

## Consumer Perceptions of Deals: Biasing Effects of Varying Deal Prices

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Some brands in the market opt to offer a single “deal” price (e.g., Pepsi brand soft drink at \$1.09 every alternate week), whereas others opt to offer 2 or more deal prices (e.g., Coca-Cola brand soft drink at \$0.99 in Week 1 and \$1.19 in Week 3). It was hypothesized that offering multiple deal prices is likely to result in underestimation of deal frequency and average deal price, which will bias the price consumers are willing to pay for the brand. Results from 3 laboratory experiments, a longitudinal experiment, and a survey support the hypotheses. In addition, consumers are likely to be willing to pay more for the brand when it is offered at 2 deal prices with a small difference compared with a single deal price. Implications of these findings for consumer welfare and pricing policy are discussed.

Marketers often offer different deal prices in the market (Raju, 1990). *Deal price* refers to the offer of a brand at a price that is lower than the regular price for the brand. In a recent survey of soft drink prices that we conducted for 12 weeks, we found varying numbers of deal prices. For example, at the same store, Dr. Pepper brand soft drink (regular price of \$1.69) was offered at two deal prices with a relatively large difference (\$0.99 and \$1.49), Pepsi was offered at a single deal price (\$0.99), and Coca-Cola was offered at two deal prices with a relatively small difference (\$0.99 and \$1.19). We believe that utilization of a multiple deal price strategy can affect the relative salience of deals. Specifically, we assume that the higher of two deal

prices is less salient than the lower of two deal prices because consumers are likely to be motivated to save money. Given this perspective, research on estimation of event frequency suggests that some occurrences of the higher of two deal prices may not be recalled because of their diminished accessibility as compared with the lower of two deal prices (Blair & Burton, 1987). This is likely to result in underestimation of overall deal frequency when two deal prices are utilized compared with a single deal price.

Studying perceptions of deal frequency and understanding how they are formed are important issues because they help us to gain insight into the processes by which consumers make purchase decisions such as the quantity to purchase on each deal and how much to pay for the brand. For example, if consumers believe that a brand is not offered on deal very often, they may purchase a larger quantity when it is on deal versus if they think that it is promoted very often. Furthermore, given their belief of a large interdeal time gap, they may not stockpile from deal to deal and may be willing to buy when the brand is not on deal thus paying greater than deal price for it. In addition, research on consumer perceptions of multiple deal prices can also reveal whether consumers make purchase decisions that are based on accurate knowledge of deals. Therefore, we study the effect of difference in deal prices on consumer percep-

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tions of deals. *Difference in deal prices* refers to the magnitude of the difference between deal prices.

We address the following question in this research: how does difference in deal prices affect (a) perceived deal frequency, (b) perceived average deal price, and (c) the price that consumers are willing to pay for the brand. First, we review the relevant literature and propose our hypotheses. Next, we discuss a laboratory experiment that tests the hypotheses. We then replicate this experiment using different levels of actual deal frequency. Following this, we report the results of a longitudinal experiment and a survey of supermarket shoppers that were conducted as tests of the external validity of the laboratory experiments. The final section of the article discusses the findings and implications of this research.

### Consumer Perceptions of Deal Frequency and Average Deal Price

Because this is the first study to examine the effects of varying deal prices, we restrict ourselves to the case of two deal prices that occur equally often. In the final section, we elaborate on how our results would change if we were to look at more than two deal prices and if the deal prices occurred with unequal frequency.

#### *Effects of Varying Deal Prices on Perceptions of Deal Frequency*

Consumers may judge the number of deals in a time period by recalling and counting every occurrence of a deal or by estimating the number of deals using procedures such as retrieving a rate-of-occurrence of deals from memory (Blair & Burton, 1987; Burton & Blair, 1991; Ross, 1984; Schwarz, 1990). Consumers may also use a combination of the two strategies and adjust frequency estimates based on rates of occurrence using a recall and count strategy (Menon, 1993). Menon also suggested that regardless of the strategy used to make judgments, the ease with which an event can be recalled (i.e., its accessibility) is likely to affect the accuracy of frequency judgments. In the case of deal frequency judgments, if a pure recall and count strategy is used, then more accessible deals may be recalled, and less accessible deals may be omitted resulting in deal frequency underestimation. If an estimation strategy is used, then less

accessible deals may not be used in computing heuristics such as rate of occurrence. This would lead to underestimation of deal frequency. If a combination of the two strategies is used, the bias remains the same. We discuss below the relative accessibility of different deals in the single vs. multiple deal price conditions and its effect on deal frequency judgments.

#### *Single Deal Price*

When there is a single deal price, each occurrence of a deal is similar to other occurrences of deals. In this situation, consumers are likely to have fairly accurate estimates of rates of occurrence of deals and may use this estimate to form deal frequency judgments rather than following a more effortful strategy of recalling and counting every occurrence of a deal (Menon, 1993). For example, if they encounter a deal for 1 week in every month at the same price, they are likely to store the rate of occurrence of once a month after observing this pattern over time.

#### *Two Deal Prices*

When a product has two different deal prices over time, the higher of the two deal prices may not be encoded as a deal. If this is so, then the higher deal price is less likely to be recalled than the lower deal price resulting in underestimates of deal frequency. Even if the higher deal price is encoded as a deal, the lower deal price (i.e., the deal price yielding the larger discount) is likely to be more easily recalled than the higher deal price for two reasons. First, if we assume that most consumers are motivated to buy the product at a lower price, then the lower deal price is likely to be more salient than the higher deal price. Second, even though both deal prices are lower than the regular price, the lower priced deal has a greater contrast with the regular price compared with the higher priced deal, thus increasing its salience.

This greater salience of the lower priced deal is likely to have two effects. As explained above, lower priced deals are likely to be easier to recall than higher priced deals (Blair & Burton, 1987; McArthur, 1981). Second, recall of higher priced deals is likely to be inhibited as a result of *output interference*, which states that recall of a subset of information results in the reduced recall of the rest

of that information (Rundus, 1973). The more salient lower priced deals are likely to be recalled first, and this recall is likely to inhibit recall of the higher priced deals.

The ease of recall of lower priced deals, combined with the inhibited recall of higher priced deals, is likely to result in underestimation of overall deal frequency. As discussed earlier, this result is expected regardless of the strategy used to make deal frequency judgments.

