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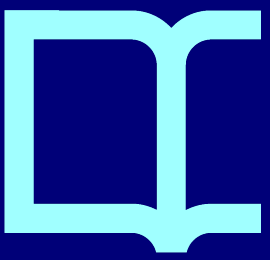

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RESEARCH ARTICLE

# Qualitative revenue management in sun-and-beach hotels

Joan Carles Cirer-Costa[1] (2022)

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**Abstract**
The introduction of the internet as a sales channel has pressed hotel companies to adopt new pricing policies, most notably revenue management (RM). These techniques have been heralded as an essential requirement for hotel companies to maximise profits. The present study, however, will show that this claim is not realistic for a leading, highly competitive destination like Ibiza. The analysis finds that there is strong price stability and that only a few hotels use RM. It is common, however, to find qualitative RM that involves removing cheaper room types and room-and-board options from the available offering when demand is high.

**Keywords** Revenue management · Sun-and-beach hotels · Room rates · Ibiza

## Introduction

Few sectors have been affected as greatly by the new developments triggered by Industry 4.0 as the tourism sector. Now hoteliers can modify their prices automatically in real time with the help of computer systems that apply sophisticated revenue management (RM) techniques. These techniques first spread through the world of air transport and were soon applied in the urban hotel sector, as is evident from the large number of academic papers that address the subject. By contrast, RM techniques do not appear to have met with much success in holiday tourism in the so-called "sun-and-beach" sector.

The main aim of this paper will be to demonstrate the existence of this differential fact. By carrying out an in-depth analysis of the behaviour of Ibiza's hotel sector, the paper will show how a mature destination like Ibiza has adapted to radical changes in the market by redefining traditional commercial policies and adapting them to new conditions without taking on more risks than are strictly necessary.

The first of the paper's four contributions lies in its focus on holiday tourism, the second contribution is that the paper analyses a crowded, highly competitive market that differs considerably from the models put forward for situations of limited competition and the third contribution, is that the analysis assumes price is not the sole variable that determines the behaviour of buyers. Lastly, the analysis will introduce the concept of slippage, which is the rationing of a hotel's various room types. In general, slippage consists of substituting the standard room with more expensive room types as a way to increase the real rates charged without making any changes to the published rates.

## Literature review

RM techniques seek to maximise a firm's revenues through dynamic management of the prices that it charges for its products and services. RM proves particularly suitable when a firm has high fixed costs and non-storable capacity and its demand is stochastic, price-sensitive and has a short sales horizon (Bitran and Caldentey 2003; Dilmé 2019).

Generally, urban hotels, which focus mostly on professional customers, meet the above conditions. Even so, however, the correct application of RM techniques will not necessarily ensure the best possible economic results. Indeed, the difficulty of applying RM techniques has been covered extensively in the related literature and many authors have reached the conclusion that their use of RM may not be optimal and that there are circumstances when price stability is advisable (Chen and Farias, 2019; Enz and Canina, 2005; Enz et al. 2015; Gallego and Van Ryzin, 1994).

Even more complex is the application of RM techniques in holiday hotels. This is because the customers of holiday

✉ Joan Carles Cirer-Costa
jccirer@gmail.com

[1] UOC, Múrcia, 1 3r C, 07800 Eivissa, Illes Balears, Spain

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hotels have very different characteristics to professional customers. Specifically, customers looking for a hotel for their holidays have a wide range of budgets, they typically book well in advance, their price elasticity is high, and their bookings tend to be for much longer stays (Abrate et al. 2012; Dresner 2006; Falk and Vieru 2019; Martínez et al. 2011; Mohammed et al. 2019).

The offering of tourism destinations in the Mediterranean is enormous. Indeed, some destinations like Ibiza have hundreds of hotels of all types and categories. As a result, the competition among destinations and hotels is very high, giving rise to product and price differentiation (Dana 1999; Gabszewicz and Thisee 1979; Rhee 1996).

The diversity of customers, the long sales horizon, and strong market competition add two new problems to the application of RM techniques in holiday hotels. The first is the major technical challenge posed by modelling multi-product offerings in a competitive environment (Aydin and Birbil 2018; Bitran and Caldentey 2003; Calmon et al. 2020; Chen and Farias 2019; Lazarev 2013). The second is that customers can take an adverse view of the market segmentation implicit in RM, regarding it as a discriminatory practice (Belarmino et al. 2020; Haddad 2015; Haddad et al. 2015; Richards et al. 2016).

