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The effects of beach characteristics and location with respect to hotel prices☆

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A B S T R A C T

This paper measures the effects of beach characteristics and hotel location with respect to the beach on sun-and-beach hotel prices by using a well-established hedonic perspective. The paper's main results are that, after controlling for the relevant variables, location in front of a beach increases the price of a room in costal hotels of Catalonia by a figure between 13 and 17%, and that a Blue Flag increases the price by around 11.5%. The effects on hotels' prices of other beach characteristics (such as beach length, width, sand type or beach services) are also estimated. With these estimates, the paper ranks beaches according to their characteristics and provides a setting to assess different policies regarding beaches from the point of view of hotels, such as regeneration, maintenance or achieving a Blue Flag award.

1. Introduction

It stands to reason that a tourist's enjoyment of a stay in a hotel during her holidays is affected not only by the specific characteristics of the product offered by the hotel finally chosen (for instance, its category, sports facilities, swimming pool characteristics, entertainment for children and room services), but by the characteristics of the site where that hotel is located (which include, for instance, cleanness of beaches and the swimming waters, public safety, approaches to the resort or the preservation of the environment, among many others) as well. Tourism research has shown evidence of this. Indeed, Bull (1998) asserts the importance of location (in terms of access to/distance from particular places, intrinsic site characteristics and neighbourhood characteristics) for product differentiation in the hospitality and tourism sectors (which produce "place-sensitive products") both theoretically and empirically. Other studies have also remarked the importance of both public and private attributes on tourists' perceptions and the prices of accommodation (Hasegawa, 2009; Rigall-I-Torrent & Fluvià, 2007, 2011).

In this setting, hotel managers and policymakers are interested in how different public (related to location, in the approaches by Bull, 1998; Rigall-I-Torrent & Fluvià, 2007, 2011) and private characteristics affect hotel prices. In the case of sun-and-beach hotels, one essential set of characteristics refers, obviously, to nearby beaches. Some studies have analysed the effects of location with respect to the beach on hotels' prices (Aguiló, Alegre, & Riera, 2001; Bull, 1998; Espinet, Saez, Coenders, & Fluvià, 2003; Papatheodorou, 2002; Rigall-I-Torrent & Fluvià, 2007, 2011). However, none of them has considered the effects on hotel prices of the specific characteristics of the beach, such as width, length, degree of urbanisation, type of sand, being awarded a Blue Flag, or availability of services (such as WC facilities, security, access for disabled people, or umbrellas for rent). Besides, introducing beach characteristics in the analysis yields a more robust estimate of the effect of location in front of the beach than those obtained in previous studies.

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The studies that have analysed the different beach characteristics have done so in order to obtain insights for coastal management, but not for hotel managers or policymakers concerned with tourism and accommodation facilities. Thus, Edwards and Gable (1991) use property values to analyse the economic value of recreation at public beaches in Rhode Island, USA, and compare the results to the cost of beach nourishment; Pompe and Rinehart (1994, 1995) estimate the effect of a wider beach on coastal housing prices in South Carolina, USA; Pompe and Rinehart (1999) use the prices of developed property and vacant lots to obtain hedonic estimates from South Carolina in order to provide a method to set fees based on proximity to the beach; Parsons and Powell (2001) use housing sales to estimate the cost of allowing Delaware's, USA, ocean beaches to retreat inland; Hamilton (2007), in order to assess the impact of climate change, considers the role that coastal and other landscape features have on attractiveness of tourism destinations.

This paper aims at filling in this knowledge gap by answering several questions regarding the effects of beach characteristics on hotel prices which are relevant for both hotel managers (in terms of expected increases in prices) and policymakers (in terms of the market valuation of different policies regarding beaches). To do so, the paper is divided in 3 sections, in addition to this introduction. Section 2 starts with a brief discussion of the analytical framework and goes on to estimate the effect of beach characteristics on hotel prices in the Costa Brava (Catalonia). Section 3 uses these results to obtain a ranking of beaches according to their characteristics and effects on prices and to outline some general implications for private firms' managers and public policymakers with respect to different policies and decisions regarding beaches. Finally, the paper's main conclusions are set out.

2. The effect of beaches on hotel prices

2.1. Framework of analysis

As it is well-known, the use of hedonic methods allows practitioners to estimate from the available data the implicit prices of the characteristics which give satisfaction to consumers. In a hedonic framework the product "stay in a hotel room" is defined as a vector of objectively measured characteristics or attributes which give rise to a product's space of characteristics affecting the satisfaction of consumers and the production costs of firms (see Bartik, 1987, 1988; Epple, 1987; Rosen, 1974). Thus, the product offered by hotel j can be represented by means of a vector

$$\mathbf{C}^j = (\mathbf{c}, \mathbf{z}, \mathbf{b}), \tag{1}$$

where $\mathbf{c}$ is a vector of measured values of the different hotel characteristics, for instance, room services, swimming pools, parking facilities for cars, entertainment for children, category or food quality and type; $\mathbf{z}$ is a vector of public characteristics (that is, related to location, see Bull, 1998; Rigall-I-Torrent & Fluvià, 2007, 2011), such as cleanliness of the streets, public safety or preservation of the environment, for instance; and $\mathbf{b}$ is a vector referring to the relevant characteristics of a beach, such as sand type and quality, water components and quality, degree of preservation, biodiversity, noise, crowdedness, etc. When a unique price exists for each of the characteristics embedded in a given hotel, then the price vector

$$p(\mathbf{C}) = p(\mathbf{c}, \mathbf{z}, \mathbf{b}), \tag{2}$$

which includes the implicit price of each characteristic considered in (1), can be defined (Rosen, 1974). Thus, the implicit prices obtained by hedonic methods can be interpreted as the marginal valuation which individuals attach to the different characteristics (Chay & Greenstone, 2005; Rosen, 1974).

