RESEARCH NOTE

THE EFFECTIVENESS OF ONLINE SHOPPING CHARACTERISTICS AND WELL-DESIGNED WEBSITES ON SATISFACTION[1]

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Electronic commerce has grown rapidly in recent years. However, surveys of online customers continue to indicate that many remain unsatisfied with their online purchase experiences. Clearly, more research is needed to better understand what affects customers' evaluations of their online experiences. Through a large dataset gathered from two online websites, this study investigates the importance of product uncertainty and retailer visibility in customers' online purchase decisions, as well as the mitigating effects of retailer characteristics. We find that high product uncertainty and low retailer visibility have a negative impact on customer satisfaction. However, a retailer's service quality, website design, and pricing play important roles in mitigating the negative impact of high product uncertainty and low retailer visibility. Specifically, service quality can mitigate the negative impacts of low retailer visibility and high product uncertainty in online markets. Website design, on the other hand, helps to reduce the impact of product uncertainty when experience goods are involved.

Keywords: Product uncertainty, retailer visibility, service quality, website design, customer satisfaction, search goods, experience goods, archival data

Introduction

Despite tremendous annual growth in electronic commerce applications, e-commerce's share of the overall U.S. retail

sales remains modest—only 4.3 percent in 2010 (U.S. Census Bureau 2010). Many online retailers are investigating better ways to attract customers and support their online operations. However, extant research has not adequately addressed the issue of how product uncertainty and retailer visibility may affect online customers' decision making.

One unique feature of e-commerce is the temporal and spatial separation of buyers and sellers (Lucking-Reiley 2000). Without being able to physically examine the product or the

retailer, consumers face a high degree of uncertainty (Ba et al. 2003; Pavlou et al. 2007; Sun 2006). Following Pfeffer and Salancik (1978), we define uncertainty as the degree to which the outcome of a transaction cannot be accurately predicted by customers due to imperfect information. When consumers make an online purchase, they do not have perfect information about product quality. In the traditional business setting, consumers may evaluate the quality of products by looking, touching, and feeling the products. However, these traditional ways of searching for more information are not available online. Therefore, product uncertainty may become a particularly important dimension in a consumer's online purchasing decision, depending on the degree of incomplete information associated with the product. This uncertainty has been considered a major barrier to online transactions (Ba et al. 2003) and an inextricable factor in understanding trust (Gefen et al. 2008).

The increasingly crowded online space also raises the issue of retailer visibility, defined as the extent of the presence of an online retailer in the consumer's environment (Drèze and Zufryden 2004). Just because the Internet allows consumers to easily locate online stores, it does not follow that the perception of distance is eliminated. With the proliferation of websites, online consumers are now faced with an ever-increasing number of alternatives. Not all online retailers are equally visible to the consumer, even though each retailer is actually only a mouse click away. Moreover, there are honest and reputable retailers as well as fly-by-night opportunists. Consumers may be naturally wary of unknown retailers. It is of strategic importance for online stores, especially those that are new or unknown, to shorten their psychological distance from online buyers (Edwards et al. 2009).

Using data collected from an online shopbot (BizRate.com), we investigate the impact of product uncertainty and retailer visibility on consumers' evaluation of their online shopping experiences, which ultimately affects an e-tailer's online strategy. We also focus on three retailer characteristics that prior research has identified as influencing customer satisfaction: customer service, website design, and pricing. We specifically examine whether these characteristics play a different role with different levels of product uncertainty and retailer visibility. For example, does customer service still matter when the product is a search good? Does website design matter more for experience goods than for search goods? Is customer service more important when the retailer is lesser-known? In short, we investigate the exact role these retailer characteristics play in the relationship between uncertainty/visibility and customer satisfaction. A systematic exploration of how retailers can manage these characteristics to mitigate the negative effects of uncertainty and low visibility on

customer satisfaction will shed light on how to use these variables to shape a firm's online strategy and adjust its investments.

Related Research and Theoretical Development ▄▄▄▄▄▄▄▄▄▄▄▄▄▄

A great deal of research has been carried out to understand the motivations of consumers to choose among online retailers as well as the retailer factors driving customer satisfaction (e.g., Devaraj et al. 2002; Jiang and Rosenbloom 2005; Kim et al. 2009; Kotha et al. 2004; Lee and Overby 2004; Pan et al. 2002; Qu et al. 2008; Smith et al. 2000; Wolfinbarger and Gilly 2003). Three retailer characteristics, namely website design (Neilsen 2000; Palmer 2002; Schlosser et al. 2006; Szymanski and Hise 2000), customer service (Ba and Johansson 2008; Jun et al. 2004; Wirtz and Mattila 2004; Zhang and Prybutok 2004), and pricing (Cao et al. 2003-04; Martín-Consuegra et al. 2007; Reibstein 2002) stand out as important factors affecting online customer satisfaction.[2] In this paper, our focus is not to explore the direct effects of retailer characteristics on customer satisfaction because these direct effects have been extensively addressed by prior literature. Instead, we concentrate on the roles of product uncertainty and retailer visibility on customers' evaluation of their online shopping experiences. In addition, we investigate how website design, customer service, and pricing can help to alleviate the effects of product uncertainty and low retailer visibility on online customer satisfaction.

