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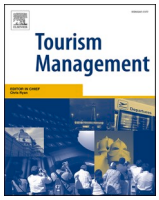

Zero price effect on hotel demand: Evidence from a discrete choice experiment

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ABSTRACT

A Choice Experiment is employed to analyze the effect of a free night promotion on hotel demand in the setting of a relatively underdeveloped area in China. Results from Error Components models show evidence in favor of a non-rational "zero price effect" (ZPE): with total price and all other aspects equal, people tend to choose the hotel which offers one free night. In addition, free pricing is shown to have stronger effects in diverting preferences than a trivial price (1 RMB). However, it is not the only successful psychological pricing strategy; its effects do not significantly differ from those of a materially equivalent discount. Building upon recent methodological innovations using Choice Experiments to study pricing strategy, this paper is the first to extend the technique to study the *ceteris paribus* ZPE. Our findings can help hotels make use of the ZPE to attract consumers.

1. Introduction

Neoclassical economics holds the view that rational agents maximize utility (Simon, 2001). When making a consumption decision, such agents would weigh up the costs and benefits associated with a product to determine whether utility would or would not be maximized by purchasing it. However, Shampanier et al. (2007) observed a non-rational phenomenon, the "zero price effect" (ZPE), wherein a trivial change in a product's cost induced by reducing the price from 1 cent to zero has a substantial positive impact on its demand, as if the price of zero increases the value of the product. Mathematically, quantity demanded at zero price is higher than the limit of quantity demanded as price becomes arbitrarily close to zero.

Promotion strategies involving free pricing have been introduced to many sectors such as the hotel industry as attempts to win over bigger market shares (Jang & Moutinho, 2019; Nair, 2019; Yang et al., 2016). In light of the popular use of such strategies and the potential identified by the path-breaking research of Shampanier et al. (2007) for them to increase sellers' profits, the impact of this type of promotion on consumer behavior has received growing academic attention, but much remains unknown (Ahmetoglu et al., 2014). Studies have demonstrated positive effects of free promotions on perceived value and purchase intention for groceries (Palmeira & Srivastava, 2013), cakes and candies (Hossain & Saini, 2015; Mazar et al., 2017) and telecommunication services (Driouchi et al., 2011). Inconsistently, some studies report null or even negative effects of free promotions in contexts such as healthcare (Cai et al., 2018; Ching et al., 2022) and computer gaming (Rietveld, 2018). In addition, within the literature, much of the available research has focused on testing the effect of adding a free extra product to a bundle, and is therefore conceptually different from the *ceteris paribus* ZPE as defined by Shampanier et al. (2007), which refers only to the effect of zero pricing while the genuine value of the item(s) sold is held constant. Understanding of the mechanisms underlying the ZPE also remains underdeveloped (Niemand et al., 2019).

The ZPE (as defined by Shampanier et al.) has never been tested for any kind of tourism product, including hotels. If verified, its existence would offer powerful opportunities for hotel managers to increase profits. For instance, by restructuring the price on each of the nights in a multi-night package, such that the total price remained unchanged but one of the nights was free, a hotel could – if the ZPE exists – increase sales of the package without making any material changes to it. In other words, a hotel could via a mere presentational alteration increase its revenue without incurring any costs, something traditionally regarded as impossible by economic theory.

The current paper reports a case study, testing for the existence of the ZPE on demand for hotels in Kuqa, a city located in Xinjiang Uygur

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Autonomous Region of western China. Kuqa is a relatively established tourism destination but has a low level of economic development in general. The primary objective of our study is to yield insight on whether free pricing represents a profit-enhancing strategy for hotels operating in areas with such characteristics. However, we go further than this and a secondary objective entails examining the ZPE in comparison to other promotional strategies, in order to investigate whether free pricing is such an effective strategy that its special consequences cannot be replicated by other approaches. To explore these questions, this research employs a Discrete Choice Experiment (DCE), which – as explained in Section 2 – differs from previous empirical attempts to study the ZPE. The comparison of free pricing against other strategies is explored through treatment variation in the description of price promotions in the experiment.

The remainder of the paper is arranged as follows. The next section forms the conceptual framework and discusses related literature. Section 3 introduces the methodological approach, the choice experimental design, the questionnaire, and the dataset. Estimation results are reported in Section 4, and Section 5 summarizes the conclusions.

2. Literature review

2.1. The "zero price effect" (ZPE)

The ZPE was first defined by Shampanier et al. (2007), as a phenomenon in which people overreact to zero price, as if the value of the product increases at this price. This represents a discontinuity in demand at the price of zero, contrary to the standard demand theory, which states demand is a continuous function of price; under the ZPE, demand is higher at zero price than it is at an infinitesimally positive price above zero. Descendent studies observe that the ZPE holds true in the contexts of food (Hossain & Saini, 2015; Saraiva, 2011), cosmetics (Spiegel et al., 2011) and online services (Hüttel et al., 2018; Niemand et al., 2019), while its impact is lacking in other contexts such as product upgrades (Mao, 2016) and healthcare (Cai et al., 2018; Ching et al., 2022).

In a multi-component context, the ZPE would imply that if zero pricing were applied on one of the components of a bundle, the demand curve for the overall bundle would shift out at any given total price. Many studies have demonstrated its existence in such contexts (Gordon-Hecker et al., 2020; Ma et al., 2018; Zeng & Hao, 2016). But many others have instead focused on the effect of adding a free extra to the bundle (Baumbach, 2016; Nicolau & Sellers, 2012), and would therefore not be considered as measuring the ZPE as defined in this paper. For example, Nicolau and Sellers (2012) is the first to explore the effect of free pricing on hotel demand. They found that a free breakfast could attract people to choose a hotel that they would not otherwise prefer. However, this increase in demand could result from increasing the value of the hotel by adding a breakfast, and potentially represents rational economic decision-making, rather than the non-rational response to zero pricing identified by Shampanier et al. (2007). The research reported in the current paper was motivated by filling this gap in the literature, to be the first to test the *ceteris paribus non-rational* ZPE on hotel demand.

