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The Role of Cybermediaries
In the Hotel Market

by

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Abstract

The advent of the Internet changed the way buyers and sellers interact. Although access to information seems unlimited, non-expert agents find it difficult to identify the information they can confidently use. A third-party expert or a cybermediary (an intermediary in the cyberspace) can help sort out the information for the contracting partners. In this paper, we study the case of the online hotel market and the role of the cyber travel agent (CTA). We claim that CTAs encourage hoteliers to exert effort in service quality and provide empirical evidence that these hotels are compensated with a price premium.

INTRODUCTION

Adverse selection and its inevitable market inefficiency is more common in geographically extended markets, such as hotel markets, where information is not immediately available. A firm's reputation for quality can compensate for this inefficiency and contribute to the firm's profitability and success (Klein and Leffler, 1981; Shapiro, 1982 ; Kreps, 1990; Fishman and Rob, 2003; and Guttman and Yacouel, 2006). Another option for mitigating the adverse selection problem is to sell goods through intermediaries such as dealers (travel agents) or professional certifiers (star ranking systems). In addition to their assistance in the search and matching process, intermediaries also provide information regarding firm quality. Diamond (1984) was the first to suggest reputation as a coherent explanation for the existence of financial intermediaries. Biglaiser (1993) shows how an expert middleman can improve product quality and total welfare, when adverse selection is present.

The advent of the Internet has improved access of buyers to information but they still have a difficult time sorting out the reliable data. Internet sites such as eBay where people share their satisfaction from the transaction conducted through the site may serve as a reputation system for both buyers and sellers. Resnik et al. (2006) in their review of 15 papers studying the effect of eBay's reputation system on transactions' outcome found out that buyers pay more to sellers with a better reputation. For example, Melnik and Alm (2002) report that the difference between 452 and one positive comments yields a price premium of 5%. The Internet does not necessarily add more information in all the markets. Jin and Kato (2006, 2007) claim that in the sports card market, there is a clear trade-off between search cost savings and information when comparing offline and online trading. The online buyers can

search easily for cards but cannot observe the cards quality like offline buyers can. We contend that in some cases, for example, the online hotel market, there is no trade-off between saving on search costs and obtaining information. On the contrary, the Internet increases the level of information customers receive on the hotel's level of service quality from reviews of past guests. The problem is the reliability of the data.

Internet site such as Tripadviser claims that it attracts over 32 million people a month who can view over 20 million travel reviews. Tourists publish information in Tripadviser on their past experience on a voluntary basis and thus it is not always reliable since anyone can write a review. The large number of reviews, however, signals that tourists do tend to share their experience with others. This may be as a reciprocity measure to other tourists that wrote there or maybe tourists elicit utility by writing about their travel experience in a public space such as travel books, visitor books and blogs. Another source for reviews of hotels past performance is the online travel agencies (cybermediaries). This is a more reliable source of information since, as we show later, these online agencies have an incentive to supply reliable data. Vermeulen and Seegers (2009) in their study of the role of online hotel reviews on consumer's choice find that online hotel reviews improve the chance of a hotel to be chosen. Their main focus is on consumers and their reaction when exposed to hotel reviews.

In this study we develop a theoretical model which takes into consideration the whole hotel market, guests and hotels. We show that cyber travel agents (CTAs) revealing the hotel's level of service quality to future customers by publishing review scores from past guests can affect the market price. We prove that high review scores enable hotel managers to charge higher prices than their counterparts with low review scores. By collecting data from CTA Booking.com we show empirical evidence for

the positive relationship between review scores, i.e., reputation, and price, holding everything else constant.

OVERVIEW OF THE HOTEL MARKET

The hotel market is a worldwide geographically and culturally extended market, with transactions taking place at different times and locations than consumption. The information is asymmetric and in many cases, transactions do not repeat themselves. Thus, prospective tourists have very little information on the hotel's quality (there are cases of repeated visits, e.g., business tourists, where the information is available but we deal here with cases where the level of service quality of the hotel is unknown to the customer). Thus hotels with high quality service could not charge higher prices. To avoid the "lemon" problem (Akerlof, 1970), national five-star rating systems were developed. However, this rating system reflects mainly physical attributes, it is not always reliable and each country can choose different standards for the rating. Before the advent of the Internet, the traditional travel agent and tour operators served as intermediaries between hoteliers and prospective guests, helping with the searching and matching process, and thus mitigating the information problem. Clerides, Nearchou and Pashardes (2008) examined the role of tour operators as quality assessors in the offline hotel market. They found that the tour operators' rating of hotels is matched better with prices than the national five-star system.