The discussion has so far led to the following hypotheses:

When there are two deal prices (occurring with equal frequency), perceived deal frequency of the higher priced deal is likely to be lower than perceived deal frequency of the lower priced deal. (Hypothesis 1)

Perceptions of overall deal frequency are likely to be (a) less accurate and (b) lower when there are two deal prices compared with a single deal price. (Hypothesis 2)

#### *Effects of Varying Deal Prices on Perceptions of Average Deal Price*

We hypothesized that deal frequency would be underestimated when deals are offered at two different prices compared with a single deal price because of easier recall of the lower deal price compared with the higher deal price. Easier recall of the lower deal price is also expected to affect perceptions of average deal price.

#### *Single Deal Price*

Perceptions of average deal price are likely to be more accurate when there is repeated exposure to a single deal price versus exposure to different deal prices. Average deal price is the same as the single deal price in this condition and does not need to be calculated as it does in the two deal prices condition. Computation of the average deal price in the single deal price condition involves recall of only one deal price, whereas in the two deal price condition both prices need to be recalled. The accuracy of the average deal price is, therefore, expected to be greater in the single deal price condition compared with the two deal price condition.

#### *Two Deal Prices*

As discussed in the section on perceptions of deal frequency, the lower priced deals are likely to be more salient than the higher priced deals. This greater salience of the lower priced deal can affect perceptions of average deal price in two ways. First, consumers may use heuristics to judge the average deal price. In this situation, the more salient lower deal price may be used as an anchor to make judgments of average deal price, and this process may result in judgments that are close to the lower deal price. The anchor is likely to be insufficiently adjusted by the higher deal price (Tversky & Kahneman, 1974). The weight of the anchor relative to the adjustment may be influenced by contextual cues such as the perceived frequency of the anchor deal price relative to the higher deal price (Einhorn & Hogarth, 1986). According to Hypothesis 1, perceived frequency of the anchor (lower deal price) will be greater than the perceived frequency of the adjustment (the higher deal price). Hence, even if adjustment occurs, it is likely to be insufficient.

If consumers are motivated and able to process the price information, they may use an effortful strategy and compute the average deal price. In this case also, the lower priced deal may affect judgments of average deal price through its effect on deal frequency judgments. In computing the average deal price, the lower deal price will be given a greater weight because of its higher perceived frequency (Hypothesis 1), resulting in a lower mean perceived deal price. Hence, regardless of whether consumers rely on heuristics or compute the average deal price, perceptions of average deal price are likely to be lower when there are two deal prices compared with a single deal price. Therefore:

The perceived average deal price is likely to be (a) less accurate and (b) lower when there are two deal prices compared with a single deal price. (Hypothesis 3)

#### *Price Consumers Are Willing to Pay*

How do perceptions of deal frequency and price affect consumer behavior? One indicator of purchase likelihood is the price that consumers are willing to pay for the brand. This measure has been widely used in the social sciences (Ajzen & Driver,

1992; D. P. Green & Blair, 1995). Price willing to pay may not be an unbiased indicator of purchase likelihood because it does not imply that purchases will necessarily be made at the stated price. However, prior research has found that the price respondents are willing to pay is correlated with actual purchasing behavior (Banks, 1950; Gabor, 1985; P. Green & Tull, 1978; Udell, 1965) and that people report the same "price willing to pay" regardless of whether they have to back up their responses with a cash payment (Bohm, 1972; Dickie, Fisher, & Gerking, 1987). Therefore, we consider the effects of perceived deal frequency and average deal price on the price that consumers are willing to pay for the brand.

Hypotheses 1, 2, and 3 predict that varying deal prices is likely to affect perceptions of deal frequency and average deal price. Past research has shown that these perceptions have an effect on the price that consumers are willing to pay for a brand. In terms of deal frequency, it has been shown that consumers are willing to pay less for a brand as perceived deal frequency increases (Kalwani & Yim, 1992; Krishna, 1991). In terms of deal price, past research suggests that consumers are willing to pay more for a brand as perceived average deal price increases (Kalwani & Yim, 1992; Monroe & Petroschius, 1981). We hypothesize that varying deal prices is likely to affect perceptions of both deal frequency and average deal price. Hence, varying deal prices is also likely to affect the price that consumers are willing to pay for a brand.

Compared with a single deal price situation, perceptions of deal frequency (Hypothesis 2b) and average deal price (Hypothesis 3b) are expected to be lower when there are two deal prices. However, given the opposing effects of these variables on the price consumers are willing to pay, it is not clear which effect will be stronger. Furthermore, when deals do not occur every week, consumers may also use perceptions of regular price and regular price frequency to judge average price. Perceptions of average price (across deal price and regular price purchase occasions) may also be used as input to decide on a price that the consumer is willing to pay. The effect of varying deal prices on price that consumers would be willing to pay for a brand is examined as an exploratory issue in this article. Studying the prices that consumers are willing to pay can provide insight into biases in consumer decision making and has implications for con-

sumer welfare. For example, if results reveal that consumers are willing to pay more for the brand when there are two deal prices, then manufacturers can exploit such biases by offering multiple deal prices and then charging higher prices for the brand.

### General Method: Experiments 1, 2, and 3

The hypotheses were tested in an interactive computer-simulated environment. Computer-simulated shopping experiments have been used previously by many researchers to study the effect of different price sequences on purchase behavior (Buyukkurt, 1986; Krishna, 1991, 1994; Urbany, Bearden, & Weilbaker, 1988). In addition, similar results have been obtained by using laboratory settings and scanner data (Simonson & Winer, 1992) and laboratory settings and real shopping trips (Burke, Harlam, Kahn, & Lodish, 1992).

The soft drink product category was chosen for three reasons. First, in a pretest we found that most college students purchased soft drinks frequently in the grocery store. Second, this product category has been used in past research and has been successful in maintaining participant interest (McAlister, 1982). Third, Burke et al. (1992) found that laboratory experiments using soft drinks closely paralleled real shopping trips in terms of brand-switching, average length of run, and market share.

### *Independent Variables*

Deal prices were varied in a between-subjects experimental design. Three points on the deal price difference continuum were selected: single deal price (\$1.09), small difference (two deal prices: \$0.99 and \$1.19), and large difference (two deal prices: \$0.79 and \$1.39). Both small and large differences were used to operationalize the two deal price condition in order to test the generalizability of our results. We selected the levels for small and large difference in deal prices on the basis of two pretests and on a survey of deal prices for soft drinks.