Product Uncertainty and its Impact

Product characteristics are important factors in consumers' ability to ascertain the quality of products online, which might, consequently, affect their satisfaction. Research has confirmed that risks faced by consumers may vary according to product class (Stem et al. 1977; Stone and Gronhaug 1993), and product category risk is one of the two predominant types of risks associated with Internet shopping (Bhatnagar et al. 2000). As Hubbard (2007) explains, whenever there is risk, there is always uncertainty (although not vice versa).

Nelson (1970, 1974) classifies products into two categories: search goods and experience goods. The quality of search

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[2]For a complete in-depth literature review on the direct effect of website design, customer service, and pricing on customer satisfaction, see Appendix A.

goods can be evaluated before purchase while the quality of experience goods can be ascertained only after purchase. Lal and Sarvary (1999) define two types of product attributes for the online environment: digital attributes, which can be easily communicated on the web, and non-digital attributes, which require physical inspection of the product. In this study, we integrate the Lal and Sarvary classification with the Nelson classification and consider search goods to be those with predominantly digital attributes. Experience goods, on the other hand, demonstrate predominantly non-digital attributes, and their quality (e.g., the fit and texture of a pair of trousers) is explored through physical presence. The major difference between search and experience goods lies in the level of uncertainty with respect to the quality of goods prior to purchase. Girard and Dion (2009) validate the product classification framework online and confirm that the risk of experience goods is significantly higher than that of search goods.

Previous studies have recognized that affect significantly predicts satisfaction judgment (Homburg et al. 2006; Isen 1984; Miniard et al. 1992; Westbrook 1987; Westbrook and Oliver 1991). The conclusion of these studies is that the affect experienced during the acquisition and consumption of the product or service can have a significant influence on satisfaction. Oliver (1997) states that affect is central to understanding customers' consumption experiences. Szymanski and Henard's (2001) meta-analysis reveals that affect is strongly related to satisfaction.

In general, uncertainty and its associated feelings of uneasiness and anxiety are considered to be negative affects (Maister 1985). Chaudhuri (1998) finds that high levels of perceived risk in products, as a state of uncertainty, are related to low levels of positive feelings during consumption. Uncertainty causes consumer anxiety about the purchase process. As the uncertainty increases, so does the associated perceived loss of power and anxiety. This results in customer demoralization (Maister 1985) and other negative affective reactions, such as anger (Bhatnagar et al. 2000; Taylor 1994; Westbrook 1987). The negative mood/affect biases evaluations in a negative direction and decreases satisfaction (Clark and Isen 1985; Homburg et al. 2006; Smith and Bolton 2002). In support of this notion, Taylor (1994) finds that uncertainty, as a negative affective reaction, decreases the customer's evaluation of overall performance. Based on the affective response-satisfaction literature, we hypothesize that greater product uncertainty is a negative for consumers.

> H1: *Product uncertainty influences online customer satisfaction.*

Retailer Visibility and its Impact

Retailer visibility reveals a certain level of information about a retailer. Specifically, online visibility reflects the cumulative effects of past marketing strategies and activities (Drèze and Zufryden 2004). Consumers can make inferences about sellers' ability and credibility based on their perceived marketing expenditure (Kirmani and Rao 2000). Therefore, an online retailer with high visibility is likely to be considered as capable, credible, and trustworthy, because maintaining high visibility entails an expensive investment of time, money, and effort. Such a large investment also makes opportunism by the retailer costly.

In addition, retailer visibility determines how familiar a consumer is with the retailer. The more familiar a consumer is with an online retailer, the less psychological distance there is between the consumer and the retailer. Things that are psychologically distant (objects, events) are those that are not present in the direct experience of reality (Liberman et al. 2007). In their study of psychological distance between online retailers and consumers, Edwards et al. (2009) demonstrate that psychological distance exists in the online retailing environment. Consumers' perception of psychological distance is most salient with a retailer of low visibility, as they have less information regarding its quality. Distance and affect are often inextricably linked. Psychological closeness provides feelings that are real, more genuine, more open, and more trusting, while distance is frequently associated with uneasiness in online shopping. Based on the affective response-satisfaction perspective, the positive affects stemming from closeness lead to higher customer satisfaction. Indeed, consumers tend to avoid risk and exhibit preferences for the familiar rather than for the unknown (Bornstein 1989). Therefore, we hypothesize that low visibility will work against retailers.

