Scale heterogeneity in hotel guests' satisfaction relative to room rates

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Abstract

Purpose – This paper aims to examine hotel guests' satisfaction relative to room rates paying attention to the heterogeneity in the scale of satisfaction scores.

Design/methodology/approach – This paper studies guests' post-purchase hotel evaluation using survey data from a sample of 14,879 tourists visiting a Northern Spanish region. This study estimates a Heteroskedastic Ordered Probit model in which both "cognitive" and "emotional" components of satisfaction are modelled. The model allows us to control for heterogeneity in the scale of the latent satisfaction scores.

Findings – This paper finds that satisfaction relative to rates (value for money) decreases with expenditure per person and day. Interestingly, this negative relationship mainly holds for those who do not prioritize prices at the time of choosing the hotel. Positive first impressions are positively associated with higher satisfaction. In addition, this study finds that the emotional component of satisfaction increases with hotel quality and hiring a full board, being also greater among women and elderly people.

Originality/value – Instead of using an overall measure of satisfaction, this paper uses one that gathers how the tourist assesses satisfaction in relation to cost (value for money).

Keywords Cognitive satisfaction, Emotional satisfaction, Value for money,
Heteroskedastic Ordered Probit, Hotel room rates

Paper type Research paper

JEL classification – Z3, C25

1. Introduction

Satisfaction with hotel services is one of the main factors that affect the probability of guests lodging there again. In a competitive market with noisy signals about quality, reputation helps "good" hotels to distinguish themselves from "bad" ones (Hörner, 2002). Satisfaction is, thus, a key determinant of consumer loyalty because it is positively associated with repurchase probabilities (San Martín *et al.*, 2019) and because satisfied guests recommend the hotel to friends and other consumers. In this sense, satisfaction positively impacts firm profitability (Sun and Kim, 2013). After the emergence of peer-to-peer accommodations, customer satisfaction has become even more important for the long-run success of hospitality accommodations (Guttentag and Smith, 2017).

Satisfaction has been conceptualized as the difference between expectations and actual outcomes (Oliver, 1980). It is a relative concept by which people compare the hotel services with what they expected beforehand. As hotels are experience goods, the per-night room rate is normally perceived as a proxy of quality. Hence, the evaluation of accommodation services may depend on room rates (Pollak, 1977). From this viewpoint, satisfaction is a balance between the monetary costs the consumer incurs and the rewards she obtains.

Although there is extant literature about tourist satisfaction, little attention has been paid to the drivers of satisfaction relative to room rates (i.e. satisfaction in relation to the monetary cost), mainly due to the lack of suitable data. Generally, customers are asked to assess their overall satisfaction on a Likert scale. We, instead, study the determinants of hotel satisfaction using a post-consumption value for money (VFM) measure that explicitly takes the price-quality relationship into account [1]. Mellinas and Nicolau (2019) and Nicolau *et al.* (2020) show that the implications derived from satisfaction studies differ depending on whether the monetary component is considered because generally monetary measures render more explicit levels of dissatisfaction. Therefore, we seek to fill this gap in the literature. This is relevant, as price reasonableness (i.e. price fairness) is an important indicator of how customers' needs are met in relation to the monetary cost (Han and Hyun, 2015).

The main purpose of this study is, therefore, to analyse the determinants of guests' satisfaction in terms of quality-price in the hotel industry. We focus on the effect of ex-ante most valued hotel features, the services hired, hotel quality and expenditure per person and day on post-consumption VFM, conditional on individuals' sociodemographic and trip characteristics. Furthermore, as satisfaction is composed of "cognitive" and "emotional" components (Del Bosque and San Martín, 2008), we propose an empirical strategy that models them under a Random Utility framework. Unlike other approaches that assume cardinality (Park and Nicolau, 2019; Mellinas and Nicolau, 2019), we estimate a Heteroskedastic Ordered Probit model (Greene *et al.*, 2014) that simultaneously models the deterministic ("cognitive") and the stochastic ("emotional") components of the latent variable for VFM. In this way, we model the unobserved variability in the latent response function representing the affective content of the consumption experience. We use a large data set of 14,879 tourists lodged at hotels in Asturias (Spain) during 2005–2016.

Our contribution to the literature is twofold. Firstly, although the role of emotions and subjective evaluations is widely acknowledged in shaping satisfaction (Kahneman and Krueger, 2006), the weighting of unobservable factors relative to observable features has not been examined to date in hotel satisfaction. Our econometric model allows us to examine the effect of several tourist-specific and hotel-related variables on both the "cognitive" and the "emotional" components. Secondly, this is one of the first studies that analyses the drivers of hotel satisfaction relative to room rates. We explore how ex-ante most valued hotel features

(including price), star rating, expenditure and accommodation board relate to post-consumption satisfaction relative to rates.

The analysis of heteroskedasticity in satisfaction scores has important implications for the appropriate identification of the sources of satisfaction. Neglected heteroskedasticity in the Ordered Probit results in inconsistent estimates (Greene *et al.*, 2014). Furthermore, if individuals have different latent response functions, the model needs to control for this source of variability for correct inference (Bond and Lang, 2019).

The remainder of the paper is structured as follows. Section 2 reviews the related literature. Section 3 outlines the empirical model. Section 4 describes the database and the variables used. Section 5 discusses econometric modelling. Section 6 presents the estimation results. Finally, Section 7 provides some concluding remarks.