The first pretest was done to ensure that prices in all deal price conditions (especially the high deal price in the large difference condition) were encoded as deals. This was done with an adaptation of Monroe's (1971) own-category experimental technique. We informed 25 graduate students

about the regular price of a 2-L soft drink (\$1.59). They were then presented with a series of deal prices ranging from \$0.29 to \$1.69 at 10-cent intervals. Prices were arranged in random order, and this order was varied among the participants. Each participant classified the prices into one of the following five categories: "The deal price is too low. I cannot believe that it's a true deal price"; "This is a good deal price"; "This is an acceptable deal price"; "This is not a good enough discount to call it a sale"; and "This is not a sale." All participants labeled \$1.59 and \$1.69 in the fifth category indicating that they took the test seriously. Deal prices used in the four experiments reported here (\$0.79, \$0.99, \$1.09, \$1.19, and \$1.39) were considered good or acceptable deals by all participants.

A second pretest was done for two reasons, first, to establish that the lower of the two deal prices in each of the two deal price conditions was perceived to be more attractive than the higher of the two deal prices (given that from the first pretest all deal prices were perceived to be deals) and second, to ensure that the difference between the low and high deal prices was perceived to be significantly smaller in the small difference condition compared with the large difference condition. We pretested eight different prices (\$0.79, \$0.89, \$0.99, \$1.04, \$1.09, \$1.19, \$1.29, and \$1.39) by asking 19 students to rate each deal price on a 11-point scale anchored with *not an attractive price reduction* and *extremely attractive price reduction*. The deal prices were presented in two random orders across participants. The regular price (\$1.59) was presented along with each deal price.

On the basis of the pretest results, we chose \$0.99 and \$1.19 as the prices for the small deal difference and \$0.79 and \$1.39 as the prices for the large deal difference conditions. These prices ensured that the mean deal price was constant across both conditions. The mean deal price of \$1.09 was thus chosen to be the deal price in the single deal price condition. Also, for both conditions, the lower of the two deal prices was perceived to be more attractive than the higher of the two deal prices; \$0.99 versus \$1.19, attractiveness  $M_s = 9.42$  versus 7.10,  $t(18) = 6.60$ ,  $p < .01$ ; \$0.79 versus \$1.39, attractiveness  $M_s = 10.52$  versus 5.52,  $t(18) = 12.82$ ,  $p < .01$ . Furthermore, the difference in attractiveness between the low and high deal price was perceived to be significantly less in the small

difference condition prices compared with the large difference condition prices; mean differences = 2.32 versus 5.00,  $t(18) = 8.76$ ,  $p < .01$ .

We also surveyed supermarket prices to ensure that these price differences were realistic. We found support for the small and large difference in deal prices that emerged from the pretest. The survey showed that the difference in deal prices for the same brand of soft drinks ranged from 20 cents to 50 cents across stores. This is similar to the difference levels that we chose to operationalize small (deal price difference of 20 cents) and large difference (deal price difference of 60 cents). Furthermore, the specific prices used in the experiment were also found to occur sometimes in the market.

#### *Actual Deal Frequency, Average Deal Prices, and Regularity*

In Experiment 1, in all three deal price conditions (single, small difference, and large difference), six deals occurred in 24 weeks. In the multiple deal price conditions, each deal occurred three times. Average deal price was \$1.09 under all three levels of deal price difference. Because the regularity of deals can also affect the accuracy of perceptions of deal frequency (Krishna, 1991), this factor was controlled by using a regular dealing pattern. Thus, deals occurred at equally timed intervals in all conditions.

#### *Participants*

There were 96 graduate business school students in Experiment 1 who made purchase decisions for soft drinks for 24 weeks compressed into a single experimental session. They were each paid \$5.00. Thirty-two students were randomly assigned to each of the three deal price difference conditions. In Experiments 2 and 3, there were 60 participants each with 20 randomly assigned to each condition.

#### *Procedure*

A handout that described the experimental procedure was given to each participant prior to the experiment. The experimental procedure was described again to the participants when they started the computer task. During the experiment,

participants were encouraged to deliberate as much as they normally would for such purchases.

Participants were informed that they were shopping in a foreign country where prices and promotions were very different from those in the United States. They were told that they consumed a 2-L bottle of soda per week and so were forced to purchase at least one bottle for the week's consumption when they had no stock. They incurred some cost when they had extra bottles in stock (10 cents per bottle per week). To ensure that all participants had the same goal during the experiment, they were given the objective of minimizing the cost of purchasing and storing soda. The objective of cost minimization is likely to operate in grocery shopping and gives the experiment greater validity.

Participants were shown prices of one brand of soda in each of the 24 simulated weeks, one price at a time, on the computer screen. They were instructed to make purchase decisions (whether to buy and if so, the quantity they would like) on each screen (i.e., each week). When the brand was on sale, the screen showed the deal price and indicated that soft drinks were "on-sale," similar to having an on-sale tag in the supermarket.

### *Dependent Measures*

At the end of the 24 simulated weeks, participants were instructed to provide answers to the following questions as best as they could. The question on price willing to pay was asked first, followed by questions on average deal price, deal frequency, and regular price.

#### *Price Willing to Pay*

What price would you be willing to pay for soda in this country?

#### *Perceived Average Deal Price*

To the best of your knowledge, what was the average deal price for soda, i.e., when it was offered on sale?

#### *Perceived Deal Frequency*

To the best of your knowledge, how many times in 24 weeks was soda offered on sale?

### *Process Issues*

To delineate the process by which the overall number of deals is assumed to be underestimated, we asked participants in the two deal price condition in Experiment 1 to respond to the following questions after responding to the questions above. Each question was presented on a different screen.

- (1) Did you realize that when soda was offered on sale it was at two different prices?
- (2a) To the best of your knowledge, what was the lower deal price at which soda was offered on sale, i.e., the deal price at which you got a higher discount?
- (2b) To the best of your knowledge, how many times was soda offered on sale at this price?
- (3a) To the best of your knowledge, what was the higher deal price at which soda was offered on sale, i.e., the deal price at which you got a lower discount?
- (3b) To the best of your knowledge, how many times was soda offered on sale at this price?

