p<.01 *** p<.001					

Source: own elaboration

Estimates of the quantile regression transformed in percentage and euros for the second specification

	Q1		Q2		Q3	
	Effect in %	Effect in €	Effect in %	Effect in €	Effect in %	Effect in €
Intercept	390,99 ***	965,74 ***	420.45 ***	1.038.52 ***	422.98 ***	1.044.76 ***
Number of rooms	0.03 *	0.06 *	0.03 **	0.06 **	0.02 *	0.06 *
Score	12.78 ***	31.55 ***	11.32 ***	27.97 ***	10.52 ***	25.98 ***
Stars						
2	10.00 *	24.71 *	0.32	0.79	7.28	17.97
3	37.63 ***	92.94 ***	27.16 **	67.09 **	38.71 ***	95.62 ***
4	64.17 ***	158.50 ***	54.50 ***	134.62 ***	55.91 ***	138.09 ***
5	174.28 ***	430.47 ***	158.18 ***	390.70 ***	147.66 ***	364.71 ***
Suites	14.43 ***	35.64 ***	14.65 ***	36.19 ***	24.21 ***	59.79 ***
Family rooms	-0.75	-1.85	-0.38	-0.93	0.90	2.22
Minibar	0.73	1.81	2.31	5.70	8.76 *	21.63 *
Kitchen	8.61 ***	21.26 ***	9.84 ***	24.31 ***	14.31 ***	35.36 ***
Pool	9.46 **	23.37 **	6.49	16.04	5.25	12.97
Gym	0.68	1.67	-2.68	-6.62	-9.31 ***	-22.99 ***
Spa	3.91	9.66	0.67	1.66	5.51	13.62
Business center	-4.54	-11.21	-1.21	-2.99	1.44	3.56
Tennis court	-1.31	-3.25	-0.79	-1.95	-1.68	-4.14
Golf course	-0.51	-1.27	1.32	3.27	-10.23	-25.26
Bar lounge	-4.24	-10.48	-2.77	-6.83	-3.64	-8.99
Restaurant	8.25 *	20.38 *	11.18 ***	27.61 ***	18.06 ***	44.60 ***
Free parking	2.79	6.88	4.77 *	11.78 *	0.63	1.57
Paid Wi-Fi	1.19	2.94	-2.97	-7.33	-0.46	-1.13
Laundry	-0.57	-1.41	0.84	2.08	5.84 *	14.43 *
Room service	1.02	2.51	1.53	3.77	2.29	5.66
Multilingual staff	2.77	6.85	2.08	5.15	4.09	10.11
Babysitting	6.94 **	17.14 **	9.26 *	22.87 *	16.03 ***	39.60 ***
Activities for children	1.13	2.80	2.50	6.17	-1.48	-3.66
Breakfast included	2.73	6.73	3.75	9.25	3.53	8.71
Beach front	3.69	9.11	2.32	5.72	-0.12	-0.31
Area						
<i>Es Pla</i>	-11.51	-28.42	-0.85	-2.09	-0.06	-0.14
<i>Formentera</i>	67.10 **	165.74 **	90.59 ***	223.76 ***	119.56 ***	295.31 ***
<i>Ibiza</i>	34.22 ***	84.52 ***	33.09 ***	81.74 ***	43.69 ***	107.92 ***
<i>Llevant</i>	-3.09	-7.63	-5.87	-14.49	8.49	20.96
<i>Menorca</i>	14.47 **	35.75 **	11.73 **	28.97 **	26.71 ***	65.96 ***
<i>Migjorn</i>	-4.68	-11.55	-3.54	-8.75	7.78	19.22
<i>Nord</i>	-6.82 *	-16.84 *	-5.25	-12.96	6.24	15.41
<i>Ponent</i>	1.11	2.74	0.78	1.92	10.38 **	25.64 **
<i>Tramuntana</i>	5.04	12.46	-0.04	-0.09	5.92	14.62
Observations	1,092		1,092		1,092	
Pseudo R ² / Pseudo adj. R ²	.340 / .318		.326 / .303		.308 / .285	
Notes	* $p < .05$ ** $p < .01$ *** $p < .001$					

