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Research Note

Effects of general and particular online hotel ratings

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The analysis of the effect of online review ratings on usefulness is a relevant topic today. Park and Nicolau (2015) find asymmetric effects in the restaurant industry so that negative reviews are more useful than positive ones, and that people perceive extreme ratings (positive or negative) as more useful than moderate ratings, giving rise to a U-shaped curve. While the study of Park and Nicolau (2015) focuses on "general review ratings of restaurants", we go a step further and analyze "general and particular review ratings of hotels". Specifically, we examine "general ratings" and ratings for "value", "location", "sleep quality", "rooms", "cleanliness" and "service". Tourism Alliance (2015) reports that for visitors to the UK accommodation is the second largest expenditure at £14.1bn, which emphasizes the importance of focusing on the hotel industry.

The sample is obtained from Tripadvisor and consists of 5,499 observations. Specifically, six 4- and 5-star hotels located in London were selected after randomizing the order of the accommodation listings on TripAdvisor. Note that this study focuses on upscale (4*) and luxury (5*) hotels in order to control potential confounding effects, derived from the different levels of consumer expectations when considering varying hotel reputations, marketing and managerial issues (Park & Allen, 2013). The dependent variable is the number of online users who voted that the reviews were useful in response to the posted reviews. The independent variables are the star ratings for "general ratings" and ratings for "value", "location", "sleep quality", "rooms", "cleanliness" and "service". The ratings are based on five star levels. We estimate three models for each rating: 1) A model with the variables "reviews" and "squared reviews" to detect potential non-linearities; 2) A model to detect potential asymmetries, with the star rating variable divided into two categorized variables (i.e., positive and negative reviews), with positive reviews being 4 and 5 stars and negative reviews 1 and 2 stars; 3) A model where each level of the star rating is included through binary variables, where the midpoint rating (three stars) is used as the reference group. Finally, some control variables are employed: response from the hotel (a binary variable which takes 1 if the hotel responded to the review and 0 otherwise); reviewer's real name and real photo (two binary variables which take 1 if the reviewer shows his/her real name (and real photo) and 0 otherwise; and number of total reviews, number of hotel reviews and number of cities the reviewer has visited and reviewed, which are quantitative variables.

The NegBin model (Negative Binomial Count Data Model) is proposed to analyze asymmetric effects of hotel reviews on usefulness. The NegBin model (Negative Binomial Count Data Model) is proposed to analyze asymmetric effects of hotel reviews on usefulness because the dependent variable is a discrete variable. Accordingly, the NegBin model avoids the estimation bias of regression analyses and the inefficiency problems of Multinomial Logit Models derived from the large number of alternatives that exist in this framework (number of votes). Tables 1–3 present the results of the effects of online review ratings: general rating, rating for value, for sleep quality, for rooms, for cleanliness and for service. All the models show globally significant results ($p < 0.01$) by looking at the likelihood ratio and the parameter α is significant at 1% ($p < 0.001$) in all cases; this finding reinforces the validity of model used as heterogeneity of tourist preferences is proven.

Before testing the asymmetric effects of reviews, note that the U-shaped relationship is generally found, as the variable "reviews" shows negative and significant parameters and the variable "squared reviews" presents positive and significant parameters (Table 1), in line with Forman, Ghose, and Wiesenfeld (2008) and Park and Nicolau (2015).

In order to detect potential asymmetries in the reviews, the rating variables are broken down into positive (4 and 5) and negative reviews (1 and 2). In all cases, the parameters for negative reviews are always higher than the parameters for positive reviews (Table 2). In fact, all the equations present a significant and positive parameter for negative reviews while the

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Table 1
Effect of star ratings on usefulness: ratings and squared ratings.

	General	Value	Location	Sleep Quality	Rooms	Cleanliness	Service
Rating	−0.7127[a]	−0.7589[a]	−0.1021	−0.6954[a]	−0.8872[a]	−1.1211[a]	−0.7123[a]
	(0.1348)	(0.1073)	(0.2082)	(0.1589)	(0.1466)	(0.2234)	(0.1407)
Squared rating	0.0871[a]	0.0977[a]	0.0219	0.0996[a]	0.1072[a]	0.1401[a]	0.0962[a]
	(0.0189)	(0.0154)	(0.0268)	(0.0219)	(0.0200)	(0.0291)	(0.0201)
Response from hotel	−0.2972[a]	−0.3411[a]	−0.3101[a]	−0.2007[a]	−0.3571[a]	−0.2936[a]	−0.2744[a]
	(0.0449)	(0.0456)	(0.0448)	(0.0476)	(0.0474)	(0.0459)	(0.0454)
Real name	−0.0974[b]	−0.0721	−0.1259[a]	−0.0161	−0.1045[b]	−0.1216[a]	−0.0915[b]
	(0.0417)	(0.0434)	(0.0438)	(0.0480)	(0.0436)	(0.0433)	(0.0433)
Real photo	0.1392[b]	0.1417[b]	0.0582	0.1449[b]	0.0400	0.1523[a]	0.1521[a]
	(0.0549)	(0.0571)	(0.0589)	(0.0626)	(0.0582)	(0.0576)	(0.0573)
Total reviews	−0.0015	−0.0009	−0.0011	−0.0015	−0.0003	−0.0015	−0.0016
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Hotel reviews	0.0027	0.0010	0.0021	−0.0008	0.0037	0.0022	0.0022
	(0.0025)	(0.0026)	(0.0027)	(0.0028)	(0.0026)	(0.0026)	(0.0026)
Cities reviewed	0.0010	0.0015	−0.0008	0.0046	−0.0044	0.0013	0.0017
	(0.0035)	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)
Constant	2.4955[a]	2.4937[a]	1.1825[a]	2.0441[a]	2.9442[a]	3.2618[a]	2.2863[a]
	(0.2259)	(0.1803)	(0.3901)	(0.2755)	(0.2605)	(0.4152)	(0.2250)
α	−0.9908	−0.9997	−1.0065	−1.1392	−1.0404	−0.9571	−0.9697
	(0.0597)	(0.0622)	(0.0645)	(0.0776)	(0.0655)	(0.0605)	(0.0610)
LR Index	0.1501	0.1575	0.1309	0.1095	0.1402	0.1525	0.1518
LR statistic	1306.2[a]	1275.1[a]	985.2[a]	637.9[a]	1062.7[a]	1243.1[a]	1243.2[a]
Log likelihood	−3697.6	−3409.5	−3271.6	−2592.9	−3259.7	−3454.3	−3473.5
AIC	4.1014	4.1100	4.1098	3.9953	4.0974	4.1291	4.1249
SIC	4.1318	4.1425	4.1435	4.0350	4.1311	4.1614	4.1635