Given the existence of this gap in the literature, and the inconsistent evidence on the ZPE in other contexts, should we expect to find it in the context of the current study? We hypothesize that the ZPE will emerge, based on our reading of previous empirical evidence as well as theoretical accounts exploring the possible mechanisms through which the ZPE may operate. One proposed channel for the ZPE is the affect heuristic (Slovic et al., 2007). Neuroscientific evidence demonstrates the presence of free options triggers a significant increase in positive affect (Ma et al., 2018; Votinov et al., 2016). There is also evidence that the ZPE is more likely to be found for hedonic rather than utilitarian products (Hossain & Saini, 2015), which may be related to the relatively important role played by affective reactions to consumption options for choices over hedonic goods. A hotel package is itself of a hedonic nature, which suggests it may be a type of product relatively susceptible to the ZPE.

Our hypothesis is also informed by the fact that we will explore the ZPE in a multi-component context. As discussed above, studies in multi-component contexts, on the occasions that they have focused on testing for the *ceteris paribus* ZPE, have generally tended to find significant evidence for it. The affective reaction to zero pricing may be particularly strong in a multi-component context, since positive feelings may arise not only from the free component itself, but also from the perceived high value of the non-free components which are sold at relatively high price to compensate for the free component (relative to the case where there are no free components but the total price of the bundle is the same). This is because the price on the main (i.e. non-free) components of the bundle may act as a quality indicator (Pauwels & Weiss, 2008). Furthermore, this type of quality indication may be of particular importance for an experiential good, such as a hotel, whose quality is hard to know prior to actual usage (Hu & Yang, 2020).

Loss aversion (Kahneman & Tversky, 1979) and zero risk bias have also been proposed as possible mechanisms underlying the ZPE (Koo & Suk, 2020; Saraiva, 2011). The drive to avoid losses may divert people from non-free to free options; this is supported by the higher probability of choosing free options found among people with higher levels of loss aversion (Romell, 2012). A free product may be perceived as a certain win with zero risk, while a non-free product might turn out to be worth less than the amount paid for it. Again, this might be of particular relevance for hotel choice, given the uncertainty of the experiential product's value prior to purchase.

Based on the above arguments, we expect that demand for a hotel product will be higher when one of its components is provided for free than when none of the components are provided for free but the value and total price of the overall product is the same. It is thus hypothesized:

H1a. : The ZPE on hotel demand exists. Specifically, including a free one-night promotion in a three-night hotel package, while holding total price and other factors constant, will increase demand for the package.

2.2. Alternative price promotions

Free promotions fall within a much wider and more extensive literature studying price promotions in general (Hermiyenti & Wardi, 2019). Price promotions are commonly used to influence consumer perceptions and increase purchase intentions (Chen et al., 1998; Shirai, 2017; Sinha & Smith, 2000). In order to explore whether free pricing is an especially effective promotional strategy, we will compare the ZPE against the effects that can be produced by two alternative promotional strategies which we also introduce in our experiment.

It is worth noting that price promotions may either genuinely change the value or total price of a product (Foubert et al., 2018; Jang & Moutinho, 2019), or else may merely change the way the offer is presented without altering it materially (Weng, 2021). The effectiveness of a promotion that genuinely improves a product's price or value from the consumer's perspective can be quite straightforwardly explained using standard economic theory. For comparability with our tests of zero pricing, the alternative promotions we will introduce in this study will involve merely changing the presentation of the hotel package without altering it materially. In order for such promotions to be successful, they need to operate – like the ZPE – through non-rational (i.e. psychological) mechanisms.

Although testing the absolute effectiveness of our alternative promotional strategies is not, per se, of primary interest to the study, we do hypothesize that both will have positive effects on demand. The long-standing and widespread use of promotional marketing suggests firms strongly believe that promotions, in general, do have positive effects on sales beyond those explainable based on rational responses to price changes. Empirically, however, separating out the rational and non-

rational effects is difficult, as it requires identifying the change in demand brought about by the mere presence of the promotion, after controlling for the effects of any genuine price changes resulting from it, using a method such as the one in our experiment. Therefore, we have only limited evidence from previous empirical studies directly testing the pure presentational effects of promotions similar to those we will introduce. However, there are also theoretical reasons for hypothesizing they will exert positive effects. In particular, it is believed that merely *labelling* an offer as being promotional may increase the "transaction utility" (Thaler, 1983, 1985) consumers perceive they will gain from purchase; capturing consumers' attention with the presentation of a price as promotional may prompt them to consider that the purchase is on more favorable terms than can usually be attained (even if this is not truly the case), and from this reference effect (Kahneman & Tversky, 1979) generating positive affect and increasing purchase intentions (Chandran & Morwitz, 2006; Fan et al., 2022).

One of the alternative promotions we will test will present the hotel package as including a very low price (almost zero) on one of its nights. To the best of our knowledge, there is no existing empirical evidence directly testing for a *ceteris paribus* effect of token pricing. However, in using wording drawing attention to this low-price component and clearly signaling to consumers the existence of the promotion, we expect this strategy to successfully harness the reference effect described above. Indeed, the reference effect for a token price promotion may be particularly strong, based on an argument similar to one employed above for H1a. The token price promotion will, like the free price promotion, involve selling the remaining nights of the package at a relatively high price to compensate for the token price on the promotional night; if the price of the non-promotional components serves as a signal of quality and a reference price for the promotional component, the token price will be attractive as it deviates far from this reference level (Heath et al., 1995). There is indeed suggestive empirical evidence (Mao, 2016) that token pricing strongly encourages consumers to draw comparisons between the token price and the price of reference products. We therefore hypothesize:

H1b. **:** Including a night at the promotional price of ¥1 in a three-night hotel package, while holding total price and other factors constant, will increase demand for the package.

The other alternative strategy presents the price as being discounted by a common percentage on each of the package's components. A discount represents the most common type of promotion used in attempt to increase demand (Palazon & Delgado-Ballester, 2009). Again, since this offer will be accompanied by wording highlighting the presence of the promotion, we expect this strategy also to successfully harness the reference effect discussed above, for similar reasons: the attention-capturing labelling of the price as being cheaper than a reference level will positively affect perceived transactional utility.