> H2: *Retailer visibility influences online customer satisfaction.*

The Moderating Effects of Retailer Characteristics

High uncertainty will lead consumers to engage in extensive information search (Dowling and Staelin 1994; Taylor 1974), to rely on performance-oriented information substitutes (Murray 1991; Nelson 1970) or to utilize other cues such as price (Wolinsky 1983). However, searching for information online can be frustrating. A retailer's website design plays a vital role in how customers locate information online. Easy access to information can greatly facilitate information search by

consumers and therefore form their prior expectations. As stated above, based on the affective response-satisfaction literature, we argue that uncertainty, as a negative affective reaction, decreases customer satisfaction. The negative impact will be more severe in the case of poor website design in that customers will not readily find information. A well-designed website, on the other hand, can facilitate information search and reduce the likelihood of mismatch. Consumers, consequently, experience less negative affect from not knowing the product or the retailer beforehand. In addition, supplied with enough information, a customer is less likely to be angry at the retailer even if the product mismatches his taste. The consumer is likely to attribute the mismatch to his misinterpretation (Westbrook 1987). Therefore, a clearly designed website allows the consumer to easily find the necessary quality information and can mitigate the impact of product uncertainty and low retailer visibility on post-purchase satisfaction.

Furthermore, good website design should have more value to the consumer of experience goods and should help low visibility retailers. Indeed, Weathers et al. (2007) find that website communication practices differ in influence between search goods and experience goods. Huang et al. (2009) demonstrate that there are important differences in online consumers' information search patterns for these two types of goods. Therefore, we hypothesize the following:

H3a: *Website design moderates the effect of product uncertainty on online customer satisfaction.*

H3b: *Website design moderates the effect of retailer visibility on online customer satisfaction.*

The more perceived uncertainty associated with the purchase, the more consumers prefer their own experiences as sources of information (Murray 1991). That is, consumers want to ascertain quality by trying the retailer. Experimenting with new stores is expensive, intensifying the anxiety and uneasiness felt by consumers.[3] But when a trial evokes powerful pleasant affective responses, the pre-consumption mood state (e.g., uncertainty and its associated anxiety and uneasiness) is likely to dissipate in the face of the mood induced by consumption-based affective responses. In a similar vein, Miniard et al. (1992) find that mood effects on post-consumption product evaluations are moderated by the affective intensity of the consumption experience itself.

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[3]The heavy cost of experimenting with new stores largely limits the scope of store visits. Johnson et al. (2004), for instance, suggest that shoppers generally visit few stores online and gravitate toward a preferred site over time, despite the fact that other stores are just a mouse click away.

Based on the above research, we argue that product uncertainty and low retailer visibility are likely to be alleviated by better customer service. Nelson (1970) finds that the ratio of repair expenditures to sales was high for experience goods. Similarly, one can argue that the product return rate will be high for experience goods, as the chance of a good match between product quality and personal taste is low. Therefore, consumers, when given better customer service, are less concerned about potential loss associated with the mismatch between the product and personal taste resulting from product uncertainties. Similarly, retailer visibility can also be moderated by customer service. Better service experiences help customers develop strong and positive affects about the retailer. The strong affects can act to diminish the priming effects of pre-consumption negative mood on post-consumption evaluation (Miniard et al. 1992). Therefore,

H4a: *Customer service moderates the effect of high product uncertainty on online customer satisfaction.*

H4b: *Customer service moderates the effect of low retailer visibility on online customer satisfaction.*

Prior research has demonstrated that price and perceived price fairness are important factors in a customer's decision-making process (Lee and Overby 2004; Martín-Consuegra et al. 2007). A retailer's price relative to its competitors' pricing is shown to be significant (Trabold et al. 2006). Ramirez and Goldsmith (2009) show that price-sensitive consumers react differently to brand-name retailers than to those with low brand recognition. Gázquez-Abad and Sánchez-Pérez (2009) demonstrate that the majority of consumers are deal-prone: when the price is low, their brand loyalty is not as powerful an explanatory factor. Based on the above, we conjecture that low prices will mitigate the negative impact of low retailer visibility on customer satisfaction and likely help those with already high visibility.

Furthermore, Alba et al. (1997) contend that price sensitivity would be lower online when the quality attributes are more important and when product choices are better differentiated. Therefore, we expect that the price leadership strategy plays a more important role for retailers selling search goods, because the digital attributes of search goods can be easily communicated online. We therefore hypothesize

H5a: *Pricing moderates the effect of high product uncertainty on customer satisfaction.*