Source: own elaboration

Estimates of the quantile regression transformed in percentage and euros for the third specification

	Q1		Q2		Q3	
	Effect in %	Effect in €	Effect in %	Effect in €	Effect in %	Effect in €
Intercept	368.20 ***	611.59 ***	389.27 ***	646.58 ***	400.14 ***	664.63 ***
Number of rooms	0.01	0.01	0.02 *	0.03 *	0.01	0.02
Score	12.36 ***	20.52 ***	10.46 ***	17.38 ***	11.16 ***	18.54 ***
Stars						
2	1.63	2.71	6.46	10.73	10.74	17.83
3	30.69 ***	50.97 ***	33.77 ***	56.10 ***	39.57 ***	65.73 ***
4	57.49 ***	95.49 ***	66.86 ***	111.05 ***	60.05 ***	99.75 ***
5	149.08 ***	247.63 ***	174.83 ***	290.40 ***	141.59 ***	235.18 ***
Suites	11.65 ***	19.35 ***	13.22 ***	21.96 ***	25.49 ***	42.34 ***
Family rooms	-4.33 **	-7.19 **	-2.95	-4.90	0.61	1.02
Minibar	3.53	5.86	4.50	7.47	7.86 *	13.05 *
Kitchen	2.42	4.02	4.15	6.90	6.19 *	10.28 *
Pool	8.23 **	13.68 **	3.88	6.45	1.48	2.46
Gym	-0.30	-0.50	-4.23	-7.02	-8.25 **	-13.71 **
Spa	2.65	4.40	1.19	1.97	5.75	9.55
Business center	-1.39	-2.31	-3.71	-6.16	4.60	7.63
Tennis court	0.83	1.38	-1.41	-2.34	-0.19	-0.32
Golf course	5.77	9.59	2.12	3.53	-7.82	-12.99
Bar lounge	-4.15	-6.90	-4.96	-8.24	-7.98	-13.25
Restaurant	8.98 *	14.92 *	11.08 ***	18.40 ***	12.14 ***	20.16 ***
Free parking	2.18	3.62	7.06 **	11.73 **	2.46	4.08
Paid Wi-Fi	-1.38	-2.29	-3.15	-5.23	-3.64	-6.05
Laundry	-1.51	-2.52	1.97	3.27	3.76	6.24
Room service	2.95	4.91	0.91	1.51	5.09	8.45
Multilingual staff	-0.04	-0.07	0.56	0.94	1.77	2.95
Babysitting	8.51 ***	14.14 ***	8.35 *	13.86 *	12.33 ***	20.49 ***
Activities for children	3.84	6.37	0.60	1.00	1.71	2.84
Breakfast included	5.77 **	9.58 **	5.74 **	9.54 **	5.18 *	8.61 *
Beach front	3.37 *	5.60 *	1.23	2.04	2.16	3.58
Area						
<i>Es Pla</i>	3.97	6.60	-1.11	-1.84	0.02	0.03
<i>Formentera</i>	72.27 ***	120.05 ***	83.76 ***	139.13 ***	83.28 ***	138.33 ***
<i>Ibiza</i>	25.21 ***	41.87 ***	27.96 ***	46.45 ***	32.38 ***	53.78 ***
<i>Llevant</i>	-2.55	-4.24	-0.90	-1.49	4.95	8.22
<i>Menorca</i>	6.78	11.26	5.63	9.34	12.27 **	20.37 **
<i>Migjorn</i>	-3.89	-6.47	-2.68	-4.45	1.13	1.88
<i>Nord</i>	-1.89	-3.14	-4.80	-7.98	-3.05	-5.06
<i>Ponent</i>	0.98	1.63	-0.77	-1.29	6.51	10.81
<i>Tramuntana</i>	12.16	20.19	5.95	9.88	11.83	19.65
Observations	1,092		1,092		1,092	
Pseudo R ² / Pseudo adj. R ²	.379 / .357		.356 / .334		.346 / .323	
Notes	* $p < .05$ ** $p < .01$ *** $p < .001$					

Source: own elaboration