2. Literature review

2.1 Conceptualization of tourist satisfaction

Despite the large body of research on customer satisfaction, there is no consensus about how to properly define "satisfaction". A comprehensive review can be found in Oh and Kim (2017). The most-accepted conceptualization defines it as the difference between what was expected and what has been experienced. If a service outperforms expectations, satisfaction (confirmation) will emerge. By contrast, if a service falls short of expectations, the consumer will be dissatisfied (disconfirmation). This is the expectancy-disconfirmation theory developed by Oliver (1980). In the tourism context, dissatisfaction, thus, arises when the travel experience does not match expectations. We use this conception throughout.

Another issue of debate is subjective versus objective nature of satisfaction. While for some scholars satisfaction is a cognitive evaluation based on objective constructs, for others it refers to the emotional reaction derived from the consumption experience (Sukhu *et al.*, 2019). This emotional component refers to a subjective "state of mind" that is normally unobserved from the researcher's viewpoint and gathers affective dimensions (Westbrook and Oliver, 1991). This closely relates to Gennaioli and Shleifer's (2010) framework of intuitive judgement by which individuals retrieve objective information from memory combined with other heuristics. An in-depth foundation of the cognitive-affective nature of satisfaction is provided by Westbrook and Oliver (1991) and Del Bosque and San Martín (2008).

2.2 Satisfaction in the hotel industry

A stylized finding in consumer research is that service quality is positively related to satisfaction (Oh and Kim, 2017; Liu *et al.*, 2017). In the hospitality industry, "Food and Beverage" service are one of the most important predictors of guests' satisfaction (Albayrak and Caber, 2015). Nield *et al.* (2000) report that the quality of the food and the variety of the dishes significantly determine customers' hotel evaluation. Aguiló and Rosselló (2012) find that hotel expectations are more difficult to be met in all-inclusive packages, possibly because the greater the services hired, the greater the likelihood of disappointing the guest.

Empirical evidence shows hotel satisfaction is strongly linked to hotel and room facilities (Panchapakesan and Ahn, 2020), calm and comfort (Pokryshevskaya and Antipov, 2017) and accessibility to attractions, transportation hubs and green spaces (Zhou *et al.*, 2014; Yang *et al.*, 2018). People choose the hotel choice is based on its characteristics (Kim and Park, 2017), and therefore hotel attributes shape both consumer ex-ante expectations and ex-post satisfaction. In this vein, hotel reviews in online platforms are found to predict booking intentions (Sparks and Browning, 2011) and to set a benchmark for what to expect at that hotel. Given their preferences, people look for information about specific characteristics, form a belief and then value the service based on compliance with that expectations.

Moreover, the economic literature has documented that first impressions matter so that people tend to sustain their ex-ante opinions even when they receive more accurate information (Rabin and Schrag, 1999). In short, beforehand most valued attributes matter for hotel service rating because they set an expectation benchmark for post-consumption evaluation.

Hotel star rating is another information cue customers use to assess hotel service quality. Generally, satisfaction is found to be positively associated with the number of hotel stars (Zhou et al., 2014; Radojevic et al., 2015), although Huang et al. (2018) indicate that 5-star hotel guests have larger gaps in their expectations. Indeed, recent evidence shows that customers hold different expectations depending on the hotel type (Bi et al., 2020).

Apart from service quality and hotel characteristics, prices play a major role in tourist satisfaction. Under risk-aversion, tourists might be willing to pay a higher rate if that guarantees a certain standard of quality (Keane, 1997). Therefore, the higher the rates, the higher the expectations about hotel quality (Huang et al., 2018; Chiu and Chen, 2014). Empirical evidence supports this claim, with several authors finding price as a significant predictor of satisfaction (Mattila and O'Neill, 2003; Radojevic et al., 2015). Chen et al. (2015) examine the relationship between hotel prices and tourist satisfaction, finding an inverted U-shaped pattern. Price perceptions in terms of cheap or expensive have been also found to be crucial aspects in consumers' evaluation of tourism services (Han and Hyun, 2015). The studies by Zhou et al. (2014) and Liu et al. (2017) find that perceived price reasonableness is one of the most important drivers of satisfaction.

Besides prices and hotel services, researchers have considered other tourist-specific variables as sources of heterogeneity. Some studies find that satisfaction varies depending on the country of origin (Huang and Crotts, 2019) and gender, with women attaching more importance to affective factors (Wang et al., 2016). Trip-related variables such as travel purpose (Park and Nicolau, 2019), length of stay (Pokryshevskaya and Antipov, 2017) and trip motivations (Albayrak and Caber, 2018) have also been shown to also affect satisfaction. Another relevant variable is travel party size, as tourists tend to evaluate their satisfaction considering that of other members in the travel party. Campo-Martínez et al. (2010) show that people who travel alone tend to be the most satisfied, whereas those who travel with their children rate the destination more negatively. Similarly, Radojevic et al. (2015) report that solo travellers have higher baseline satisfaction scores.

2.3 Emotional satisfaction

Economic theory points to a non-negligible role of emotions (visceral factors) in consumers' utility and their behaviour (Loewenstein, 2000). Consistent with the emotional view of satisfaction introduced before, some authors have empirically analysed how arousal and pleasure affect satisfaction formation. The works by Han and Back (2007), Del Bosque and San Martín (2008) and Hosany and Gilbert (2010) point to emotional dimensions such as joy or surprise having a positive impact on customer hotel satisfaction. Sukhu et al. (2019) find that emotionally attached hotel guests engage more in positive word-of-mouth, with emotional satisfaction being even more important than objective satisfaction. Recent research by Zhu et al. (2020) also shows that customers' analytical thinking influences satisfaction. Overall, there is a consensus in the tourism literature that emotions influence to some extent post-purchase evaluation and need to be accounted for.