Aside from this reference effect, it has been argued that discount promotions simplify information processing, with consumers more likely to stop searching and make their purchase decisions once they find a discounted option (DelVecchio, 2005). In addition, there is existing empirical evidence showing a positive non-rational effect of a percentage-based discount pricing strategy similar to the one we will test (Mckechnie et al., 2012). We therefore hypothesize:

H1c. **:** Describing a three-night hotel package as including a percent-off promotion (discount), while holding total price and other factors constant, will increase demand for the package.

2.3. The ZPE versus effects of alternative promotional pricing strategies

While we anticipate that all three of the promotional strategies in our experiment will positively impact demand, there are reasons to expect the magnitude of each effect may not be the same. Motivated in particular by the idea of zero being a "special price" (Shampanier et al., 2007), we hypothesize that the ZPE will outperform the effects of the other two pricing strategies we examine. We expect our free pricing strategy, like the others, to trigger a positive reference effect because it makes salient the presence of a promotion. However, the extent to which the free promotion invokes positive affect may be greater than for the alternative promotions: attitude surveys show that free products induce people to feel significantly better than any other offers (Driouchi et al., 2011; Shampanier et al., 2007).

Moreover, some of our arguments above in favor of the ZPE may not apply to the other promotion types. In particular, when comparing the free pricing strategy against the token pricing strategy, while the former may benefit from loss aversion and zero risk bias, the latter might not since the price on its promotional component is (slightly) positive. Empirical evidence comparing the effectiveness of zero and token price promotions in multi-component contexts like the one in our study is scarce.[1] However, it is also worth considering that, by its very definition, the ZPE for single component products entails that free pricing outperforms a token price in such contexts, as demand for the single component increases discontinuously when the price changes from marginally above zero to absolutely zero. In our multi-component context, if buyers under both promotional strategies respond equivalently to the non-promotional components of the package (which have an identical pricing structure across the two strategies), and respond more positively to the promotional component when it is free than when it has a token positive price, this will necessarily translate into the free promotion being more successful than the token price promotion in inducing demand for the bundle as a whole.

Based on these arguments, we propose:

H2a. **:** A free night promotion has a stronger positive effect on demand for the hotel package than an almost zero-price night promotion.

Regarding the comparison of our free promotion with the discount-based promotion, the latter may also be disadvantaged by an inability to harness the effects of loss aversion and zero risk bias. In this multi-component context, another advantage the discount-based promotion may lack is the signal of high quality that is provided by the high reference price on the non-promotional components under the free promotion (recall that under the discount-based promotion, all nights are sold at the same price); it has been argued that consumers may respond to a discounted price with suspicions that low quality is the reason for the price reduction, while similar suspicions may not be triggered by the presence of one free component within a bundle (Roll & Pfeiffer, 2017).

In this instance, we have more empirical evidence to draw upon from previous studies which have compared the effect of free pricing against some essentially equivalent discounts, i.e. "buy one get one free" (BOGO) versus "buy two get 50% off" or "50% off" (Gordon-Hecker et al., 2020; Sinha & Smith, 2000; Zeng & Hao, 2016). Data from choice behavior has shown that BOGO, which involves free pricing, outperforms the other promotions, while eye-tracking evidence indicates a possible channel for this: BOGO offers attract more attention than others (Gordon-Hecker et al., 2020). Based on the theoretical arguments and the empirical evidence, we propose:

H2b. **:** A free night promotion has a stronger positive effect on demand for the hotel package than an equivalent discount promotion.

2.4. Experiments to test the ZPE

To conclude this subsection, the authors offer a brief note on the methodology used in existing literature and how this relates to that of

[1] The only applicable study we could identify was Ma et al. (2018), which found a statistically insignificant difference between the effectiveness of two such pricing strategies.

the current study. Most research on the ZPE is limited to two-step experiments, in line with the design of Shampanier et al. (2007), run on non-diverse samples (Driouchi et al., 2011); Saraiva, 2011; Romell, 2012). Participants are asked to make a choice between two options. In the first step ("cost condition"), both options have positive prices. In the second step ("free condition"), their prices are decreased by the same amount, making the cheaper one become free. This method restricts research to focusing on cheap and simple products. It would be very costly to apply on more expensive products, since decisions are not hypothetical (Saraiva, 2011). For example, to test the ZPE in hotel consumption, the two-step method would require providing real hotel rooms for free.

To test our hypotheses regarding the ZPE in the context of a more valuable, complex product whose quality is difficult for consumers to gauge – namely, a hotel – the current research will instead employ a DCE. While this method has been widely used in many areas, with recent innovations employing it as a tool to investigate the effect of hotel promotion strategies (Fu et al., 2021; Hu & Yang, 2020), the current study is the first to build upon these developments by extending the technique to study the *ceteris paribus* ZPE. This method relies on a stated preference (SP) survey in which hypothetical scenarios can be simulated, and outside influencing factors controlled. The DCE provides a test for the effect of rewording offers which is indirect rather than direct. Rather than presenting subjects with two materially identical but differently presented options and comparing demand between them, the DCE instead relies on regression methods which measure the effects of various attributes on the likelihood of a hotel being chosen while controlling for all other attributes, and can therefore estimate whether consumers *would* be more attracted to a 3-night package that is labelled as including a promotion than one that is not labelled as including a promotion, if the total price and all other attributes were held constant between the packages. Further details of this method will be explained in the next section.

3. Methodology

3.1. Discrete choice models

DCEs have been widely used in hospitality research (Albaladejo-Pina & Díaz-Delfa, 2009; Kim et al., 2017; Liu, 2017). The experiment takes the form of a Stated Preference (SP) questionnaire, in which respondents are asked repeatedly to choose one alternative from a set of options in a hypothetical market. In the current study, each choice set consisted of three alternative hotels and a non-purchase option. Various attributes of each hotel were presented and varied within and across choice sets, including price per night, deal, brand, quietness, etc. (details discussed in Section 3.2). Through the controlled variation of attributes, it is possible to isolate the effect of each one – including the presence of a promotion – from all other aspects of a product. Since the choices are hypothetical, the DCE is able to investigate expensive choices at low cost (see Louviere et al., 2000).[2]

Responses from the SP survey are used to estimate discrete choice models. These models are based on Random Utility Theory (see, for instance, Ortúzar & Willumsen, 2011, pp. 269–331). The theory assumes that, facing a set of J alternatives, individuals choose the alternative which maximizes their utility.