When analysing price formation in holiday hotels, therefore, it makes no sense to pose scenarios that assume the independence of demand or short-sighted behaviours on the part of purchasers (Dilmé 2019; Klein et al. 2020; Liu and Van Ryzin 2008; Strauss et al. 2018). Customers have at their fingertips as much information as they can process and enough time to notice the strategic behaviours of sellers. Purchasers of summer holidays, therefore, can adopt their own strategy, because they have a whole host of hotels to choose from and enough time to select the exact moment when they want to make their purchase. A well-informed customer will detect dynamic pricing policies and reject their discriminatory effect while also looking favourably on offerings with stable prices that enable him or her to make comparisons (Chen and Farias 2019).

Professional customers are recurring travellers, but a family or a group of friends typically have only one chance a year to enjoy a summer holiday, whose cost represents a large proportion of their annual budget. In addition, the organisation of summer holidays is typically complex. For instance, all members of a family or group must be available at the same time. In addition, they may wish to coincide in the destination with other relatives or groups of friends. In such circumstances, it is logical to expect a strong aversion to risk and a solid tendency to place bookings as soon as dates have been chosen and enough information has been collected (Liu and Van Ryzin 2008; Lu and Gursoy 2015; Neirotti et al. 2016).

Risk aversion is not exclusive to purchasers. It is also shared by sellers, who know that if they do not sell their rooms in advance at a reasonable price they may end up selling them at low prices in ruinous, last-minute deals. Hoteliers who focus their offering on well-informed, risk-averse customers will start the sales season with stable pricing and seek to close their reservation books as soon as possible. To achieve this aim, they will make use of flash offers, which remain available for only a few days, to incentivise early booking and they will maintain their offering of cheap (standard) rooms even when the category has sold out (Dilme 2019; Guillet 2020; Zhang and Hanks 2015).

That said, not all potential customers of summer holidays in the Mediterranean have strong risk aversion. For example, a couple without children may make an impulse buy. At the last minute, they may join a trip previously scheduled by friends. In addition, some customers are not price-sensitive and cannot easily make plans in advance because of their schedules (Carreras, 2016). Given that there are enough customers who are not strongly averse to risk, there will be sellers who ration their sales and reserve rooms to meet last-minute demand at higher prices.

## The Ibiza tourism market

Ibiza is part of the tourism market of the Balearic Islands, one of the most competitive markets in the world (Alegre et al. 2012; Cirer 2014). The market is strictly focussed on holidaymaking, the number of visiting professionals is negligible, and the main appeal of the islands is their beaches. In addition, the market is very mature, the hotel establishments have long and well-defined policies, and prices are stable.

One of the foremost elements of the Balearic Islands market is the high rate of repeat tourists on every island: the figure is close to two-thirds and it is the consequence of a high level of satisfaction achieved among visitors (Cladera 2009; Coll 2016; García et al. 2015). The fact that many tourists are repeat visitors implies that they have a high level of information, lower price-sensitivity and a limited sense of risk before purchase (Haddad et al. 2015; Rather 2018). In addition, the proportion of repeat tourists is lower in high season.

As for the profile of Ibiza's visitors, 44% come to the island with friends and the same proportion arrives in families. Their average stay is 10 nights in length and nearly 70% of overnight stays occur in hotels. Also, 25% of tourists book their stay in the month preceding their arrival, whereas 34% make their booking between one and two months early and 41% book three or more months in advance (AETIB 2017).

## The tourism product of Ibiza's hotels: definition and data used

The focus of this analysis is the temporal evolution of prices for a one-week stay for two people in a hotel room. The data have been collected for the middle week of the months of May, June, July, August and September 2019. As Fig. 3 shows, the price differences by month are very significant, so the first defining element of the product is the month of stay.