a = prob < 0.01; b = prob < 0.05%.

Table 2
Effect of star ratings on usefulness: positive (4 & 5) and negative (1 & 2) ratings.

	General	Value	Location	SleepQuality	Rooms	Cleanliness	Service
Positive reviews (4 & 5)	−0.3256[a]	−0.0421	−0.0526	−0.0302	−0.0279	0.0992	−0.0149
	(0.0801)	(0.0553)	(0.0574)	(0.0458)	(0.0559)	(0.0699)	(0.0666)
Negative reviews (1 & 2)	0.3311[a]	0.4634[a]	−0.3680	0.5278[a]	0.7256[a]	1.0182[a]	0.3921[a]
	(0.1155)	(0.0900)	(0.2237)	(0.1254)	(0.1078)	(0.1531)	(0.1151)
Response from hotel	−0.4205[a]	−0.3917[a]	−0.3345[a]	−0.3673[a]	−0.3833[a]	−0.3818[a]	−0.3536[a]
	(0.0457)	(0.0458)	(0.0445)	(0.0456)	(0.0455)	(0.0452)	(0.0454)
Real name	−0.0756	−0.0780	−0.1059[b]	−0.0919[b]	−0.0758	−0.1091[b]	−0.0900[b]
	(0.0430)	(0.0433)	(0.0433)	(0.0433)	(0.0430)	(0.0429)	(0.0434)
Real photo	0.1424[b]	0.1578[a]	0.1688[a]	0.1681[a]	0.1543[a]	0.1365[b]	0.1591[a]
	(0.0567)	(0.0569)	(0.0575)	(0.0572)	(0.0566)	(0.0570)	(0.0573)
Total reviews	−0.0014	−0.0016	−0.0018	−0.0018	−0.0012	−0.0018	−0.0018[c]
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Hotel reviews	0.0015	0.0013	0.0020	0.0025	0.0020	0.0025	0.0023
	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)
Cities reviewed	0.0014	0.0023	0.0024	0.0020	0.0008	0.0015	0.0018
	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)	(0.0036)
Constant	1.4581[a]	1.1715[a]	1.2117[a]	1.1670[a]	1.1626[a]	1.0835[a]	1.1609[a]
	(0.0891)	(0.0635)	(0.0651)	(0.0490)	(0.0644)	(0.0775)	(0.0755)
α	−0.9840	−0.9608	−0.9239	−0.9402	−0.9837	−0.9689	−0.9395
	(0.0612)	(0.0606)	(0.0595)	(0.0599)	(0.0613)	(0.0607)	(0.0600)
LR Index	0.1611	0.1583	0.1540	0.1562	0.1607	0.1595	0.1556
LR statistic	1335.5[a]	1312.9[a]	1277.0[a]	1295.4[a]	1332.3[a]	1322.2[a]	1290.3[a]
Log likelihood	−3478.2	−3489.5	−3507.4	−3498.2	−3479.8	−3484.8	−3500.8
AIC	4.1281	4.1415	4.1627	4.1518	4.1300	4.1360	4.1548
SIC	4.1603	4.1736	4.1948	4.1840	4.1622	4.1681	4.1870

a = prob < 0.01; b = prob < 0.05%.

parameters for positive reviews are either not significant or significantly negative. Thus, negative reviews are perceived to be more useful than positive reviews, in line with Chevalier and Mayzlin (2006) and Park and Nicolau (2015).

When the star ratings themselves are used as independent variables to fathom out the genesis of the asymmetries (Table 3), it is found that the extreme positive review rating of 5 is more useful than the moderate rating of 4 for "general rating" and "sleep quality". For the rating "value", "rooms", "cleanliness" and "service" there is no difference between positive reviews of 4 and 5.

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