Advertising Strategy in the Presence of Reviews: an Empirical Analysis

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Abstract

Over the last fifteen years, one of the major developments online has been the growth and proliferation of review websites such as TripAdvisor and Yelp. The ready availability of independent information from past users of the product or service poses a challenge for firms. What role does advertising play in the new environment? How should firms fine-tune their advertising strategy in the presence of reviews? In this paper we address these questions in the context of the hotel industry. Using a dataset of all TripAdvisor hotel reviews from 2001 onwards, and another describing the corresponding hotels’ advertising strategies – spending levels, media allocation, message – we show that hotels’ advertising strategies are partially driven by their perceived online quality. Moreover, hotel chains exhibit a more strategic behavior when compared to independent hotels.

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1 Introduction

Over the last fifteen years, one of the major developments online has been the growth and proliferation of review websites such as TripAdvisor and Yelp (Figure 1).\(^1\) According to the Pew Research Center, 82% of U.S. adults report reading reviews occasionally or regularly before purchasing a product for the first time, with 40% doing so almost always.\(^2\) The ready availability of independent experiential information from past users poses a challenge for firms. How should they think about the role of advertising in the new environment? Should they cut back on advertising or should they increase it? Should they use advertising to complement reviews or should they use it as a substitute? In this paper we report on these questions by examining review and advertising data from the U.S. hotel industry over the last 15 years.

Hotels are experience goods (Nelson 1970). Consumers do not observe key aspects of hotel quality before purchase, but they do after purchase, and share their experiences with others.

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\(^1\)In fact, these are among the most visited websites on the Internet. According to Alexa.com, TripAdvisor ranked 257 and Yelp 238, in global traffic on April 27, 2017.

\(^2\)See: [http://www.pewinternet.org/2016/12/19/online-reviews/](http://www.pewinternet.org/2016/12/19/online-reviews/)
Whereas in an earlier time this would have been done through actual word-of-mouth, within a small circle of friends and family, now people post reviews on websites like TripAdvisor, effectively broadcasting their opinions to the entire world.

There are good theoretical reasons for why firms should recognize these developments in their advertising strategy. For advertising strategy ought to differ depending on the scale and scope of independent information available to consumers. To see this, consider a hypothetical scenario in which consumers have no independent sources of information. In this scenario, advertising has free reign to work its magic in the myriad ways discussed in the advertising literature: awareness and information (Grossman and Shapiro 1984), signaling (Milgrom and Roberts 1986, Nelson 1974), persuasion (Chioveanu 2008, Sutton 1991).\footnote{For a recent review of the empirical and theoretical literature in advertising see Bagwell (2007).} Different firms may choose different ways depending on their unique strengths and weaknesses. By contrast, consider the other extreme in which all consumers have access to, and use, independent sources of information. In this scenario, the scope for what advertising can do is necessarily much more limited, perhaps even non-existent. Firms with good reviews would see little point in advertising because reviews do the same job for free (Chen and Xie 2005). Firms with bad reviews also see little point in advertising because it would be hard to overcome the effect of the negative reviews. Reality lies somewhere between the two extremes. First, not all consumers read reviews despite the growing numbers who do. Advertising may target the ones who don’t. Second, even among people who read reviews, advertising might have a role to play, directing consumers’ search through the reviews, or by serving as a tie-breaker among equally-rated firms (Lei and Moorthy 2017).

The hotel industry is an ideal setting to study the relationship between reviews and advertising for several reasons. First, it was one of the earliest adopters of online reviews, and thus is a leading indicator of the likely effects of reviews on firms’ strategies. Second, because hotels are experience goods and serve primarily people from from outside their home markets, online word-of-mouth is especially important relative to offline word-of-mouth. Finally, the
industry is large and important in its own right, with hotels generating $196 billion in sales in 2012 and employing 2 million individuals according to the 2012 Economic Census.

Our empirical analysis is based primarily on two datasets, one comprising all TripAdvisor hotel reviews from 2001 onwards, and the other describing the advertising strategies of these hotels over the same time period. The data are comprehensive. The review data set contains all U.S. hotels listed on TripAdvisor, and the advertising data set includes information about each hotel’s monthly advertising spend level, disaggregated by geography and media—TV, newspapers, magazines, radio, Internet, and outdoor. In addition, for two of the media—TV and Internet—we have access to the ads themselves, which allows us to see how ad content varies over time, and in the cross-section.

