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Holiday Rentals in Cultural Tourism Destinations: A Comparison of Booking.com-Based Daily Rate Estimation for Seville and Porto

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Abstract: Multiple variables determine holiday rentals' price composition in cultural tourism destinations. This study sought, first, to test a model including the variables with the greatest impact on tourism accommodations' prices in these destinations and, second, to demonstrate the proposed model's applicability to cultural city destinations by identifying the adaptations needed to apply it to different contexts. Two cities were selected for the model application—Seville in Spain and Porto in Portugal—both of which are located in different countries and are well-known cultural tourism destinations. The data were extracted from Booking.com because this accommodations platform has adapted its offer to the sharing economy, becoming one of the most important players in the market, and because research on holiday rentals using data from Booking.com is scarce. The results show that the variables used are relevant and highlight the adaptations necessary for specific cultural tourism destinations, thereby indicating that the model can be applied to all cultural tourism destinations. The proposed approach can help holiday rental managers select the correct tools for determining their accommodation units' daily rates according to their product and marketing context's characteristics.

Keywords: daily rate pricing; holiday rentals; hedonic pricing method; Booking.com; sharing economy

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1. Introduction

The rapid development of information and communication technologies has profoundly transformed the tourism and hospitality industries (Cheng et al. 2018, 2019; Dickinger et al. 2017; Fernández-Gámez et al. 2020; Suzilo 2020). Consumers have changed the way they search for information, book services and communicate their experiences, thereby disrupting traditional distribution routes (Fernández-Gámez et al. 2020; Mohamad et al. 2021; Núñez-Tabales et al. 2020; Pinto and Castro 2019; Suzilo 2020) and making online booking the main channel of business (Cheng et al. 2019; Fernández-Gámez et al. 2020; Suzilo 2020). New business models have emerged such as online reservation systems and sharing economy platforms, also called peer-to-peer (P2P) platforms (Fernández-Gámez et al. 2020; Guttentag 2015; Suzilo 2020; Veiga et al. 2018). Customers' decision-making processes increasingly rely on comments posted by tourists who have experienced the relevant products and/or services (Cheng et al. 2019; Fernández-Gámez et al. 2020; Suzilo 2020; Veiga et al. 2018) rather than on official websites, advertising or travel agent information (Fernández-Gámez et al. 2020; Gemar et al. 2019; Suzilo 2020; Veiga et al. 2017). In addition, the connection between demand and supply has become more accessible to

consumers through new online distribution channels, allowing people to book accommodations provided by their peers rather than by travel or rental companies (Veiga et al. 2017, 2018; Zekan et al. 2019).

Millennials are among the most intensive users of P2P accommodations, as they look for authentic experiences, including living in residential areas among local populations (Lu and Tabari 2019; Suzilo 2020; Veiga et al. 2017). This generation also tends to reject traditional tourism structures and looks for places that they do not perceive as tourism destinations (Veiga et al. 2017). For private owners, P2P rentals is a way to monetise otherwise unused residential spaces or redefine their use for tourism purposes (Zekan et al. 2019).

Various factors attract tourists to residential areas, including historic quarters' traditional architecture, local people's everyday life and authentic experiences of cities (Maitland 2008). However, tourists and residents do not always coexist easily, and, in some cases, encounters can create friction between them (Davidson and Infranca 2016; Veiga et al. 2017, 2018; Zekan et al. 2019). Another phenomenon frequently linked to the sharing economy in some cities is overtourism, as it tends to concentrate an excessive number of tourists in city centres, historic quarters and residential areas (Veiga et al. 2017, 2018).

According to a comparative study of four European cities, 'only a minority of Airbnb listings can be classified as sharing economy services, while commercial offers constitute a significant share of listings on the platform' (Gyódi 2019, p. 536). Reinhold and Dolnicar (2021) also question the use of the terms sharing economy, collaborative consumption and P2P accommodations to describe Airbnb and similar platforms' products. The original idea of empowering ordinary people to purchase access to private owners' spare rooms has been replaced in most cases by companies trading short-term rentals for commercial purposes. Interactions between hosts and guests have been significantly reduced, as guests can book instantly, and the relevant individuals' photos are no longer displayed until the booking is confirmed (Reinhold and Dolnicar 2021).

Hosts frequently turn out to be agencies that act as intermediaries, receiving a commission for their services. The latter comprise inserting listings into booking platforms, managing bookings and check-in, assisting guests, if needed, during their stay and check-out and cleaning and maintaining rental properties (Reinhold and Dolnicar 2021). The lodgings' owners do not need to care about how well any of these procedures go, so no authentic hosts are involved, and owners have no contact with guests.

Regardless, the true sharing economy is an urban phenomenon that has extended tourism to new city areas (Davidson and Infranca 2016; Veiga et al. 2017, 2018) and contributed to urban transformation and gentrification (Davidson and Infranca 2016; Gant 2016; Veiga et al. 2018). This economy has also funded the regeneration of buildings in historic quarters and city centres that otherwise would have remained vacant. These structures have thus suddenly become valuable assets (Davidson and Infranca 2016).

One of the two largest platforms for accommodation bookings and holiday rentals, Booking.com, was the platform that first disrupted the entire accommodations sector. Airbnb did the same for vacation rentals. Both platforms replaced traditional intermediaries, such as tour operators and travel agencies, by allowing customers to book directly through their platforms. However, these websites' scope of business has changed, as Booking.com is expanding into the vacation rental sector, and Airbnb is entering the hotel sector (Cardoso 2018). An increasing number of vacation rentals are listed on both platforms in order to attract more clients (Cardoso 2018).