H5b: *Pricing moderates the effect of low retailer visibility on customer satisfaction.*
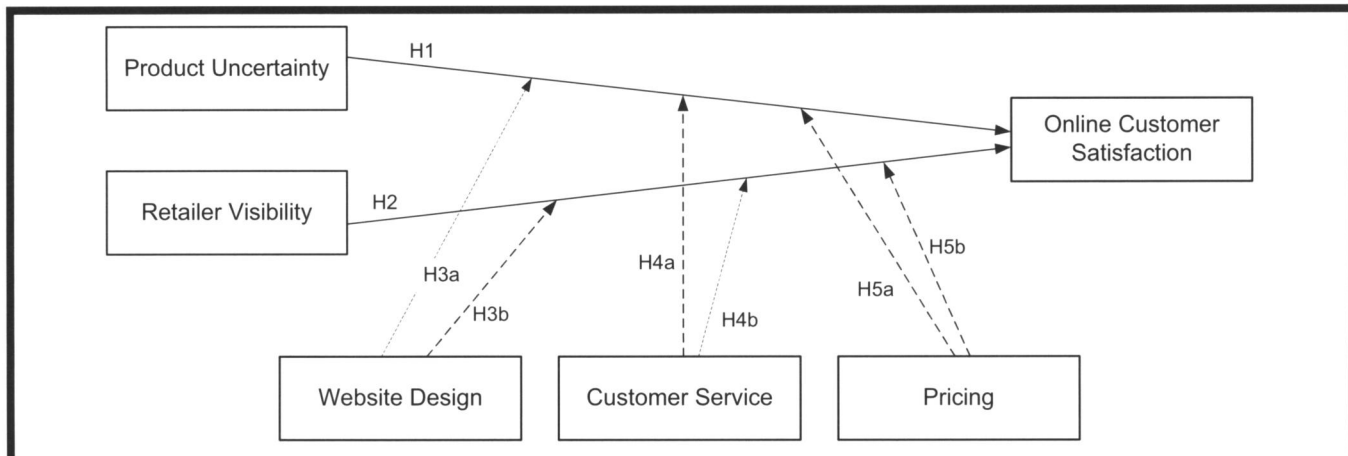
Figure 1 summarizes our research model.

Figure 1. Research Model and Hypotheses

Research Method

The research method chosen to test our theoretical framework was a field study using data collected from archival sources. The data for this study was collected primarily from BizRate.com and Alexa.com over a one month period. BizRate.com collects merchant ratings by asking customers to evaluate their purchase experiences on a 1 to 10 scale. Each customer transaction provides 15 ratings. Eight ratings are collected at "check-out," while the remaining seven ratings are collected via a follow-up survey after delivery. Table B1 online Appendix B explains the 15 ratings. Rating information was available for each merchant on an aggregate level as well as on an individual consumer level. BizRate.com has repeatedly conducted validity checks on its possible response bias and reported no substantial nonresponse bias (Reibstein 2002).

We collected data for two types of retailers: retailers selling only clothing and those selling books and magazines, excluding mega-retailers such as Amazon. By using these two categories, we hope to test our hypotheses of the structural difference of customer satisfaction associated with search goods and experience goods. The characteristics of a book can be easily described online while the attributes of clothing are hard to communicate. This leaves consumers with a high degree of information asymmetry for clothing (Lal and Sarvary 1999; Nelson 1970). Consumers, consequently, face more severe uncertainty of product quality on the web for experience goods like clothing (Weathers et al. 2007). The classification of clothing as experience goods and books and magazines as search goods is consistent with the classification scheme by Ekelund et al. (1995) and Korgaonkar et al. (2006). Indeed, several studies (Bhatnagar et al. 2000; Levin

et al. 2005) have argued that the risk for buying books may not be high, but feel and touch are important for the purchasing of fashion products.

For each retailer, we collected all available individual consumer ratings to increase the effective sample size and the precision of the estimation. Appendix C is a screen shot of a BizRate.com individual consumer's ratings of Barnes& Noble.com. The resultant data set comprised a cluster sample of online store ratings, with 9,956 observations overall. This data differs from the ordinary dataset in that it has a retailer dimension and an individual consumer dimension.

Given the nature of our data, all four constructs (i.e., customer service, website design, pricing, and customer satisfaction) in our research model were treated as formative rather than reflective (Petter et al. 2007). Customer service, for instance, includes the following measures: product is available at time of expected delivery, ability to track orders, product arrived as expected, correct product was delivered, and customer support. A change in one measure (e.g., product arrived when expected) does not require a change in other measures of the construct and these measures are by no means interchangeable. Dropping any measure would change what the construct of customer service measures. The same logic applies to the other three constructs, which we also designate as formative. Two items from the Bizrate.com ratings ("variety of shipping options" and "shipping charges stated clearly") were excluded in our analysis, as they measure shipping rather than the constructs of interest in this research.[4] Table 1 details the items that form each construct.

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[4]Q-sorting also put these two items in groupings other than customer service, website design, and pricing (Thomas and Watson 2002).

Table 1. Constructs, Their Measurements and Data Sources			
Construct	**Measurement**	**Source**	**Reference**
Product uncertainty	Search goods (surrogate for low uncertainty) Experience goods (surrogate for high uncertainty)	E-tailers on BizRate.com	Ekelund et al. (1995) Korgaonkar et al. (2006)
Retailer visibility	Website traffic: three-month average of "reach per million"	Alexa.com	Drèze and Zufryden (2004)
Website design	Ease of finding product Site design Clarity of product info Product selection	BizRate.com	Jiang and Rosenbloom (2005)
Customer service	Customer support Order tracking On-time delivery Product met expectation Product availability	BizRate.com	Jiang and Rosenbloom (2005)
Pricing	Price Shipping charges	BizRate.com	Jiang and Rosenbloom (2005)
Customer satisfaction	Overall rating Shop again	BizRate.com	Jiang and Rosenbloom (2005)

Contrary to reflective measures, the measurement of internal consistency or reliability of formative measures is not straightforward. High levels of multicollinearity between construct items are problematic because the influence of each item on the latent construct cannot be distinctly determined. Multicollinearity among the items under each construct was therefore assessed. No VIF (variance inflation factor) statistic for the formative measures is greater than 3.3, which indicates the absence of multicollinearity (Diamantopoulous and Siguaw 2006; Petter et al. 2007).