In addition, the analysis looks at the four room-and-board options of room only (RO), bed and breakfast (BB), half board (HB) and all inclusive (AI), while the hotels themselves are categorised by star rating. Accordingly, the product of a one-week stay is defined by three variables: month, board and stars (M-B-S). After removing the relatively uncommon combinations, 74 remain. For these, prices have been analysed separately, so that each of the 74 combinations is treated as an individual product.

The data collection began in early February. Every Friday, the prices for the analysed combinations were collected, giving a total of 36,990 prices. All data came from a single source: the Spanish online travel agency (OTA) *atrápalo.com*. This OTA was selected because it best differentiates the room-and-board options in its online listings, making the complex task of data collection much more straightforward.

The resulting chronological price series can be regarded as practically comprehensive, because it contains the prices of 292 establishments covering 86% of the rooms on offer in Ibiza's hotels and aparthotels.

One subject that will receive special attention relates to the slippages that can occur in the room type offered by each hotel. The promotional offers that appear on the home-pages of OTAs only list the hotel, a room-and-board option and a price; they do not show the room type, which is nonetheless a very important piece of data to determine the price (Fleischer 2012; Guillet 2020; Zhang and Hanks 2015).

In general, the most numerous room type in all hotels is also the most economical one: the standard room.

Slippages arise when a hotel changes the default room type on offer in the promotions that appear on the home-pages of OTAs. By withdrawing the standard room from promotional offers and substituting a room with a sea view or a room with a balcony, the price will go up by 10–20%, and if the substitution is a junior suite, the price will go up by 30–60%.

A total of 1,506 slippages were detected, practically all of them concentrated in the final weeks before the date of occupancy.

## Stated hypotheses and methods of statistical analysis

Based on the theoretical schema introduced above, the potential use of RM techniques in Ibiza hotels will be identified by means of variations in prices over the booking horizon stretching from early February to the time of check-in at the hotel in each of the five months under consideration.

As we have data for 74 M-S-B combinations, we will need to check each combination to determine whether there are any variations in mean prices that are important enough to indicate the presence of dynamic behaviours, such as last-minute deals at low prices or, to the contrary, sharp rises in prices as check-in time draws near.

In accordance with the stated aim, we have posed the following hypotheses:

**Hypothesis 1 (H1)** Are the variations statistically significant?

**Hypothesis 2 (H2)** Do the detected variations in prices have an identifiable pattern?

**H2a** In terms of time, are they concentrated in any specific months out of the five months under analysis?

**H2b** Is the effect greater for a particular category of establishment?

**H2c** Is the effect greater for a particular room-and-board option?

**Hypothesis 3 (H3)** What role do slippages play in the price variations?

In addition, the following questions examine the individual behaviour of establishments:

**Hypothesis 4 (H4)** Is it possible to detect any price variations in individual establishments that are compatible with RM?

**Hypothesis 5 (H5)** Are any variations concentrated in establishments with specific characteristics (category, size, membership in a chain) or do the practices have no identifiable distribution?

To identify the presence of any statistically significant variations in mean prices for each of the 74 series, we have used the ANOVA method, the complementary Tukey's test and Bonferroni test, and the Kruskal–Wallis test. The quality of the results using the ANOVA method is dependent on the normality of the data used. Accordingly, the normality of the 74 data sets was analysed and it was found that the deviation from normality was very far from extreme. In such situations, the ANOVA test loses quality but maintains its general validity, whereas the Kruskal–Wallis test is fully effective (Blanca et al. 2017; Lantz 2013; Westfall 1986).

To examine the behaviour of each hotel in particular, the analysis made use of the coefficient of variation (CV). The data came a common origin and used only one strictly numerical unit of measure. This made CV a good tool for comparing the behaviour of different establishments. The only drawback with using CV is the impossibility of constructing confidence intervals to evaluate the statistical significance of variations (Allison 1978; Bendel et al. 1989; Sorensen 2002; Vangel 1996).

In addition to the instruments described above, the data trends were also examined by means of graphic analysis.

## Results for the variability of mean prices

### Statistical analysis of the M-B-S combinations

In Table 1, the columns under the heading "Total values" show the significant results from the statistical analysis of the mean prices for each M-B-S combination. Across the 74 price series, the statistical tools point to the possible existence of unstable average prices in only nine cases, which have some value that deviates significantly from their respective series ($p=0.05$). The nine cases are the only candidates for the detection of the existence of RM practices.