Research applying the hedonic pricing method (HPM) to the sharing economy's accommodation prices is relatively new (Tong and Gunter 2020) and restricted mainly to Airbnb. Because Booking.com has expanded into the holiday rental sector relatively recently, studies connecting this platform to the sharing economy are still scarce. The same can be said about comparative investigations of vacation rentals in cultural city destinations. More specifically, no researchers, to date, have compared vacation rentals' price composition in two or more urban cultural tourism destinations listed on Booking.com. Therefore,

the present study addresses both research gaps. It thus sought, first, to identify the most influential variables for holiday rentals' price composition in cultural tourism destinations and, second, to demonstrate this HPM model's applicability to different cultural tourism destinations listed on Booking.com. The last objective was to provide examples of the adaptations needed to apply the proposed model to all cultural city destinations.

2. Literature Review

2.1. Efficient Pricing

Pricing tools play a crucial role in the accommodation sector's revenue management, and efficient pricing has become a popular research field in recent years. Many hotels rely on cost-based, competition-driven and customer-driven pricing strategies (Tong and Gunter 2020), while others use dynamic pricing, namely, adjusting prices upward or downward over time (Leoni and Nilsson 2021). According to Vives and Jacob (2020), two dynamic pricing models are currently widely applied in the hotel industry to maximise revenue. The first is a deterministic model that sets different prices across booking horizons, while the second is a stochastic model that segments demand into different classes in order to determine market responses and demand's sensitivity to price variations. A combination of both dynamic pricing models is often used.

These models take advantage of consumers' willingness to pay more as the date of their stay approaches. Companies set the price of accommodations according to the time horizon between booking and travel dates and their hotels' capacity at any given time. Empirical research has shown that the probability is extremely high that the price will increase as the travel date approaches and the number of rooms available decreases (Leoni and Nilsson 2021).

HPM theory posits that prices depend on each product's features and their effects, which determine that item's consumption utility. HPM models have long been used to analyse the relationship between various product characteristics and their prices and to study heterogeneous features' impact on prices (Liang and Yuan 2021). Soler-García et al. (2019) report that HPM models have been extensively used in both tourism and hospitality studies to assess the influence of specific destination and hotel factors on room rates. To ensure efficient pricing, hotel managers need to know customers' propensity to pay for particular amenities and their hotel's set of services, so services' impact on overall customer satisfaction and the associated costs need to be analysed (Soler-García et al. 2019). HPM models facilitate the estimation of goods or services' prices based on previously defined variables. For hotels, prices are mainly determined by various tangible factors such as hotel category and geographic location, but type of accommodations and hotel chain membership are also important.

In addition, destinations' characteristics must be incorporated into hotel room rates (Soler-García and Gémar-Castillo 2018). Another external feature considered is the time of year, especially in sun-and-sea destinations, due to seasonality (Coenders et al. 2003; Rigall i Torrent et al. 2011); day of the week, especially in destinations with higher occupation rates on weekends; or special event periods (Soler-García and Gémar-Castillo 2017). Typical accommodation characteristics that influence prices are distance to the beach, the city centre, tourism hotspots, train stations or airports (Castro and Ferreira 2018; Gunter and Önder 2018; Soler-García and Gémar-Castillo 2018), as well as reputational factors such as hotel brand, number of stars and customer ratings (Castro and Ferreira 2018; Soler-García et al. 2019). Additional features affecting prices are hotel category; availability of a swimming pool, fitness centre or sport facilities (Castro and Ferreira 2018); pet admission (Santos et al. 2021); spa; parking; accommodations' size (Chen and Rothschild 2010; Santos et al. 2021; Voltes-Dorta and Sánchez-Medina 2020); the inclusion of a restaurant, bar or terrace; and room amenities such as Wi-Fi, television (TV), minibar or room service (Castro and Ferreira 2018).

Inefficient pricing can contribute to financial losses in every business activity, especially in the holiday rental sector. Hotels have trained professionals, price management

programmes and industry benchmarking reports, but vacation rental units are usually managed by people without specific training in pricing strategies and with limited access to pricing tools (Gibbs et al. 2018). Airbnb has made some attempt to develop pricing tools that the hosts can use to set their listings' prices. However, the first tool launched in 2012 was quite basic, as it only focused on simple factors including, among others, the number of rooms, neighbouring properties and amenities such as parking (Gibbs et al. 2018; Hill 2015).

A second, more elaborate pricing tool, Smart Pricing, was released a few years later, which takes both property characteristics and demand into account. The tool uses machine learning to provide hosts with a suggested price for a specific date that hosts may accept or change according to their perception (Gibbs et al. 2018; Hill 2015). Smart Pricing thus has a purely advisory function, so it may have no real influence on holiday rentals' price because most hosts do not use the tool (Tong and Gunter 2020).