3. Model

Consistent with the expectancy-disconfirmation theory, we define satisfaction as an ex-post evaluation of hotel services relative to expectations. To consider its cognitive-affective

nature, we model it as a linear function of a "cognitive" (deterministic) and an "emotional" (random) component so that:

$$SRR_i^* = V_i + \varepsilon_i \qquad (1)$$

where SRR_i^* is a latent continuous measure of satisfaction relative to hotel room rates, V_i denotes the deterministic (objective) part and ε_i gathers all the unobservable (subjective) factors that affect satisfaction.

The use of an indicator of satisfaction relative to cost has its theoretical roots in equity theory (Adams, 1963). Consumers' valuation of services is not unconditional but involves fairness concerning service performance (ex-ante expectations) and the amount of money (sacrifice) paid for it. Satisfaction scores will vary according to hotel features and guests' characteristics. Based on the findings in the related literature, the deterministic part is explained by the following variables:

- *Accommodation board*: one important source of heterogeneity in hotel experiences is the variety of services purchased. Part of the differences in satisfaction between guests can be attributed to the accommodation board chosen (the type of "Food and Beverage" services hired).

- *Hotel star rating*: as discussed before, the official star rating is an objective indicator of the expected level of quality. Differences in hotel stars reflect not only heterogeneity in the quality of services received but also in beforehand expectations. Although the literature has found a positive relationship between stars and overall satisfaction, it remains to be explored whether high-quality hotels are able to translate their higher standards into higher satisfaction relative to rates.

- *Beforehand most-valued hotel attributes*: satisfaction with a hotel depends on their hedonic attributes (Yang *et al.*, 2018). Importance-performance theory (Barsky, 1992) posits that satisfaction emerges when the relevant factors for utility are met. Taplin (2012) argues in favour of the use of self-reported attribute importance for predicting overall satisfaction, which helps to identify which hotel features are associated with higher satisfaction. Along his lines, we define binary indicators for respondents' beforehand most-valued hotel characteristics.

- *Total expenditure per person and day at the hotel*: VFM might change depending on how much people have paid for the services (expenditure). If there is an inverted U-shaped relationship between rates and overall satisfaction (Chen *et al.*, 2015), it seems interesting to explore whether the ratio of satisfaction to rates changes with expenditure level. This will indicate whether marginal increases in expenditure translate into a level of satisfaction that makes such expenditure worthwhile.

4. Data
4.1 Database
Our database comes from the Tourist Information System of Asturias (Spain). This is an institute for tourism research that surveys visitors over 18 to Asturias during the whole year. Data collection takes place through personal interviews with trained pollsters both in the street and in collective establishments. Respondents fill a questionnaire in which they are asked about several trip characteristics (e.g. length of stay, party size, chosen accommodation). Sociodemographic characteristics such as age, gender or labour status are also collected. Respondents are sampled based on a mixture of quota random sampling and

pure random sampling (95% confidence level, 5% error). For defining the quotas by tourist profile and period, official records about visitors from the National Statistics Institute are used.

Our sample covers the period 2005–2016. We restrict our attention to tourists visiting Asturias and lodged at hotels. Residents in Asturias are also considered. This data set is relevant for our study purposes as it asks respondents their satisfaction with the chosen accommodation relative to the paid room rates. The survey also collects the total expenditure at the hotel. Moreover, it also provides detailed information on the *beforehand* most-valued attribute (i.e. the attribute that tourists appreciated most for choosing the hotel). The quality of the hotel (number of stars) and the area within Asturias where it is placed are also gathered.

Recently, scholars have started to examine hotel satisfaction through review data obtained from online platforms such as Booking (Nicolau *et al.*, 2020) or TripAdvisor (Bi *et al.*, 2020). The main limitation of this kind of data is its lack of representativeness because travel website users tend to be young, highly educated and with high income (Ip *et al.*, 2012). By contrast, our data set provides information of a representative sample of tourists visiting Asturias and lodged at hotels, in which all profiles of customers are considered.

Our final sample encompasses 14,879 individuals. Summary statistics are presented in Supplementary Material, Table A1. Age ranges from 18 to 91 years old with an average value of 40. About half of the tourists are employees (49%). Only 6% come from abroad, being the vast majority from other Spanish regions (89%). Most of them visit Asturias for leisure purposes (87%) and lodge in the central area, where the main cities are located (51%). The average party size and length of stay are 3.1 and 4.1, respectively. More than half of the sample opt for 3-star (34%) and 4-star (27%) hotels. Approximately half of the sample just sleeps at the hotel without hiring any other service (45%). On average, the expenditure per person and day on accommodation is 78 euros. Almost 30% of respondents report "the environment" as the key attribute for choosing in which hotel to stay. About 10% indicate that they pay attention to prices, whereas 13% of them justify their hotel choice because they simply "like it".

4.2 Dependent variable
Respondents are asked about their overall level of satisfaction with the hotel relative to the room rates. That is, they are inquired about the VFM of the hotel stay (i.e. the price-value rating). This is assessed on an 11-item Likert scale (*srr*), where 0 means "completely dissatisfied" and 10 "completely satisfied". Table 1 reports the distribution of the answers [2].