### *Order Effects*

To control for primacy effects found in earlier research (Buyukkurt, 1986), we counterbalanced the order in which participants were exposed to the deal prices across participants. In Experiment 1, half of the participants were exposed to the regular price first, and half of the participants were exposed to the deal price first. Furthermore, in the multiple deal price conditions, half of the participants were exposed to the lower deal price first, and half of the participants were exposed to the higher deal price first. Thus, we had 10 conditions in all (2 for the single deal price scenario and 4 each for the two multiple deal price scenarios). None of these order variables had any main or interaction effects on the dependent variables, and they were therefore dropped from subsequent analyses. Table 1 provides an overview of the prices seen by participants in Experiment 1. Only the order of the two deal prices was counterbalanced in Experiments 2 and 3.

### *Experiment 1*

Most participants recalled the regular price correctly indicating that they were involved in the

Table 1  
*Prices Used From Week 1 to Week 8 in Experiment 1*

Order of presentation	Price (\$)							
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Single deal price								
Regular first	1.59	1.59	1.59	1.09	1.59	1.59	1.59	1.09
Deal first	1.09	1.59	1.59	1.59	1.09	1.59	1.59	1.59
Small price difference								
Regular, low, regular, high	1.59	1.59	1.59	0.99	1.59	1.59	1.59	1.19
Regular, high, regular, low	1.59	1.59	1.59	1.19	1.59	1.59	1.59	0.99
Low, regular, high, regular	0.99	1.59	1.59	1.59	1.19	1.59	1.59	1.59
High, regular, low, regular	1.19	1.59	1.59	1.59	0.99	1.59	1.59	1.59
Large price difference								
Regular, low, regular, high	1.59	1.59	1.59	0.79	1.59	1.59	1.59	1.39
Regular, high, regular, low	1.59	1.59	1.59	1.39	1.59	1.59	1.59	0.79
Low, regular, high, regular	0.79	1.59	1.59	1.59	1.39	1.59	1.59	1.59
High, regular, low, regular	1.39	1.59	1.59	1.59	0.79	1.59	1.59	1.59

*Note.* The same prices were repeated in Weeks 9–24.

task. Furthermore, at the end of the experiment, all participants took the option of learning more about the study, suggesting a high level of interest in the experiment. Prior to the debriefing, in order to check for demand effects, we asked participants their opinion of the purpose of the experiment. Most participants erroneously believed that the experiment tested how well consumers can minimize costs or that the experiment tested how deals affect purchase quantity.

### *Hypotheses Tests*

Table 2 provides the mean perceived deal frequency, perceived average deal price, and the price that participants were willing to pay in each condition.<sup>1</sup>

### *Perceptions of Deal Frequency*

Hypothesis 1 predicts that perceptions of the frequency of the higher priced deal will be lower than perceptions of the frequency of the lower priced deal.<sup>2</sup> Participants estimated deal frequency in whole numbers, that is, the number of weeks out of 24 where a deal occurred. Therefore, the mean may not be a very illuminating indicator of perceptions of deal frequency. We therefore examined the median perceived deal frequency in each

condition to test the hypothesis.<sup>3</sup> In the small difference condition as well as in the large difference condition, the median perceived frequency of the higher priced deal was lower than that of the lower priced deal ( $Mdn$ s = 2 vs. 3; actual = 3, for both higher and lower priced deals). A Wilcoxon matched-pairs signed ranks test was used to test the significance of this difference. The test revealed that the difference in location of perceived deal frequency of the higher priced deal versus the lower priced deal was significant in both conditions; small difference condition,  $z = 2.30, p < .05$ ;

<sup>1</sup> It may appear from this table that contrary to the reasoning in this article, the price that consumers are willing to pay is not related directly with the perceived average deal price or is related inversely with perceived deal frequency. However, perceived average deal price and perceived average deal frequency together affect the price consumers are willing to pay, and this combined effect masks the independent effect of each variable in this table.

<sup>2</sup> Perceptions of each of the two deal prices were found to be accurate ( $ps > .2$ ) in the small deal price difference condition (actual prices = \$0.99 and \$1.19; mean perceived prices = \$0.96 and \$1.15) and large deal price difference condition (actual prices = \$0.79 and \$1.39; mean perceived prices = \$0.78 and \$1.34); hence these biases are not considered here.

<sup>3</sup> We thank an anonymous reviewer for suggesting that we use the median.

Table 2  
*Results of Experiment 1 According to Experimental Condition*

Dependent measure	Actual frequency	Experimental condition		
		Single deal price (\$1.09)	Difference in deal price	
			Small (\$0.99 and \$1.19)	Large (\$0.79 and \$1.39)
<b>Perceived</b>				
Frequency of higher price deal	3		2.32 <sub>b</sub>	2.22 <sub>b</sub>
Frequency of lower price deal	3		2.94 <sub>a</sub>	2.81 <sub>a</sub>
Overall deal frequency	6	5.94 <sub>a</sub>	5.25 <sub>b</sub>	5.00 <sub>b</sub>
Average deal price (actual = \$1.09)		1.09 <sub>a</sub>	1.06 <sub>a,b</sub>	1.01 <sub>b</sub>
Price willing to pay (\$)		1.23 <sub>a</sub>	1.33 <sub>b</sub>	1.26 <sub>a,b</sub>

*Note.* Perceived average deal price and perceived average deal frequency together affect the price consumers are willing to pay, and this combined effect masks the independent effect of each variable;  $n = 32$  in each condition. Mean values in the same row that do not share the same subscripts are significantly different at  $p < .05$ .

large difference condition,  $z = 2.07$ ,  $p < .05$ . Hypothesis 1 is therefore supported.<sup>4</sup>

Hypothesis 2a states that perceptions of overall deal frequency are likely to be less accurate when there are two deal prices compared with a single deal price. Analysis of variance (ANOVA) on the absolute difference between the actual deal frequency (i.e., six deals) and perceived deal frequency revealed a significant main effect for difference in deal prices,  $F(2, 93) = 10.54$ ,  $p < .01$ . Follow-up contrast tests revealed that the difference between actual and perceived deal frequency was greater in the small difference in deal prices condition compared with the single deal price condition;  $M_s = 0.75$  versus  $0.19$ ;  $F(1, 93) = 9.63$ ,  $p < .01$ . This difference was also greater in the large difference in deal price condition compared with the single deal price condition;  $M_s = 1.00$  versus  $0.19$ ;  $F(1, 93) = 20.10$ ,  $p < .01$ . Hypothesis 2a is therefore supported in the small and large difference conditions.