The communication and Internet technology (CIT) has provided the players with a lower cost, more effective way of gathering information. Today, transactions in this market are conducted both online and offline. However, online trading is rapidly gaining importance, with cyber travel agents (CTAs) replacing the traditional travel agents (Kuom and Oertel, 1999). Today's consumers can easily, and at almost no cost,

observe hotels' attributes online, lowering the costs of searching and matching. The CIT enables consumers to book a hotel room directly through the hotel's web page or via a CTA such as Expedia.com, Travelocity.com or Booking.com. Consumers can easily find most of the information they need online to compare hotel attributes and choose the most suitable one for them (information such as prices, star rating, location, facilities and so on). However, consumers still find it hard to trust information appearing on the hotels' or tourists' sites, especially information regarding hotels' past performance (e.g. hotels' reputation for service quality), since anyone can write a review on these sites, including the hoteliers themselves.

We claim that CTAs provide the prospective guests with a reliable channel through which to track hoteliers' past service quality. This enhances the hotelier's incentive to exert effort in service quality and consequently, increases the profitability of both hotels and CTAs. In general, our hypothesis is that one main role of cybermediaries (other roles may be to provide packages of complementary products, mitigate sellers' risk, and help in the searching and matching process) is to provide buyers of experienced goods with reliable information regarding sellers' past performance. This enhances the sellers' incentive to exert effort and improve the good's quality and thus the level of welfare.

How does this process work? The CTAs publish reviews of past guests that booked a hotel room through them. The CTAs allow only guests that actually stayed at the hotel to write reviews. Thus, unreliable reviews only rarely penetrate the CTAs' web sites. The CTAs also monitor the hotel descriptions which are published on their websites, ensuring that the hotels' actual informative data matches that which is published. Why do the CTAs make this effort to monitor the data? Or in other words, who monitors the monitor? A CTA conducts transactions with a large number of

tourists and hoteliers; its relationship with both groups of players repeats itself. If a CTA does not deliver reliable information, it will lose future customers. Thus, the mechanism which guarantees the CTA's credibility is the CTA's own reputation. Since the hoteliers' behavior is immediately observed by the hotel guests, the hoteliers now have an incentive to expend extra effort in serving them. As a result, the CTAs enhance the service quality in the hotel market, and the hoteliers are compensated by being able to charge higher prices.

Similar to eBay, even though the incentive to free-ride is clear, guests still provide feedback. However, in the case of eBay it was found that there is tendency to write positive feedback; only 2% of the feedbacks were negative. Bajari and Hortaçsu (2004) explain it by fear of retaliation from the sellers since sellers can write feedback on buyers as well. This is not the case in the hotel market. Hotels do not write feedbacks thus there is no reason not to write a negative review. Moreover, in many cases it is a one time transaction thus guests are not engaged in a strategic game. Based on these observations and the fact that millions of travels write reviews and advices on a voluntary basis in other sites we claim that guests like to share their experience with others and they reciprocate the information they received. There is no incentive to publish only positive or non-reliable feedback. This phenomenon of writing feedback with no apparent reward is explained by Resnik and Zeckhauser (2002) as a form of courtesy just the way people provide a thank you in every day discourse.

The Model

We model the online market for hotels rooms in order to show that the CTAs produce a price premium for high-quality service, compared to the standard TAs (travel agent).

It should be noted that in order to avoid a complicated mathematical model we made some simplifying assumptions. These assumptions enable us to develop a parsimonious model that focuses on hotels' reputation. This parsimony comes at some cost, as the model does not take into consideration horizontal differentiations. However, a more complex model with different type of guests will not yield qualitatively better results.

When a guest books a hotel through a TA, he offers her a hotel which may suit her requirements. Since the TA is local and relatively small, the guest needs to rely on the agent's past experience or her friends' past experience with that hotel which is in many cases not very extensive. Since the guest does not have a reliable channel she can count on, she can only expect a standard hotel and that's what she is willing to pay for (Akerlof, 1970). However, if she is booking a hotel online through a CTA, the guest herself chooses a hotel from a large list. She can observe all the data which the hotels are publishing on that site, and most importantly she can observe all the reviews of past guests. When she observes a sufficient number of good reviews for the same hotel she may believe that the hotel is truly offering a high quality service, and hence she is willing to pay a higher price for such hotel.