As hosts are responsible for setting their listed properties' price, analyses of which factors affect vacation rental rates are of great importance to the sharing economy (Voltes-Dorta and Sánchez-Medina 2020). A significant number of studies have found that property, host and location factors have the strongest impact on prices (Voltes-Dorta and Sánchez-Medina 2020). Significant property features usually include the number of beds, bedrooms and bathrooms (Fearne 2021; Gibbs et al. 2018; Gunter and Önder 2018; Voltes-Dorta and Sánchez-Medina 2020) and online photos (Tong and Gunter 2020). Host characteristics, reputation, experience, responsiveness and 'superhost' status are specifically referred to in research on Airbnb (Gunter and Önder 2018; Voltes-Dorta and Sánchez-Medina 2020). Extremely important location factors for pricing holiday rentals are similar to those for hotels, namely, distance to the city centre, bus or train stations, airports, beaches or other hotspots (Gunter and Önder 2018; Gyódi and Nawaro 2021; Santos et al. 2021; Toader et al. 2021; Voltes-Dorta and Sánchez-Medina 2020).

While most research on sharing economy accommodation pricing has focused on Airbnb, a few investigations have taken Booking.com into account. For example, Gyódi (2017) compared Airbnb and Booking.com listings in Warsaw, finding evidence that Airbnb provides cheaper accommodation alternatives in all price segments. However, the cited study included Booking.com's complete offer of hotels, hostels and apartments, so the focus was not exclusively on the sharing economy. Santos et al. (2021) subsequently proposed a new HPM model for Booking.com holiday rentals using an extensive set of variables developed by Solano-Sánchez et al. (2019) that were also used in the present comparative study (see Table 1).

Table 1. Variables, descriptive statistics and description.

Var.	Seville		Porto		Description
	Mean or %	SD	Mean or %	SD	
PRCE	162.093	105.542	108.994	44.267	Accommodation price per day
MIN	14.71	8.531	14.3	11.872	Minutes to walk from accommodations to Plaza del Triunfo (Seville)/Praça da Liberdade (Porto)
IDIS	0.959	0.092	0.775	0.105	District index according to price per square metre in each district
BEDS	3.94	1.9	3.04	1.422	Number of beds
M2	75.8	40.818	54.62	29.376	Square metres
TV	99%	–	95%	–	Television (dummy variable)
WASH	96%	–	29%	–	Washing machine (dummy variable)
BAL	44%	–	46%	–	Balcony (dummy variable)

Table 1. *Cont.*

Var.	Seville		Porto		Description
	Mean or %	SD	Mean or %	SD	
TER	36%	–	22%	–	Terrace (dummy variable)
CRT	34%	–	17%	–	Courtyard or patio (dummy variable)
VIEW	53%	–	69%	–	Panoramic views (dummy variable)
INS	21%	–	41%	–	Soundproofing (dummy variable)
PARK	40%	–	41%	–	Parking (dummy variable)
PETS	11%	–	9%	–	Pets allowed (dummy variable)
POOL	3%	–	1%	–	Swimming pool (dummy variable)
BATH	34%	–	14%	–	Bathtub (dummy variable)
CAL	8.872	0.678	9.138	0.4597	Previous users' ratings (from 0 to 10)
PICS	32.8	0.22	38.95	12.445	Number of photos
VSAT	8.403	0.826	8.733	0.599	Visual appeal according to photos (from 0 to 10)
HWD	35%	–	35%	–	High season weekday (dummy variable)
HWE	13%	–	17%	–	High season weekend (dummy variable)
LWD	29%	–	30%	–	Low season weekday (dummy variable)
LWE	10%	–	14%	–	Low season weekend (dummy variable)
HW	8%	–	NA	NA	Holy Week (dummy variable) for Seville only
FAIR	5%	–	NA	NA	April Fair (dummy variable) for Seville only
SJ	NA	NA	4%	–	São João (dummy variable) for Porto only

Note: Var. = variable; SD = standard deviation; NA = not available. Source: (Booking.com 2018, 2019); (Google Maps 2018, 2019); (Tinsa 2018); (INE-PT (Instituto Nacional de Estatística) 2019).

2.2. Rise of Sharing Economy and Normative Adaptations

In Spain, legislation on holiday rentals varies according to the autonomous region involved. Vacation rentals' law[1] in Andalusia, of which Seville is the capital, define it as *viviendas con fines turísticos* (homes for tourism purposes, i.e., holiday rentals, HRs hereinafter). This law's Article 3 defines HRs as those located in buildings for residential use that provide accommodation services regularly marketed specifically to tourists. Andalusian HRs can be rented in full (i.e., the entire home) or in part (i.e., a spare room). In addition, tourism's law in Andalusia (Boletín Oficial de la Junta de Andalucía 2011)[2] highlights different types of tourism accommodations' obligation, including HRs, to register with the RTA[3] (Andalusian Tourism Registry), which the general public can access.

Portugal's national legislation on holiday rentals endows municipalities with the power to approve and, when the volume of existing vacation rental establishments has exceeded the limit set, curbing these facilities' numbers. Portugal started regulating the sharing economy's accommodations in 2008 (Diário da República 2008) to provide a legal framework for the provision of temporary accommodations in homes that did not meet the legal requirements imposed on any facilities previously classified as tourism accommodations. The new form of holiday rental establishments has been designated local lodging[4] and standardised as HRs in the present research, which consists of villas, apartments and lodging establishments that, after being authorised for this use, provide temporary paid accommodation services but do not meet the requirements to be classified as tourism businesses. HR establishments must comply with the minimum safety and hygiene requirements, be registered with the relevant municipal council and be marketed to tourists either by their owners or by travel and tourism agencies.