SRR	Frequency	(%)
1	44	0.29
2	46	0.31
3	137	0.92
4	142	0.95
5	514	3.45
6	1,225	8.23
7	4,593	30.87
8	5,162	34.69
9	2,194	14.75
10	822	5.52

Table 1.
Distribution of answers to the original question about satisfaction relative to rates

An 11-item scale with an ordered nature creates some difficulties in the interpretation of the results. Because of this, many researchers opt for dichotomizing the dependent variable into a fuzzy rating scale with fewer categories (Dilmaghani, 2019). This preserves the ordinal nature of the indicator while allowing for an easier interpretation (see D'Urso *et al.*, 2020). This is common in the literature to deal with the usual left-skewness of satisfaction (Albayrak and Caber, 2015). We transform the original answers into a 1–4 scale (denoted by SRR) in the following way:

$$SRR = \begin{cases} 1 \ if \ srr < 5 \\ 2 \ if \ 5 \le srr < 7 \\ 3 \ if \ 7 \le srr < 9 \\ 4 \ if \ srr \ge 9 \end{cases}$$

We interpret the values of the transformed scale (SRR) as follows: 1 = "Dissatisfied", 2 = "Moderately satisfied", 3 = "Quite satisfied" and 4 = "Highly satisfied". Table 2 shows the distribution of SRR. We acknowledge that the choice of the cut-offs is debatable, but our analysis is robust to this transformation.

Only 2.5% of tourists declare to be dissatisfied relative to rates. The vast majority are quite satisfied (65%), whereas a non-negligible 20% of tourists fall into the highly satisfying category.

4.3 Explanatory variables
The four blocks of variables introduced in Section 3 are measured as follows:

- *Type of board (Board)*: compared with those who just sleep at the hotel, we distinguish among bed and breakfast board (*bed_bfast*), half-board (*half_board*) and full board (*full_board*).

- *Hotel stars (S)*: we define three dummy variables (*3-star*, *4-star* and *5-star*) for 3-, 4- and 5- star hotels, respectively. Hotels with 1 or 2 stars act as the base category.

- *Most-valued hotel attributes (Attrib)*: a set of dummy variables that reflect the self-reported beforehand most-valued factor for choosing the hotel are considered. These attributes are: "good quality", "comfort", "positive previous experience there", choosing the hotel because the tourist "liked it" (positive first impression), "recommendation" by friends or relatives (WoM), "environment" (nice area), "tranquility" (calm area), "closeness" to places of interest and "price" (rates matches desires, either cheap or expensive). They are denoted as *a_quality*, *a_comfort*, *a_experience*, *a_like*, *a_recommend*, *a_environment*, *a_tranquility*, *a_closeness* and *a_price*, respectively. The reference category gathers other reasons.

- *Expenditure (Exp)*: total expenditure at the hotel per person and day expressed in euros (denoted by *exp_accom*).

Table 2.
Distribution of answers to the transformed measure of satisfaction relative to rates

SRR	Frequency	(%)
1 = "Dissatisfied"	369	2.48
2 = "Moderately satisfied"	1,739	11.69
3 = "Quite satisfied"	9,755	65.56
4 = "Highly satisfied"	3,016	20.27

It is highly likely that the effect of expenditure on satisfaction varies depending on the guest's price sensitivity (i.e. how much he cares about money). To explore this, our specification considers an interaction term between *exp_accom* and *a_price*.

To control for other sources of heterogeneity, the following sociodemographics, trip characteristics and time effects are considered:

- *Sociodemographic characteristics (Soc)*: age (in levels and in a squared form), gender (a dummy for men), labour status (distinguishing among *self-employed*, *student*, *homemaker*, *unemployed* and *retired,* with the *employee* acting as reference) and place of origin (*foreign* and *resident*, being domestic tourists the reference).

- *Trip characteristics (Trip)*: travel purpose (*leisure* and *business*, collapsing the rest of purposes in the reference category), travel companion (*alone* and *couple*, with the rest acting as the reference category,), length of stay (*LOS*), a dummy for being a first-time visitor (*first-time*) and the area where the tourist stays (*main_cities*, *east_coast* and *east_coast*).

- *Time effects (Time)*: year dummies and a dummy for the third quarter (*q3*) are included to control for time and seasonal effects.

5. Econometric modelling

There is an ongoing debate in the well-being and happiness literature about the cardinality vs ordinality of satisfaction measures (Ng, 1997; Mandler, 2006). Although some authors indicate using one approach or another does not lead to different conclusions (Ferrer-i-Carbonell and Frijters, 2004), scholars tend to avoid interpersonal comparisons of satisfaction and assume the indicator has an ordered nature. Therefore, the econometric modelling of consumer satisfaction is generally done using the Ordered Probit model (OP).

5.1 A Heteroskedastic ordered probit model

We assume the ordinal measure of satisfaction comes from a latent continuous representation of satisfaction relative to rates (SRR_i^*), which equals the sum of a deterministic ("cognitive") and a random ("emotional") component as follows:

$$SRR_i^* = X_i'\beta + \sigma_i u_i \tag{2}$$

where X_i is a set of explanatory variables, β is a vector of coefficients to be estimated, u_i is a standard normally distributed error term capturing any omitted variable that affects SRR_i^* and is not included in X_i and σ_i is an individual-specific scale parameter that shifts the error variance.