2.2. Data

This paper uses prices and characteristics of hotels to estimate the relationship (2), that is, to isolate the effect caused by beaches on the prices of hotels. The analysis relies on data on prices, location and characteristics for a sample of 197 coastal hotels in the Costa Brava (Catalonia) for six months of the year 2002. The data are drawn from tour operators' brochures, official hotel guides, local tourism offices, and official statistics and data from Spanish Ministry of the Environment and Rural and Marine Affairs (distances from hotels to beaches were calculated on maps). A total of 36 beaches (all of them public beaches with public access) in 22 jurisdictions are analysed (see Table 1 for a detail of the beaches analysed and their characteristics). 4934 valid prices (observations) are included in the database. It is important to notice that, as it is usual with hedonic studies of hotel prices (Espinet et al., 2003; Haroutunian, Mitsis, & Pashardes, 2005; Rigall-I-Torrent & Fluvià, 2007, 2011; Thrane, 2005), the prices used in this study are not transaction prices, but prices listed on tour operators' brochures. Although it is not possible to consider discounts on list prices (last minute or based on age or club membership, for instance), the use of list prices should not be problematic. Indeed, as noticed by Rigall-I-Torrent and Fluvià (2011), it is reasonable to assume that brochure prices reflect "expected" prices paid by tourists (subject, of course, to deviations around the expected value). Besides, the market for hotel rooms in the region analysed in this paper is highly competitive (see Rigall-I-Torrent & Fluvià, 2007, 2011). Thus, it is very unlikely that list prices systematically do not reflect equilibrium market prices, since individual firms cannot increase their profits by setting prices above or below the market price.

Two types of variables are considered in the analysis: beach characteristics and control variables. The variables included in the database are presented in Table 2 together with some descriptive statistics. Notice that beach characteristics refer to a wide variety of beach attributes, but do not include cleaning services, availability of litter baskets or showers, since those services are available in virtually all the beaches analysed. Besides, water quality is not included either, since (because all the beaches in the sample display very good water quality levels) there is not enough variability to estimate water quality parameters. Control variables refer to the quality characteristics of hotels, the period of the year, and the public (related to location) characteristics of the jurisdictions where the hotels are located which are commonly used in the literature (Bull, 1998; Espinet et al., 2003; Haroutunian et al., 2005; Rigall-I-Torrent & Fluvià, 2007, 2011; Thrane, 2005). Notice that control variables do not account for differences in the climate or the degree of competition among locations or between different distribution channels, since such differences are not plausible for the hotels in the region analysed (Rigall-I-Torrent & Fluvià, 2007, 2011).

2.3. Specifications and results

Several alternative specifications (along the lines of Espinet et al., 2003; Haroutunian et al., 2005; Rigall-I-Torrent & Fluvià, 2007, 2011; Thrane, 2005) of (2) are taken into account. Since most of the variables are dichotomic, the number of alternative easily interpretable specifications is limited. Thus, the parsimonious semi-logarithmic regression specification used in the vast majority of existing hedonic studies has been adopted for the different specifications. Hence, for each specification the dependent variable is the natural logarithm of $Price_j$ (where subscript

Table 1
Beaches analysed.

Beach name	Jurisdiction	Sand type	Beach type	Beach length (m)	Beach width (m)	Blue Flag
Cala de la Belladona	Castell-Platja d'Aro	Medium or coarse	Semi-urban	200	25	No
Canyelles Petites	Roses	Very fine or fine	Semi-urban	315	28	No
Cau del Llop	Llançà	Medium or coarse	Semi-urban	2000	20	No
D'en Malaret	Begur	Medium or coarse	Semi-urban	15	5	No
De Lloret	Lloret de Mar	Medium or coarse	Urban	1300	40	Yes
De Pals	Pals	Very fine or fine	Semi-urban	4200	60	No
De Sant Feliu	Sant Feliu de Guíxols	Medium or coarse	Semi-urban	400	30	Yes
De l'Estartit	Torroella de Montgrí	Very fine or fine	Urban	925	95	No
De la Gola	Torroella de Montgrí	Very fine or fine	Semi-urban	3100	65	No
De la Ribera	El Port de la Selva	Medium or coarse	Urban	500	40	Yes
De la Rovina	Castelló d'Empúries	Very fine or fine	Natural	1700	50	No
Del Port	Llançà	Medium or coarse	Urban	425	20	Yes
Fenals	Lloret de Mar	Medium or coarse	Urban	775	45	Yes
L'Almadrava	Roses	Very fine or fine	Semi-urban	500	23	No
La Fosca	Palamós	Very fine or fine	Semi-urban	500	42	Yes
La Punta	Roses	Very fine or fine	Urban	500	65	No
Llarga	Castell-Platja d'Aro	Medium or coarse	Urban	2400	60	Yes
Mar Menuda	Tossa de Mar	Medium or coarse	Urban	180	20	Yes
Platja Gran	Palamós	Medium or coarse	Urban	575	48	No
Platja d'Empúriabrava	Castelló d'Empúries	Medium or coarse	Urban	1575	90	Yes
Platja de Blanes	Blanes	Medium or coarse	Urban	625	30	Yes
Port Pelegrí	Palafrugell	Medium or coarse	Urban	47	12	No
Port d'en Perris	L'Escala	Gravel	Urban	100	10	No
Portbo	Palafrugell	Medium or coarse	Urban	190	15	No
Rovira	Castell-Platja d'Aro	Medium or coarse	Semi-urban	400	30	Yes
S'Abanell	Blanes	Medium or coarse	Urban	3100	60	Yes
Sa Conca	Cadaqués	Gravel	Semi-urban	125	11	No
Sa Platja	Tossa de Mar	Medium or coarse	Urban	385	50	Yes
Sa Riera	Begur	Medium or coarse	Semi-urban	180	30	Yes
Sant Antoni	Calonge	Medium or coarse	Urban	1500	25	Yes
Sant Jordi	Calonge	Medium or coarse	Semi-urban	110	15	No
Sant Pol	Castell-Platja d'Aro	Medium or coarse	Urban	870	25	Yes
Sant Roc	Palafrugell	Medium or coarse	Urban	40	18	No
Santa Cristina	Lloret de Mar	Medium or coarse	Semi-urban	365	30	No
Santa Margarida	Roses	Very fine or fine	Urban	1790	45	No
Tamariu	Palafrugell	Very fine or fine	Urban	220	40	Yes

j denotes the hotel) and the right-hand side variables enter the regression additively. The random error term is independent and identically (normally) distributed (i.i.d.), with zero mean and constant variance.