Hypothesis 2b states that deal frequency is perceived to be lower when there are two deal prices compared with a single deal price. The median perceived deal frequency in the single deal price condition (i.e., six deals) was greater than the median in the other two conditions (five deals in each of the two conditions). Nonparametric median tests revealed that the median deal frequencies are significantly different across the three deal price difference conditions,  $\chi^2(2, N = 96) = 19.50$ ,  $p < .01$ . Follow-up median tests revealed that the

median deal frequency in the single deal price condition was significantly higher than that in the small difference condition,  $\chi^2(1, N = 64) = 8.80$ ,  $p < .01$ , and in the large difference condition;  $\chi^2(1, N = 64) = 16.80$ ,  $p < .01$ . Hypothesis 2b is therefore supported.<sup>5</sup>

As discussed earlier, the underestimation of deal frequency when there are two deal prices compared with a single deal price can be due to encoding biases (i.e., the higher deal price is not encoded as a deal) or retrieval biases (i.e., the lower deal price is more accessible than the higher deal price). We controlled for the encoding bias by pretesting all deal prices used to ensure that they were encoded as deals. In addition, results support the retrieval bias explanation. This can be seen based on the following results. Given the regular

<sup>4</sup> Paired  $t$  tests on the mean perceived deal frequencies also supported the prediction. In the small difference in deal price condition, perceptions of deal frequency of the higher priced deal were significantly lower than perceptions of deal frequency of the lower priced deal;  $M_s = 2.32$  versus  $2.94$ ,  $t(30) = 2.66$ ,  $p < .05$ . This result was also found in the large difference condition;  $M_s = 2.22$  versus  $2.81$ ,  $t(30) = 2.47$ ,  $p < .05$ .

<sup>5</sup> Mean perceptions of deal frequency were also significantly lower when there were two deal prices with a small difference compared with a single deal price;  $M_s = 5.25$  versus  $5.94$ ,  $F(1, 93) = 14.10$ ,  $p < .05$ . The same result was obtained when there were two deal prices with a large difference compared to a single deal price;  $M_s = 5.00$  versus  $5.94$ ,  $F(1, 93) = 26.22$ ,  $p < .01$ .



price of \$1.59, the higher priced deal in the large difference in deal prices condition (\$1.39) was less likely to be encoded as a deal than the higher priced deal in the small difference in deal prices condition (\$1.19). However, results reveal that the perceived frequency of the higher priced deal was not significantly different in the small versus large difference in deal prices conditions (2.32 vs. 2.22). Thus, perceptions of deal frequency appear to be less accurate when there are two deal prices as a result of the greater accessibility of the lower priced deal in memory.

### *Perceptions of Average Deal Price*

Hypothesis 3a states that the perceived average deal price is less accurate when there are two deal prices compared with a single deal price. An ANOVA on the absolute value of the difference between actual (i.e., \$1.09) and perceived average deal price revealed a significant effect of difference in deal prices,  $F(2, 93) = 38.35, p < .01$ . Contrast tests revealed that the difference between the actual (\$1.09) and perceived average deal price was significantly greater when there were two deal prices compared with a single deal price in the small difference in deal prices condition;  $M = 0.06$  versus  $0.001$ ;  $F(1, 93) = 8.86, p < .01$ . This result also held in the large difference in deal prices condition;  $M_s = 0.16$  versus  $0.001$ ;  $F(1, 93) = 74.33, p < .01$ . Hypothesis 3a is therefore supported.

Hypothesis 3b states that perceptions of average deal price will be significantly lower when there are two deal prices compared with a single deal price. An ANOVA revealed a significant main effect of difference in deal prices on perceptions of average deal price,  $F(2, 93) = 3.76, p < .05$ . Follow-up analyses revealed that perceived average deal price was lower in the small difference versus single deal price condition (\$1.06 vs. \$1.09), but the difference was not significant,  $F(1, 93) = 1.60, p = .20$ . However, the contrast between the large difference and single deal price condition was significant;  $M_s = \$1.01$  versus \$1.09,  $F(1, 93) = 7.52, p < .01$ . Hypothesis 3b is supported when the two deal prices have a large difference.

Thus, perceived average deal price is lower in the multiple deal price conditions versus the single deal price condition, but this occurs only when there is large difference in deal prices. There may

be no difference between perceived average deal price in the single and small difference conditions because of the small disparity between the prices used in these two conditions (\$0.99 and \$1.19 in the small difference condition vs. \$1.09 in the single deal price condition). Results on perceived deal frequency and average deal price from two replications of Experiment 1 are presented in the next section followed by a discussion of the results on price willing to pay.

### Experiments 2 and 3

To test the robustness of our results, we replicated the experiment varying the frequency of deals. The experiment was replicated in two different actual deal frequency scenarios: four deals in 24 weeks (Experiment 2) and eight deals in 24 weeks (Experiment 3). There were 60 participants in each experiment. Deal frequency was varied across the experiments because actual frequency of an event can affect the process used to arrive at a frequency judgment (Blair & Burton, 1987; Burton & Blair, 1991). Our earlier discussion of these processes suggests that the results should remain the same regardless of the underlying frequency estimation process.

Table 3 provides the results for the two replications. Only judgments of average deal price and overall deal frequency were collected in these experiments. Data on recall of each of the two deal prices and their frequency were not collected.

A comparison of results with the first experiment reveals that the substantive results remain unchanged. Small deal price difference results in lower estimations of deal frequency compared with a single deal price but not lower perceptions of average deal price. Large deal price difference results in lower estimations of both deal frequency and average deal price compared with a single deal price scenario.<sup>6</sup>

<sup>6</sup> Nonparametric tests of the difference between the median perceived deal frequencies in the three differences in deal price conditions were also significant. In Experiment 2, the medians were 4.0 in the single deal price condition and 3.0 in the other two conditions;  $\chi^2(2, N = 60) = 12.92, p < .01$ . In Experiment 3, the medians were 8.0 in the single deal price condition and 6 in the other two conditions;  $\chi^2(2, N = 60) = 20.42, p < .01$ .