In 2014, several laws[5] were passed to provide further regulations on this type of activity in terms of properties' taxation, delimitation and required characteristics. These laws (Diário da República 2014, 2015) also specify which entity monitors compliance with rules and noncompliance fines, as well as safety requirements, such as a fire extinguisher and fire blanket in the kitchen, first aid equipment and the national emergency number (i.e., 112) posted in a visible place.

In 2018, another law[6] further regulates temporary holiday rentals and allows owners to rent rooms in their own home. This decree additionally allows municipal councils to set limits on HR accommodations or even extinguish all HR activity in specific areas of cities, makes liability insurance mandatory and requires owners to display an information book with the building's accommodation rules. These councils also determine the temporary vacation rental facilities' maximum capacity. Lisbon and Porto have relied on this legislation to impose strong restrictions on HR accommodations and stop issuing permits for new HR facilities in their historic city centres.

In 2020, another law[7] introduced, among other norms, standards regarding all HRs' environmental sustainability. This legislation requires owners to implement practices promoting more efficient water and energy consumption, as well as making available to guests information on these sustainable tourism practices. In addition, all HR properties must use biodegradable detergents, be equipped with recycling bins for solid waste separation and ensure employees are continuously trained in environmentally friendly procedures. Owners must get an environmental certification or quality seal from a national or international organisation of recognised merit. All HR accommodations have to implement these regulations as of 4 February 2022.

If an HR facility is an autonomous part of an urban property, which can be used independently, the remaining owners together can oppose the accommodation activity, but the decision must be approved by more than half of them. The reasons for the decision have to be substantiated (e.g., annoying actions that affect the other property owners), and the mayor of the relevant city council must be informed of the decision. This legislation means that owners of apartments in buildings can close down HR activity in their building. In addition, apartment owners in buildings can now impose an additional fee on each HR in their building—up to a limit of 30% of the annual value of the respective activity—to cover the expenses arising from an increased use of shared areas. This fee must be approved by a two-thirds majority of the building's owners (Diário da República 2020).

As a concluding remark, it can be said that the autonomous regions of Spain have their own legislations for HR, while Portugal has national legislation that, in the last few years, has been adapted to assure high-quality standards of HR as well as the safety of guests and the well-being of the resident population.

2.3. Seville and Porto Vacation Rental Overview

The number of registered holiday rentals has grown significantly in Seville and Porto (see Figure 1). Starting in January 2017, the public was given access to data from official HR records in Seville[8]. Both cities present quite similar trends in holiday rentals' growth, with a more pronounced increase as of January 2018.

Porto has significantly more holiday rental facilities than Seville does. According to Portugal's National Institute of Statistics (INE-PT)[9], the latest official data on Porto's total population set the total of residents at 222,252 in 2013 (RNT (Registo Nacional de Turismo) 2019). In contrast, Spain's National Institute of Statistics (INE–ES[10]) reported that Seville had a total population of 688,711 in January 2018 (INE-ES (Instituto Nacional de Estadística) 2018). Thus, by March 2019, Porto would have had a ratio of approximately one HR for every 35 inhabitants as compared to 167 inhabitants for each HR in Seville.

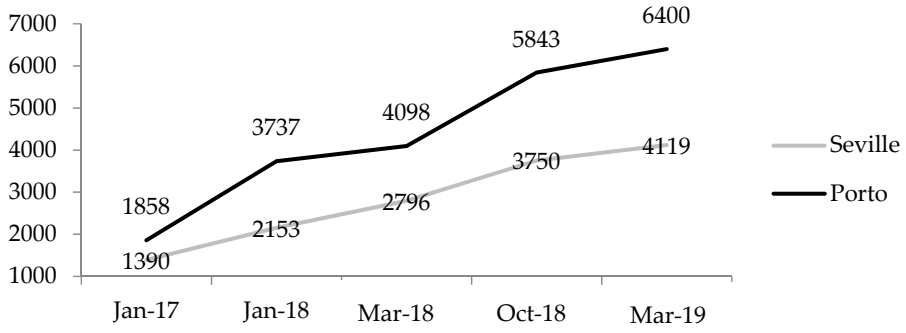

Figure 1. Evolution of number of HRs in Seville and Porto. Source: Authors, based on data from RTA. (Registro de Turismo de Andalucía) (2016, 2017, 2018) and RNT[11] (RNT (Registo Nacional de Turismo) 2019).

An analysis was carried out of the relative number of beds for each city in March 2019. In Seville (see Figure 2a), the beds for vacation rentals and hotel establishments were equal—both around 45%. However, in Porto (see Figure 2b), the number of tourism-related beds was much higher since almost two out of every three accommodations in the city were vacation rentals (i.e., HR).

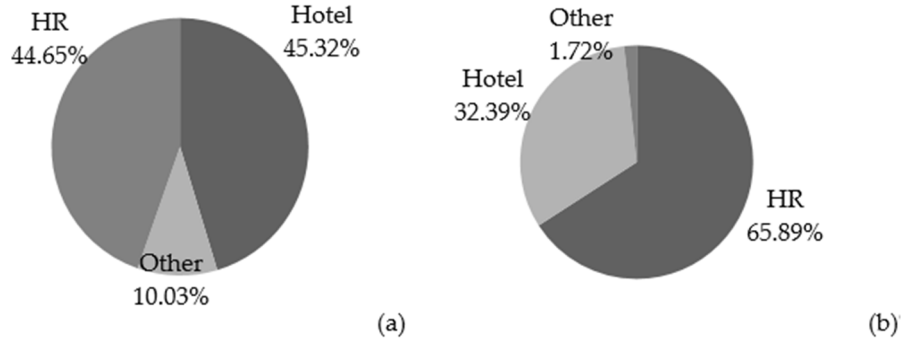

Figure 2. Number of tourism accommodation beds in Seville (**a**) and Porto (**b**) in March 2019. Source: Authors, based on data from RTA (Registro de Turismo de Andalucía) (2018) and RNT (Registo Nacional de Turismo) (2019).