Table 3 shows the results of estimating 10 different specifications of expression (2) by OLS using robust standard errors clustered by beach and time period (Liang & Zeger, 1986; Rigall-I-Torrent & Fluvià, 2010; Wooldridge, 2003). (No relevant changes occur when standard errors are clustered by hotel and time.) All the specifications include the same control variables, and the variables related to beach characteristics are introduced stepwise. The fit of the different specifications is very good (adjusted-R^2 ranges from 0.7902 to 0.8081) and the F-tests reject the hypothesis that the slope coefficients are jointly zero. The results are mostly robust to changes in the specification. Multicollinearity is not a problem for specifications #1–7, since the mean VIF (variance inflation factors) range from 1.42 to 1.84 and the larger VIF is lower than 10 in all cases, but it can be a problem for specifications #8–10, since the mean VIFs are, respectively, 3.82, 3.30 and 3.83, and the maximum VIFs 14.03, 13.38, and 14.03. Our preferred specification is #8, since (in spite of possible multicollinearity) bias from omitted variables is likely to be minimized. Several conclusions emerge clearly from the different specifications:

1. Location in front of the beach matters a lot. For the different specifications, the coefficient associated to this variable is statistically different from zero at a significance level of 0.1%. If $\widehat{\beta}_{beach}$ is the coefficient associated to the variable "location in front of the beach", the difference between the price of a hotel h located in front of the beach and another hotel h' not located in front of the beach is given by $(e^{\widehat{\beta}_{beach}} - 1)\cdot 100$ (Halvorsen & Palmquist, 1980). Thus, the coefficient $\widehat{\beta}_{beach}$ says that a hotel located in front of a beach can set (on average) prices between $(e^{0.1215} - 1)\cdot 100 = 12.9\%$ (specifications #6 and #7) and $(e^{0.1552} - 1)\cdot 100 = 16.8\%$ (specification #8) higher than a hotel with otherwise identical private characteristics but which is not located in front of one. For hotels not located in front of the beach, distance to the beach does not have a significant effect on price. Nevertheless, when the variable "location in front of the beach" is not included in the regression, then the distance to the beach becomes significant (see specifications #3 and #10): when distance increases by 1%, hotel prices decrease by 0.004%. (Notice that, since "beach length" is a continuous variable, the percentage change in hotel prices due to a 1% change in beach width is given by $100\cdot\widehat{\beta}_{beach\_length}$.)
2. Beach width is negatively correlated to the price of hotels: when beach width increases by 1% hotel prices decrease by 0.17–0.47%. This implies a preference for beaches less wide than the sample average (45.1 m). This might be related to over-crowding, since in crowded wide beaches accessing the water is more difficult than in narrower ones. On the other hand, beach length has no statistically significant effect on price.
3. Urban and semi-urban beaches do not have statistically significant effects on hotel prices, but natural beaches exert a significant negative influence on prices: location close to a natural beach reduces prices by 23.3–48.0%. Nevertheless, this result should be taken with a pinch of salt, since only one

Table 2
Variables included in the database.

	Variable	Description	Mean	Standard deviation	Maximum	Minimum
Dependent variable	Price	Price in euros of a double room half board during seven nights. Original prices are in euro for all countries except the United Kingdom, Lithuania and Switzerland. Since tour operators usually publish their prices a year in advance, the exchange rates of 31st October 2001 are used for those three countries	269.846	131.60	991.46	76.5
Beach variables	Hotel located in front of the beach	Dummy variable	0.258	–	1	0
	Distance to the beach (m)	Distance in meters from the hotel to the nearest beach	357.403	514.77	7000	0
	Beach length	Length in meters of the beach	1302.025	745.89	4200	15
	Beach width	Width in meters of the beach	45.111	13.99	95	5
	Urban beach	Dummy variable: beach located in urban environment (reference variable)	0.912	–	1	0
	Semi-urban beach	Dummy variable: beach located in semi-urban environment	0.084	–	1	0
	Natural beach	Dummy variable: beach located in natural environment	0.004	–	1	0
	Fine sand	Dummy variable: beach with fine or very fine sand	0.186	–	1	0
	Coarse sand	Dummy variable: beach with medium or coarse sand	0.810	–	1	0
	Gravel	Dummy variable: beach with gravel	0.003	–	1	0
	Blue Flag award	Dummy variable: beach has been awarded a Blue Flag	0.787	–	1	0
	Anchoring space	Dummy variable: beach with anchoring space	0.297	–	1	0
	Security services	Dummy variable: beach with security services	0.831	–	1	0
	Access for disabled people	Dummy variable: beach with access for disabled people	0.857	–	1	0
	WC facilities	Dummy variable: beach with WC facilities	0.887	–	1	0
	Boardwalk	Dummy variable: beach with boardwalk	0.924	–	1	0
	Umbrellas for rent	Dummy variable: beach with umbrellas for rent	0.870	–	1	0
	Beach kiosks	Dummy variable: kiosks on the beach	0.763	–	1	0
	Beach vegetation	Dummy variable: beach has surrounding vegetation	0.410	–	1	0
Control variables	May	Dummy variable: observation corresponds to May	0.157	–	1	0
	June	Dummy variable: observation corresponds to June	0.173	–	1	0
	July	Dummy variable: observation corresponds to July	0.173	–	1	0
	August	Dummy variable: observation corresponds to August	0.173	–	1	0
	September	Dummy variable: observation corresponds to September	0.173	–	1	0
	October	Dummy variable: observation corresponds to October	0.150	–	1	0
	Number of rooms in the hotel	Total number of rooms in the hotel	159.507	113.45	870	18
	Hotel has room services	Dummy variable: TV or air conditioned available in the room	0.718	–	1	0
	Hotel has garden or balcony	Dummy variable: garden or balcony available in the room	0.941	–	1	0
	Hotel has swimming pool	Dummy variable: outdoor swimming pool available	0.900	–	1	0
	Outdoor sports facilities available	Dummy variable: tennis court, sports centre, volleyball, golf or miniature golf available	0.299	–	1	0
	Car park available	Dummy variable: hotel has car park for guests	0.836	–	1	0
	Quality acknowledgement from ICTE	Dummy variable: hotel has quality acknowledgement from the Instituto para la Calidad Turística Española	0.034	–	1	0
	Entertainment for children available	Dummy variable: hotel has entertainment for children	0.267	–	1	0
	Indoor sports facilities available	Dummy variable: squash court, heated swimming pool, gym or fitness centre available	0.418	–	1	0
	Premises improved/opened in the last 5 years	Dummy variable: hotel has improved/opened premises in the past 5 years	0.401	–	1	0
	1-star hotel	Dummy variable: 1-star hotel	0.067	–	1	0
	2-star hotel	Dummy variable: 2-star hotel	0.091	–	1	0
	3-star hotel	Dummy variable: 3-star hotel (reference variable)	0.728	–	1	0
	4-star hotel	Dummy variable: 4-star-hotel	0.114	–	1	0
	Population in the jurisdiction (thousands of people)	Total population in the jurisdiction in thousands of *de jure* inhabitants	17.079	8.36	32.926	0.897
	Local police officers per 1000 hotel rooms	Local police officers in the jurisdiction per 1000 hotel rooms	5.773	5.66	29.77099	0