In PLS, loadings represent the influence of individual scale items on reflective constructs, while weights represent a comparable influence for formative constructs (Bollen and Lennox 1991). All item weightings, except for order tracking, are significant at the 0.05 level (see Table B2 in Appendix B). Following the suggestion of Bollen and Lennox (1991), we kept the item of order tracking to preserve content validity for the construct of customer service. We then multiplied the values of the scale items by their individual PLS weights and summed them for each construct to obtain composite construct scores, as suggested by Petter et al. (2007).

To assess the discriminant validity of the formative measures, we examined item-to-item and item-to-construct correlations (Loch et al. 2003; Ravichandran and Rai 2000). We find that the items exhibit stronger correlations with their composite construct scores than with the composite scores of the other constructs. Additionally, intra-construct item correlations are greater than inter-construct item correlations. Overall, these

results suggest that the instrument has acceptable measurement properties. We then normalized each index score around zero with a standard deviation of one and employed the standardized factor scores in our empirical estimates.

BizRate.com does not measure retailer visibility in its survey of each consumer. According to Drèze and Zufryden (2004), online visibility is strongly related to website traffic and has a more significant association with traffic generation than does advertising spending or awareness. Because of the strong causal link between retailer visibility and the retailer's website traffic, one legitimate way to measure retailer visibility is to examine the number of people that visit the site. We acknowledge that website traffic is not a perfect measure of retailer visibility, and there may be more to retailer visibility than simply web traffic. However, we believe website traffic is a reasonable surrogate of retailer visibility. Scholars frequently collapse constructs in models to achieve greater parsimony. For example, in the technology acceptance model, scholars collapse attitudes, intentions, and behaviors into a "use" variable (e.g., Davis 1989). We follow the same approach here and collapse the concepts of website traffic and retailer visibility into one construct.[5]

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[5]We collected the Google PageRank data, as another possible measure of retailer visibility. The rationale is that the more web pages that link to a retailer's website, the more visible the site. The data is positively correlated with website traffic and is statistically significant. Using the PageRank data as a proxy for retailer visibility gives us qualitatively similar results.

We drew traffic data from Alexa.com, using the three-month average of "reach per million," which measures how many unique web users visited the retailer's website daily on average in the previous three months. We obtained the data in July 2005 for all merchants whose customer ratings were collected from BizRate.com. It is possible that other factors may influence website traffic, temporarily inflating or deflating the measure for retailer visibility. For example, a promotion might cause a short-term spike in that retailer's website traffic. However, Alexa.com's traffic data is averaged over a three-month period. We think that the effect of any short-term promotion on a website's "reach per million" would be minimal.

Table 1 summarizes the constructs in our model, their measurement, the data source, and the literature support for the measurement items for each construct.

To test for common methods bias, we first conducted a Harman's single factor test (Podsakoff et al. 2003). Since more than one factor emerged to explain the variance in our analysis, we infer that common method bias is not severe. Second, we included a common method factor to examine the effects of the unmeasured latent method factor (Podsakoff et al. 2003; Vance et al. 2008). As shown in Table B4 in Appendix B, the average substantively explained variance of the indicators (0.76) is far larger than the average method based variance (0.013). The ratio of substantive variance to method variance is about 58:1. In addition, out of the 13 paths from common methods variance (CMV) to single indicator constructs, none were significant. Therefore, we contend that the common method bias is unlikely to be a serious concern in this study.

The following model was used to test our research hypotheses:

$$CS_{ij} = \beta_0 + \beta_1 w_{ij} + \beta_2 s_{ij} + \beta_3 p_{ij} + \theta_1 PU_j + \theta_2 RV_j + \tau_1 RV_j w_{ij} + \tau_2 RV_j s_{ij} + \tau_3 RV_j p_{ij} + \gamma_1 PU_j w_{ij} + \gamma_2 PU_j s_{ij} + \gamma_3 PU_j p_{ij} + \varepsilon_{ij}$$

where CS_{ij} is the satisfaction customer i derives from the purchase of a product from retailer j; w, s, and p represent the three retailer characteristics (website design, customer service, and pricing), respectively. RV and PU represent retailer visibility and product uncertainty, respectively. We define PU as a dummy variable that equals 0 for search goods and 1 for experience goods. ε is the error term. By checking the joint significance of the τ coefficients, we can see whether and how retailer characteristics (i.e., website design, customer service quality, and pricing) mitigate the relationship between retailer visibility and customer satisfaction. Similarly, the joint significance of the γ coefficients will tell us whether

there is an interaction effect between retailer characteristics and product uncertainty. The direct effects of retailer characteristics were included in the estimation to rule out alternative explanations, although we do not formally hypothesize relationships between these characteristics and customer satisfaction.

