

# The Moderating Role of the Price Frame on the Effects of Price Range and the Number of Competitors on Consumers' Search Intentions

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*The Internet and Internet shopping agents (ISAs) are likely to have a substantial impact on the way consumers shop and conduct price searches. This article examines how the price frame (the relative position of a retailer's price presented by ISAs) moderates the effects of the price range and the number of competitors carrying a product on consumers' search intentions. Building on prospect theory and range theory, the authors predicted that the effects of price range and the number of competitors on consumers' search intentions would be more pronounced in a negative price frame than in a positive price frame. The results of two experiments provide support for these predictions.*

**Keywords:** *shopping bot; price dispersion; Internet shopping agent; search intentions; price range; prospect theory; range theory*

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Various researchers have predicted that the Internet will change how people search and shop, because it can provide consumers with access to considerable information about prices and stores (e.g., Tang and Xing 2001). The advent of Internet shopping agents (ISAs), or shopping bots, such as BizRate.com and EvenBetter.com are changing how consumers shop. They reduce consumers' search costs by more than 30-fold compared with a conventional search conducted through telephone inquiries and store visits (Brynjolfsson and Smith 2000). An important but

unaddressed question is how consumers' search intentions will be affected by the array of price and competitor information.

The answer to this question is likely to be influenced by a host of factors, including the price ranges encountered by consumers. For example, the greater the price range, the greater are the potential benefits of a consumer's search (Putrevu and Ratchford 1997). This is the case for grocery shopping, in which context consumers estimate the perceived price range and weigh it against the costs of their search to determine likely financial returns (Urbany, Dickson, and Kalapurakal 1996). When shopping with ISAs, consumers can calculate the price range (the difference between these two prices), which is likely to play an important role in consumers' decisions to engage in additional searching.

Another factor that affects searching (and search intentions) is the number of competitors in the marketplace that offer a given product. As tools that present product and pricing information for several competitors, shopping bots represent the nearest approximation of Adam Smith's perfect competition that we have found in a modern economy (Lal and Sarvary 1999). Therefore, we might expect that when a particular ISA search provides a greater number of competitors, a consumer is less likely to engage in additional searching.

Finally, the way ISAs present information is also likely to affect additional searching. Framing research demonstrates that consumers are likely to react differently to prices when they are viewed more or less favorably relative to other prices (Adaval and Monroe 2002). Additionally, research has demonstrated that message frames

moderate the effect of price cues (Grewal, Gotlieb, and Marmorstein 1994). In this study, we operationalized message frame (positive vs. negative) in terms of the relative positioning of an offering by a retailer familiar to a consumer.

In our study, a negative frame was one in which a familiar retailer's price was the second highest out of the array of retailer prices presented. A positive frame was one in which the familiar retailer's price was the second lowest out of the array of retailer prices presented. We build on prospect theory to suggest that price frame moderates the effects of the range of prices (i.e., the highest minus lowest price) and the number of competitors (i.e., the number of prices found during a product search) on consumers' search intentions. More specifically, we focused on consumers' search intentions for a lower price (e.g., "Before making a purchase decision, I would visit other web sites that sell [product used in the studies] to check their prices").

## CONCEPTUAL UNDERPINNINGS AND HYPOTHESES

Prior research has linked price range and the intensity of competition to searching and search intentions (Beatty and Smith 1987). When consumers conduct searches in a shopping bot environment, they are provided with many competitors (or retailers) selling particular products and the price each charges (i.e., they are exposed to a range of prices). Search literature (e.g., Grewal and Marmorstein 1994) suggests that the greater the price range and the number of competitors to which a consumer is exposed, the lower his or her intentions will be to search for additional price information.

Past research has consistently provided evidence that contextual influences or frames of reference play an important role in how consumers process information (Rajendran and Tellis 1994). More specifically, context has been shown to affect preferences for familiar stimuli (Cooke, Sujana, Sujana, and Weitz 2002). Because shopping bots generally provide multiple prices for any product, we believe that the effects of the price range and the number of competitors on consumers' search intentions will be moderated by the contextual position of a familiar retailer's price relative to others in the choice set. This relative position is termed the *price message frame* in this research.