natural beach is included in our sample and only one hotel is located near that beach. Besides, the criteria used by the Spanish Ministry of the Environment and Rural and Marine Affairs (the source used in this paper) to classify beaches as urban, semi-urban and natural are not clear.

4. Coarse sand (and, for some specifications, gravel) has a negative effect on hotel prices when compared with fine or very fine sand: prices are 6.8–22.3% lower in hotels located close to beaches with coarse sand.
5. Although the coefficient on the “Blue Flag” variable is not statistically different from zero in specification #7, when the services available on the beach are included in the regression (specifications #8 and #10), then it becomes strongly significant. This suggests that the omission of the services variables may be a source of omitted variable bias. The coefficients on the “Blue Flag” variable in specifications #8 and #10 say that, everything else constant, location close to a beach which has been awarded a Blue Flag increases hotel prices by 11.4–11.6%.
6. The available data do not provide unequivocal evidence about the effects of other beach characteristics on hotel prices. This may be due to multicollinearity problems, since the VIFs of the beach service variables are quite high for specifications #8, 9 and 10. Nevertheless, the coefficients on “anchoring zone”, “WC facilities” and “umbrellas for rent” are statistically different from zero. Thus, having an anchoring zone lowers hotel prices

Table 3
OLS estimates of different specifications of the model.