3. Materials and Methods

HPM models can take a variety of functional forms. The present study used a linear function as a reference point because it is the most commonly used function in HPM models, similar to the one proposed for this research. In addition, when other functional forms were tested, the results showed that the linear function produces the best outcomes. This type of function is expressed as Equation (1). Following this formula, the subsequent *Xs* (1,2, . . . , *n*) correspond to the relevant variables that determine the daily rate of the accommodation (*Y*). The model estimations (β_0, β_1, . . . , β_n) are the parameters that assess the direct influence in price that each variable (X_1, X_2, . . . , X_n) has.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n + \varepsilon \quad (1)$$

To develop the HPM model, data had to be obtained for a sample of registered holiday rentals based on the cities' total units. The research population was defined as the number of HR facilities officially existing at the time of data collection. For HRs in Porto, only the 'apartment' category was selected. For HRs in Seville, the modality 'by rooms' was excluded from the sample due to the distortion that could occur in the model if different services (i.e., spare room or complete apartment) were compared. This study thus only focused on complete apartments, especially because spare rooms are an insignificant percentage of vacation rentals in Seville and Porto.

The final sample (see Table 2) comprised the total number of holiday rentals for which complete data could be obtained. It is checked that both sample sizes guarantee a confidence level of 95%. The HPM model was developed using IBM SPSS Statistics 25 and EViews 10 software. The number of cases included was higher than that of the initial sample because identical accommodations offered with different numbers of beds were quantified separately.

Table 2. Number of cases, sample and total population of vacation rentals in Seville and Porto.

Type of Data	Seville (Municipality)	Porto (Municipality)
Population at time of data collection	3467 HRs (October 2018)	6400 HRs (March 2019)
Sample	665 HRs	369 HRs
Number of cases included in system	1623	882

Note: HRs = holiday rentals. Source: RTA (Registro de Turismo de Andalucía) (2018) and RNT (Registo Nacional de Turismo) (2019).

The variables to be analysed (see Table 1 above) were selected based on the literature review's findings. The information incorporated into the HPM models was extracted from searches of Booking.com (Booking.com 2018, 2019). The exceptions to this rule were the MIN variable (i.e., minutes needed to walk from accommodations to the city's main tourist attractions), which were taken from Google Google Maps (2018, 2019), and IDIS (i.e., district index according to the price per square metre (m^2)), which was drawn from Tinsa (2018) for INE-PT (Instituto Nacional de Estatística) (2019) for Porto. In addition, VSAT (i.e., visual appeal according to photos) was evaluated by the authors.

Table 1 above presents the main similarities and differences between the holiday rentals in both cities. Major similarities include the average number of minutes needed to walk to the city's main tourist attractions and the availability of a TV, balcony, views, parking and pet admission. Other parallel features are the average rating given by previous guests on Booking.com and the number of photos in accommodations' profiles on that website, as well as the images' visual appeal. Notable differences appear in the average price (i.e., significantly lower in Porto) and accommodations' size—both in m^2 and in the number of beds offered. The most important contrasts in amenities are that washing machines are much less often available in Porto's HR facilities compared to the HRs analysed in Seville, and notable differences were found in whether a courtyard, patio and bathtub were available.

Regarding the data extraction process, the price (PRCE) was estimated per holiday rental facility and day for Seville based on a stay of two days, which is the average for that city according to the Seville Tourism Data Centre[12] (Centro de Datos Turísticos del Ayuntamiento de Sevilla 2017). The average stay is, however, only 1.73 nights for tourism accommodations in Portugal's northern region and thus for Porto, according to the INE-PT (Instituto Nacional de Estatística) (2019). Taxes, tourist fees and other added expenses (e.g., cleaning) were included.

In the case of a property that offered different types of lodgings at the same price, the one that provided the greatest added value was chosen to reflect how any rational consumer would act. Priority was given to the option of cancellation within a specific period and/or a partial refund. Finally, the no refund option was selected only when no other possible alternative was given.

The minutes to walk from accommodations to the city's main tourist attraction (MIN) were determined for Seville using the Plaza del Triunfo. This square is located between the Cathedral of Seville and the Real Alcázar, which are the two most visited monuments according to (Centro de Datos Turísticos del Ayuntamiento de Sevilla 2017). For Porto, Praça da Liberdade was taken as the reference point, as it begins at Avenida dos Aliados, which is considered the city's centre. This square's proximity to the São Bento train station

also played a fundamental role in the choice of the Praça as Porto's main tourist attraction. This variable should negatively influence the price since the less time spent reaching major points of interest from the accommodations means the more expensive they will be.

The district index (IDIS) was quantified as the average price per m^2 according to the Seville district or Porto parish in which the vacation rentals were located (see Table 3). The predefined hypothesis posited that a higher value per m^2 in a district or parish implies a higher property value, which will be reflected on accommodations' price. This index was composed by giving the highest-priced district or parish a value of one, after which the rest of the cities' zones were given a proportional value. Tests were also carried out on the model in which each district or parish served as a dummy variable, except the one zone that served as a basis, because the inclusion of all districts or parishes would increase the chances of an exact multicollinearity problem appearing in the model.