### Price Frame: Familiar Retailer's Price Relative to Competitors' Prices

Existing knowledge structures serve as frames of reference against which incoming stimuli are judged (Inman, Peter, and Raghuram 1997). When a consumer evaluates a given retailer's offering, his or her perceptions are

influenced by the prices offered by competitors. Furthermore, the order in which consumers are exposed to alternative prices may affect their price perceptions. As demonstrated by Adaval and Monroe (2002), consumers evaluate products as less expensive when other products in the context are priced higher (a positive price frame, or a gain in prospect theory) and as more expensive when other products are generally priced lower (a negative price frame, or a loss in prospect theory). Therefore, price frames are likely to moderate the effects of additional information.

### Price Range by Price Frame Interaction

Prior research has consistently demonstrated that consumers make cost-benefit assessments before deciding to undertake additional searching (Marmorstein, Grewal, and Fiske 1992). Consumers estimate the price range and weigh it against the costs of additional searching to determine their likely financial returns. Range theory suggests that the range of the value of various stimuli is a determinant of the perceived value of any one stimulus (Janiszewski and Lichtenstein 1999). In the context of a shopping bot, consumers are likely to use the endpoints (i.e., the price range) to determine if additional searching is required.

Prior research also suggests that consumers prefer offers from familiar retailers—such as Amazon.com, Barnes & Noble.com, and Borders in a book retailer context—even after observable product differences, such as price and shipping, are taken into consideration (Dodds, Monroe, and Grewal 1991). In pretests for this research, we determined that Amazon is a familiar retailer for most consumers. Therefore, we framed Amazon's price as the second highest to create a positive frame (or gain condition) and in another condition as the second lowest to create a negative frame (or loss condition). For both frames, we used an identical dollar amount difference.

Using Kahneman and Tversky's (1979) seminal work on prospect theory as a foundation, many researchers have examined the way consumers evaluate offers that are viewed as gains versus those viewed as losses and found that framing affects the way consumers process information (e.g., Levin, Schneider, and Gaeth 1998; Maheshwaran and Meyers-Levy 1990). More specifically, when consumers are exposed to negative frames, they seek risk and use heuristic information to process price information. In addition, price has a greater effect on risk perceptions when consumers are exposed to negative frames than when they are exposed to positive frames (Grewal et al. 1994). Similarly, Roggeveen, Grewal, and Gotlieb (2005) found that the effect of store reputation on performance risk was more pronounced in a negative frame than a positive frame. In contrast, positive frames tend to result

in consumers who are risk averse and evaluate information more carefully. In both these studies, the message frames were manipulated in comparative ads.

Building on prospect theory and the associated empirical work discussed above, we predicted that the effect of price range (an information cue) on consumers' search intentions would likely be moderated by the price frame. That is, when consumers are exposed to negative frames, they are likely to use more heuristic information. As a consequence, they are likely to use price range information as a cue and conclude that searching for additional price information is not worthwhile. However, when they are exposed to positive frames, they are likely to be more risk averse, and price range information is less likely to affect their search intentions. Thus, we propose the following hypothesis:

*Hypothesis 1:* There will be an interaction effect of price range and price frame on consumers' search intentions. Specifically, the price range will reduce search intentions to a greater extent when the price frame is negative than when it is positive.

### Number of Competitors by Price Frame Interaction

A greater number of competitors for a given product should increase price competition (Ratchford and Srinivasan 1993). Therefore, consistent with economic theory, we expect that as retail competition increases, it reduces the benefits of additional searching. We also expect that the price frame moderates the effect of the number of competitors on consumers' search intentions. Consumers exposed to negative price frames are likely to seek more risk (Grewal et al. 1994) and use the number of competitors as a heuristic cue that it is not worthwhile to search for additional price information. In contrast, when they are exposed to positive price frames, they are likely to be more risk averse (Grewal et al. 1994), and the heuristic cue of the number of competitors is less likely to affect their search intentions. Thus, we posited the following hypothesis:

*Hypothesis 2:* There will be an interaction effect of the number of competitors and price frame on consumers' search intentions. Specifically, the number of competitors will reduce search intentions to a greater extent when the price frame is negative than when it is positive.

## EXPERIMENT 1

The following three variables were examined in a between-subjects experiment: (1) the price range, (2) the number of competitors, and (3) the price frame.