	Variable	Specifications (dependent variable: natural logarithm of price)									
		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Beach variables	Hotel located in front of the beach	0.1536***	0.1546***	–	0.1427***	0.1421***	0.1215***	0.1215***	0.1552***	0.1550***	–
		(0.0212)	(0.0219)		(0.0229)	(0.0227)	(0.0196)	(0.0196)	(0.0206)	(0.0205)	
	Distance to the beach (m)	–	2.08e−06	−4.53e−05**	−5.96e−06	3.20e−07	1.26e−06	3.31e−06	−2.93e−06	−1.55e−06	−4.31e−05**
			(1.26e−05)	(1.66e−05)	(1.32e−05)	(1.28e−05)	(1.29e−05)	(1.31e−05)	(1.21e−05)	(1.21e−05)	(1.45e−05)
	Beach length	–	–	–	7.68e−07	7.30e−07	−6.87e−06	−7.60e−06	−1.32e−05	−1.21e−05	−3.12e−06
					(1.25e−05)	(1.28e−05)	(1.15e−05)	(1.19e−05)	(1.22e−05)	(1.27e−05)	(1.09e−05)
	Beach width	–	–	–	−0.0017***	−0.0020***	−0.0023***	−0.0023***	−0.0033***	−0.0032***	−0.0047***
					(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0008)
	Semi-urban beach	–	–	–	–	−0.0353	−0.0270	−0.0346	0.0384	0.0409	0.0111
						(0.0285)	(0.0255)	(0.0268)	(0.0318)	(0.0318)	(0.0335)
	Natural beach	–	–	–	–	−0.2651***	−0.3234***	−0.3284***	−0.6442***	−0.6139***	−0.6540***
						(0.0491)	(0.0530)	(0.0534)	(0.0773)	(0.0775)	(0.0770)
	Coarse sand	–	–	–	–	–	−0.0984***	−0.0702*	−0.2162***	−0.1446***	−0.2523***
							(0.0216)	(0.0316)	(0.0402)	(0.0319)	(0.0400)
	Gravel	–	–	–	–	–	−0.0624	−0.0527	−0.2394**	−0.1823*	−0.2740***
							(0.0707)	(0.0735)	(0.0841)	(0.0833)	(0.0750)
	Blue Flag award	–	–	–	–	–	–	−0.0316	0.1096**	–	0.1078**
								(0.0313)	(0.0387)		(0.0372)
	Anchoring zone	–	–	–	–	–	–	–	−0.1825***	−0.1731***	−0.1674***
									(0.0481)	(0.0483)	(0.0472)
	Security services	–	–	–	–	–	–	–	0.0556	0.0923	0.0653
									(0.0502)	(0.0518)	(0.0495)
	Access for disabled people	–	–	–	–	–	–	–	0.0311	0.0503	−0.0131
									(0.0303)	(0.0300)	(0.0305)
	WC facilities	–	–	–	–	–	–	–	−0.1186***	−0.1027**	−0.1192***
									(0.0324)	(0.0335)	(0.0336)
	Boardwalk	–	–	–	–	–	–	–	0.0674	0.1010**	0.0476
									(0.0354)	(0.0349)	(0.0370)
	Umbrellas for rent	–	–	–	–	–	–	–	−0.2150***	−0.2151***	−0.1212**
									(0.0385)	(0.0391)	(0.0362)
	Beach kiosks	–	–	–	–	–	–	–	0.0128	0.0108	0.0048
									(0.0333)	(0.0341)	(0.0348)
	Surrounding vegetation	–	–	–	–	–	–	–	−0.0014	−0.0026	0.0087
									(0.0226)	(0.0230)	(0.0233)
Control variables	May	−0.8160***	−0.8160***	−0.8153***	−0.8155***	−0.8156***	−0.8160***	−0.8160***	−0.8172***	−0.8170***	−0.8163***
		(0.0250)	(0.0250)	(0.0277)	(0.0247)	(0.0245)	(0.0241)	(0.0242)	(0.0240)	(0.0242)	(0.0249)
	June	−0.4959***	−0.4959***	−0.4958***	−0.4959***	−0.4959***	−0.4959***	−0.4959***	−0.4956***	−0.4956***	−0.4955***
		(0.0247)	(0.0247)	(0.0279)	(0.0239)	(0.0233)	(0.0185)	(0.0184)	(0.0162)	(0.0163)	(0.0164)
	July	−0.2143***	−0.2143***	−0.2142***	−0.2142***	−0.2142***	−0.2142***	−0.2142***	−0.2143***	−0.2143***	−0.2142***
		(0.0215)	(0.0214)	(0.0224)	(0.0200)	(0.0196)	(0.0196)	(0.0197)	(0.0160)	(0.0162)	(0.0156)
	September	−0.4968***	−0.4968***	−0.4968***	−0.4968***	−0.4968***	−0.4968***	−0.4968***	−0.4969***	−0.4969***	−0.4968***
		(0.0304)	(0.0303)	(0.0337)	(0.0297)	(0.0291)	(0.0231)	(0.0230)	(0.0211)	(0.0211)	(0.0214)
	October	−0.8315***	−0.8315***	−0.8308***	−0.8306***	−0.8309***	−0.8307***	−0.8309***	−0.8332***	−0.8333***	−0.8311***
		(0.0189)	(0.0188)	(0.0202)	(0.0185)	(0.0186)	(0.0230)	(0.0232)	(0.0212)	(0.0215)	(0.0220)
	Number of rooms in the hotel	−0.0002***	−0.0002***	−0.0002***	−0.0001**	−0.0001**	−0.0001*	−0.0001*	−0.0001**	−0.0001**	−0.0002**
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)
	Hotel has room services	0.1215***	0.1213***	0.1165***	0.1186***	0.1221***	0.1203***	0.1189***	0.1235***	0.1196***	0.1161***
		(0.0152)	(0.0152)	(0.0142)	(0.0147)	(0.0151)	(0.0147)	(0.0146)	(0.0150)	(0.0148)	(0.0131)
	Hotel has garden or balcony	0.0994***	0.0991***	0.1235***	0.1039***	0.1022***	0.0909***	0.0897***	0.1113***	0.1107***	0.1225***
		(0.0201)	(0.0199)	(0.0219)	(0.0197)	(0.0193)	(0.0192)	(0.0190)	(0.0170)	(0.0168)	(0.0178)
	Hotel has swimming pool	−0.0363	−0.0366	−0.0657**	−0.0329	−0.0293	−0.0383	−0.0416	−0.0222	−0.0315	−0.0496*
		(0.0241)	(0.0240)	(0.0215)	(0.0237)	(0.0236)	(0.0219)	(0.0227)	(0.0220)	(0.0216)	(0.0192)
	Outdoor sports facilities available	0.0824***	0.0821***	0.0857***	0.0762***	0.0751***	0.0578**	0.0562*	0.0672**	0.0635**	0.0579*
		(0.0181)	(0.0183)	(0.0224)	(0.0183)	(0.0184)	(0.0219)	(0.0225)	(0.0205)	(0.0204)	(0.0280)