A number of control variables were also included in the estimations to account for store-specific factors, such as a retailer's online age and whether a retailer has a "customer certified" seal from BizRate.com. Interested readers are referred to Appendix A for a complete listing and explanation of the control variables. The descriptive statistics of the variables (before standardization) used in our empirical models are listed in Table B3 in Appendix B.

Empirical Results and Discussions ■■■

Our data set comprised a cluster sample of online store ratings, with multiple consumers within one store. For data analysis on cluster-sample, we used Stata 10.0. A modified Wald statistic for groupwise heteroskedasticity in the residuals (Greene 2000, p. 598) suggests the existence of heteroskedasticity. Thus cluster-sample techniques with robust standard errors clustered by retailer are employed to fit our dataset (more analysis of the data is available in Appendix A). Table 2 reports the final estimation results. Model 1 is a baseline model, which tests the direct effects of product uncertainty and retailer visibility. Model 2 examines the moderating effect of the three retailer characteristics on retailer visibility. Model 3 is the full model that jointly examines the effects of product uncertainty and retailer visibility on customer satisfaction as well as the moderating effects of the retailer characteristics. Interpretation of the significance of all hypotheses (except for the *post hoc* analysis discussed below) is based on model 3 results. The alpha protection level was set at .05.

All main effects hypotheses were supported with the exception of the effect of website design on satisfaction, which received partial support in the *post hoc* analysis. Among the moderations, customer service by product uncertainty and by retailer visibility were supported.

Customer Response to Product Uncertainty and Retailer Visibility

When the moderating effects of retailer characteristics are controlled for in Model 3, we find that the direct effect of pro-

Table 2. Effects of Product Uncertainty, Retailer Visibility and Retailer Characteristics

	Model 1	Model 2	Model 3
Customer service	0.848** (0.036)	0.882** (0.041)	0.732** (0.036)
Website design	0.038* (0.019)	0.027 (0.021)	0.032 (0.036)
Pricing	0.030* (0.013)	0.020 (0.017)	0.044* (0.018)
Product uncertainty	-0.031 (0.029)	-0.039 (0.028)	-0.086* (0.038)
Retailer visibility	0.020 (0.013)	0.024* (0.011)	0.027* (0.012)
Moderating Effects			
Customer service × Retailer visibility	—	-0.045* (0.021)	-0.053** (0.019)
Website design × Retailer visibility	—	0.017 (0.022)	0.016 (0.022)
Pricing × Retailer visibility	—	0.012 (0.016)	0.016 (0.016)
Customer service × Product uncertainty	—	—	0.18** (0.048)
Website design × Product uncertainty	—	—	-0.001 (0.040)
Pricing × Product uncertainty	—	—	-0.036 (0.022)
Control Variables			
Number of ratings	ns	ns	ns
Online age	ns	ns	ns
Online age square	ns	ns	ns
Customer certified	-0.127* (0.053)	-0.120* (0.058)	ns
R^2	0.78	0.78	0.79
χ^2 statistics for retailer visibility interactions	—	12.06**	20.90**
χ^2 statistics for product uncertainty interactions	—	—	17.64**

Notes: N = 9956. * = significant at 0.05 level. ** = significant at 0.01 level. Standard errors are reported in parentheses.

duct uncertainty on customer satisfaction is significant (b = −.086, p < .05), providing support for H1. Highly visible retailers tend to fare better with consumers (b = .027, p < .05), as consumers are less concerned about these retailers' quality. Conversely, low retailer visibility negatively impacts online customer satisfaction. These results provide support for H2.

The Moderating Effects of Retailer Characteristics

The tests for the moderating effects of retailer characteristics used the Wald statistic (Greene 2000), which examines whether the moderating effects affect a consumer's shopping experience. The Wald test statistic in Model 3 indicates that the three interaction terms (i.e., τ_1, τ_2, τ_3) between the retailer visibility and the retailer characteristics are jointly statistically significant ($\chi^2(3)$ = 20.90, p < .01), suggesting that the retailer characteristics do function as a moderator on the relationship between retailer visibility and customer satisfaction.

As suggested in Model 3, the interaction between retailer visibility and customer service is negative and significant (b = −.053, p < .01). The marginal effect of retailer visibility on customer satisfaction depends on the retailer's customer ser-