To make it simple, we compare between two cases. In the first case, all guests book through local TAs, and in the second all guests book through one CTA. We assume two possible quality levels of hotel service, a *standard* service and an *extra* service (i.e. low-quality service and high-quality service), and we define two groups of players, hoteliers (the sellers), and guests (the customers). All guests in the model are identical with all preferring extra service over standard service. A guest's utility from standard service is *s* and her utility from extra service is *s+e*. All hoteliers in the model are identical (except for their type, as will be discussed further on) hence we

assume no horizontal or vertical differentiation. Each hotel sells at most one room in each time period to one guest, and a guest demands at most one room in each time period.

There are two hotel types. An Extra type with proportion $\alpha \in (0,1)$ and a Standard type with proportion $1-\alpha$. We denote the Extra Hotelier with EH and the Standard Hotelier with SH. Using types is essential for obtaining high-quality equilibrium (see , Kreps et al., 1982; Kreps, 1990; Tirole, 1996). Guttman (2000) shows how an honest (or good) type will survive in an evolutionary game. Since this model studies only the high-quality equilibrium, we use only two types in the model. Studying the low-quality equilibrium requires a third type of agent, the one that provides high quality with probability one.

SH can provide only the standard service. EH provides the standard service if he does not invest in service quality, but if he invests a periodic cost c_H per room (by choosing and training the staff, and by monitoring service quality standards), he provides the extra service with probability $\theta \in (0,1)$. An agent's own type is his own private knowledge, but the proportion of extra type α, and the probability of providing extra service, θ, are public knowledge. Neither the guests nor the CTA observe hoteliers' investment behavior.

At each time period, we assume that guests do not book rooms all at the same time, but one at a time. When a guest books a room via a CTA she chooses an available hotel with the best record on the CTA's web site. The first one to buy obtains the best hotel (a good-record hotel with the lowest price), while the last obtains only a hotel with a bad record. The hoteliers, however, quote prices at the same time (similarly, we can say that when an hotelier quotes a price she does not know other hotels' chosen prices). Hence, as long as a hotelier quotes a price that is

lower (or at least no higher) than the guest's expected utility from the room (taking into account the hotel's past record), he will eventually sell the room. Hence, the best strategy for hoteliers is to quote the maximum price a guest may pay, or the price for which the guest is indifferent between buying and not buying. Hence, in the following model

Room price = Guest expected utility   (1)

In each transaction between a hotelier and a guest, the hotelier pays a fee, *f*, to the CTA which is a proportion of the room price. We apply this fee scheme, following the Booking.com commission scheme. Their commission is based on a percentage of sales and other components, calculated on the rates published on the website. Using a different fee scheme could change players' incentives. Another complementary pricing scheme could be to allow hoteliers to bribe directly the CTA for allowing them to post favorable fake reviews. That off course would tarnish the CTA's own reputation. In our model we do allow the CTA to post fake reviews, not by bribing, but by not exerting any effort at all. Since we model a two-period game, the hotelier's expected payoff depends on his investment today plus the expected revenues of tomorrow. For convenience of notation we set the discount factor to 1. Then

Hotelier's expected payoff = (1-f)(Room price) – Investment cost   (2)

We study a pure Perfect Bayesian Equilibrium for this game which specifies when extra hotels invest in service quality, and the prices each type obtains as a function of previous quality realizations. We call this EE, that is, the Extra-quality Equilibrium. Trivially, there always exists the pure equilibrium where the guests believe that no hotelier invests, which makes it optimal for hoteliers not to invest. We start with the first case, booking through local TAs. To make it simple we assume that

a guest has no information about the past record of the hotel recommended, and also has hardly any experience with the TA (any successes or failures in the past are too scarce as to rely on them). Hence, each guest is playing a one-shot game, and the only outcome is 'lemon' as in Akerlof (1970), that is only a standard service. In the second case, when booking through the CTA, the existence of the CTA allows a repeated game where each guest is using the experience revealed by past guests. We employ a two-period model whereas its qualitative properties extend in a straightforward manner to any length of horizon.