The OP model assumes that the error variance is homogeneous across the sample and equal to one. However, it is highly possible that two individuals that experienced the same events exhibit different satisfaction scores due to differences in perceptions (i.e. scale heterogeneity). In other words, the width of the distribution of unobserved factors affecting satisfaction might differ across people due to differences in emotional satisfaction. If so, arbitrarily fixing the scale to one imposes a restriction. Note that cognitive (objective) omitted factors (e.g. noise, bathroom size) are assumed to affect the *location* of the random component while the emotional component is assumed to affect its *scale*. Additionally, from an econometric perspective, heteroskedastic misspecification in an OP model is more problematic than in linear regression because it results in inconsistent parameter estimates (Greene *et al.*, 2014).

Therefore, we propose a Heteroskedastic Ordered Probit model (HOP) that allows the error variances to differ across individuals. We specifically consider a set of covariates as explanatory of this scale heterogeneity (i.e. $Var(u_i|X_i)$).

Mean equation:

$$SRR_i^* = X_i'\beta + \sigma_i u_i \tag{3}$$

where the observation mechanism collapses latent satisfaction to take integer values ϑ_k for $k = 1, 2, 3, 4$ so that the probability that the observed ordinal satisfaction equals ϑ_k is:

$$Prob(SRR_i = 1['Dissatisfied']) = Prob(-\infty < X_i'\beta + \sigma_i u_i < \tau_1)$$

$$Prob(SRR_i = 2['Moderately\ satisfied']) = Prob(\tau_1 \leq X_i'\beta + \sigma_i u_i < \tau_2$$

$$Prob(SRR_i = 3['Quite\ satisfied']) = Prob(\tau_2 \leq X_i'\beta + \sigma_i u_i < \tau_3)$$

$$Prob(SRR_i = 4['Highly\ satisfied']) = Prob(\tau_3 \leq X_i'\beta + \sigma_i u_i < \infty) \tag{4}$$

where τ_h are thresholds to be estimated for $h = 1, 2, 3$.

Variance equation:

$$\sigma_i = exp(W_i'\delta) \tag{5}$$

being X_i and W_i two vectors of variables that might share some common covariates, β and δ two vectors of parameters to be estimated and u_i the standard normal error term.

The HOP model is estimated by Maximum Likelihood. The exponential functional form ensures variance non-negativity. The intercept is omitted from (3) and (5) for identification (Greene *et al.*, 2014).

6. Results

As the parameter estimates are not straightforward to interpret in a HOP model, Table 3 presents the average marginal effects (AME) for the mean and the variance equations [3]. The parameter estimates can be found in Supplementary Material, Table A2. These margins are average values and measure the change in the probability the respondent assesses her satisfaction with each of the four possible categories (in percentage). For the variables appearing in the two equations, the overall marginal effect is the sum of the marginal effects in the two equations (Greene, 2012, p. 763; Greene and Hensher, 2010, p. 187) for each category.

However, Greene and Hensher (2010) are sceptical about the proper interpretation of the *overall* partial effects because they refer to effects on two different moments of the distribution of the dependent variable. Because of this, we examine the partial effects on the mean and on the variance *separately*. Note that the margins for binary variables are interpreted relative to the excluded category and because the model is non-linear, the margins are asymmetric.

We begin by discussing the margins for the "cognitive" component (mean equation). Satisfaction increases as the tourist hire more food services. Compared with those who just sleep at the hotel, tourists who also pay for the breakfast being included (*bed_bfast*), purchase the half board (*half_board*) or the full board option (*full_board*) are 4.6%, 6.5% and 12.9% more likely to be highly satisfied, *ceteris paribus*. This provides further evidence that

Mean equation	Explanatory variables	AME on Prob (SRR = 1)	AME on Prob (SRR = 2)	AME on Prob (SRR = 3)	AME on Prob (SRR = 4)
Accommodation characteristics	bed_bfast	−0.935***	−2.838***	−0.863***	4.636***
	half_board	−1.030***	−3.405***	−2.078***	6.512***
	full_board	0.174	−2.543**	−10.543***	12.912***
	3-star	−0.169	−1.145***	−1.935**	3.249***
	4-star	−1.350***	−5.614***	−7.363***	14.326***
	5-star	−1.218***	−7.146***	−24.563***	32.927***
	a_quality	−1.567***	−5.553***	−5.167***	12.287***
	a_comfort	−2.037***	−6.710***	0.992	7.755**
	a_experience	−1.919***	−7.179***	−8.768***	17.866***
	a_like	−2.193***	−5.929***	4.362***	3.761***
	a_recommend	−1.432***	−4.873***	−3.811***	10.117***
	a_environment	−1.916***	−3.802***	4.428***	1.290
	a_tranquility	−0.564	−1.788	−0.832	3.184
	a_closeness	0.803	2.222	0.230*	−3.254
	a_price	−1.511***	−3.291***	2.446***	2.356**
	exp_accom	0.007***	0.021***	0.008***	−0.037***
Sociodemographic characteristics	age	0.027***	0.036*	−0.112***	0.049
	male	−0.430**	−0.095	2.838***	−2.313***
	self-employed	−0.041	−0.123	−0.036	0.200
	student	0.641**	1.813**	0.274***	−2.728**
	homemaker	−0.148	−0.449	−0.146	0.743
	unemployed	−0.170	−0.517	−0.173	0.860
	retired	−0.242	−0.739	−0.259	1.241
	foreign	−0.306	−0.939	−0.344	1.589
	resident	−0.657***	−2.100***	−1.007**	3.764***
Trip characteristics	leisure	−0.325	−0.946	−0.211**	1.482
	business	−0.379	−1.173	−0.454	2.006
	alone	−0.142	−0.428	−0.138	0.708
	couple	−0.208*	−0.619*	−0.169*	0.996*
	party_size	−0.025*	−0.075*	−0.021*	0.121*
	LOS	−0.013	−0.038	−0.011	0.062
	first-time	0.394**	0.628*	−1.126***	0.103
	main_cities	2.295***	4.983***	−2.920***	−4.358***
	east_coast	1.706***	2.391***	−4.023***	−0.074
	east_inner	2.125***	2.720***	−5.173***	0.328
Time effects	y2006	0.912***	2.534***	0.261***	−3.708***
	y2007	0.598*	1.695*	0.272***	−2.565**
	y2008	0.435	1.250	0.244***	−1.929*
	y2009	−0.475**	−1.480**	−0.604	2.559**
	y2010	0.483*	1.389*	0.264***	−2.136*
	y2011	0.174	0.512	0.128	−0.814
	y2012	−0.814***	−2.615***	−1.294***	4.723***
	y2013	−0.330	−1.013	−0.373	1.716
	y2014	0.396	1.142	0.232**	−1.770
	y2015	−0.957***	−3.134***	−1.754***	5.845***
	y2016	−0.612***	−1.934***	−0.876*	3.422**
	q3	0.442***	1.312***	0.353***	−2.107***
Variance equation	Explanatory variables	AME			
Scale determinants	full_board	22.298***			
	3-star	3.906*			