The utility of the individual n choosing the j th alternative, U_{jn}, can be divided into two parts: a measurable part V_{jn} and an error term ε_{jn}. The error term might represent the observed inconsistency in people's preferences or the modeler's lack of information. The measurable term can be further decomposed into k observed variables (Lancaster, 1966), named attributes, which are weighted by parameters β. In (1) these observed variables are x_{jk}. The utility is thus a function of attributes and is conveniently assumed linear and additive.

$$U_{jn} = \beta' x_{jk} + \varepsilon_{jn} \tag{1}$$

where the element in vector β associated with each attribute x_{jk} can be viewed as the importance or the weight of the corresponding attribute in the utility. These parameters β are the ultimate object of estimation.

Assuming the error term is *iid* and extreme value type I, the model is a Multinomial Logit (MNL). The probability of choosing alternative j from alternatives 1 to J is given by the expression below (McFadden, 1974):

$$P_{jn} = \frac{exp\ V_{jn}}{\sum_{j=1}^{J} exp V_{jn}} \tag{2}$$

More realistically, a Random Parameter Logit (RPL) relaxes the assumption of homogeneous tastes and allows parameters to be distributed among the sample. To capture individual effects, this study uses an error component (EC) model with systematic taste variations, which is formally equivalent to an RPL (see Train, 2009, p144). An EC adds an additional error term that distributes zero-mean random normal with a standard deviation (named σ_{panel} in the output) to be estimated. As such $J-1$ additional parameters will be estimated to account for this error (Hess et al., 2008). The utility function then becomes:

$$U_{jn} = \alpha' x_{jk} + \mu_n' z_{jn} + \varepsilon_{jn} \tag{3}$$

where α is a vector of fixed (nonrandom) parameters, μ is a vector of random parameters with zero mean, and z_{jn} are error components that allow for any pattern of correlation among alternatives.

A Maximum Likelihood approach is used to estimate the changes in the probability of one alternative (hotel) being chosen over the others that result from changes in the levels of attributes within the alternative. Estimation of the specification (3) yields estimates for each element in vector α, which represent the effect of each independent variable, which can include attributes and the interactions between attributes and demographic variables.

The ZPE can be demonstrated by a comparison of demand curves for a certain hotel product with and without free promotion, holding everything else constant. By putting the estimated coefficients from EC models with demographic interactions and attribute levels specified by us into specification (3), one can calculate the utility of choosing this hotel product with and without free promotion, and thus compute the probability that an individual would actually choose the hotel using specification (2). The market share is calculated by averaging the probability of choosing this hotel product. The sample enumeration method (Ortúzar & Willumsen, 2011, pp. 269–331) will be applied to assess the demand Q; this study follows López-del-Pino & Grisolía (2018) in investigating how the demand Q responds to changes in total price in a market of 10,000 consumers.

$$Q = \frac{1}{N} \sum_{n=1}^{N} P_n * 10000 \tag{4}$$

P_n is the n th individual's probability of choosing the specified hotel product.

[2] Potentially, a discrete choice experiment might induce hypothetical bias. This issue has been explored empirically (e.g. List & Gallet, 2001; Murphy et al., 2005), although most such research has focused on studies using contingent valuation methods (CVM) rather than DCEs. An advantage of DCEs over CVM is that choice tasks are presented more realistically (especially when a non-purchase option is included; see, for instance, Alemu & Olsen, 2018), which should limit bias (List et al., 2006). Hypothetical bias has been found to be weaker in studies – like the current one – which investigate private goods (List & Gallet, 2001), and goods that subjects are experienced with (Hensher et al., 2015; McFadden, 2014).

3.2. Experimental design

The choice experiment asked participants to imagine they were planning a 3-night trip to Kuqa, Xinjiang. This is a relatively poor destination with GDP per capita in 2019 equal only to about 55,000 yuan[3] (8000 USD[4]), in comparison to the average in China of 11,000 USD. But it boasts a rich cultural history (Trip.com, 2022) and therefore promoting tourism has become a major part of its development strategy.[5] A 3-night stay was chosen since visiting Kuqa's top attractions usually takes 3 days (2 nights) and one extra night was for recovering from the long journey to this remote city. In each of 24 scenarios, participants needed to choose their favorite hotel or click "none of them" if they did not like any. Every participant had to provide a choice in each of the 24 scenarios.

Great efforts were put into the design of the choice experiment, in order that the attributes and levels finally chosen were similar to those actually present in hotels in Kuqa and really demanded by consumers (Bateman et al., 2002). This study followed a preliminary process of studying existing literature and conducting several semi-structured interviews, two focus group discussions and a series of pilot tests. Full details of this preliminary process are covered in Appendix A. The final version of the DCE included 9 attributes and 2–5 levels in each (Table 1). Most attributes have 2–3 levels while "price" and "reviews" have more than 3 levels, in order to make the experiment more realistic (Hensher et al., 2015). To achieve more realism, price levels were chosen based on online prices of hotels in Kuqa, and the design allowed for a correlation between price and number of stars. The lowest two prices belong to 3-star hotels; 4-star hotels were priced from 300 to 600 RMB (about 44–88 USD); and 5-star hotels were priced at 600 or 900 RMB (about 88 or 132 USD). Relying on NGene to produce D-efficient designs (Rose et al., 2008), we reduced the number of hypothetical choice tasks while maximizing the determinant of the information matrix and minimizing the generalized variance of the parameter estimates.

Higher levels are expected to increase desirability for all attributes except total price. In particular, it is expected that respondents will be enticed by price promotions and therefore that the "deal" parameter will be positive and significant (H1ãH1c). A significantly positive parameter on this attribute would represent a positive effect of promotional presentation on demand: it would indicate that, holding constant total price and all other attributes, demand is increased by the presence of a promotion. To further explore the effects of price promotions, the deal was presented in three different ways, "Enjoy 1 Night For ¥1!", "Enjoy 33.3% Off!" and "Enjoy 1 Night For Free!". Note that these statements are similar in terms of word count and the choice of words. For the remainder of this paper, these treatments are labelled as "1 RMB", "Discount" and "Free" respectively.