The first contribution of this paper is simply to collect and match these two datasets, allowing for the first empirical study of the relationship between online reviews and firms’ advertising strategies. This is noteworthy because our data are not just a sample of a particular market in a particular window of time, but rather the full experience of an entire industry over virtually the entire period online reviews have existed.

Next, to support a claim that TripAdvisor reviews have a causal impact on advertising strategy based on observational data we need to rule out the possibility that changes in reviews might be correlated with other unobservable factors and it is those factors that really drive advertising strategy. We do so by taking advantage of TripAdvisor’s rounding-off procedure for the summary ratings it displays. Individual ratings are averaged and either rounded up or rounded down to the nearest .5 or whole number. This provides us with a ready-made regression-discontinuity design (Anderson and Magruder 2012, Luca 2016) to allay endogeneity concerns.

Our main results are the following. First, total ad spending falls for all hotels from 2001 to 2015, but the fall is substantially larger for independent hotels than for chain hotels. Second, there is a negative relationship between hotels' TripAdvisor ratings and the amount of money they spend on advertising, suggesting that reviews and advertising are substitutes,
not complements. Third, this relationship is stronger for chain hotels than for independent hotels, indicating that perhaps chain hotels are more strategic in their advertising spend decisions than independent hotels. Fourth, when TripAdvisor ratings are high—when perceived quality is high—hotel chains spend more on Internet advertising and less on outdoor advertising. We hypothesize that this is because hotels chains receiving positive ratings use the Internet to promote those ratings while hotels receiving negative ratings use outdoor advertising to target uninformed consumers. In the hotel category, in particular, outdoor advertising is unusually precise in targeting uninformed consumers because of the confluence of three factors: (1) you have to be in the local area to see outdoor ads, (2) people who live in the local area are not the target market for most hotels, and (3) visitors who respond to outdoor ads are, by definition, people who haven’t planned where they will stay, and must therefore be uninformed.

2 Literature review

There is a substantial empirical literature that establishes that online reviews have an impact on sales. For example, Chevalier and Mayzlin (2006), using data from Amazon.com and BN.com, show that online reviews influence consumers’ purchase decisions about books. Anderson and Magruder (2012) and Luca (2016) use data from Yelp.com to show that restaurant reviews affect restaurants’ sales; the latter shows that this effect is particularly strong for independent restaurants as opposed to chain restaurants. Sun (2012) demonstrates how the variance and the average of ratings interact in affecting firms’ sales.

There is also a theoretical literature that examines the effect of reviews on advertising strategy. Chen and Xie (2008) shows that a monopolist may use advertising as a complement to reviews or as a substitute depending on the sophistication of consumers. In their model, reviews provide “complete” information on all product attributes, but may or may not be accurate, while advertising-supplied information is accurate, but may or may not be
complete, depending on the monopolist’s advertising strategy. Sophisticated consumers are assumed to be able to learn from advertising as well as from reviews, but novice consumers can only learn from reviews. Chen and Xie (2005) examine two competing firms’ advertising and pricing strategies in response to third-party product reviews when a substantial number of consumers have strong preferences on horizontal attributes. By contrast, Lie and Moorthy (2017) examine the advertising and pricing strategies of two firms that are vertically differentiated by their review endowments in a repeat-purchase market. In their model, the firm with the better endowment of reviews also has a larger “installed base” of satisfied customers who purchase automatically, without the aid of reviews or advertising. On the other hand, there is an “expansion market” which consists of three segments. One segment visits review websites independently of advertising and makes its purchase decisions based on the two firms’ reviews. Another segment, while not accessing review websites independently, will do so after being exposed to a firm’s advertising. Finally, there is a third segment which bypasses reviews altogether when exposed to advertising. Lie and Moorthy show that the firm with a better endowment of reviews faces a “fat cat’s” dilemma: its larger endowment of satisfied repeat customers makes it less eager to pursue the expansion market aggressively. On the other hand, its stronger review endowment makes it more likely to “win” the expansion market should it decide to pursue it. These tradeoffs create both a substitution effect as well as a complementarity effect. In particular, firms with different review endowments are likely to choose different advertising strategies.

3 Data

To study the effect of online reviews and ratings on hotels’ advertising spending we combine data from several sources: Kantar Media, TripAdvisor, and Smith Travel Research (STR).