Booking through TA and CTA

Before the advent of the Internet, the guests had no reliable channel through which they can observe hoteliers' past service quality. Hence, the EH had no incentive to invest, and a guest's expected utility is *s* (the utility from standard service). In turn, the room price (the maximal price a guest is willing to pay or the maximal price a hotelier may quote) is also *s*. Thus, the Extra Equilibrium (EE) does not exist and we obtain a market with low qualities and low prices. We now introduce the CTA, whose role is to gather the information of hoteliers' past service quality and reveal it to future guests. We assume that the CTA provides a reliable channel of information to the guests (allowing only guests who actually booked a room from a hotel to write a review, eliminating unreliable effects on the presented data).

Hence, if an hotelier does not invest, the guest observes a rating of '0', whereas if the hotelier invests, the guest observes a rating of '1' with probability θ, and '0' with probability *1-θ*. Recall that θ is a random probability of EH providing the extra service. Under perfect monitoring, in EE, if a guest observes a rating of '1', the hotel invests for certain, but if she observes a rating of '0', the hotel invests only with

$$\sigma = \Pr(I \mid '0') = \frac{\Pr('0' \mid I) \cdot \Pr(I)}{\Pr('0' \mid I) \cdot \Pr(I) + \Pr('0' \mid N) \cdot \Pr(N)}$$
$$= \frac{(1-\theta)\alpha}{(1-\theta)\alpha + (1-\alpha)} \tag{3}$$

Using the Equation 1 we obtain the room price, denoted $p_{'0'}$ or $p_{'1'}$ (it depends on the hotelier record - a bad record hotelier gains $p_{'0'}$ while a good record hotelier gains $p_{'1'}$). Hence

$$p_{'0'} = s + e\sigma\theta$$
$$p_{'1'} = s + e\theta \tag{4}$$

Notice that an hotelier with a good record charges a higher price than a hotelier with a bad record. Notice also that both prices are higher than s, the price hoteliers receive when selling directly to the guests.

If a hotelier invests today, his record tomorrow will be '1' with a probability θ, and '0' with probability $1-\theta$. Hence, his expected room price for tomorrow is: $p_{'1'}\theta + p_{'0'}(1-\theta)$. Hence, an EH's expected payoff per guest (Equation 2) in EE (when he invests, and all other EHs invest as well), denoted Π, is

$$\Pi = (1-f)[p_{'1'}\theta + p_{'0'}(1-\theta)] - c_H \tag{5}$$

If an EH does not invest today (deviates from EE), his record tomorrow will be '0' and his expected room price will be $p_{'0'}$. Hence, an EH's expected payoff per guest when deviating from EE (when he does not invest, but all other EHs invest), denoted Π^d, is

$$\Pi^d = (1-f)p_{'0'} \tag{6}$$

Substituting the prices $p_{'1'}$ and $p_{'0'}$ (Equation 4), the gain from investment, $\Pi - \Pi^d$, is

$$\Pi - \Pi^d = (1-f)e\theta^2(1-\sigma) - c_H \qquad (7)$$

Proposition 1 *There exists $c_H{}^*$, such that EE exists iff $c_H \leq c_H{}^*$.*

Proof *An EH will not deviate from EE, if and only if the gain from investment*

$\Pi - \Pi^d$ *(Equation 7) is non-negative, which requires $(1-f)e\theta^2(1-\sigma) - c_H \geq 0$. Let*

us set

$$c_H{}^* = (1-f)e\theta^2(1-\sigma) \qquad (8)$$

It follows that EHs do not deviate from EE, iff $c_H \leq c_H{}^*$..

We obtain that the existence of a CTA, that carries the information of the hoteliers' past performance, produces higher service quality in the market. Under EE, the difference between $p_{'1'}$ *and* $p_{'0'}$ is the price premium charged by a hotelier with a good record, comparing to a hotelier with a bad record. That is:

$$Price\ Premium = p_{'1'} - p_{'0'} = (1-\sigma)e\theta > 0 \qquad (9)$$

Comparative Statics

We may expect that a higher rate of honesty in the population and a higher probability of success, these are *denoted by θ and α* respectively, will provide a wider range for EE.

Proposition 2 *α is negatively correlated with c_H*.*

Proof

The derivation of σ (Equation 3) with respect to α is

$$\frac{\partial \sigma}{\partial \alpha} = \frac{(1-\theta)}{(1-\theta\alpha)^2} > 0 \qquad (10)$$

and hence the derivation of c_H (Equation 8) with respect to α is*

$$\frac{\partial c_H *}{\partial \alpha} = (1-f)e\theta^2(1-\frac{\partial \sigma}{\partial \alpha}) < 0 \qquad (11)$$

Unlike our expectations, we obtain that c_H* decreases with α. Notice that a smaller

c_H*, means a narrower range of EE. The intuition behind this result is that when α

increases the guests expect higher revenues from a bad record hotelier, but their

expected revenues from a good record hotelier does not change. That lowers the price

premium they are willing to pay for the good record hotelier.