## Experimental Design

We tested the hypotheses using a  $2 \times 2 \times 2$  between-subjects experiment with two levels each of price range (high and low), number of competitors (four and nine), and price frames (the negative frame, in which the familiar retailer's price was the second highest, and the positive frame, in which the familiar retailer's price was the second lowest), for a total of eight conditions. The 209 participants from a northeastern U.S. business school had an average age of 20 years, consisted of 46 percent women, spent an average of 23.6 hours on the Internet per week, had purchased products on the Internet an average of 8.6 times in the preceding year, and had spent an estimated average of \$665 online during the preceding year.

We chose a VCR as the stimulus in the experiment because of its product characteristics. That is, a VCR is perceived as a more digital product (Lal and Sarvary 1999), it is more practical with regard to shipping charges, it requires few aesthetic considerations for its choice, and it involves few variations in the number of available features or options. For a particular model of VCR, participants were provided with a detailed description of its features, the retailer's name, its offering price, its 10-point quality rating, and its on-time delivery percentage. We used a JVC Super VHS VCR HRS4800 because its price represented the average of the 79 VCR models available on the BizRate.com Web site at the time of our investigation.

## Pretests

We conducted a pretest ( $n = 15$ ) to determine consumers' familiarity with individual Internet retailers and thereby establish sets of well-known and relatively unknown retailers. We subsequently used the retailers' names as the familiarity (well-known) manipulation in the experiment. Results from the pretest indicated that BestBuy.com and Amazon.com were the best known electronics (televisions and VCRs) retailers among our participants. The list of the most unfamiliar Internet retailers, in ascending order of familiarity, is as follows: AMDV.com, Emkt.com, Brandsmall.com, Buy.com, Photoalley.com, Cyberteria.com, 800.com, and AbtElectronics.com.

Through another pretest with 29 participants, we confirmed that the positive frame (Amazon's price was the second lowest) was perceived as a gain or better value than the negative frame (Amazon's price was the second highest),  $M_{\text{positive}} = 4.30$  versus  $M_{\text{negative}} = 3.11$ ,  $t(27) = 2.34$ ,  $p < .05$ . For this posttest, we used a three-item value scale ( $\alpha = .92$ ). The three items were as follows: "If I acquire this VCR, I think I would be getting good value for the money I spend"; "Before making a purchase decision, there is a high probability that I would buy a VCR from this

retailer”; and “I think that given this VCR’s features, it is a good value for the money.”

## Method

In the main experiment, we presented participants with the following text, in which the worksheet used to administer the experiment instructed participants to

try to imagine that you are planning to purchase a VCR. You have decided to check the selection of VCRs on the Internet using BizRate.com (a rating site and a search site for numerous products). You have been considering the VCR model that is shown on this page.

This text was followed by an advertisement for the VCR. Participants were told,

You have decided to try out one of the Internet rating services that do side-by-side price comparisons for a particular model of VCR.

On the next page you will be presented with a page of an Internet Rating service called BizRate.com. You will see a page that includes a side-by-side comparison of retailers that offer the particular model of VCR that you are interested in. You were assuming you would probably make a purchase from Amazon.com, since you have heard a great deal about them.

Participants were presented with one of eight conditions. They viewed a mock retailer and price page from BizRate.com that listed either four or nine retailers, depending on the condition, but Amazon.com, as the familiar retailer, was always included. The other three or eight retailers had been determined by the pretest as unfamiliar. The information about the highest and lowest priced retailers was the same in all eight conditions; Amazon.com was positioned as either the second highest (negative price frame) or the second lowest priced (positive price frame) retailer, with a constant offer price of \$199.99. We manipulated the price range by changing the highest price and listing the prices as ranging either from \$224.99 to \$164.99 (\$60, low price range) or from \$274.99 to \$164.99 (\$110, high price range).

After presenting participants with this scenario, a description of the product in the form of a Web advertisement and the BizRate.com search information with the experimental manipulations, we asked the participants to respond to a questionnaire.

## Measurement

The dependent variable was participants’ search intentions for a lower price (Grewal, Monroe, and Krishnan

1998). We measured the scale items on a 7-point, Likert-type scale (ranging from *strongly disagree* to *strongly agree*) with a Cronbach’s  $\alpha$  of .79. The three items were

- “I think I could find a lower price if I checked the prices at additional Internet retailers”;
- “Before making a purchase decision, I would visit other Web sites that sell digital VCRs to check their prices”; and
- “Before making a purchase decision, I would need to search for more information about prices of alternative VCRs.”