Kantar Media collects and provides advertising spending information for a wide range of media and industries, including the hotel industry, the focus of this paper. The media

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4Kantar media coverage includes 18 categories: Network TV, Spot TV, Spanish Language Network
covered by Kantar can be broadly classified into six categories: magazines, TV, newspapers, radio, Internet, and outdoor. We were able to obtain monthly advertising expenditures over a period of 15 years, from January 2001 to December 2015, for all the media covered by Kantar for about 16,000 hotel “products”—the hotel entities that advertise in the U.S.

The hotel reviews dataset comes from TripAdvisor. Launched in 2000, TripAdvisor is one of the most popular review platforms for travel-related content. As of May 2016, TripAdvisor had 500 million customer reviews, on over 6 million accommodations, restaurants and attractions. In an average month, TripAdvisor has about 350 million unique visitors worldwide, making it one of the largest travel communities in the world. We collected review data for the majority of U.S.-based accommodations (hotels, B&Bs, motels, hostels, and inns) listed on TripAdvisor—a total of 91,783 properties. For every property, we have the TripAdvisor unique identifier, the property name, and its location including state, city, ZIP code, and address.

After collecting the TripAdvisor review data, we linked it to the Kantar dataset. The linking process consisted of three phases. In the first phase, we matched the Kantar product name with the TripAdvisor hotel name using a simple string-matching algorithm, and kept only the 1-to-1 matches. In the second phase, we hired U.S.-based M-Turk workers with a HIT approval rate greater than 95% to check whether the linked hotels were indeed correctly matched. Finally, we manually inspected each linked hotel to verify the accuracy of the links obtained. The correct links amount to 2,834 hotels across 1,321 cities in the U.S.

Next, we returned to TripAdvisor to collect the entire review history of the linked hotels. For every review, we obtain its unique identifier, the text content, the date of publication, and the star-rating associated with it. The final ad spending-review dataset contains 1,623,248 reviews about 2,798 hotels with each hotel receiving at least one review in the period 2001 to 2015. Because the advertising data is aggregated at the year-month level, we do the same for

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Table 1: Summary statistics

<table>
<thead>
<tr>
<th></th>
<th>Independent</th>
<th>Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotels</td>
<td>2121</td>
<td>677</td>
</tr>
<tr>
<td>Fraction of months with advertising</td>
<td>0.13</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Advertising expenditures (thousands of $)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newspapers</td>
<td>0.60</td>
<td>0.42</td>
</tr>
<tr>
<td>Magazines</td>
<td>0.58</td>
<td>0.77</td>
</tr>
<tr>
<td>Television</td>
<td>0.14</td>
<td>0.02</td>
</tr>
<tr>
<td>Radio</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Outdoor</td>
<td>0.12</td>
<td>0.04</td>
</tr>
<tr>
<td>Internet</td>
<td>0.11</td>
<td>0.09</td>
</tr>
<tr>
<td>Total</td>
<td>1.59</td>
<td>1.35</td>
</tr>
</tbody>
</table>

**Ratings and reviews**\(^6\)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. hotel rating</td>
<td>4.07</td>
</tr>
<tr>
<td>Reviews per hotel</td>
<td>494.31</td>
</tr>
<tr>
<td></td>
<td>734.47</td>
</tr>
</tbody>
</table>

the TripAdvisor data. This aggregation leave us with a panel of 392,174 hotel-year-month observations.

Finally, we augment the TripAdvisor hotel information with data from STR, a company that tracks the hotel industry. We obtain from STR the list of all the hotel chains in the U.S, including their class (economy, midscale, upper midscale, upscale, upper upscale, luxury), and the number of properties in the chain. We match every hotel in our panel data with the STR information to identify which hotels are part of a chain and which are independent. Summary statistics of our dataset are reported in Table 1.

### 4 Empirical analysis

In this section we describe the empirical strategies that we use to study the relationship between TripAdvisor ratings and hotel advertising spending. The first step is descriptive, to examine the broad patterns in advertising spending over the period 2001-2015 during which

\(^6\)By the end of the observation period of each hotel.
Figure 2: Total Per Firm Ad Spend by Type

Note: This figure plots the total ad spending per hotel for both chains and independents. Both series are normalized to 1 in 2002 to provide a comparison of change over time. In addition, both series presents the six month moving average of the underlying to reduce noise.

online reviews sites experienced their rapid growth.