Table 3. District index.

District (Seville)	EUR/m^2	Index	Parish (Porto)	EUR/m^2	Index
Historic quarter	2398	1	UF: Aldoar, Foz do Douro, Nevogilde	2250	1
Los Remedios	2196	0.916			
Nervión	2137	0.891	UF: Cedofeita, Sto. Idelfonso, Sé, Miragaia, S. Nicolau, Vitória	1860	0.826
Triana	1932	0.806			
South	1825	0.761	UF: Lordelo do Ouro, Massarelos	1810	0.804
San Pablo–Santa Justa	1629	0.679			
Bellavista–La Palmera	1578	0.658	Ramalde	1429	0.635
Macarena	1301	0.543	Bomfim	1319	0.586
East Alcosa–Torreblanca	1226	0.511	Paranhos	1316	0.585
Norte	1041	0.434	Campanhã	986	0.438
Cerro Amate	974	0.406			

Note: EUR/m^2 = euros per square metre; UF = União de Freguesias (Joint Parishes). Source: Tinsa (2018) and INE-PT (Instituto Nacional de Estatística) (2019).

Regarding the accommodations' amenities, the model specified that only views (VIEW) of the city and/or emblematic monuments would be considered rather than views of patios, courtyards and/or interior gardens. For the parking variable (PARK), both parking in the establishment itself and private parking near it were quantified. Finally, Table 4 reflects the different dates on which the price of a stay was based. For Seville, May–June and January were selected as the high and low seasons, respectively, thereby avoiding holidays that could cause specific price increases. In addition, special events in the city such as Holy Week (i.e., the week leading up to Easter) and the April Fair were highlighted. For Porto, August was set as the high season and November as the low season to exclude holidays again, and São João was selected as the city's most characteristic celebration.

To determine the seasons' weight (see Table 1 above), the accommodations' price was divided into approximately two halves to take into account both high and low seasons (i.e., from April to September and from October to March, respectively). Greater weight was given to the high season due to the associated increase in overnight stays. Weekends account for just over two-sevenths of all cases in comparison to weekdays due to a significant increase in overnight stays on weekends. The special events of Holy Week (HW) and April Fair (FAIR) are approximately one week each, so those dates were assumed to quadruple and double, respectively, the 2% that an average week takes up of the total year, due to the increase in overnight stays in these two periods. São João (SJ) was given a slightly lower proportion than the April Fair because Porto's festivities take up fewer days.

Table 4. Dates when prices were taken.

Var.	Description	Seville		Porto	
		From:	To:	From:	To:
HWD	High season weekdays	27 May 2019	29 May 2019	05 August 2019	07 August 2019
HWE	High season weekend	31 May 2019	02 June 2019	09 August 2019	11 August 2019
LWD	Low season weekdays	14 January 2019	16 January 2019	11 November 2019	13 November 2019
LWE	Low season weekend	18 January 2019	20 January 2019	15 November 2019	17 November 2019
HW	Holy Week	18 April 2019	20 April 2019	NA	
FAIR	April Fair	10 May 2019	12 May 2019	NA	
SJ	São João	NA		23 June 2019	25 June 2019

Note: Var. = variable; NA = not applicable. Source: Booking.com (2018, 2019).

Andalusian (RTA) and Portuguese (RNT) Tourism Registry were the key sources used to develop the database with which the model was constructed. However, other sources were also consulted, such as Booking.com and Google Maps. The information was processed with IBM SPSS Statistics version 25 and EViews version 10 software.

4. Results

After different tests confirmed that using a linear functional form for the HPM model was the best option, the independent variables considered too insignificant to include in the model were excluded from it. For all of these, the probability of error if the null hypothesis is rejected using the Student's *t*-statistic is greater than 1% ($p > 0.01$). Next, 5 atypical cases were eliminated from the system in the Seville model and 12 in the Porto model because they were considered to be nonrepresentative of the entire dataset, and their inclusion would cause significant distortions in the models. The final set of variables analysed in the two datasets and their coefficients is presented in Table 5.

Table 5. Variables and coefficients of HPM model for Seville and Porto.

Variable	Coefficient	Standard Error	Student's *t*	Prob.	VIF
		Seville			
Constant (C)	−65.087	15.211	−4.279	0.000	-
MIN	−1.475	0.159	−9.255	0.000	1.104
BEDS	14.854	0.837	17.75	0.000	1.51
M2	0.934	0.041	23.004	0.000	1.641
POOL	31.028	8.443	3.675	0.000	1.05
VSAT	12.868	1.767	7.283	0.000	1.27
HWE	17.56	4.191	4.19	0.000	1.207
LWD	−30.783	3.287	−9.364	0.000	1.32
LWE	−24.09	4.604	−5.232	0.000	1.171
HW	151.876	5.12	29.665	0.000	1.147
FAIR	130.666	6.274	20.825	0.000	1.091
		Porto			
Constant (C)	−89.584	15.542	−5.764	0.000	-
UF: Aldoar, Foz do Douro, Nevogilde	57.633	12.427	4.638	0.000	1.509
MIN	−0.303	0.109	−2.779	0.006	1.631

Table 5. *Cont.*

Variable	Coefficient	Standard Error	Student's *t*	Prob.	VIF
		Porto			
BEDS	12.219	0.942	12.971	0.000	1.711
M2	0.422	0.046	9.252	0.000	1.708
CRT	−9.123	2.79	−3.27	0.001	1.043
PICS	0.307	0.091	3.372	0.001	1.224
VSAT	16.458	1.861	8.846	0.000	1.186
LWD	−29.699	2.365	−12.557	0.000	1.131
LWE	−30.649	3.131	−9.79	0.000	1.112
SJ	30.62	5.327	5.748	0.000	1.074

Note: Prob. = probability; VIF = variance inflation factor; UF = União de Freguesias (Joint Parishes).