## Results and Analyses

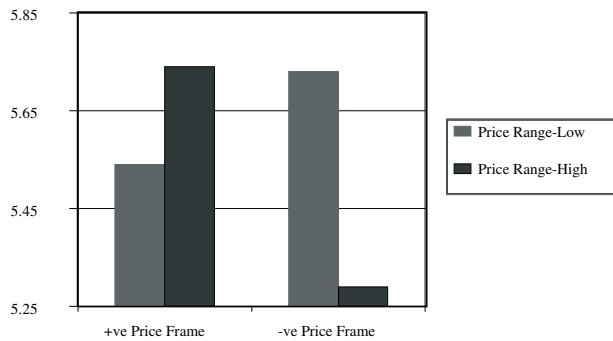
*Manipulation checks.* When they finished the survey, participants were asked to respond to three manipulation check questions: “What was the highest price for the VCR?” (a higher price would evoke a higher price range); “How many retailers were presented in the BizRate.com search?” (number of competitors); and “Was Amazon’s price near the low end or the high end?” (price frame).

The results indicated that the manipulations worked as intended. As we expected, the greater price range condition was perceived to have a higher price, low = \$244.08, high = \$266.43,  $t(205) = 2.64$ ,  $p < .01$ . We also asked the participants to estimate the lowest and highest prices they would expect to pay for the VCR, as suggested by Grewal et al. (1998). We calculated the difference between the highest and the lowest named prices, and the analysis of variance (ANOVA) results indicated that the manipulated price range significantly affected the measured price range (highest price estimate – lowest price estimate),  $M_{\text{high}} = \$119.86$  versus  $M_{\text{low}} = \$93.06$ ,  $F(1, 199) = 10.85$ ,  $p < .001$ . Participants correctly recalled the number of retailers, low = 4.06, high = 8.64,  $t(206) = -33.92$ ,  $p < .001$ . Finally, our manipulation check for the price frame was effective; participants correctly recalled Amazon’s price position relative to its competitors’,  $\chi^2(1) = 123.36$ ,  $p < .001$ .

*Hypotheses tests.* The  $2 \times 2 \times 2$  experimental design was analyzed using ANOVA procedures. For Hypothesis 1, the ANOVA results supported an interaction between price range and price frame on search intentions,  $F(1, 201) = 3.88$ ,  $p < .05$ . The means are plotted in Figure 1, and the results are consistent with Hypothesis 1. The effect of price range on price search intentions was more pronounced when the price frame was negative,  $M_{\text{PR low}} = 5.74$  versus  $M_{\text{PR high}} = 5.29$ ,  $F(1, 201) = 3.71$ ,  $p < .05$ ,  $\eta = .13$ , than when the price frame was positive,  $M_{\text{PR low}} = 5.54$  versus  $M_{\text{PR high}} = 5.74$ ,  $F(1, 201) = 0.75$ ,  $p = ns$ ,  $\eta = .06$ .

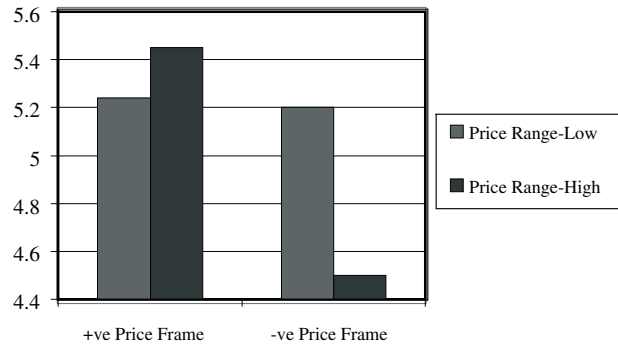
However, the ANOVA results did not support Hypothesis 2 with regard to the interaction between the number of competitors and the price frame on search intentions,  $F(1, 201) = 0.72$ ,  $p = ns$ , though we found a main effect for the

**FIGURE 1**  
Price Range by Price Frame Interaction,  
Experiment 1



NOTE: +ve = positive; -ve = negative.

**FIGURE 2**  
Price Range by Price Frame Interaction,  
Experiment 2



NOTE: +ve = positive; -ve = negative.

number of competitors,  $M_{4 \text{ stores}} = 5.73$  versus  $M_{9 \text{ stores}} = 5.41$ ,  $F(1, 201) = 3.76$ ,  $p < .05$ . The role of the number of competitors may have been affected by the identical lowest prices in all eight conditions; that is, consumers may be more likely to be affected by the lowest price in the marketplace than by the highest price.