(continued)

Mean equation	Explanatory variables	AME on Prob (SRR = 1)	AME on Prob (SRR = 2)	AME on Prob (SRR = 3)	AME on Prob (SRR = 4)
	4-star	9.342***			
	5-star	35.609***			
	a_comfort	−15.495***			
	a_like	−17.683***			
	a_environment	−14.278***			
	a_price	−10.016***			
	age	0.274***			
	male	−7.052***			
	first-time	3.207*			
	main_cities	10.914***			
	east_coast	11.731***			
	east_inner	15.085***			
Total observations		14,879			

Table 3.

Notes: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

"Food and Beverage" constitutes an important factor of guest satisfaction, in line with Albayrak and Caber (2015). Something similar happens with hotel quality. The higher the hotel star rating, the higher the probability of being highly satisfied. This is consistent with Zhou *et al.* (2014) and Radojevic *et al.* (2015).

Concerning the most important beforehand attributes, all of them are statistically significant except *a_tranquility* and *a_closeness*. This implies that choosing a hotel because it is near to the main places of interest or because it is in a tranquil area does not affect satisfaction. This follows Liu *et al.* (2017), who find that location appears to be the least important hotel attribute for explaining satisfaction.

Those who seek quality and comfort (*a_quality* and *a_comfort*) are more satisfied, which provides further evidence on the relevance of high-quality standards to please customers (Liu *et al.*, 2017). Interestingly, those who have experience at the hotel (*a_experience*) have a larger probability of being highly satisfied (+17.8%). This can be explained by these tourists having personal knowledge of the hotel services and characteristics so that outcomes are aligned with expectations. Therefore, experience reduces uncertainty, making disconfirmation less likely.

Guests who report their hotel choice was based on having a good first impression (*a_like*) are more likely to be either quiet (+4.3%) or highly satisfied (+3.7%). This relates to the literature on first impressions shaping the way people cognitively judge (Rabin and Schrag, 1999). Recommendation (*a_recommend*) is also related with a higher satisfaction (+10.1%). Like previous experience, this suggests that receiving feedback from friends and relatives may better adjust expectations with reality, reducing the likelihood of disappointment.

Those for whom the price was the most relevant factor for hotel choice (*a_price*) are likely to be highly (+2.3%) or quite satisfied (+2.4%), showing a lower likelihood of being dissatisfied (−1.5%) or moderately satisfied (−3.3%). Accordingly, when the choice focuses on rates, the quality-price satisfaction is high. A possible explanation could be that if rates are perceived as a beforehand quality signal (Chiu and Chen, 2014), there might be less asymmetry between expectations and outcomes.

Turning to the effect of the total expenditure per person and day on accommodation (*exp_accom*), the coefficient is negative, while the interaction term with *a_price* is positive (Supplementary Material, Table A2). The overall marginal effects suggest that for each 10 € increase in the expenditure per person and day the probability of being highly satisfied decreases by 0.37%. This is consistent with the U-shaped pattern documented by Chen *et al.* (2015) between rates and satisfaction because this means that at low prices satisfaction relative to cost is high but then the ratio smoothly decreases. Our results also match evidence presented in Nicolau *et al.* (2020) showing that VFM decreases with prices because prices rise faster than quality. As our model controls for the accommodation board, hotel quality, length of stay and travel party, *exp_accom* measures the net effect of expenditure on satisfaction. It is important to indicate that *exp_accom* increases with the number of services hired and hotel stars, although the correlation is not very large [4]. Therefore, there is enough variability to separately identify the effects.

We have shown that the probability of being quite satisfied under a half-board regime increases by 6.5% (compared to the only accommodation option). If on average, there is a 27 € difference in expenditure between the two regimes and satisfaction relative to rates decreases by 0.037% per spent euro, then the net effect of *half_board* on Prob(SRR = 4) is 5.5% (6.5–0.037*27). Similarly, the overall effect of *4-star* on the likelihood of being highly satisfied is 12.7% (14.3–0.037*43) [5].