Car park available	0.0079	0.0081	0.0232	0.0136	0.0140	0.0223	0.0246	0.0019	0.0092	0.0268
	(0.0141)	(0.0139)	(0.0138)	(0.0139)	(0.0139)	(0.0141)	(0.0147)	(0.0146)	(0.0142)	(0.0137)
Quality acknowledgement	0.0336	0.0337	0.0133	0.0281	0.0210	0.0194	0.0192	0.0535	0.0540	0.0113
from ICTE	(0.0535)	(0.0535)	(0.0607)	(0.0502)	(0.0524)	(0.0551)	(0.0553)	(0.0528)	(0.0527)	(0.0634)
Entertainment for	−0.0701***	−0.0700***	−0.0848***	−0.0672***	−0.0685***	−0.0494***	−0.0494***	−0.0619***	−0.0609***	−0.0595***
children available	(0.0151)	(0.0152)	(0.0162)	(0.0149)	(0.0151)	(0.0138)	(0.0137)	(0.0161)	(0.0159)	(0.0154)
Indoor sports	0.1127***	0.1124***	0.1060***	0.1097***	0.1070***	0.0944***	0.0930***	0.0981***	0.0956***	0.0875***
facilities available	(0.0166)	(0.0169)	(0.0165)	(0.0171)	(0.0177)	(0.0194)	(0.0201)	(0.0197)	(0.0195)	(0.0206)
Premises improved/opened	−0.0527***	−0.0529***	−0.0361	−0.0533***	−0.0535***	−0.0581***	−0.0577***	−0.0504***	−0.0503***	−0.0457**
in the last 5 years	(0.0155)	(0.0154)	(0.0189)	(0.0155)	(0.0149)	(0.0142)	(0.0143)	(0.0139)	(0.0140)	(0.0156)
1-star hotel	−0.2340***	−0.2343***	−0.2581***	−0.2278***	−0.2275***	−0.2296***	−0.2317***	−0.2474***	−0.2497***	−0.2529***
	(0.0257)	(0.0261)	(0.0298)	(0.0259)	(0.0258)	(0.0230)	(0.0236)	(0.0255)	(0.0256)	(0.0277)
2-star hotel	−0.1690***	−0.1692***	−0.2023***	−0.1656***	−0.1665***	−0.1679***	−0.1697***	−0.1670***	−0.1721***	−0.1864***
	(0.0180)	(0.0181)	(0.0211)	(0.0176)	(0.0173)	(0.0164)	(0.0165)	(0.0151)	(0.0150)	(0.0160)
4-star hotel	0.3591***	0.3589***	0.4011***	0.3576***	0.3577***	0.3957***	0.3975***	0.3924***	0.3908***	0.4378***
	(0.0314)	(0.0314)	(0.0308)	(0.0319)	(0.0324)	(0.0347)	(0.0354)	(0.0370)	(0.0368)	(0.0408)
Population in the jurisdiction	−0.0105***	−0.0105***	−0.0111***	−0.0111***	−0.0115***	−0.0102***	−0.0100***	−0.0128***	−0.0129***	−0.0138***
(thousands of people)	(0.0007)	(0.0008)	(0.0009)	(0.0010)	(0.0010)	(0.0009)	(0.0009)	(0.0021)	(0.0021)	(0.0021)
Local police officers per	0.0082***	0.0081***	0.0094***	0.0093***	0.0103***	0.0098***	0.0098***	0.0128***	0.0125***	0.0142***
1000 hotel rooms	(0.0013)	(0.0013)	(0.0014)	(0.0014)	(0.0014)	(0.0013)	(0.0013)	(0.0016)	(0.0016)	(0.0016)
Intercept	5.8759***	5.8757***	5.9391***	5.9465***	5.9647***	6.0645***	6.0650***	6.3237***	6.2647***	6.4432***
	(0.0319)	(0.0321)	(0.0295)	(0.0367)	(0.0342)	(0.0392)	(0.0398)	(0.0701)	(0.0677)	(0.0684)
N	4934	4934	4934	4934	4934	4934	4934	4934	4934	4934
Adjusted-R^2	0.7902	0.7902	0.7750	0.7923	0.7935	0.7985	0.7986	0.8081	0.8075	0.7961
F	773.3887	747.4969	649.8506	702.2905	671.9794	604.1626	570.8898	620.4828	580.8468	632.0804
p-Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mean VIF	1.43	1.44	1.42	1.49	1.53	1.54	1.84	3.82	3.30	3.83
Maximum VIF	1.79	1.80	1.80	1.82	2.00	2.06	5.63	14.03	13.38	14.03

Robust standard errors in parentheses, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. All the independent variables enter the regression additively.

by 15.4–16.7%, having WC facilities by 9.8–11.2%, and umbrellas for rent by 11.4–19.4%.

7. The estimates of the coefficients linked to the control variables are very robust to the different specifications and consistent with other studies in the literature (Bull, 1998; Espinet et al., 2003; Haroutunian et al., 2005; Rigall-I-Torrent & Fluvià, 2007, 2011; Thrane, 2005).

Summing up, the information obtained from computing (2) by hedonic methods may be very useful for hotel managers and public sector policymakers in sun-and-beach destinations. The next section analyses the possible uses that the resulting information, together with some further developments, may have for private firms' managers and public policymakers in tourism municipalities.

3. Implications for managers

The hedonic estimates in Section 3 are relevant for both public and private sector managers. Public sector managers are usually interested in deciding whether it is worthwhile to spend money to improve the characteristics of a given beach. From a purely economic point of view, an investment is socially desirable if the sum of the willingnesses to pay for improving a given characteristic by all the affected individuals is greater than the cost of the improvement. Since the hedonic estimate of the implicit price for a particular indicator shows the marginal effect on the price of private supply of a marginal change in that indicator (Rosen, 1974), then it is possible to have an approximate idea of the monetary value that the market attaches to improving that particular indicator. (See, however, Chay & Greenstone, 2005 for the case when market response is the result of preference heterogeneity.) By using data on the total number of hotel rooms, policymakers can then compute the approximate total change in price that a marginal improvement in each indicator would have for hotels. By adding up the total variation for each indicator, public policymakers have an estimate of the market valuation of a marginal variation (improvement or worsening) for each indicator. The data can be then compared to the cost of marginally changing each indicator and thus obtain the net marginal value of a particular policy. This calculation is useful to policymakers not only for taking informed decisions, but also in order to make firms aware of the tangible benefits they obtain from beaches, and to justify potential increases in the taxes needed to finance a possible improvement.

Private firms also benefit from the information provided by the hedonic estimates. Firms are interested in making products valuable to consumers. However, determining the exact composition of the products which produce satisfaction to customers is not an easy task. Consider the case of hotels. Tourists get satisfaction from the different components of the products available, such as swimming pools, sports facilities, room services, or the quality of nearby beaches. The hedonic estimates allow private firms to figure out how different combinations of beach characteristics affect the prices they can charge. Since the estimates supply price/quality information with a theoretical economic background, they make possible for the agents in the market to properly evaluate differentiated products on which production and consumption decisions can be based (Kristensen, 1984). This information would be expensive to obtain with other existing marketing research tools (see, for instance, Rigall-I-Torrent & Fluvià, 2011).

The remaining of this section presents some implications of the hedonic estimates in Section 2 for both hotel and beach managers. First, the approach in Rigall-I-Torrent and Fluvià (2011) is used to rank beaches according to their characteristics. Then, a discussion on the use of the estimates to assess the convenience (from the point of view of hotels) of sediment redistribution and beach maintenance in the most important tourism destination in the Costa Brava (Lloret de Mar) are provided. Next, the importance of earning a Blue Flag is discussed. Finally, some general implications for hotel managers regarding promotion and bundling strategies are presented.