Moreover, in only three of the nine cases do all four statistical indicators coincide in accepting the alternative hypothesis, indicating that these three cases have at least one value in the series that deviates significantly from the remaining values. Specifically, they are the combinations 8-AI-4, 8-HB-4 and 8-BB-4.

For the combination 9-HB-4, three of the four indicators accept the alternative hypothesis (the Bonferroni test does not). For the combination 6-RO-2, only two of the indicators do so (neither the Bonferroni test nor Tukey's test does). For the four remaining cases, the results are doubtful because Tukey's test and the Bonferroni test do not reject the equality of means, while the ANOVA method and the Kruskal–Wallis test produce contradictory results.

In any event, the most important confirmation is that none of the indicators points to a significant deviation from the mean of the price series in the remaining 65 combinations.

Therefore, we cannot fully reject hypothesis *H1*, but we can nearly do so. In addition, we can respond positively to hypotheses *H2a* and *H2b* and negatively to hypothesis *H2c*. The detected variability is low, but strongly concentrated in the month of August and in the four-star category. It does not appear to have a distinct effect in the different room-and-board options.

The third hypothesis looks at the potential effect on prices of any slippages in room type. In order to accept or reject the hypothesis, a new series was constructed by removing

**Table 1** Statistical tests for the equality of the mean price of each month–board–star combination

| Month–Board–Star | Total values | | | | Standard rooms only | | | |
|---|---|---|---|---|---|---|---|---|
| | ANOVA | Tukey | Bonferroni | Kruskal–Wallis | ANOVA | Tukey | Bonferroni | Kruskal–Wallis |
| 8–AI–4 | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| 8–HB–4 | **1** | **1** | **1** | **1** | **1** | **1** | **1** | 0 |
| 8–BB–2 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | **1** |
| 9–HB–4 | **1** | **1** | 0 | **1** | **1** | 0 | 0 | 0 |
| 8–BB–4 | **1** | **1** | **1** | **1** | 0 | 0 | 0 | 0 |
| 6–RO–2 | **1** | 0 | 0 | **1** | 0 | 0 | 0 | 0 |
| 8–RO–2 | 0 | 0 | 0 | **1** | 0 | 0 | 0 | 0 |
| 6–BB–4 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8–BB–3 | **1** | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The tests contradict the hypothesis of the equality of means for only 9 of the 74 combinations. If all but standard rooms are removed, only 4 combinations raise doubts over the equality of the mean prices in all periods under analysis

$0 = H_0 =$ Null hypothesis. Mean prices are equal in all periods

$1 = H_1 =$ Alternative hypothesis. For at least one of the periods under analysis, the price deviates significantly (95%) from the average for all periods

the 1,506 detected slippages and the tests were repeated, but this time only using the 35,484 prices that were related exclusively to standard rooms. The results appear in the right-hand columns of Table 1.

Now there are 70 cases where the statistical tools point to no indicator of statistically significant price variability and there is only one case where the four indicators point to the existence of significant variations in price: 8-AI-4. In a second case, three indicators point to variability: 8-HB-4. In the two remaining cases, the variability is doubtful because the ANOVA method and the Kruskal–Wallis test do not coincide and the other two tests give negative results. These final two cases are: 8-BB-2 and 9-HB-4.

Accordingly, it is possible to respond positively to hypothesis *H3*. The overall price variability is not very high, but it does appear strongly correlated to the slippages detected in room type.

### Graphic analysis

As Table 1 demonstrates, variability is concentrated in the stays occurring in the month of August and in four-star hotels. Consequently, the analysis from this point onwards will pay special attention to August and hotels in that category.

The bottom row of Fig. 1 demonstrates how the room offering gradually disappears as the date of arrival in the hotel (in this case, 10 August 2019) draws nearer. The bottom row also shows that the phenomenon is common across all room-and-board options and hotel categories.

By contrast, the four graphs in the top row are notable for the stability of the rates at one-star, two-star and three-star hotels throughout the entire sales period.

In the case of the four-star hotels, the price shows a high degree of stability until the final three weeks, when it rises sharply for all room-and-board options. As Table 1 has already showed, these rises were sufficiently great to be detected by the previously described statistical tools that have been used.