The "1 RMB" treatment presents the deal in a way that is almost identical to the "Free" treatment, with only a token price difference. Significantly stronger effects of the "Free" presentation than the "1 RMB" presentation would support H2a and be consistent with a model in which consumers consider the discounted night in isolation from the rest of the bundle, and have a demand curve for this night which exhibits a discontinuity where price equals zero. This would suggest that free pricing is a particularly attractive way of presenting the promotion. The question would still remain, however, as to whether free pricing is a *uniquely* attractive way of presenting a promotion. This was explored by investigating the difference between the "Free" and "Discount" presentations, the second of which offers a discount materially equivalent to a free night and maintains the appearance of a bargain, but excludes any pricing at or close to zero. If no significant difference can be found between the effects of these two means of presentation, it would suggest that free pricing is not a uniquely effective promotion strategy and that the psychological reactions it works via can be equally well achieved by promotions which do not rely on the use of zero pricing (thus rejecting **H2b**).

Our study is primarily interested in the effects of the "Deal" variable. However, in the process of estimating these effects, we naturally estimate the effects of the other attributes in Table 1. Since the effects of these attributes have already been studied in depth in previous literature, we will not discuss them in the main text. However, for completeness we will report and discuss them in Appendix A. Note that an advantage of including these other attributes in our design, regardless of any interest in their effects per se, is to increase the realism of the decision environment.

Table 1
Attributes and levels.

Attribute	Base	Level 1	Level 2	Level 3	Level 4
Price per night	150	300	400	600	900
Deal	No	Yes ("Enjoy 1 Night For ¥1!"/"Enjoy 33.3% Off!"/"Enjoy 1 Night For Free!")			
Star	3-star	4-star	5-star		
Safety	Acceptably safe	Fairly safe	Very safe		
Brand	Less-known	Well-known			
Location	Acceptably convenient	Fairly convenient	Very convenient		
Cleanliness	Acceptably clean	Fairly clean	Very clean		
Quietness	Noisy all day	Quiet during night	Quiet all day		
Reviews	6+ Pleasant	7+ Good	8+ Very Good	9+ Wonderful	

3.3. Data collection and sample

Thus, the experiment was carried out with three treatments, according to the way the deal was presented (Fig. 1). Each participant was randomly assigned to only one of these wordings, which was applied on every promotional hotel in the questionnaire. All subjects were faced with the same 24 scenarios except for the way the deal was worded. As a result of this consistency between treatments, one is able to draw controlled comparisons between the effects of the price promotions separately estimated within each treatment. To facilitate understanding, original price per night (excluding any promotion) was displayed along with the total price including the deal if there was any. This reflects how booking websites would typically present such promotions.

[6]While the classic two-step experiment, used commonly in the ZPE literature, typically draws implications from a nondiverse group of participants (very often, university students), we hired a professional panel service to estimate the preferences of a more representative cohort. The questionnaires were built on the web survey platform Qualtrics (Weber, 2019) and distributed using the online panel service provided by wjx.cn, a leading survey company in China. The survey

[3] Source: Aksu Statistical Yearbook of 2020.

[4] The exchange rate between RMB and USD was, as of late 2019, approximately 6.8:1.

[5] In 2018 and 2019, Kuqa adopted a free promotion strategy, which provided tourists from Ningbo, Zhejiang (the anti-poverty partner of Kuqa) with free night stays in two designated hotels. This free promotion provided the original inspiration to use Kuqa as the setting of this experiment. This paper should not, however, be regarded as an attempt to demonstrate this governmental strategy was effective, as such a conclusion would not necessarily follow from the identification of a ZPE in the context our experiment studies.

[6] See Appendix C for copies of the questionnaires that subjects were presented with. This English version is translated from the original Chinese version.

Q2.2. Among the following hotel options, which one do you prefer?

	Hotel 1	Hotel 2	Hotel 3
¥ Original Price Per Night	300 RMB	600 RMB	600 RMB
促 Deal	None	None	Enjoy 1 Night For ¥1!
Total Price (Including any deal)	900 RMB	1800 RMB	1201 RMB

(a) 1 RMB treatment

Q2.2. Among the following hotel options, which one do you prefer?

	Hotel 1	Hotel 2	Hotel 3
¥ Original Price Per Night	300 RMB	600 RMB	600 RMB
促 Deal	None	None	Enjoy 33.3% Off!
Total Price (Including any deal)	900 RMB	1800 RMB	1200 RMB

(b) Discount treatment

Q2.2. Among the following hotel options, which one do you prefer?

	Hotel 1	Hotel 2	Hotel 3
¥ Original Price Per Night	300 RMB	600 RMB	600 RMB
促 Deal	None	None	Enjoy 1 Night For Free!
Total Price (Including any deal)	900 RMB	1800 RMB	1200 RMB

(c) Free treatment

Fig. 1. The three different ways of presenting the promotion.

company recruited respondents from all over China and ensured the three treatment groups had roughly similar demographic distributions. In addition, only relatively rich individuals (with annual household income of at least 100,000 RMB or 14,706 USD) were included because they are more representative of those who can afford a 3-night trip in Kuqa.[7]

With the help of wjx.cn, a total sample size of 1,710, with 570 individuals in each treatment group, was obtained. Demographic information is summarized in Table 2. "Non-traders" – those who always chose the alternative on the same position of the screen (Grisolía et al., 2015) – are not included in the sample.

4. Estimation results

This section demonstrates the estimation results corresponding to the EC models according to the specifications discussed in Section 3. All models were estimated using the free package Apollo V0.0.1.0 (Hess & Palma, 2019) in R. This section will first examine the three different promotional presentation effects, from the three treatments, by inspecting the coefficients on the attribute "deal". It will then demonstrate the market demand curve for the whole package and how this shifts to the right due to increased demand at every total price point when a promotion is applied to one of the nights.

4.1. Promotional presentation effects

To test the existence of promotional presentation effects, three separate models were estimated, one for each treatment group, along with one model which pooled the data from all treatments (Table 3). Instead of directly using the attributes displayed in Section 3, all the qualitative attributes with more than two levels (safety, location, cleanliness, and quietness) were separated as level dummies. For

Table 2
Descriptive summary of respondents.