3.1. Ranking beaches according to their effects on hotel prices

The regressions in Table 3 break up the effects of different beach characteristics on hotel prices. Although, as shown in the next subsections, this decomposition is already useful, managers may find it convenient to have a synthetic index which allows them to easily compare different beaches. The results obtained from the previous analysis and the developments in Rigall-I-Torrent and Fluvià (2011) allow managers to obtain an index of the quality of different beaches in terms of their characteristics. Specification #8 in Section 3 can be expressed as

$$\log \widehat{P}_h = \widehat{\gamma}_0 + \sum_{n=1}^{N} \widehat{\beta}_n c_{n,h} + \sum_{m=1}^{M} \widehat{\varphi}_m z^j_{m,h} + \sum_{t=1}^{T} \widehat{\phi}_t b^j_{t,h}, \tag{3}$$

where $\log \widehat{P}_h$ is the natural logarithm of the predicted price of hotel h, $c_{1,h}$, $c_{2,h}$, …, $c_{N,h}$ are the relevant characteristics or attributes of hotel h, $z^j_{1,h}, z^j_{2,h}, \ldots, z^j_{M,h}$ are the public characteristics of the hotel, $b^j_{1,h}, b^j_{2,h}, \ldots, b^j_{T,h}$ are the characteristics of the closest beach to the hotel, and $\widehat{\gamma}_0$, $\widehat{\beta}_1, \ldots, \widehat{\beta}_N$, $\widehat{\varphi}_1, \ldots, \widehat{\varphi}_M$, $\widehat{\phi}_1, \ldots, \widehat{\phi}_T$, are the estimated values of the parameters. In order to obtain an index of beach characteristics we need to compare hotels with identical private and public characteristics. From (3), the difference in the price of a hotel h close to the beach k and another hotel h' located close to the beach k' is given by the expression

$$\log \widehat{P}_{h'} - \log \widehat{P}_h = \sum_{t=1}^{T} \widehat{\phi}_m b^{k'}_{m,h'} - \sum_{t=1}^{T} \widehat{\phi}_m b^{k}_{m,h} \Rightarrow \frac{\widehat{P}_{h'}}{\widehat{P}_h} = \frac{\exp\left(\sum_{t=1}^{T} \widehat{\phi}_m b^{k'}_{m,h'}\right)}{\exp\left(\sum_{t=1}^{T} \widehat{\phi}_m b^{k}_{m,h}\right)}, \tag{4}$$

since $c_{1,h} = c_{1,h'}$, $c_{2,h} = c_{2,h'}$, …, $c_{N,h} = c_{N,h'}$, and $z_{1,h} = z_{1,h'}$, $z_{2,h} = z_{2,h'}$, …, $z_{N,h} = z_{N,h'}$. Given that beach characteristics do not vary for all the hotels located close to the same beach, and by setting a given beach as the reference, a Beach Index ranking can be constructed, classifying/ranking beaches according to the price differentials for hotels which result from being placed at each of the K possible locations/beaches. By setting beach k as the reference, then (4) becomes

$$\text{Beach Index}^{k'} \equiv \frac{\exp\left(\sum_{t=1}^{T} \widehat{\phi}_m b^{k'}_{m,h'}\right)}{\exp\left(\sum_{t=1}^{T} \widehat{\phi}_m b^{k}_{m,h}\right)} \cdot 100. \tag{5}$$

Notice how in the index (5) each beach characteristic is weighted by the hedonic coefficients estimated through (3).

Table 4 shows the ranking of beaches in our sample according to this index (setting Platja de Lloret = 100). In the computation of the index the variables location in front of the beach and distance to the beach are not included, since they are variables essentially related to the hotels and not beach characteristics. By looking at Table 4, hotel managers and policymakers can easily determine the position of a beach with respect to other competitors. By using the estimates

Table 4
Index of beach characteristics.

Beach	Jurisdiction	Index
De la Ribera	El Port de la Selva	141.08
De la Gola	Torroella de Montgrí	128.32
Portbo	Palafrugell	122.45
Sant Roc	Palafrugell	115.76
Canyelles Petites	Roses	110.65
Del Port	Llançà	110.21
Cala de la Belladona	Castell-Platja d'Aro	105.37
Tamariu	Palafrugell	104.77
D'en Malaret	Begur	104.50
Santa Margarida	Roses	102.70
La Fosca	Palamós	101.92
Cau del Llop	Llançà	101.23
De Pals	Pals	100.44
De Lloret	*Lloret de Mar*	*100.00*
Sa Conca	Cadaqués	99.96
Port d'en Perris	L'Escala	99.73
L'Almadrava	Roses	99.67
Fenals	Lloret de Mar	98.91
Port Pelegrí	Palafrugell	98.66
Sant Jordi	Calonge	97.76
Sa Platja	Tossa de Mar	96.82
S'Abanell	Blanes	91.42
De Sant Feliu	Sant Feliu de Guíxols	89.40
Mar Menuda	Tossa de Mar	89.18
Sant Pol	Castell-Platja d'Aro	87.92
De l'Estartit	Torroella de Montgrí	87.04
La Punta	Roses	86.14
Platja de Blanes	Blanes	85.78
Llarga	Castell-Platja d'Aro	85.33
Sant Antoni	Calonge	84.64
Rovira	Castell-Platja d'Aro	84.53
Platja d'Empúriabrava	Castelló d'Empúries	84.48
Santa Cristina	Lloret	82.72
Sa Riera	Begur	80.19
Platja Gran	Palamós	73.42
De la Rovina	Castelló d'Empúries	71.02

in Table 3, hotel managers can improve their location decisions and policymakers can ascertain how a beach's standing would change if its characteristics increased or decreased.