## Individual behaviours of hotels

### Evolution of prices over time

Figure 2 demonstrates that the vast majority of Ibiza's hotels have a very low CV and that as their CV rises, so too does

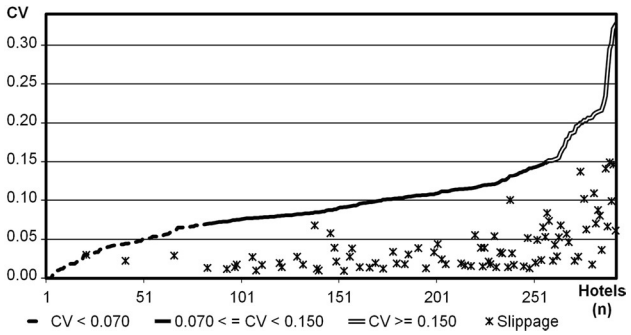


**Fig. 2** Graph of the coefficient of variation (CV) for the 292 hotels in the sample ranked from lowest to highest and indicating the effect of any slippages on variability

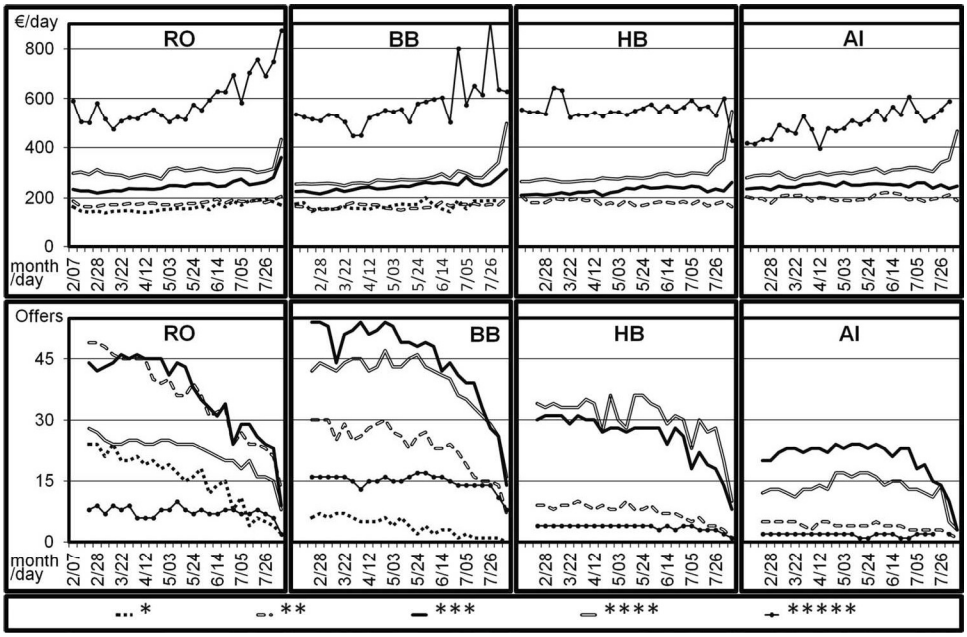


**Fig. 1** Evolution of the price and number of available double rooms for a stay in the second week of August in the various categories and room-and-board options on offer

**Table 2** Main features of the analysed hotels as a function of their CV

| | Average CV | Impact of slippages | Number of hotels | Average category (stars) | Average size (rooms) |
|---|---|---|---|---|---|
| $CV < 0.07$ | 0.04 | 0.00 | 82 | 2.4 | 68 |
| $0.07 \leq CV < 0.15$ | 0.10 | 0.01 | 174 | 2.9 | 108 |
| $CV \geq 0.15$ | 0.20 | 0.05 | 36 | 3.3 | 109 |

their use of slippages. Based on these figures, the set of 292 hotels has been divided into three groups, whose main features appear below in Table 2.

As Table 2 shows, the 82 hotels in the first group tend to hold their prices very steady, have hardly any variations, and do not use slippages. In general, the hotels in the group are small and their category is low. The middle group contains 60% of the hotels. In this case, variations now appear in the prices, and they are sometimes significant and accompanied by slippages in the final weeks of the sales period. The third and last group contains 36 hotels that systematically manage their prices and typically use slippages. Most of them are in a high category.