As we have noted, both the Amazon.com price and the lowest presented price were constant across all eight conditions. To investigate the effect of this constancy, we replicate our experimental study in the following experiment but have changed the highest price in all eight conditions to \$249.99.

## EXPERIMENT 2

Experiment 2 was identical to Experiment 1 in most respects, except that we manipulated the price range using the lowest instead of the highest price. Price range was manipulated by listing prices ranging from \$249.99 to \$174.99 (\$75, low price range) and from \$249.99 to \$124.99 (\$125, high price range).

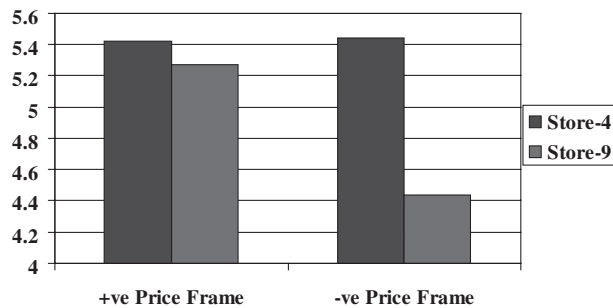
We tested the hypotheses using a  $2 \times 2 \times 2$  between-subjects experiment with two levels each of price range (high and low), number of competitors for the particular VCR model (four and nine), and price frame (negative and positive), for a total of eight conditions. The 253 participants were drawn from the staff and graduate students of a northeastern U.S. business school. The average age of the respondents was 32 years, 56 percent were women, they spent an average of 13.4 hours on the Web per week, they had purchased an average of 13 times on the Internet in the past year, and they had spent an estimated average of \$852 online during the past year. We used the same search intention scale, which had a Cronbach's  $\alpha$  of .80 in this experiment.

## Results and Analyses

*Manipulation checks.* At the end of the survey, we asked participants to respond to the same manipulation check questions. The results indicated that the manipulations worked as intended. As expected, the greater price range condition was perceived to have a lower price, low = \$175.00, high = \$130.11,  $t(246) = 27.07$ ,  $p < .001$ . We calculated the difference between the highest and the lowest price (as in Experiment 1), and the ANOVA results indicated that the manipulated price range significantly affected the measured price range (highest price estimate – lowest price estimate),  $M_{M\text{-low}} = \$81.14$  versus  $M_{M\text{-high}} = \$122.36$ ,  $F(1, 236) = 37.88$ ,  $p < .001$ ). Participants correctly recalled the number of competitors, low = 4.12, high = 8.80,  $t(249) = -34.32$ ,  $p < .001$ . Finally, the price frame manipulation check was effective; participants correctly recalled the position of Amazon relative to its competitors, namely, the price frame,  $\chi^2(1) = 154.57$ ,  $p < .001$ . We also found a significant effect of the number of competitors on the price range. These results suggest that as the number of stores that carry a product increases, participants expect the price range to decrease,  $M_{4 \text{ stores}} = \$112.62$  versus  $M_{9 \text{ stores}} = \$93.69$ ,  $F(1, 236) = 6.85$ ,  $p < .01$ .

*Hypotheses tests.* The  $2 \times 2 \times 2$  experimental design was analyzed using ANOVA procedures. For Hypothesis 1, the ANOVA results supported an interaction effect between price range and price frame on search intentions,  $F(1, 245) = 4.30$ ,  $p < .05$ . As the plotted means in Figure 2 show, the results were consistent with our hypothesis. The effect of price range on price search intentions was more pronounced when the price frame was negative,  $M_{PR \text{ low}} = 5.19$  versus  $M_{PR \text{ high}} = 4.61$ ,  $F(1, 245) = 5.52$ ,  $p < .05$ ,  $\eta = .15$ , than when it was positive (second lowest price),

**FIGURE 3**  
**Number of Competitors by Framing Interaction,**  
**Experiment 2**



NOTE: +ve = positive; -ve = negative.

$M_{PR\ low} = 5.33$  versus  $M_{PR\ high} = 5.46$ ,  $F(1, 245) = 0.30$ ,  $p = ns$ ,  $\eta = .035$ .