Table 3  
*Results of Experiments 2 and 3 According to Experimental Condition  
 and Dependent Measures*

Experiment	Actual	Experimental conditions		
		Single deal price (\$1.09)	Difference in deal price	
			Small (\$0.99 and \$1.19)	Large (\$0.79 and \$1.39)
Perceived deal frequency				
Experiment 2	4	3.95 <sub>a</sub>	3.45 <sub>b</sub>	3.35 <sub>b</sub>
Experiment 3	8	7.90 <sub>a</sub>	6.55 <sub>b</sub>	6.30 <sub>c</sub>
Average deal price (\$) <sup>d</sup>				
Experiment 2		1.090 <sub>a</sub>	1.029 <sub>a</sub>	0.949 <sub>b</sub>
Experiment 3		1.091 <sub>a</sub>	1.037 <sub>a</sub>	0.936 <sub>b</sub>
Price willing to pay (\$)				
Experiment 2		1.418 <sub>a</sub>	1.479 <sub>b</sub>	1.438 <sub>a,b</sub>
Experiment 3		1.123 <sub>a</sub>	1.261 <sub>b</sub>	1.161 <sub>a,b</sub>

*Note.* Perceived average deal price and perceived average deal frequency together affect the price consumers are willing to pay, and this combined effect masks the independent effect of each variable. Means in the same row that do not share the same subscripts are significantly different at  $p < .05$ ;  $n = 20$  in all conditions.

<sup>d</sup>Actual deal price = \$1.09.

### Computation of Average Deal Price

As discussed above, judgments of average deal price may be made by relying on heuristics such as anchor and adjust or by computing the average deal price. Both processes are likely to result in the observed underestimation of average deal price. The data are therefore consistent with both processes. Given the nature of our data, we cannot test whether participants used the anchor and adjust process. To test whether participants used the averaging process, we computed the mean perceived deal price for each participant as a weighted mean of perceived deal prices (weighted by perceived deal frequency):

$$\text{Average deal price (DP)} = \frac{\sum_{i=1}^n (DP_i \times DF_i)}{\sum_{i=1}^n DF_i}, \quad (1)$$

where  $DF_i$  = perceived frequency of deals with perceived deal price  $DP_i$ , and  $n$  = perceived number of different deal prices.

We collected data on perceptions of frequency of lower priced and higher priced deals in Experiment 1. Using these data, we found that the

weighted mean of perceived deal prices was highly correlated with participants' perceived average deal price ( $R^2 = .69$ ,  $p < .01$ ). Adding perceived frequencies of the lower and higher deal price in the next step of the hierarchical regression did not significantly improve the regression results ( $R^2 = .71$ ,  $F_{\text{change}} = 1.74$ ,  $p > .15$ ). Thus, consumers may use a weighted mean of perceived deal prices (weighted by their respective perceived frequencies) in arriving at their perception of average deal price. They may not use perceived deal frequencies of the lower and higher deal prices as contextual cues over and above the weighted mean in their perception on average deal price. The most interesting implication of this model is that the frequency and price of the deal interact in the calculation of average deal price. This implies that perceived deal prices will not affect perceptions of average deal price as much if the perceived deal frequency is low versus when it is high. Support for this process does not rule out the possibility that participants used an anchor and adjust process to arrive at judgments of average deal price. Regardless of the underlying process, average deal price is likely to be underestimated as a result of the underestimation of the deal frequency of higher priced deals.

### Deal Price Difference and Price Willing to Pay

As discussed earlier, the price that consumers are willing to pay in each of the deal price difference conditions is difficult to predict. This is because two variables (perceived deal frequency and perceived average deal price) that are affected by deal price difference have opposite effects on the price that consumers are willing to pay, and it is not clear which effect will dominate. Furthermore, the two variables may have a joint effect, such that the effect of perceived average deal price on price willing to pay may depend on perceived deal frequency. More frequent deal prices may be given a greater weight than less frequent deal prices. We now turn to this issue.

Results on the willing to pay measure are consistent across the three experiments (see Tables 2 and 3). We therefore pooled the data from the three experiments to examine how participants arrive at the price that they are willing to pay. Results from the three experiments reveal that participants are willing to pay more for the brand when exposed to two deal prices with a small difference compared to a single deal price;  $M_s = \$1.38$  versus  $\$1.25$ ,  $F(1, 213) = 11.54$ ,  $p < .01$ ,  $\eta^2 = .05$ . However, the difference between the prices that consumers are willing to pay under conditions of large difference in deal prices versus a single deal price is not significant;  $M_s = \$1.28$  versus  $\$1.25$ ,  $F(1, 213) = 0.90$ ,  $p > .3$ .

These results are consistent with the idea that consumers base the price that they are willing to pay on perceptions of average price computed as follows:<sup>7</sup>

Perceived average price

$$RP = \frac{N - \sum_{i=1}^n DF_i + \sum_{i=1}^n (DP_i \times DF_i)}{N}, \quad (2)$$

where  $RP$  = perceived regular price,  $DF_i$  = perceived frequency of deals with perceived deal price  $DP_i$ ,  $n$  = perceived number of different deal prices, and  $N$  = total number of weeks.

It is clear from equation (2) that as perceived deal frequency decreases and as perceived average deal price increases, perceived average price (as

computed above) increases. Results regarding differences in price willing to pay in the three conditions are consistent with this model. Compared with a single deal price, a small difference in deal prices ( $\$0.99$  and  $\$1.19$ ) results in significantly lower perceptions of deal frequency but does not significantly affect perceptions of average deal price. Therefore, perceived average price increases, which in turn increases the price consumers are willing to pay. In the case of large difference in deal prices ( $\$0.79$  and  $\$1.39$ ), perceptions of both deal frequency and average deal price are significantly lower than in the single deal price condition. Lower perceptions of deal frequency result in a larger perceived average price, whereas lower average deal price perceptions result in a smaller perceived average price. These two results are offset resulting in no difference in the price willing to pay in the large difference versus single deal price condition.

We computed this perceived average price for each participant in the three experiments with responses to the average perceived deal price and overall perceived deal frequency.<sup>8</sup> The significant correlation between this price and the price willing to pay ( $r = .80$ ,  $p < .01$ ) supports the argument that average price is computed and used by participants to decide on the price they are willing to pay. Consumers may not always expend the cognitive effort to compute average price. However, the average price offers a good approximation of the price that consumers are willing to pay. In this sense, it is a model of the data that people produce rather than a process model of what people do when they make judgments of the price they are willing to pay (Lopes, 1987). As Graesser and Anderson (1974) pointed out, establishing such a model is a first step in the analysis of the judgment process. Multiplicative models such as those proposed in Equations 1 and 2 have appeared previously in the literature on attitudes and decision making (e.g., Anderson, 1981; Hogarth & Einhorn, 1992; Lopes, 1982).