The temporal evolution of prices for the four hotels represented in Fig. 3 offers examples of different pricing policies in the Ibiza market. In the first case ($CV = 0.043$), the hotel applies a strictly stable pricing policy, thanks to which it succeeds in closing its reservation book at least a month before check-in. In the second case ($CV = 0.081$), there is a notable use of flash offers within a broader relatively stable trend. In the third case ($CV = 0.164$), the dynamic management of prices is clearly present through the use of slippages: when demand is high, the hotel offers only superior rooms at a high price. In the fourth case ($CV = 0.321$), the dynamic management of prices is ongoing and affects the price of standard rooms. The hotel also makes use of slippages. The fourth hotel is the only one to have rooms available at the last minute in the three months under consideration.

In view of the above examples, the response to hypothesis *H4* is that most hotels do not apply RM techniques or they do so only sparingly, but some (not many) use RM techniques intensively. This would be case with 36 hotels that have a $CV >= 0.150$.

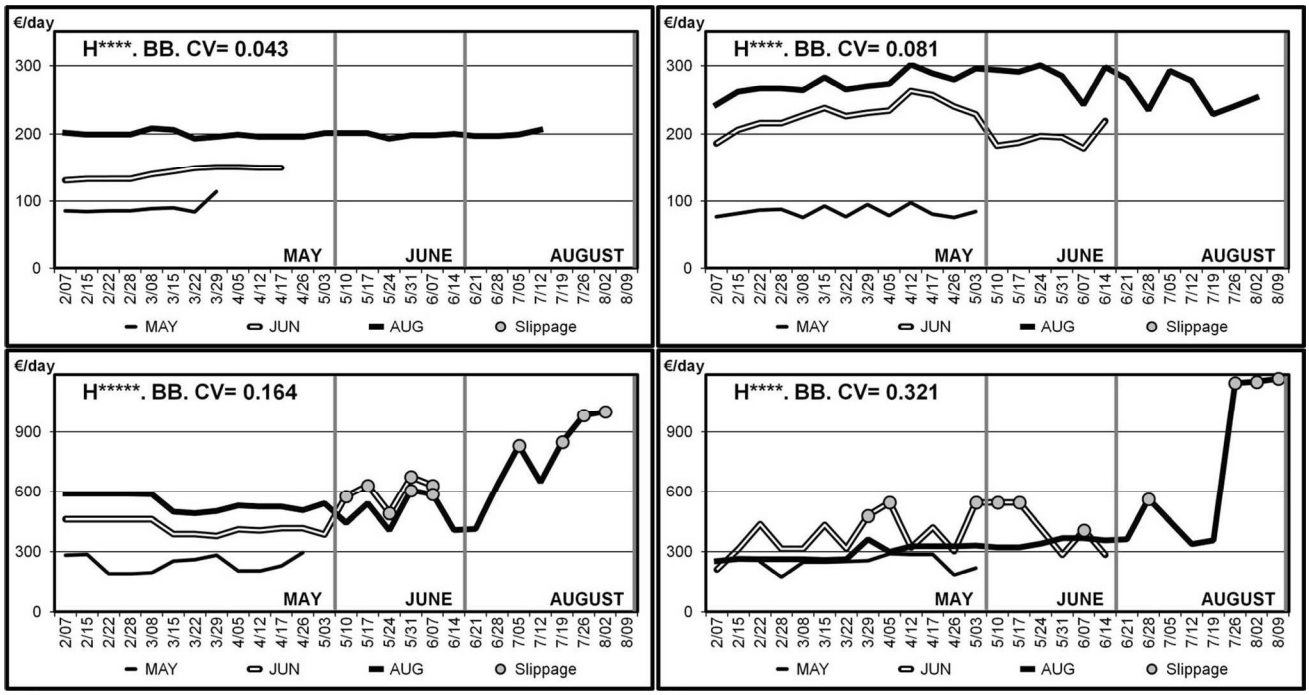


**Fig. 3** Temporal evolution of prices throughout the booking period for four hotels with different pricing policies as defined by their CVs. All are four-star or five-star hotels located on the beachfront, and the graph represents their BB room-and-board option. Any slippages indicate that a hotel no longer offered the standard room and that the lowest price on offer at the time actually corresponded to a superior room (sea view, junior suite, etc.)