Proposition 3 *Under perfect monitoring, θ is positively correlated with c_H*.*

Proof

Derivation of σ (Equation 3) with respect to θ is

$$\frac{\partial \sigma}{\partial \theta} = \frac{-\alpha(1-\alpha)}{[(1-\theta)\alpha + (1-\alpha)]^2} < 0 \qquad (12)$$

and hence, the derivation of c_H* (Equation 8) with respect to θ is

$$\frac{\partial c_H *}{\partial \alpha} = 2(1-f)e\theta(1-\sigma) - (1-f)e\theta^2(1-\frac{\partial \sigma}{\partial \theta}) > 0 \qquad (13)$$

As we expected, the gain from investment increases with the probability of success,

that is $c_H *$ increases with θ.

EVIDENCE FOR THE RELATIONSHIP BETWEEN PRICE AND REPUTATION

In the theoretical model we show that when the CTA reveals the level of

service quality the hotelier can charge a price accordingly. We thus, similar to Melnik

and Alm (2002), expect to see a price premium for a good review. This means that

high review scores are expected to be positively associated with high prices, holding

everything else constant.

To collect the data, we chose the site of the CTA Booking.com and the cities Paris, London and Barcelona. Booking.com was chosen due to the fact that relative to other large CTAs, it has a large number of hotels receiving reviews and a large number of reviews per hotel. Booking.com specializes in online hotel reservations and thus it is in its best interest to provide reliable data on the hotels listed on its site.

Paris and London were chosen because they had the largest number of hotels, about 800 and 700, respectively, appearing on Booking.com. Barcelona was chosen randomly from medium-size European tourism cities. A special program was written facilitating data collection from each site in less than an hour. The short time span of data collection from the three cities minimized the problem of price changes while the data were being collected. We collected data from a few future dates, chosen at random, to up to half a year from the time of data collection. We show the results of the analysis based on data collected on July 23rd, 2008 for the night of September 16th 2008 for two persons. We chose this two month period between booking and staying at the hotel and the low season date in September in order to have as many hotels as possible in our data collection. Since only available hotels appear on the site, a shorter period of time would not show the very popular hotels that are completely booked. It should be noted that there were no significant differences in the analysis results when it was conducted based on data collected on different days for different future dates. The results reported in this paper are very robust and do not depend on the timing and dates of data collection.

The number of hotels in Paris, London and Barcelona for this date was 758, 610 and 316, respectively, out of which 687, 501 and 275, respectively, were used for the analysis. Hotels that did not have star ranking or review scores were eliminated. Many of the hotels that did not have reviews were new on the site (a label 'new'

appears near the hotel listing) and we therefore saw no reason for sample-selection bias. The data collected from the site included: the lowest price in Euros for available double room, number of stars (the number of stars is provided by the hotel and is set according to a national standards system) and the score for: staff performance, services provided at the hotel, cleanliness, comfort, value for money and average total score. In their reviews, the lowest grade a guest can give is one and the highest is 10. We chose to use only the staff performance score ('score_staff') in the analysis to reflect service quality. Cleanliness, services and comfort are not known to the guest at the time of booking a room but we found them to be highly correlated with 'score_staff' thus they were excluded from the regressions analysis in order to prevent multicolinearity. Value for money depends on the price at the time of the stay and thus we decided not to use it.

Additional information collected included number of rooms, inclusion of breakfast in the price and affiliation with a hotel chain. Another explanatory variable was 'popularity', which represents the location of the hotels on Booking.con site. The first hotel on the list receives the value one the second one, two, and so forth. However, there is no explanation as to what 'popularity' is based on and we believe it might reflect promotional efforts of Booking.com. Descriptive statistics of these variables appear in Table 1.

--- please insert Table 1 about here ---

Results

The theoretical model implies that a price premium exists for extra-quality hotels in the online hotel market. To detect the existence of this price premium, we estimated a

reduced-form hedonic Equation with the future price as a dependent variable. The 'score_staff' and the rest of the variables are the explanatory variables for each city. A positive coefficient of 'score_staff' can be interpreted as the effect of the quality of the hotel on the price charged.