The coefficients represent the marginal price variations (i.e., endogenous variable) produced by each exogenous variable. Thus, an HR in Porto that is located within the Union of Parishes of Aldoar, Foz do Douro and Nevogilde increases its daily price of a one-night stay by EUR 57.63 compared to another facility that does not (see Table 5 above). Concurrently, every extra minute spent walking from a HR to the Plaza del Triunfo in Seville (i.e., the city's main tourist attraction) reduces accommodations' price by EUR 1.48. In contrast, if guests walk from an HR to Praça da Liberdade in Porto (i.e., the city's main tourist attraction) the reduction in price is only EUR 0.30. Finally, each extra bed that a holiday rental offers in Seville increases its price by EUR 14.85, compared to EUR 12.22 in Porto.

Regarding the variables related to seasonality (see Table 5 above), in the Seville model, the HWD variable was the basis on which the price was estimated, so this variable was excluded from the model to avoid the problem of exact multicollinearity. In Porto, both HWD and HWE proved to be irrelevant to the model, so the same price was estimated for the high season without a distinction being made between weekend or weekday prices. Additional tests were performed to rule out multicollinearity between independent variables using the variance inflation factor (see Table 5 above). No independent variables exceeded the tolerance level (i.e., set at 10), thereby implying that no multicollinearity was present.

A comparison of the models (see Table 5 above) highlighted the main similarities and differences. Similarities include the variables referring to the accommodations' size (BEDS and M2), distance to the centre (MIN) or visual attractiveness (VSAT). Special events are also decisive for both Seville (HW, FAIR) and Porto (SJ). The models diverge regarding the vacation rentals' amenities. Pool availability (POOL) is a key feature for Seville's HRs but irrelevant for Porto's HR establishments. Conversely, courtyard or patio availability (CRT) is significant in Porto but extraneous in Seville.

Table 6 includes an assessment of the models' overall goodness of fit. The coefficient of determination (R^2) represents the total percentage of each endogenous variable's variation that is explained by the model's full set of exogenous variables. The Seville model has a significantly higher R^2 than the Porto one does, that is, the former model's exogenous variables explain 19.2% more of the estimated price than the Porto model does.

Table 6. Adjustment measurements of Seville and Porto HPM models.

Variables	Seville	Porto
Coefficient of determination (R^2)	0.732	0.54
Mean relative error	22.97%	21.09%
Theil inequality index	0.139	0.129

The mean relative error (see Table 6 above) shows the differences in percentage between each model's predicted prices and its actual values. The Porto model has a slightly

higher goodness of fit than that of Seville since the absolute average of errors committed is approximately 2% lower. The Theil index of inequality represents a given model's predictive power, namely a greater accuracy the closer this index gets to zero. Both models have values that indicate a good ability to predict prices. Finally, the Chow test was run to check the models' stability, which produced results indicating no structural changes occurred in both models' parameters.

Figure 3 presents graphs comparing the real price with the price estimated by the Seville and Porto models. The former model shows a significantly higher price range than that of Porto. An outlier above EUR 400 appears in the Porto model in the real price range, but that price's exclusion would mean a lower goodness of fit. The models' degree of fit, if perfect, should appear as point clouds in a diagonal line, as seen in Figure 3. Both models' estimated values thus suggest that the linear form is a good fit.

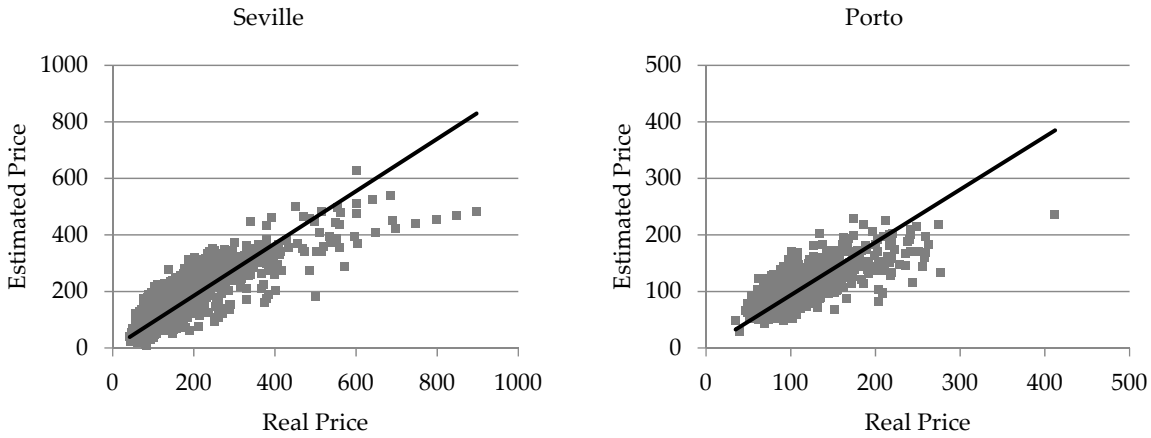

Figure 3. Comparison of real vs estimated price for Seville and Porto models.