Average price includes deal and regular prices as well as frequency cues. However, consumers

<sup>7</sup> We thank Richard D. Johnson for suggesting this model.

<sup>8</sup> Responses for perceived deal frequencies for the lower and higher deal prices were not available for Experiments 2 and 3.

may still use contextual cues, such as deal frequency along with average price, to make decisions on the price that they are willing to pay. For example, if deal frequency is high, people may want to purchase from deal to deal and thus may be willing to pay only close to the average perceived deal price and may not want to pay even the average price across deal and nondeal occasions (i.e., the average price). To test this possibility, we ran hierarchical regression analyses with computed average price entered first into the equation followed by perceived deal frequency. Average price significantly predicted the price participants were willing to pay ( $R^2 = .64$ ;  $p < .01$ ). When perceived deal frequency entered the equation,  $R^2$  increased significantly ( $R^2 = .69$ ,  $p < .01$ ;  $F_{\text{change}} = 34.67$ ,  $p < .01$ ). As expected, perceived deal frequency was negatively related to price consumers were willing to pay ( $\beta = -.34$ ,  $p < .01$ ).<sup>9</sup> Thus, participants appear to use both perceived average price and perceived deal frequency to arrive at a price that they are willing to pay. Thus, frequency with which deals are offered has a double impact on the price consumers are willing to pay.

#### Limitations of Laboratory Experiments

As with all laboratory experiments, our results can be questioned on the grounds of low external validity. Participants in the experiments were exposed to information regarding prices of one brand for 24 weeks in a single experimental session lasting less than 1 hour and in a controlled lab environment. In the real world, there are many brands, a long interpurchase shopping time, a long time period between deals, and a large number of deals at a supermarket. This may result in poor recall of deal price and deal frequency for a particular brand (Dickson & Sawyer, 1990; Krishna, Currim, & Shoemaker, 1991). The process underlying estimation of deal frequency in the real world may rely more on the memory trace for deals and may be affected by the decay of the memory trace during the interval since the last deal.

However, we expect our results to hold even for consumers with poor knowledge of prices. For consumers with inaccurate recall of deals, perceptions of deal frequency and average deal price may be based on their inaccurate recall of the observed prices and would be biased in the same manner as suggested in this article. Thus, in this case too, if

there are multiple deal prices, perceptions of deal frequency and average deal price should be lower than if there were a single deal price. In addition, if consumers do not realize that there are multiple deal prices and can only recall one deal price, we argue that the recalled deal price is more likely to be the lower deal price than the higher deal price because of an encoding as well as retrieval bias. First, higher deal prices may not be encoded as deals, and second, even if they are encoded as deals, lower deal prices are likely to be more accessible in memory than higher deal prices, resulting in underestimates of deal frequency and average deal price. Thus, our hypotheses are likely to be supported in the market as well.

We conducted a preliminary test of this proposition by asking 15 shoppers at one store about their perceptions of the deal price for Coca-Cola offered in that store in the last 12 weeks. A survey done by us had revealed that in these 12 weeks Coke was promoted at two deal prices, \$0.99 and \$1.19. Thirteen of the 15 shoppers responded that the deal price was \$0.99, supporting our reasoning that the lower deal price is more accessible than the higher deal price. Thus, there is some anecdotal evidence from the real world to support our findings. We also conducted a longitudinal experiment over 12 real weeks using nonstudent participants to test if our results hold over a longer period of time compared with the compressed time in the laboratory experiment. In addition, we conducted a more detailed survey of supermarket shoppers to test the generalizability of our findings to the real world.

#### Experiment 4

##### *Method*

In this longitudinal experiment, the hypotheses were tested over a period of 12 calendar weeks with deals occurring in 4 of these weeks (as in Experiment 3, which used eight deals in 24 weeks).

##### *Participants*

There were 47 participants in the experiment: 28 were administrators and staff at a large northeast-

<sup>9</sup> Separate hierarchical regressions for each experiment provided the same results.

ern university and 15 were recruited from administrative positions at other organizations. They were promised a gift at the end of 12 weeks as incentive for participation. Participants were randomly assigned to one of the three deal price difference conditions, and 14 in the large difference condition. Four participants did not complete the experiment, resulting in a sample size of 43, 13 in the single deal price condition, 16 in the small difference condition, .

### *Deal Prices*

The same prices were used in the three conditions. Pretests for Experiments 1, 2, and 3 apply here as well and do not need to be conducted again. Therefore, we can be confident that all deal prices were encoded as deals, that the lower deal prices were perceived as being lower than the higher deal prices in both the small and large difference conditions, and that the difference in deal prices was perceived as being a smaller difference in the small difference condition compared with the large difference condition.

Deal prices in the two deal price conditions were counterbalanced to control for order effects. Half of the participants in each condition saw the lower deal price first, and half the participants saw the higher deal price first. All participants were exposed to the regular price in Week 1. Deals occurred in Weeks 3, 6, 9, and 12.

### *Cover Story*

Participants were told that the purpose of the study was to examine how consumers make purchase decisions about soft drinks. They were told to pretend that they were spending 3 months in a different city and that they consumed one 2-L bottle of a particular brand of soda every week. To control for possible confounding with prices of soda in the supermarket, we told participants that this particular brand was not available in the city they actually lived in. Other aspects of the cover story remained the same as in the three lab experiments: participants were told they shopped once a week, consumed one 2-L bottle of the soda every week, and the cost of storing a bottle of soda was \$0.10 per week. Participants were given the goal of minimizing the cost of buying and storing the soda over the 12-week period.

### *Procedure*

Participants responded to a questionnaire on the same day each week. The questionnaire contained the price of the brand of soda and the number of bottles the participant had in stock. Stock was calculated for each participant on the basis of their purchases in the previous week. When they had no bottles in stock, participants were told that they had to buy at least one bottle (because they consumed one bottle each week). Their responses to the questionnaire contained their decision regarding whether to buy any bottles of the soda (if they had at least one bottle in stock), and if yes, how many bottles to buy.