--- please insert Table 2 about here ---

The results in Table 2 suggest that 'stars' and 'score_staff' are positively and significantly associated with price level in all three cities, as expected. The number of stars conveys information on the physical attributes of the hotel according to set of standards. This information is revealed to the guest at the time of booking a room. With an increase in the number of stars, the price charged is higher due to the higher standards. The level of 'score_staff describes the information on the quality of the service provided by the hotel, and is revealed by past guest reviews according to Booking.com's grading system. As expected, with an increase in the 'score_staff' level, the price charged is higher due to higher reputation. Notice that 'score_staff' does not measure present service quality but rather past quality reported by other customers, e.g., it reflects the reputation for high quality. The present customer uses this information for her expectations for present quality and therefore is willing to pay a higher price for higher reputation.

        To compare the impact of changes in 'stars' and 'score_staff' on the price, the ratio between the coefficients and the average price and elasticities were calculated for both variables. It appears that the ratio and elasticities of 'score_staff', in all three cities, are more similar to each other than those of 'stars'. One possible explanation is that the number of stars is usually set by national standards and thus may reflect

different parameters in each city. The score, however, is the same for all the hotels on the Booking.com site. This shows that the price premium for reputation is similar in all studied cities. Moreover, a hotel with x number of stars and a score higher than four in Paris (and around three in London and Barcelona) and another hotel with $x + 1$ number of stars charge the same price. This means that one point in the review score in Paris is worth 0.25 stars and 0.3 and 0.37 stars in London and Barcelona, respectively.

The number of rooms was positive in all three models but only significant in London. Following Guttman and Yacouel (2006), we can interpret this coefficient as a signal for reputation. The larger the size of the firm, the better its reputation and accordingly, the price it charges. The rest of the variables, 'breakfast' and 'chain', and 'popularity' vary in their impact on hotel prices and their level of significance. Two other possible variables that might affect hotel room prices are the location of the hotel and the type of room. Although it might be possible to collect information on the hotel's location, we were not able to determine which locations are better than others since there is horizontal differentiation in location preferences. The rooms for which we collected data are considered double rooms but some can be defined as standard double rooms and some as luxury double rooms. It was impossible to form a variable describing the type of room due to the different definitions hotels use to describe the rooms they offer. However, we do not see any reason for a correlation between these omitted variables and the variables used in the regression and thus we do not expect a bias in the estimated coefficients.

CONCLUSION

This paper presents a case study in which the Internet plays an important role in improving efficiency in the hotel market. The CTAs provide reliable information regarding hotels past service quality, by allowing only guests that actually stay at a hotel to write a review at their sites. Since the information of hotels past quality is revealed to the guests, the guests are willing to pay higher prices to hotels with a good record (hotels which they expect to keep on providing a high service quality). This price premium for a good reputation motivates the hoteliers to actually invest in providing the high standards of service quality. Surely hotels offering high quality service charged higher prices even before the emergence of CTAs. However, CTAs have improved information transmission to allow for an even better matching of price with quality. It follows that CTAs contribute to the improvement of service quality in the hotel market. All of the guests that stay in the hotels, i.e., those that booked a room via the CTA and those that did not, enjoy the improved level of service since the staff cannot distinguish between the two groups. Thus, although the CTAs are intermediaries in the online market, they impact both the online and offline hotel markets.

In the theoretical model, we proved that the existence of extra-quality equilibrium is possible if the investment costs of the hotelier are not too high. In such case we prove that there is a price premium for high record hotels. Evidence for this was found in the analysis of online hotel prices as a function of their attributes and review scores. Hotel rooms in Paris, London and Barcelona that are traded on Boooking.com and have received high review scores charged higher prices, holding everything else constant. We found that each point in the score review is worth between 0.25 and 0.37 stars. The implication of this finding is that the standardized star system, which requires governmental funding, may become obsolete as

transactions in the online market start to dominate the hotel market as a whole. Because the star system is based on physical attributes of the hotel that can be published in detail on the site, there is no need to rank them. Each prospective guest can decide which of the hotel's physical attributes fits her needs. Moreover, information about the quality of the service in the hotel is revealed in the reviews published on the CTA sites. This means that the CTAs not only improve market efficiency, but can also save on the public resources currently allocated to the standardized star system.

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