To better explore the differences in the effect of expenditure depending on the importance attached to rates, Figure 1 depicts the AME over the sampling distribution of *exp_accom* on each of the four scores, separately for *a_price* = 0 and *a_price* = 1. Interestingly, the probability of being dissatisfied (highly satisfied) or just moderately (quite) satisfied increases (decreases) with expenditure among those for whom hotel rates
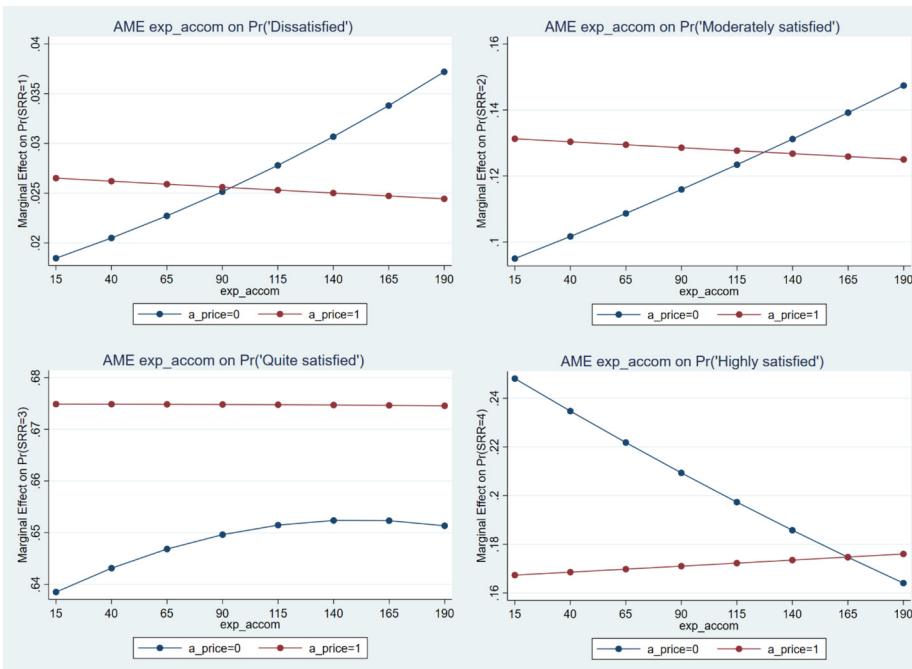

Figure 1.
Marginal effects for
exp_accom by *a_price*

are not the most valued beforehand attribute. Contrariwise, satisfaction relative to rates remains almost unchanged with expenditure among those who attach great importance to rates. We interpret this result as follows. Guests who are more sensitive to prices (i.e. a_price = 1) seem to prioritize hotels in which there is a good balance between service quality and rates. Possibly this segment engages in a deeper information search, so they hold more accurate quality expectations, and therefore they are less likely to provide high (low) satisfaction scores. Indeed, as shown in Figure 1, they locate themselves in the "quite satisfied" category. By contrast, those who prioritize non-monetary aspects are more likely to become dissatisfied when they increase their expenditure.

Regarding sociodemographic characteristics, age is negatively related to satisfaction [6]. We interpret this result as elderly people having a higher benchmark (possibly due to being more experienced). As for gender differences, women seem to be more extreme in their valuations: men are more likely to be quite satisfied while women's valuation is either dissatisfied or highly satisfied. Students appear to be less satisfied in comparison to employees (reference category). Surprisingly, there are no differences in satisfaction between domestic tourists and those coming from abroad. This contradicts earlier literature (Huang and Crotts, 2019). However, residents in the region rate hotels better.

Those who travel in a couple are (marginally) more likely to be highly satisfied. Indeed, satisfaction appears to increase with party size, possibly due to the mixture of economies of scale in rates and positive externalities due to social interactions. Surprisingly, there are no differences in satisfaction depending on the trip purpose (*leisure* or *business)* or the length of the stay (*LOS*). We also document that first-time visitors (*first-time*) are more likely to be dissatisfied.

Concerning time effects, visiting Asturias in the third quarter is associated with lower satisfaction (−2.1%). In line with Chen *et al.* (2015), we speculate this could be because during the summer hotels are more crowded, which might make hotel service quality worsen. Moreover, during the high season hotels might increase room rates while providing the same standard of quality (Mattila and O'Neill, 2003). On the other hand, we do not find any systematic pattern in satisfaction levels throughout the period 2005–2016.

We now turn to the margins for the conditional variance ("emotional" component). The choice of the covariates that enter the variance equation is not an easy task. As the form of the variance is unknown (Greene *et al.*, 2014), some authors suggest including some or all the variables considered in the mean equation and examine ex-post which of them are significant (Litchfield *et al.*, 2012). After some preliminary analysis, our final specification was selected based on stepwise estimation based on LR tests following recommendations by Williams (2010).

The standard deviation of the random component of satisfaction for those who purchase the full board accommodation is 22.3% larger. This means that when all the meals are included, non-observable factors weigh more when assessing satisfaction. Something similar happens with hotel quality. Tourists lodged at 3-, 4- and 5-star hotels exhibit standard deviations of the error terms 3.9%, 9.3% and 35.6% larger. Conversely, satisfaction is more deterministic (lower variance) for those who state that hotel comfort (−15.5%) and the environment (−14.2%) are the main reasons for having chosen it. Interestingly, *a_like* and *a_price* are associated with lower residual dispersion (−17.6% and −10.0%, respectively). This implies that positive first impressions and paying greater attention to rates beforehand make satisfaction more deterministic. Additionally, men exhibit less variability in their satisfaction (−7.0%). Put another way, the weight of the emotional component is higher for women, in line with Wang *et al.* (2016). The same holds for elderly people, who appear to be more "emotional" in their self-reported satisfaction (+0.27% per year). Finally, there is a larger variation in satisfaction among first-time visitors (+3.2%) and those who lodge in the central (+10.9%) or the eastern area (+11.7% and +15.0%).