3.2. Is it worthwhile to nourish and maintain a beach?

After hotels have made their decisions regarding location, beach characteristics may change because of natural events (storms, for instance) or frequentation by tourists. Therefore, the question of how much to spend on beach nourishment and maintenance arises. The estimates in Section 2 are useful to answer these types of questions. An application to Lloret de Mar, one of the major tourism destinations in Catalonia, can be carried out with the global estimate of the effect on hotels' prices of location in front of a beach in Table 3. The average price in euros of a double room (half board) during seven nights in a 3-star hotel located in Lloret de Mar not placed in front of the beach is close to €227 a week. Therefore, the weekly price per person for a double room is €227/2 = €113.5. Using the results is specification #8, an estimate of the valuation tourists staying at hotels have for a beach is $0.168 \times 113.5 =$ €19.1 per week and tourist. Lloret de Mar had 160 hotels in 2002, with total capacity up to 30,896 persons a day (Institut d'Estadística de Catalunya, 2009). Assuming that the period during which tourists enjoyed the beach was 12 weeks (the summer period), and that the occupancy rate was 60% for the whole period, then the total valuation tourists staying at hotels have for a beach is $19.1 \times 30{,}896 \times 12 \times 0.6 \approx 4{,}239{,}000$€. The cost of sediment redistribution (moved by waves to other locations within the beach) in the main beach in Lloret de Mar (Platja de Lloret) was €140,000. Adding beach maintenance costs and other beach-related costs to the cost of sand reallocation, total costs associated with beaches can be set against valuation by tourists.

As noticed by Pompe and Rinehart (1994), not all local use benefits can be obtained with a model of this kind. For instance, the benefits for owners of campsites, restaurants or second homes are excluded when only hotel prices are considered. Besides, non-use benefits, that is, the benefit provided by an environmental entity the existence of which is considered desirable to be maintained although it has no prospect of being of use to humans now or in the future (Organisation for Economic Co-operation and Development, 2007), cannot be measured with this approach. Nevertheless, the hedonic estimates provide a lowest bound for the overall value of environmental amenities. Therefore, the previous computation suggests that Lloret de Mar has ample scope for spending in sediment redistribution and beach maintenance, that is, a greater investment in implementing beach management programmes seems justified. Obviously, such programmes must be proactive, they require general consensus among stakeholders, and should be oriented towards preserving natural resources, minimising pollution, and guaranteeing quality of enjoyment by users.

3.3. Is it worthwhile to earn a Blue Flag?

The estimates in Section 2 can also be used to determine whether it is worthwhile for a beach to earn a Blue Flag. Municipalities can apply for a Blue Flag, which is a voluntary eco-label awarded to beaches (Foundation for Environmental Education, 2010). In order to be awarded a Blue Flag a beach needs to meet several criteria regarding environmental education and information, water quality, environmental management, and safety and services. Obviously, meeting those criteria is costly, and the funds devoted to paying the costs could be used for different alternative purposes. Therefore, it is important have an estimate of the social valuation of a Blue Flag. The estimates in Table 3 show that a Blue Flag increases hotel prices by around 11.5%. This is a remarkable figure. With the help of this estimate managers can repeat the process in the previous subsection and determine the total valuation that tourists staying at hotels have for a Blue Flag. By proceeding likewise with second homes and campsites, for instance, policymakers can then compute the approximate total change in price that a earning a Blue Flag would have for each kind of premise and business. By adding up the results, policymakers would have an estimate of the market valuation of a Blue Flag. This data could then be compared to the cost meeting the Blue Flag criteria and thus obtain the net marginal social value of the policy. In turn, hotel managers can compare their contributions (in the form of taxes, for instance) to earning a Blue Flag against the expected benefits (essentially an increase in the prices they can charge).

3.4. Promotion and bundling strategies

As noticed by Bull (1998) and Rigall-I-Torrent and Fluvià (2011), after choosing their hotel's location, managers can use the hedonic estimates in order to market their product properly. For instance, tourists might expect a close match between the characteristics of their hotel and those of nearby beaches (see Rigall-I-Torrent & Fluvià, 2011, for further examples). Consider two hotels, *A* and *B*, showing similar prices and identical advertised characteristics (remember, category, food quality, swimming pool, or activities for children, for instance). However, assume that hotel *A* is located in front of a well-preserved beach with lots of high-quality services, whereas hotel *B* is surrounded by a run-down beach with no services. Then a tourist weighing up both hotels as alternatives for her holidays, could be deceived into thinking that both hotels represent similar value for money. If that was the case, the manager of hotel *A* should clearly advertise the beauty and supply of services of nearby beaches. For that purpose, joint initiatives between the public and the private sectors could also be in order.

Finally, notice that although it is not this paper's subject, the estimates obtained from the control variables in the hedonic regression in Table 3 provide additional information useful for private firms' managers. For instance, by performing the appropriate computations to the estimates in Table 3 it can be seen that room services increase, ceteris paribus, hotel prices by 13.1%, a garden or balcony by 11.8%, or outdoor sports facilities by 6.9% (see Rigall-I-Torrent & Fluvià, 2011, for further details about how this information can be used for managing products and destinations).

4. Conclusions

This paper measures the effects of beach characteristics and hotel location with respect to the beach on hotel prices and draws implications for managers and policymakers. Starting with the consideration that products are bundles of characteristics from which consumers get satisfaction, the paper decomposes (by means of hedonic methods) the price of a hotel room into the implicit prices of each of its attributes, including the characteristics of the beach in front of which a hotel is located. Hotel managers and policymakers can thus compute the market's marginal valuation of improving a particular indicator and compare it with the cost of the improvement. Thus, hotel managers can use the estimates to decide among different locations for their firms and to implement appropriate marketing policies and policymakers can determine the social valuation of different policies regarding beaches.

Specifically, the analysis of a large sample of coastal hotels in Catalonia shows that location in front of a beach increases hotels' prices by average 13–17%. Also, other relevant findings are that beach width is negatively correlated to the price of hotels; that natural beaches exert a negative influence on prices; that coarse sand has a negative effect on hotel prices when compared with fine or very fine sand; and that, everything else constant, hotels close to a beach which has been awarded a Blue Flag have prices about 11.5% higher. Among the different implications for management, the paper shows how to use the hedonic estimates to construct a synthetic index of beach characteristics and to assess the benefits that hotels and destinations can obtain from nourishing and maintaining beaches. These findings provide answers to several elusive questions regarding beaches which are of interest for private firms' managers and public sector policymakers in sun-and-beach destinations.

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