Figure 2. The Moderating Effects of Retailer Characteristics
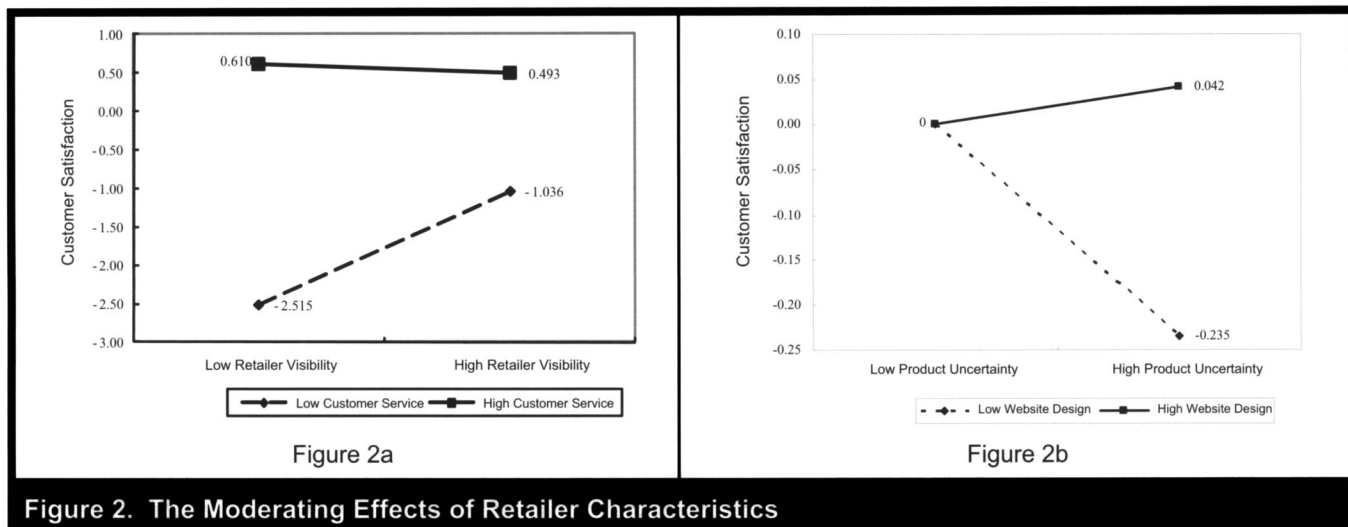
vice quality,[6] confirming H4b. As customer service improves, the impact of low retailer visibility becomes smaller. Therefore, better service, to a degree, alleviates the adverse impacts of low visibility for an unknown retailer and enhances its competitiveness in the online market. Figure 2a demonstrates the mitigating effects of customer service. For a sharper contrast, low and high visibilities are represented by its minimum and maximum, respectively. Low and high customer service are also graphed using its minimum and maximum. As shown in Figure 2a, the satisfaction gap between retailers with low visibility and those with high visibility can be quite large (1.48), but it narrows as the quality of customer service improves.

Contrary to prediction, website design does not mitigate the negative impact of low visibility on customer satisfaction and H3b is not supported. The interaction term between retailer visibility and pricing is also not significant (b = .016), thus H5b is not supported.

Model 3 adds the interaction terms between product uncertainty and the three retailer characteristics to Model 2. The three interaction terms (i.e., γ_1, γ_2, γ_3) between the product dummy and the retailer characteristics are jointly significant ($\chi^2(3) = 17.64$, p < .01). This confirms the role of retailer characteristics as a moderator on the relationship between product uncertainty and customer satisfaction. As suggested by the results, consumer evaluation of service quality varies across retailers selling different products. H4a is therefore

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[6]Retailer visibility is a continuous variable, so its marginal effect is $\partial CS / \partial R = \theta_2 + \tau_1 w + \tau_2 s + \tau_3 p$, where w, s, and p are website design, customer service, and pricing, respectively. Since τ_2 is significant, the marginal effect depends on the level of customer service.

supported. Customer service is more important to consumers when they are buying experience goods. Given that service includes such transaction dimensions as customer support and whether the product meets expectations, this result makes sense: facing high chances of mismatch between the product and personal taste in experience goods, consumers are less concerned about potential loss when customer service is better. Explained variance was excellent at 79 percent, a figure that may reflect the possibly tautological effect of service quality on customer satisfaction.

Post Hoc Analysis

In Model 3, all variables related to website design are individually insignificant but website design is significantly positive in Model 1 (b = .038, p < .05). The conflicting result is a symptom of multicollinearity. As confirmed by the VIF statistics (Belsley et al. 1980), there is a concern in Model 3 about multicollinearity between the constitutive terms (i.e., website design, customer service, pricing) and the interaction terms between product uncertainty and the retailer characteristics. Because the problem was purely raised by the interaction terms of product uncertainty, we conducted a comparative sample-split analysis by dividing the retailers into high- and low-product uncertainty groups. We were interested in testing whether the three retailer characteristics play different roles across the two groups. The results are reported in Table 3.

As the results in Table 3 indicate, customer service is more important for retailers selling goods of high product uncertainty, providing additional evidence for H4a. Interestingly, website design has virtually no effect on customer satisfaction for retailers of search goods, but the effect is fairly large in

Table 3. Results of Comparative Sample-Split Analysis		
	Low Product Uncertainty	**High Product Uncertainty**
Constant	1.556* (0.732)	0.229 (0.410)
Customer service	0.694** (0.043)	0.868** (0.035)
Website design	0.025 (0.029)	0.041* (0.020)
Pricing	0.047** (0.005)	0.022* (0.011)
Number of ratings	0.104** (0.011)	-0.000 (0.000)
Online age	-1.230** (0.186)	-0.038 (0.093)
Online age square	0.106** (0.014)	0.003 (0.005)
Customer certified	0.036** (0.010)	-0.121* (0.062)
N	1327	8629
R²	0.77	0.78

Notes: * = significant at 0.05. ** = significant at 0.01 level. Standard errors are reported in parentheses.

the experience goods category, as hypothesized (b = .041, p < .05). This result offers partial support for H3a; that is, by reducing search costs for product quality information, better website design is able to alleviate the negative influence of product uncertainty. Figure 2b (graphed based on Table 3) demonstrates the moderating effect of website design. When product uncertainty is high, customer satisfaction is much higher when the website is well designed: the difference in customer satisfaction could be as large as 0.28. Further, the results suggest that price leadership strategy plays a more important role for retailers selling search goods, validating H5a.