5. Discussion

The dependent variables found to be relevant to the models are in agreement with previous studies in terms of distance to the city centre or tourist attractions of greatest interest. Comparable results have been reported by, among others, Soler-García and Gémar-Castillo (2017), Gyódi (2017) (i.e., a Booking.com model), Gibbs et al. (2018), Soler-García and Gémar-Castillo (2018) and Tong and Gunter (2020) (i.e., a Seville case study). However, Voltes-Dorta and Sánchez-Medina's (2020) research did not confirm any significant relevance, and Gyódi and Nawaro's (2021) results vary depending on the city analysed.

More specifically, the number of beds appears as an important variable in Gibbs et al. (2018), Tong and Gunter (2020), Voltes-Dorta and Sánchez-Medina (2020), Fearne (2021) and Gyódi and Nawaro's (2021) findings. The m^2 of accommodations is also significant in the present study's two models, as reported by Chen and Rothschild (2010), but this variable is rarely present in other tourism accommodation pricing models. In addition, the date on which the price is recorded is seldom mentioned in the literature. However, variables related to this factor are similarly treated as important in work done by Coenders et al. (2003) and Rigall i Torrent et al. (2011) on seasonality and Soler-García and Gémar-Castillo (2017) on special events such as Seville's April Fair.

6. Conclusions and Implications

The comparison of the models developed produced especially interesting results on similarities and differences between the two cities. Strong conditioning factors in both models include accommodations' size in m^2, location, walking distance to the centre and visual appeal, as well as the influence of high and low seasons and, in particular, local festivities. The main differences are more secondary issues such as holiday rentals'

amenities, district or parish and number of photos in Booking.com profiles. The large number of variables that proved to be insignificant for the model is also noteworthy—primarily specific amenities including, among others, the availability of a TV, washing machine, views, soundproofing or parking. The district index also was irrelevant to the configuration of vacation rentals' final stay price for both models.

The most interesting conclusion drawn from this research is that conclusive results can be obtained by applying the same methodology when developing a model for estimating holiday rentals' prices for two different cities. In summary, the literature review and findings confirm that the strongest price determinants to consider in pricing models for cultural destination holiday rentals are distance to the city centre, number of beds, m^2, seasonality factors and special events. These results also underline the convenience of using Booking.com and Google Maps as a source of data on all these variables. The methodology used in this study will likely produce different results for other cultural tourism cities as researchers accept or discard variables according to each city's realities. However, this study detected the same similarities as Tong and Gunter (2020) and Gyódi and Nawaro (2021) did, except for seasonality, which was not included in the latter investigation. Thus, the proposed methodology appears to be applicable to multiple cultural city destinations. The application of this methodology to the comparison of daily rate estimation of cultural city destinations using data from Booking.com is the main theoretical contribution of this study.

The model's main practical implication is related to estimating accommodations' daily rate under previously defined conditions (i.e., variables) since the model is easy for the relevant practitioners to customise. This research's contribution consists of presenting two models of price estimation whose application entails the obtention of a certain price through easily modifiable variables. Thus, a collection of predetermined variables will assess a confident daily rate estimation under those circumstances. This tool can help holiday rentals' managers or consumers determine in advance if a price is in line with what the market normally offers under specific circumstances. These estimations can also be useful for municipal councils' tax agencies to calculate reasonable tax bases, especially in a sector in which the informal economy is prominent.

The study's limitations include, first, the impossibility of creating larger datasets due to the difficulty of obtaining complete data for all cases and variables and, second, the data collected reflecting a pre-coronavirus disease-19 (COVID-19) period. Finally, future lines of research could involve replicating the above methodology for holiday rentals in other cultural city destinations of great importance to tourists such as Paris, Barcelona, Rome, Venice or Amsterdam. These studies need to analyse the new models' main similarities to and differences from—with a special focus on COVID-19's effects—the two models developed in this research or to adapt the methodology to fit other types of tourism accommodations.

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Conflicts of Interest: The authors declare no conflict of interest.

Notes

1 Decreto (Decree) 28/2016 (Boletín Oficial de la Junta de Andalucía 2016).
2 Article 37 of Ley (Law) 13/2011 of 23 December.
3 *Registro de Turismo de Andalucía*, in Spanish.
4 *Alojamento local* in Portuguese.
5 Decreto-Lei n.º 128/2014 of 29 August (Diário da República 2014) was passed and then amended by Decreto-Lei n.º 63/2015 of 23 April (Diário da República 2015).
6 Decreto-Lei n.º 62/2018 (Diário da República 2018).
7 Portaria (Ordinance) No. 262/2020 of 6 November (Diário da República 2020).
8 When Decree 28/2016 (Boletín Oficial de la Junta de Andalucía 2016) came into force.
9 *Instituto Nacional de Estatística*, in Portuguese.
10 *Instituto Nacional de Estadística*, in Spanish.
11 *Registo Nacional de Turismo*, in Portuguese.
12 *Centro de Datos Turísticos del Ayuntamiento de Sevilla*, in Spanish.

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