Characteristic	1RMB	Discount	Free	Pooled
Age (years)				
18–28	24.39%	31.75%	26.84%	27.66%
29–39	59.82%	55.26%	57.54%	57.54%
40–50	13.33%	10.70%	14.04%	12.69%
51+	24.60%	2.28%	1.58%	2.11%
Gender				
Male	50.35%	43.33%	50.35%	48.01%
Female	49.65%	56.67%	49.65%	51.99%
Annual Income (RMB)				
100,000–200,000	25.44%	28.95%	26.67%	27.02%
200,001–300,000	35.61%	34.21%	33.33%	34.39%
300,001–400,000	18.77%	19.12%	19.12%	19.01%
400,001–500,000	11.58%	9.12%	9.47%	10.06%
500,001+	8.60%	8.60%	11.40%	9.53%
Education Level				
High school or below	2.11%	2.63%	3.33%	2.69%
Bachelor	78.07%	79.65%	73.49%	78.07%
Master	17.72%	15.79%	18.07%	17.19%
PhD or above	2.11%	1.93%	2.11%	2.05%
Marital Status				
Single	20.70%	26.49%	24.91%	24.04%
Married/Domestic partnership	78.07%	72.81%	74.04%	74.97%
Widowed	0.35%	0.53%	1.05%	0.12%
Divorced	0.70%	0.18%	0.00%	0.76%
Separated	0.18%	0.00%	0.00%	0.12%

[7] After we paid for the panel service, wjx.cn distributed the Qualtrics questionnaire links to qualified participants registered in their pool. Links were private and not open to the public. See https://www.wjx.cn/sample/service.aspx for more details about the service employed.

Table 3
Estimation results of simple EC model (three subsamples and the pooled sample).

	1RMB	Discount	Free	Pooled
sample size	570	570	570	1710
LL (final)	−15159.53	−14888	−14856.03	−44934.67
Rho-square (0)	0.2006	0.215	0.2166	0.2102
Adj.Rho-square (0)	0.1998	0.2142	0.2158	0.2099
AIC	30349.06	29805.99	29742.05	89903.33
BIC	30461.91	29918.84	29854.91	90049.91
asc_non_purchase	1.45***	1.28***	1.236***	1.321***
	(-7.753)	(-7.514)	(-6.759)	(-11.693)
σ_{panel}	0.285***	0.169***	−0.199***	0.219***
	(-6.914)	(-3.811)	(-4.996)	(-9.376)
total price	−5.10E-04***	−5.44E-04***	−5.10E-04***	−5.20E-04***
	(-11.642)	(-13.181)	(-12.099)	(-21.136)
Deal	0.051**	0.069**	0.116***	0.115***
	(-1.989)	(-2.486)	(-4.253)	(-4.587)
Star	0.147***	0.073***	0.094***	0.104***
	(-5.119)	(-2.621)	(-3.214)	(-6.088)
fairly safe	0.416***	0.405***	0.439***	0.420***
	(-11.806)	(-12.012)	(-13.241)	(-21.303)
very safe	0.629***	0.628***	0.669***	0.642***
	(-13.934)	(-15.349)	(-15.715)	(-25.848)
Brand	0.091***	0.095***	0.078***	0.088***
	(-4.867)	(-4.826)	(-4.276)	(-8.038)
fairly convenient location	0.054**	0.059**	0.088***	0.067***
	(-2.209)	(-2.565)	(-3.977)	(-5.018)
very convenient location	0.163***	0.177***	0.165***	0.169***
	(-6.746)	(-7.722)	(-6.765)	(-12.261)
fairly clean	0.118***	0.124***	0.159***	0.133***
	(-4.118)	(-4.486)	(-5.604)	(-8.068)
very clean	0.32***	0.361***	0.379***	0.352***
	(-10.422)	(-12.155)	(-12.302)	(-19.822)
quiet during night	1.031***	0.916***	0.985***	0.976***
	(-18.678)	(-17.862)	(-18.368)	(-31.491)
quiet all day	1.175***	1.092***	1.128***	1.13***
	(-19.501)	(-18.823)	(-18.83)	(-32.8)
Review	0.202***	0.241***	0.212***	0.218***
	(-13.375)	(-16.492)	(-13.824)	(-24.752)
1rmb × deal				−0.094***
				(-2.831)
discount × deal			−0.012	
				(-0.358)

***p < 0.01, **p < 0.05, *p < 0.1. Robust *t*-ratios are in brackets.

example, "safety" was split into "fairly safe" and "very safe". The dummies equal 1 if the hotel could be characterized as the corresponding level, and 0 otherwise. The lowest levels (the column under "Base" in Table 1) were set to be the reference category.

The coefficient estimated on "deal" is significantly positive in all subsamples and the pooled sample, indicating that consumers' choices over hotel products are influenced by the promotion, no matter how it is expressed (H1ãH1c are supported). The impact of "deal" is larger in the "Free" treatment than the other two, suggesting that using the "Free" presentation has the biggest influence on people's choices. According to the coefficients of interaction between the treatment dummies and "deal" in the Pooled model, there is a significant difference between "Free" (0.115) and "1 RMB" (0.115–0.094 = 0.021). However, the difference between "Free" and "Discount" is insignificant. The findings are robust no matter which treatment is chosen as the baseline.[8] These results are consistent with the ordering of goodness-of-fit between models.[9]

The significance of the "deal" variable in each case implies that the means of price presentation play an essential role and the words used have a powerful effect on people's behavior, since hotels with promotions are more likely to be chosen, even holding constant the total price. The "Free" presentation is more successful than "1 RMB", supporting the hypothesis **H2a**.

However, as there is no significant difference between "Discount" and "Free", the models do not find evidence supporting **H2b**. It is impossible to rule out that expressing a promotion via a simple money-off discount works equally well as attempting to entice consumers with the lure of "Free".

4.2. Demand curves

The estimates from EC models with socioeconomic interactions (see Appendix B) – run both on the complete sample and on the subsamples from each treatment – are then utilized to forecast market demand. The effects of the price promotions can be demonstrated by a comparison of the demand curves for a certain hotel product with and without a price promotion, holding everything else constant (including the total price). By using the estimation results from these models and specifying a set of attributes and levels, one can compute the probability of individuals selecting this hotel against the non-purchase option.