As regard model fit, Table A4 in Supplementary Material displays the log-likelihood values, AIC and BIC information criterion for the HOP model presented in Table 3 and a standard OP model which assumes variance homoscedasticity. Both AIC and BIC are lower for the HOP model, indicating that the heteroskedastic specification fits the data best once considering its greater number of parameters. Furthermore, a Wald test for variance homoscedasticity supports the necessity of accounting for variance heteroscedasticity.

To check whether our results are affected by multicollinearity, we computed the variance inflation factor (VIF) after a linear regression (available upon request). All the VIF scores are lower than 4 (mean VIF = 1.55), which is the common threshold value to detect multicollinearity problems.

As a robustness check, we have examined whether our results are sensitive to the grouping of the dependent variable in four categories. Firstly, we re-estimated the model using the original variable (*srr*). Parameter estimates and marginal effects remain largely unchanged (see Supplementary Material, Table A3). Secondly, the dependent variable was alternatively recorded using five levels [7]. Results also remain consistent with the main analysis.

7. Conclusions
This paper analyses the determinants of tourist satisfaction relative to hotel room rates. Unlike other studies that focus on overall satisfaction, we use a measure of the VFM of the hotel experience (i.e. a quality-price satisfaction score). Using survey data from tourists visiting Asturias (Spain) during the period 2005–2016, we estimate a Heteroskedastic Ordered Probit model in which we model the mean and the variance of the self-declared satisfaction scores. In this way, our econometric modelling considers scale heterogeneity in the latent responses. The non-linearity of the model further allows controlling for possible asymmetric effects.

Our empirical results show that satisfaction relative to rates is higher for those who choose the hotel due to recommendations or previous experience there. This result can be due to a better match between expectations and outcomes that make disconfirmation less likely. Interestingly, positive first impressions are positively associated with higher satisfaction, which suggests people tend to sustain ex-ante perceptions. Similarly, those who devote great attention to prices beforehand are subsequently more satisfied. VFM also increases deterministically with hotel quality and the number of food services hired. However, this quality-price post-purchase evaluation is negatively related to total expenditure. Interestingly, we show this negative relationship holds for those who do not prioritize prices at the time of choosing. VFM decreases with age, possibly because elderly people are more demanding or hold different expectations. Men are more deterministic when rating the hotel, with female's valuation being more affected by unobserved factors. Furthermore, we find robust evidence that the higher the quality of the hotel and the services hired, the larger the weight of the emotional component of satisfaction. By contrast, satisfaction is more deterministic among those whose choice was based on the price or first impression.

From our analysis, some implications can be drawn. Firstly, the study adds more evidence about the effects of positive word-of-mouth. It is not only that recommendation increases demand but it also makes tourists be more satisfied, which, in turn, enhances the likelihood of spreading recommendation. The same applies to tourists that stayed at the hotel before. As such, when the ex-ante uncertainty about hotel quality is narrow, expectations are more aligned with actual outcomes and guests' satisfaction is more likely. The positive association between positive first impressions and satisfaction also points to

the crucial role of websites' aesthetic appeal, marketing campaigns and brand image in creating a positive attitude towards the hotel. Great effort and care should be devoted to the way hospitality firms advertise their services and characteristics to generate positive first impressions that would help in the tourist's attitude towards the hotel.

Secondly, the negative relationship between expenditure and satisfaction, conditional on tourist and hotel characteristics, indicates that expensive hotels in Asturias are not being effective at translating their higher fees into higher satisfaction. This is relevant because these customers are those with the highest revenue per available room. If they do not perceive their expenditure to be worthwhile (low VFM), this segment might opt for alternative accommodations. Given the high level of competence in the sector, hotel room rates and quality signals must match the standard of quality supplied to maximize guests' satisfaction relative to rates.

Finally, the fact that the emotional component weighs more for women and elderly people points to the necessity of more personalized attention to these tourists. Future research might explore the specific factors that make them be more extreme in their judgements. Along the same lines, we document that the weight of emotional satisfaction is larger among tourists who lodge at better quality hotels and hire full board services. This means that the quality-price relationship becomes more random as the complexity of the services offered rises. Again, this calls for more attention to the quality of "Food and Beverage" services, especially for expensive and high-quality hotels.

Notes

1. Throughout the paper we use the terms "satisfaction" and "value for money" interchangeably. This is because we study satisfaction relative to cost.

2. Nobody rated their satisfaction with a "0" and this is why *srr* ranges from 1 to 10.

3. The detailed formulas for the HOP model can be found in Greene (2012, p.763) and Greene and Hensher (2010, p.187).

4. The average expenditure per person and day by hotel star rating is 48 (*1-star*), 59 (*2-star*), 78 (*3-star*), 99 (*4-star*) and 123 (*5-star*) euros, being the correlation between the two equal to 0.5. The average expenditure by accommodation board is 70 (*only_accom*), 82 (*bed_bfast*), 97 (*half_board*) and 89 (*full_board*) euros, being the correlation between the two equal to 0.19.

5. We thank an anonymous referee for highlighting this point.

6. The coefficient estimate for *age* is negative while the one for *agesq* is positive (see Supplementary Material, Table A2). The overall marginal effect (which depends on age levels) is negative.

7. Based on the original variable *srr*, satisfaction was recoded as 1-2; 3-4; 5-6; 7-8; 9-10.

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