**Table 3** Relationship between category, hotel size, and size of hotel chain with respect to the coefficient of variation (CV) calculated based on the temporal evolution of prices

| Category (Stars) | CV | Hotel size (No. of rooms) | CV | Size of chain (No. of hotels) | CV |
|---|---|---|---|---|---|
| * | 0.09 | 1–24 | 0.09 | 1–5 | 0.09 |
| ** | 0.09 | 25–58 | 0.10 | 6–10 | 0.13 |
| *** | 0.09 | 59–130 | 0.10 | 11–30 | 0.08 |
| **** | 0.11 | 131 and over | 0.10 | 31–100 | 0.10 |
| ***** | 0.15 | | | 101 and over | 0.13 |

## Price variability and hotel characteristics

Table 3 shows that the price variability for one-star, two-star and three-star hotels is low, the variability is higher for four-star hotels and for five-star hotels. However, this does not imply that the practice is common to all hotels in the two categories. In reality, only 16% of four-star hotels and 40% of five-star hotels in the analysed population practice RM techniques systematically.

Having a higher number of room types on offer, however, does not in any way imply that large hotels tend to apply RM techniques to a greater extent. In the same vein, Table 3 indicates that it is not possible to associate a specific RM policy with the fact that an establishment belongs to a hotel chain of a particular size.

As a consequence, hypothesis *H5* receives a largely negative response. The use of RM techniques can be associated only with hotel category, since there is no doubt that their use rises as the category rises. However, this is only a tendency, not a rule.

## Conclusions

The primary finding obtained in the present paper is that the practical implementation of RM techniques based on pricing is low in one of the major destinations of the Mediterranean specialising in sun-and-beach tourism: the island of Ibiza.

The hotels based in Ibiza hardly modify the price of their standard rooms at all and instead seek to capitalise on occasional excess demand by rationing standard rooms. In other words, they apply qualitative RM practices based on the characteristics of rooms on offer in a clear attempt to avoid the poor image that results from two similar customers paying different prices. The primary aim of reservations managers is to fill their bookings as early as possible and then, when they have reached an acceptable occupancy rate, to use the rationing of standard rooms as a form of market segmentation (Carreras, 2016; Selmi 2010). This behaviour, in turn, incentivises customers to book early in future seasons. Given that most of them are repeat customers and they keep track of the evolution of prices, they soon learn that the best way to secure a good price is by booking early and that holding out for last-minute deals is a high-risk strategy.

Only a few hotels engage in aggressive commercial behaviours. They are luxury establishments that are not focussed on family tourism and they assume the risk of keeping some rooms free until the last minute in order to take advantage of any eventual price rises.

An important finding of the study lies in its demonstration that the most economical establishments, urban and holiday hotels alike, tend to keep their prices stable and make very little use of RM techniques. This can be seen in Table 3, which shows that one-star, two-star and three-star hotels have an average CV that is both uniform and low at 0.09. A number of authors have already highlighted this fact, but they have applied it almost exclusively to urban hotels (Enz and Canina 2005; Enz et al. 2015; O'Connor 2003).

Most of these establishments tend to keep their prices strictly homogeneous on a stable trajectory and they only modify them occasionally and consistently in the face of substantial variations in demand. The aim is to incentivise early booking and ensure that the reservation books are closed as soon as possible.

Other hotels, however, adopt a riskier and more aggressive policy with multiple room types on offer. In seasons of high demand, suites can generate substantial additional income. However, when a season suffers from weak demand, suites can result in ruin if customers fail to book them.

The paper has highlighted the impossibility of assessing holiday hotels with the same criteria that are used to assess urban hotels. As a result, it is viewed as very necessary to conduct future research on the price formation and adaptation of mature destinations in the face of any new market conditions that affect this type of tourism, while foregoing the application of models and tools of analysis that are designed to be used with urban hotels.

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**Joan Carles Cirer-Costa** Doctor in Economics (UB). His research centres on the tourism in the Mediterranean and the analysis of tourism as a factor of economic growth.