The ANOVA results also indicated an interaction between the number of competitors and the price frame on search intentions,  $F(1, 245) = 5.15$ ,  $p < .05$ , in support of Hypothesis 2. The means are plotted in Figure 3. The effect of the number of available competitors on price search intentions was more pronounced when the price frame was negative,  $M_{4\ stores} = 5.41$  versus  $M_{9\ stores} = 4.43$ ,  $F(1, 245) = 15.18$ ,  $p < .001$ ,  $\eta = .24$ , than when it was positive,  $M_{4\ stores} = 5.50$  versus  $M_{9\ stores} = 5.30$ ,  $F(1, 245) = .62$ ,  $p = ns$ ,  $\eta = .05$ .

## GENERAL DISCUSSION

We must note several limitations of our studies. First, our key dependent variable was search intention for a lower price, as opposed to actual searching. It would be important for future inquiries to design a computer-based study and track actual searching behavior. Second, we did not incorporate the moderating effects of individual-level variables, such as involvement and consumers' risk propensity. Third, other contextual factors may also moderate the effects of price range and the number of competitors on consumers' search intentions. For example, ISAs sometimes provide multiple-page search responses. Do consumers tend to choose from the first page? In what format do consumers prefer to view the retailer information (e.g., price ascending, price descending, by brand)? Does this format influence search intentions and searching behaviors? Finally, in our studies, we focused on a situation in which consumers were making a purchase from a well-known retailer. Because retailer credibility may be of greater concern to Internet consumers because there is no human contact or brick-and-mortar location, it would be

important to assess the effects when a retailer is less known or less credible. Is consumer trust in a retailer therefore a more critical issue on the Internet?

With this article, we present empirical evidence from two experimental studies regarding the moderating effects of price frames on the influence of price range information and the number of competitors on consumers' search intentions. Building on seminal research by Kahneman and Tversky (1979), previous research has examined the role of message framing in a variety of contexts (e.g., Maheshwaran and Meyers-Levy 1990). We explicitly predict and find support for an interaction between framing and price range on consumers' search intentions. Specifically, when the price frame is negative, consumers are likely to use the price range information as a cue to infer that searching for additional price information is not worthwhile. However, when they are exposed to positive price frames, they are likely to be risk averse, and price range information does not affect their search intentions.

On the basis of research in microeconomic theory and on consumer searching, we also might expect that the greater the number of competitor's prices a consumer can access, the lower his or her additional searching will be. Again building on Kahneman and Tversky's (1979) prospect theory, we explicitly predict and find support in Experiment 2 for the interaction between framing and the number of competitors on consumers' search intentions. Specifically, we find that the number of competitors reduces search intentions when the price frame is negative but does not affect search intentions when the price frame is positive.

Our research demonstrates how price framing moderates the effects of price range and the number of competitors on consumers' search intentions. Our research in conjunction with prior message-framing research (e.g., Grewal et al. 1994) demonstrates that consumers' responses to information cues (e.g., price range, number of competitors, store reputation) are contingent on how the prices are framed or communicated in ads, in flyers, within stores, and online.

Retailers therefore must monitor their prices to ensure that their prices are being presented in the best light by ISAs. These ISAs are also an excellent means for retailers to monitor competitive prices and then use that information to engage in a dynamic pricing system in which they change their prices to be in line with their overall strategies or targeted price images (e.g., to be closer to the high end, low end, or middle). Additionally, retailers need to be cognizant that competitors can monitor their prices via shopping bot information. Thus, pricing information must be carefully planned and managed.

Shopping bots also present information in various ways and enable consumers to sort that information using different methods. Further research should therefore assess whether the different default sorting methods (e.g., price,

quality rating) offered by shopping bots can moderate the effectiveness of the provided information and affect consumers' purchase or search behaviors. Such insights would be valuable for both retailers and ISA managers in that they could obtain a better understanding of which sorting methods result in higher purchases. Those sorting mechanisms could be made the default.

In our two experimental studies, we examined the effects of manipulating the price range by changing either the highest price (Experiment 1) or the lowest price (Experiment 2). The familiar retailer's price was \$199.99 in every condition. Additional research should assess the effects of more specific price dispersion manipulations rather than just price range manipulations. For example, studies could manipulate price dispersion by changing the levels of variance in the prices to which the participants are exposed. Because participants may be more influenced by end prices than by prices within the competitive array (Monroe 2003), price dispersion may suggest a more pronounced effect when manipulated through end prices than through prices within the competitive array.

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