Figure 2 shows total ad spending by firm type. We see that total ad spending falls for all firm types from 2001 to 2015. The fall is substantially larger for independent hotels than chain hotels, falling roughly 65% from the level in 2001 compared to a 45% fall for chain hotels. We also note that hotels of all types increase their spending on internet sources during the period studied, as one would expect. But the share of spending on outdoor advertising also increases for all chain hotels, but increases by a factor of more than 10 for low quality chain hotels, as shown in Figure 3.

4.1 Advertising spending

We start our analysis by presenting suggestive evidence that hotels do take into account their online perceived quality when deciding their advertising strategies.

We analyze the relationship between advertising spending and TripAdvisor ratings using
Note: This figure plots the share of total ad spending for both chains and independents with ratings above and below 4.1. Each series presents the six month moving average of the underlying to reduce noise.

the following specification:

\[
\log \text{Ad Spending}_{it} = \beta_1 \text{Avg Ratings}_{it} + \beta_2 \text{Avg Ratings}_{it} \times \text{Is Chain}_i + \alpha_i + \tau_t + \epsilon_{it}, \quad (1)
\]

where the dependent variable is the logarithm of advertising spending of hotel \(i\) in the period \([t, t + 6 \text{ months}]\). \(\text{Avg Ratings}_{it}\) is the cumulative average rating of hotel \(i\) at time \(t\), and \(\text{Is Chain}_i\) is a indicator of whether the hotel \(i\) is a chain. \(\alpha_i\) and \(\tau_t\) are hotel and year-month fixed effects, respectively. Hotel fixed effects control for hotels time-invariant characteristics such as location, size, layout and major attributes. In addition, year-month fixed effects controls for shocks to ratings common to all the hotels. Because we include hotel fixed effects, the results are driven by within hotel variation in both ratings and advertising decisions. \(\beta_1\) captures the impact of star ratings on advertising spending for independent hotels, while \(\beta_2\) capture the differential impact (with respect to independent hotels) of star rating on advertising spending for hotel chains.

The results of this specification are reported in column 1 of Table 2. We observe a positive and marginally significant \((p < 0.1)\) relationship between average star ratings and advertisings spending for independents, and a negative and statistically significant \((p < 0.01)\)
Table 2: Within hotel analysis.

<table>
<thead>
<tr>
<th></th>
<th>log Ad Spend.</th>
<th>Is Advertising</th>
<th>Internet Share</th>
<th>Outdoor Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>is chain=0 × Avg. Ratings</td>
<td>0.0257*</td>
<td>0.00535</td>
<td>-0.00771</td>
<td>0.0311***</td>
</tr>
<tr>
<td></td>
<td>(0.0108)</td>
<td>(0.00427)</td>
<td>(0.0159)</td>
<td>(0.00646)</td>
</tr>
<tr>
<td>is chain=1 × Avg. Ratings</td>
<td>-0.125***</td>
<td>-0.0339***</td>
<td>0.0877***</td>
<td>-0.0291**</td>
</tr>
<tr>
<td></td>
<td>(0.0163)</td>
<td>(0.00645)</td>
<td>(0.0257)</td>
<td>(0.00981)</td>
</tr>
<tr>
<td>is chain=0 × high rating=0 × Avg. Ratings</td>
<td>0.0283***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00436)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is chain=0 × high rating=1 × Avg. Ratings</td>
<td>-0.0561***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00482)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is chain=1 × high rating=0 × Avg. Ratings</td>
<td>-0.0234***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00651)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is chain=1 × high rating=1 × Avg. Ratings</td>
<td>-0.102***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00780)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Month FE: Yes
Year FE: Yes
Hotel FE: Yes

N: 244569

Note: This table presents a set of results for 4 different dependent variables. (1) log of total ad spending over the following 6 months, (2)-(3) a dummy equaling 1 if the hotel has positive ad spending over the following 6 months, (4) the share of ad spending done on internet display and (5) the share of ad spending done on outdoors. In each case hotel fixed effects are used and the sample is limited to hotels with 10 or more reviews. The dummy “is chain” indicates if the hotel is in a chain and “high rating” indicates if the average star rating at the end of the sample is above 4.1 (the overall average hotel star rating in our sample).

Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

relationship for chains. These results suggest that hotel chains are more strategic in their decision to advertise than independent hotels: high hotel ratings reduce the amount of advertising spending for chains, which suggest that chains pay attention to their online ratings, and use them as substitute for advertising when the perceived online quality is good.

4.2 Hotels’ decision to advertise

Next, we turn to analyze the hotels’ decision to advertise. We do so by creating the dummy variable Is Advertising, an indicator of whether the hotel i has a positive advertising spending in the period [t, t+6 months]. We estimate Equation 1, using such variable as the dependent variable. We report these results in column 2 of Table 2. We observe a non significant relationship between the decision to advertise and average ratings for independent hotels. However, we observe a strong and negative relationship for chains. Once again, these results
confirm that chains tend to advertise when their ratings are low, but that they stop when their perceived online quality is high.

In column three we further explore the relationship between the decision of advertising and TripAdvisor ratings. Besides classifying hotels based on their mode of operation, we classify hotels as high-quality, those with an average rating above or equal to the overall hotel average by the end of our observation period, and low-quality, those with an average rating below the overall hotel average by the end of our observation period. We measure quality at the end of the sample period such that this variable is time-invariant. Then, we estimate the following specification:

\[
\text{Is Advertising}_{it} = \beta_1 \text{High Ratings}_i \times \text{Avg Ratings}_{it} + \beta_2 \text{High Ratings}_i \times \text{Avg Ratings}_{it} \times \text{Is Chain}_i + \alpha_i + \tau_t + \epsilon_{it},
\]

where the dependent variable is an indicator of whether the hotel \(i\) has a positive advertising spending in the period \([t, t+6 \text{ months}]\). High Ratings\(_i\) is an indicator of whether hotel \(i\) has an average rating above the overall hotel average, and Avg Ratings\(_{it}\) is the cumulative average rating of hotel \(i\) at time \(t\). The coefficients of interest, \(\beta_1\) and \(\beta_2\), measure the effect of ratings on the decision to advertise for high-ratings independent hotels and chains, respectively. We report these results in column 3 of Table 2. When looking separately at high quality and low quality hotels, we find that for independents low quality hotels have a positive relationship between ads and rating and high quality hotels have a negative relationship. For chains, the relationship is negative for both types but much more negative for high quality chains.

4.2.1 Internet display and outdoor

Finally, we analyze the relationship between average ratings and the share of advertising spending for Internet display and outdoor. To do so, we create two dependent variables,
Internet Share$_{it}$ and Outdoor Share$_{it}$, the share of advertising spending for Internet display and Outdoor for hotel $i$ for the period $[t, t + 6 \text{ months}]$. Then, we estimate Equation 1 using these new variables as dependent variables.

We report the results for the share of Internet display in column 4 of Table 2. The relationship between average ratings and independent hotels is non significant, while it is positive and significant for chains. These suggests, that while chains spend less on advertising when their ratings are good, the spending is strategically focused on Internet display, perhaps promoting their good ratings to the same users that are more likely to use online platforms for their bookings.$^7$

We report the estimates for the share of outdoor advertising in column 5 of Table 2. We observe a strong and positive relationship between hotel ratings and share of outdoor advertising for independent, and a negative and statically significant relationship for chains. While the fact that the share of outdoor advertising spending increase for independents is a little puzzling for us, the fact that chains reduces the share of outdoor advertising seems consistent with the story that, because only perceived quality is good, chains prefer to target those consumers that will likely observe their online ratings, rather than targeting consumers that rely more on offline advertising, and thus they are less likely to book their hotels through online platforms.

4.3 Regression discontinuity analysis

4.3.1 Total advertising spending

In this section we exploit a characteristics of the TripAdvisor platform to estimate the casual impact of star-rating on advertising spending. TripAdvisor, as many other online review platforms, displays the average rating for each hotels, and these average ratings are rounded to the nearest half-star. This means, for example, that a hotels with a $real$ average