Implications and Conclusion ∎

This study makes several important contributions to the research literature on online customer satisfaction. First, our study empirically investigates the impact of product uncertainty and retailer visibility on a consumer's evaluation of online purchase experience using real-world observations. The data comes from real consumers based on their real transaction experiences. This gives the results of our study more generalizability than studies using subjects who are not asked to engage in real transactions.

Second, while prior research has examined the effect of uncertainty on online customer shopping behavior (Levin et

al. 2005; Pavlou et al. 2007), our research is one of the first to investigate the role of pre-purchase uncertainty in post-purchase evaluations, which has been largely neglected in the literature. Our results indicate that product uncertainty indeed plays an important role in online customer satisfaction. Our research also examines the impacts of retailer visibility on satisfaction. Retailers that do not have high visibility must come up with effective ways to attract customers and alleviate the psychological distance between them and the consumers. Our paper sheds light on the importance of customer service for achieving that purpose.

Third, previous studies have examined the importance of retailer characteristics for online customer satisfaction. Our research similarly found some direct effects, like customer service and pricing on customer satisfaction. This research goes beyond those direct effects by focusing on an issue that has not been examined by the literature: What role do these retailer characteristics play in mitigating the product uncertainty and low retailer visibility faced by online consumers? By incorporating the moderating effects of retailer characteristics in our research model, we highlight the importance of understanding customer satisfaction in different contexts. The nature of the online products (search versus experience) and retailers (well recognized versus lesser known) should be taken into account when retailers develop their online competitive strategy.

This research offers several implications for practice. Satisfaction is generally believed to exert a dominant influence on key post-purchase consumer attitudes and activities, such as complaints, word of mouth, and repurchase behavior (Bettman 1979; Howard 1989). Keaveney and Parthasarathy (2001) recommend that managers target customer retention strategies at both pre- and post-purchase stages of the consumer's decision process. Our results show that during pre-purchase phases, managers should carefully design IT tools to make product information more accessible and to help potential customers to ascertain product quality. Although website design has an insignificant effect on customer satisfaction for retailers selling search goods, it becomes very important in the experience goods category. Thus, clear layout and variety of selection on the website can reduce the customer's search cost for quality information of experience goods. New technologies, like virtual product experience technology, can enable potential customers to experience online products virtually, which allows consumers to better understand and evaluate experience goods (Jiang and Benbasat 2005). In short, a well designed website can help consumers to reduce the welfare loss from the mismatch between products purchased and personal tastes.

Firms should focus on increasing online service quality during post-purchase phases; this is especially true for firms that are not well known. Our study indicates that customer service can mitigate the negative impact of being less visible. Poor service would have more devastating effects on relatively new and unknown retailers because of the negative affects associated with low visibility. To attract consumers, some retailers may resort to low introductory prices. According to our results, low prices can enhance customer satisfaction but their effect is not significant compared with customer service. More importantly, low prices do not alleviate the negative impacts of high product uncertainty and low retailer visibility. Therefore, retailers must provide superior service to reduce concerns from consumers about possible losses while trying out new stores. For example, customers will feel more at ease when they are frequently updated with the product processing/shipping status. This enables consumers to estimate waiting time and plan ahead, thus mitigating the impact of uncertainty. Excellent service quality also provides leverage for new retailers to overcome the negative impact of low recognition. They can take advantage of lower expectations and provide a positive service experience, leading to a pleasant surprise and high levels of positive disconfirmation (Westbrook and Oliver 1991). Combined with the large direct effect of customer service, these results highlight the importance of service provision no matter the product a retailer sells, and they justify the investment in service technology.

As with any research, this paper comes with a number of limitations, which open opportunities for further exploration in future research. First, we studied stores selling two types of products (i.e., books/magazines and apparel) in order to differentiate the degree of product quality uncertainty. To generalize the results of the study, more product categories would be desired.

Service has different dimensions, and the processes delivering different services online can also be different. In this research, we only studied service as an aggregate measure. However, conceptually, it is possible that some dimensions play a more significant role than others. Therefore, future theoretical investigations are warranted to understand what dimensions of service are important to delivering quality services.

Our results also have a very high explained variance level (79%), with customer service having a very high coefficient. Future studies should test whether customer service and customer satisfaction draw from the same source, and thus whether these strong results suggest the presence of common method variance.

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