Consider Hotel A, which is 4-star, fairly safe, less-known, located at a fairly convenient place, fairly clean, quiet during the night, and has a review score of 8. This represents a typical hotel in an under-developed city like Kuqa. By applying the specification (2) in Section 3, it is possible to predict every individual's probability of actually paying for Hotel A in the two-alternative scenario (choose or not choose) with and without promotion conditions. This is first done separately for each treatment, and then using data pooling across all types of promotions.

As clearly shown in Fig. 2, in every treatment group the aggregated demand shifts out when the promotion is applied. Note that the curves are comparing the demand for the same hotel An under the promotional and non-promotional scenarios, holding the total price (after inclusion of any promotion) unchanged. This means the original price per night of hotel A is lower under the non-promotional scenario (but is not described as including any promotion). The plot demonstrates that faced with exactly the same total price to pay, individuals are drawn to the promotional effects, supporting H1ãH1c. One possible explanation could be that people naturally link the relatively high original per-night price with better quality and therefore the sense of a bargain.

The shift-out holds true at every point of total price (Fig. 3). The "Free" treatment has the greatest distance for the shift-out and the distance reaches its maximum at a higher total price than in the other two treatments. Specifically, in the "Free" treatment, the difference reaches its peak at around 802 USD for three nights.

5. Conclusion

This paper investigates whether a hotel offering a free one-night stay promotion attracts more consumers in the setting of Kuqa. This is motivated by the lack of solid evidence and mixed results in existing research about the effectiveness of such promotions. The study demonstrates the existence of the ZPE on hotel demand. The free pricing works significantly better than a token price promotion, but an equivalent discount is as effective as the free pricing, suggesting that "Free" is not a uniquely effective promotion strategy. In short, the results support all hypotheses except **H2b**.

The findings support the existence of a ZPE. When making relatively

[8] In Table 3, the "Free" presentation is the baseline category. If "Discount" is used as the baseline instead (output not reported in the table), the estimation result shows that the "deal" parameter equals 0.020 for "1RMB", 0.102 for "Discount" and 0.114 for "Free"; while "1 RMB" is significantly inferior to "Discount", "Free" is still insignificantly different from "Discount".

[9] The goodness-of-fit refers to log-likelihood, AIC and BIC, which can be found in Table 3. According to these criteria, the best model is clearly "Free", followed by "Discount".

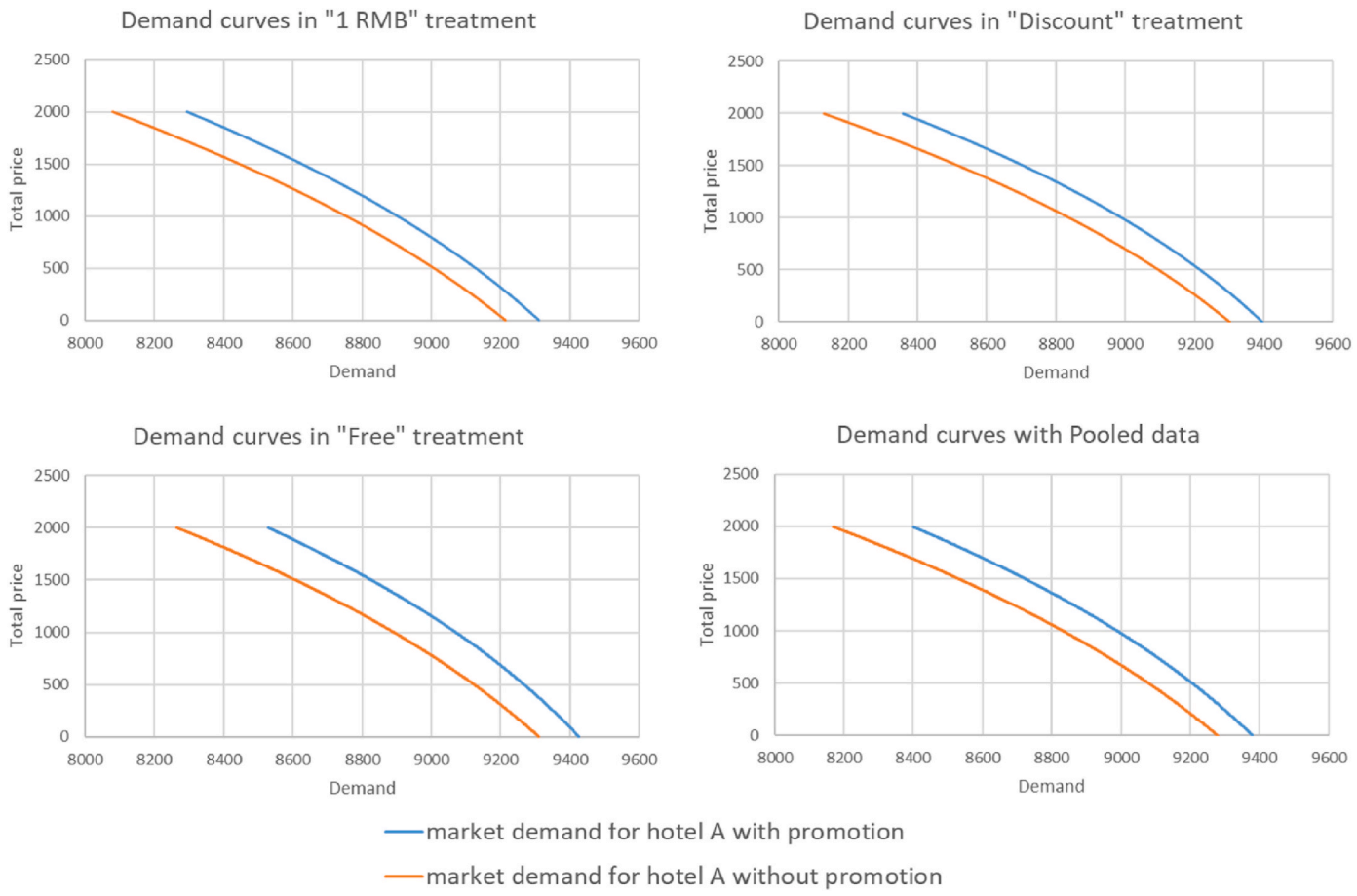

Fig. 2. Demand curves for a hypothetical Hotel A priced at 0–2000 RMB (0–308 USD).