$^7$At this point this is just an hypothesis. We are currently analyzing advertising content to test our conjecture.
rating of 3.74 will be rounded to 3.5 stars, while a hotel with an average rating of 3.76 stars will be rounded to 4 stars. This rounding mechanisms provides us with variation in hotel ratings displayed to consumers that is effectively exogenous to the hotel quality. We focus on hotels that are within 0.1 stars above or below the 4.25-stars discontinuity, and estimate the following specification:

$$\log \text{Ad Spending}_{it} = \beta_1 T_{it} + \beta_2 \text{Avg Ratings}_{it} + \beta_3 T_{it} \times \text{Avg Ratings}_{it} + \epsilon_{it},$$  \hspace{1cm} (3)$$

where the dependent variable is the logarithm of advertising spending of hotel $i$ at year-month $t$. $T_{it}$, whose coefficient is of interest, is an indicator of whether the average rating of hotel $i$ at time $t$ falls above the rounding threshold, so that it is rounded to the next half-star, and $\text{Avg Ratings}_{i,t}$ is the average rating of hotel $i$ at time $t$. $\beta_1$ measure the difference in advertising spending for hotels that differ in their displayed star rating by exactly half-star.

We estimate Equation 3 separately for all the hotels in our sample, for only chains, and for only independent hotels. These results are reported in Table 3. In column 1 we report the estimates for all hotels, in column 2 for chains, and in column 3 for independents. The coefficient of interest is negative, but only marginally significant ($p < 0.1$) for all the hotels. However, it is statistically significant when we look at only chains. Finally, the estimate is not significant for independent hotels. These results confirm our previous findings that chains are more strategic in their advertising spending that independent hotels.

4.3.2 Internet display and outdoor

Next, we look at the share of advertising spending for Internet display advertising and outdoor. To do so we use Equation 3, but replace the dependent variable with either the share of Internet display of outdoor spending. As before we estimate the specification separately for all hotels, chains, and independents.

We report the results for the share of Internet advertising in Table 4. The coefficient of interest is not statistically significant for all hotels. However, it is positive and significant
(p < 0.05) for chains, and negative and significant (p < 0.05) for independent hotels. These results are in line with those discussed in Section 4.2.1, and support our hypothesis that chain hotels tend to use more Internet display advertising when their online ratings are good.

We report the results for the share of Internet advertising in Table 5. In this case, the coefficient of interest is positive and significant (p < 0.05) for both all hotels and chains, but not for independent. These results partially confirm those discussed in Section 4.2.1, i.e., chain hotels tend to spend less on outdoor advertising when their ratings are good, but we do not find any relationship for independent hotels.
Table 5: Regression discontinuity: outdoor share of advertising spending

<table>
<thead>
<tr>
<th></th>
<th>All Hotels</th>
<th>Chains</th>
<th>Independents</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>-0.099***</td>
<td>-0.183***</td>
<td>-0.050</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
<td>(0.046)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>Avg. Ratings</td>
<td>1.493***</td>
<td>2.753***</td>
<td>0.796**</td>
</tr>
<tr>
<td></td>
<td>(0.326)</td>
<td>(0.538)</td>
<td>(0.405)</td>
</tr>
<tr>
<td>T × Avg. Ratings</td>
<td>-1.685***</td>
<td>-4.411***</td>
<td>-0.629</td>
</tr>
<tr>
<td></td>
<td>(0.441)</td>
<td>(0.749)</td>
<td>(0.536)</td>
</tr>
<tr>
<td>N</td>
<td>4881</td>
<td>1441</td>
<td>3440</td>
</tr>
</tbody>
</table>

*Note:* The dependent variable is the share of outdoor advertising spending for hotel $i$ in year-month $t$. Robust standard errors in parenthesis. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

5 Conclusions

This paper investigates the relationship between online reviews and advertising spending in the hotel industry, using a 15-year panel of TripAdvisor hotel reviews matched to advertising data from Kantar Media.

Our results suggest that hotels are treating advertising as a substitute for TripAdvisor review ratings, i.e., advertising goes up when reviews are less positive. Beneath this broad relationship, however, there are several interesting nuances. When reviews are good, hotels tend to allocate a greater share of their advertising spending to the Internet, but when reviews are bad, they tend to allocate a larger share of their spending to outdoor advertising. The latter finding suggests that poorly-reviewed hotels might be targeting poorly-informed consumers through their advertising, while well-reviewed hotels are using online advertising to encourage searches on TripAdvisor. In general, hotel chains seem to be more strategic in these decisions than independent hotels.

We are currently exploring the content of hotel advertising across different channels to better understand how TripAdvisor ratings affect advertising decisions. We hope to report results on this at the conference.
References