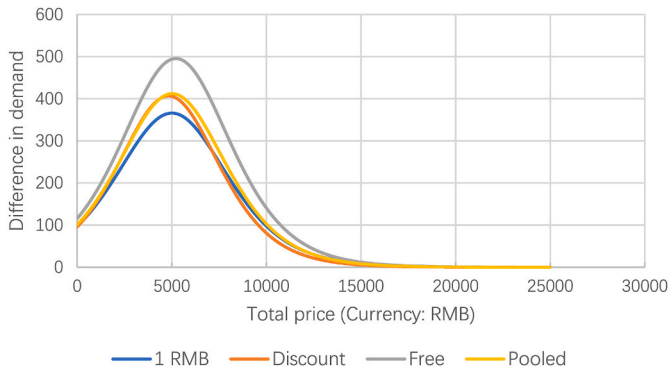

Fig. 3. Difference in market demand for three nights between promotional and non-promotional hotel.

expensive and risky decisions, over hotels, there is no sign that people associate free promotions with inferior quality (Jang et al., 2018; Niemand et al., 2019; Yang et al., 2016). Instead, they are more likely to choose the option with free promotions included, even if the total price does not vary. This can be described as "irrational" because demand changes despite the actual costs and benefits of buying the package remaining unchanged. This ZPE can be visualized as the demand curve of the same hotel shifting out at each total price point when free pricing is introduced. As a managerial recommendation, hotels can increase their market share by including a free one-night stay while keeping a high per-night price, rather than lowering the per-night price. The shift in demand goes up at first and then diminishes as total price increases. Inspection of the change in the magnitude of the ZPE and the peak of the curve provides a useful tool for hotels to decide the optimal price per night.

Theoretically, the study contributes to knowledge of the ZPE by testing for its existence in the hotel industry, which has never been explored before. The finding is in line with some existing research in the context of food, cosmetics and e-services (Niemand et al., 2019; Shampanier et al., 2007; Spiegel et al., 2011), but contradicts results in contexts involving healthcare products, high-price single products and utilitarian products (Baumbach, 2016; Ching et al., 2022; Hossain & Saini, 2015). Understanding the precise reasons why the ZPE seems to work in some contexts and not others remains a challenge, and is beyond our scope. However, it has been proposed that hedonic products may be relatively susceptible to the effect (Hossain & Saini, 2015), and this would be consistent with its presence in hotel consumption.

In addition to establishing the effectiveness of free pricing, this study also compares it against that of alternative promotional pricing strategies. With essentially the same bargain, the means of presentation significantly influence the probability of a product being chosen. We compared three different wordings and concludes that it is better to describe promotions using the word "free" directly, or to use an equivalent discount, whereas asking for a token payment is cast in the least favorable light, but still works better than no promotion. We recommend hotels avoid using seemingly equivalent offers, such as including a one-night stay at a token rather than zero price, as this could make a promotion less attractive.

These results strengthen our theoretical understanding of the ZPE: the stronger effect of the "Free" treatment than the "1RMB" treatment suggests a discontinuity in demand for a single night at the price of zero, since the two treatments are identical except for whether the promotional night is priced at zero or a positive price arbitrarily close to zero.

However, this discontinuity may be driven by psychological effects that can also be elicited by offering a materially equivalent discount on the whole bundle, since doing so is not a significantly less effective strategy than including a free night.

In summary, these findings make the following important contributions. First, the study has confirmed the existence of the ZPE on hotel demand. Though previous works (Akkus & Gokalp, 2017; Nicolau & Sellers, 2012) have shown a positive effect on demand in hotel of free add-on services - a related but conceptually different effect to the one this paper examines, as explained in Section 2 - evidence of the ZPE on hotel demand was still generally anecdotal. This work provides robust evidence and supports the implementation of offers which do not incur any cost but merely involve restructuring multi-night packages to include free nights without altering the package's total price or value. Second, by comparing the effects of free pricing against other promotional pricing strategies, this paper deepens the understanding of the mechanisms through which the ZPE may work. In particular, the paper focuses on the suggestion by Shampanier et al. (2007) that people have special feelings towards the price of zero, and demonstrates that it is not a unique effect but can be triggered by other pricing strategies.

5.1. Limitations and future research

The choice experiment was run in the setting of one specific location in China. The authors argue that the results would still be likely to hold if the choice experiment focused on another destination in China, or even another country, since there is no obvious reason why the psychological channels through which the ZPE operates should be geographically specific. This study's respondents were from all over China; the preferences identified in the experiment should be representative of Chinese tourists. Therefore, the results are likely to at least hold true elsewhere in China. However, the authors accept that this is an open empirical question and encourage future research to address the generalizability of the paper's findings to other tourism contexts. Another worthwhile target for future research should be to improve our understanding of why the ZPE works on hotel demand but not in some other contexts. It could be also interesting to consider cultural characteristics of decision-makers as explanations for the ZPE.

Impact statement

The impact of our research is beyond academia. Our research findings have implications for marketing of hotels, particularly in less-developed areas in China. Hotels or other accommodation providers can take advantage of the "zero price effect" to increase demand by rewording multi-night offers as including one free night while keeping a high per-night price. This practice outperforms selling the same package at the same total price but with all nights charged at a consistent positive price. Hotel managers should avoid charging a token price instead of zero price, as this approach is less successful. We demonstrate how the magnitude of the ZPE changes in response to changes in the per-night price, thus providing a helpful tool for price setting.

Credit author statement

Xian Zhang: Conceptualization, Software, Formal analysis, Investigation, Data curation, Writing - Original Draft, Visualization, Jose Grisolia: Conceptualization, Methodology, Writing - Review & Editing, Supervision, Funding acquisition, Tom Lane: Conceptualization, Resources, Writing - Review & Editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tourman.2022.104692.

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