At the end of 12 weeks, participants were thanked, but 1 week later, they were unexpectedly asked to respond to the dependent measures on price they were willing to pay, deal frequency, average deal price, and regular price. Participants also provided information on their shopping behavior in real life (number of shopping trips per month) and their susceptibility to deals or "deal proneness" (on a 5-point scale anchored with *not at all concerned about sales on grocery products* and *very concerned about sales on grocery products*). Deal proneness (an individual difference variable) was expected to be an important covariate because deal proneness in real life can affect participants' perceptions of experimental deal prices and the price they are willing to pay in the 12-week experiment (Krishna, Currim, & Shoemaker, 1991).

This last questionnaire was kept as a surprise in order to reduce attempts by participants to memorize the prices during the course of the experiment. Debriefing revealed that participants believed the cover story and none of the participants guessed the true purpose of the experiment. Participants' estimates of regular price were fairly accurate ( $M = \$1.60$  vs. actual = \$1.59;  $p > .9$ ). Estimates of regular price did not differ significantly across conditions ( $p > .5$ ).

### *Results*

Table 4 presents the results from the longitudinal experiment. First, we screened for outliers on each dependent variable separately in each deal price difference condition. The number of outliers for each dependent variable ranged from three to four, and they were generally distributed across

Table 4  
Results of a 12-Week Longitudinal Study in Experiment 4

Dependent measure	Actual	Experimental condition		
		Single deal price (\$1.09) ( <i>n</i> = 13)	Difference in deal price	
			Small (\$0.99 and \$1.19) ( <i>n</i> = 16)	Large (\$0.79 and \$1.39) ( <i>n</i> = 14)
Perceived deal frequency	4	3.33 <sub>a</sub>	3.14	2.60 <sub>b</sub>
Perceived average deal price (\$)°	1.09	1.16 <sub>a</sub>	1.08	1.02 <sub>b</sub>
Price willing to pay (\$)°		1.09 <sub>a</sub>	1.30 <sub>b</sub>	1.23

Note. Means in the same row with different subscripts are significantly different at  $p < .05$ .

°Adjusted for deal proneness.

conditions. Participants who did not respond on specific dependent measures were also excluded from analysis on that dependent measure. The hypotheses are tested using a priori contrasts of means for two reasons. First, we have specific expectations regarding the direction of results from our hypotheses and from the results of three experiments. Second, the small sample size in this experiment limits statistical power to test overall significance of the  $F$  test and to perform nonparametric tests. One-tailed tests of significance are reported. Overall, the results are consistent with those of the laboratory experiments.

#### Perceptions of Deal Frequency

Accuracy of deal frequency was higher in the single deal price condition compared with the two deal price conditions. The means of the absolute value of the difference between actual deal frequency (i.e., four deals) and perceived deal frequency reveal that this hypothesis is supported directionally ( $M_s = 0.67, 1.00, \text{ and } 1.40$ , respectively). Contrast analysis on this variable revealed one marginally significant effect. Perceptions of deal frequency were less accurate (four actual) when there was a large difference in deal prices compared with when there was a single deal price,  $F(1, 33) = 2.93, p < .05, \eta^2 = .08$ . Means show underestimation of deal frequency in all conditions.

Perceived deal frequency was expected to be lower when there were two deal prices compared with a single deal price. This hypothesis was supported for the large difference in deal price condition;  $M_s = 2.60$  versus  $3.33; F(1, 33) = 2.63, p = .05, \eta^2 = .07$ . Contrary to results from the lab

experiments, deal frequency perceptions were not significantly lower in the small difference in deal price condition compared with the single deal price condition. However, directionally the result is supported ( $M_s = 3.14$  vs.  $3.33$ ).

#### Perceptions of Average Deal Price

Accuracy of average deal prices was tested using contrasts on the absolute value of the difference between perceived average deal price and actual average deal price (\$1.09). Means reveal that the accuracy was higher when there was a single deal price compared with two deal prices with a small or large difference ( $M_s = 0.04$  vs.  $0.14$  vs.  $0.20$ ). Accuracy was significantly lower in both the small difference in deal price condition compared with the single deal price condition,  $F(1, 36) = 5.94, p < .05$ , and in the large difference in deal price condition compared with the single deal price condition,  $F(1, 36) = 14.38, p < .01$ .

Perceptions of average deal price were expected to be lower when there were two deal prices compared with a single deal price. Participants' deal proneness was found to be a significant covariate,  $F(1, 35) = 4.95, p < .05$ . Perceptions of average deal price increased as deal proneness increased ( $r = .33$ ). Contrast analyses using deal proneness as a covariate revealed one significant effect: perceptions of average deal price were significantly lower when there was a large difference in deal prices compared with a single deal price; adjusted  $M_s = 1.16$  versus  $1.02; F(1, 35) = 4.74, p < .05$ . These results are consistent with the results from the three lab experiments.

### *Price Willing to Pay*

*Deal price difference conditions.* Participants' deal proneness was again a significant covariate and was therefore included in an analysis of covariance,  $F(1, 36) = 3.83, p < .05$ . As deal proneness increased, participants were willing to pay less for the brand ( $r = -.29$ ). Contrast tests revealed that after controlling for deal proneness, participants were willing to pay significantly more for the brand when the two deal prices had a small difference compared with when there was a single deal price; adjusted  $M_s = \$1.30$  versus  $\$1.09$ ;  $F(1, 36) = 3.75, p < .05$ . These results are completely in keeping with those from the three lab experiments.

*Model.* Weighted average price was significantly correlated with the price consumers were willing to pay ( $r = .33, p < .05$ ). Hierarchical regression did not reveal a significant effect for perceived deal frequency when it was entered after weighted average price in the equation ( $p > .5$ ). Recall that the power to detect significant effects was low in this experiment because of the small sample size.

### *Quantity Purchased*

We also analyzed purchasing behavior in different conditions. This enabled us to draw conclusions about the practical (short-term) impact of offering deals at different prices versus a single deal price from a manufacturer or retailer point of view. In general, quantity purchased was significantly greater when the brand was "on deal" compared with "on regular price,"  $M_s = 2.24$  versus  $0.73$  bottles,  $t(42) = 7.84, p < .01$ . Given this stockpiling behavior, it is important to determine the average price paid per bottle in the three different conditions. Means reveal that the average price paid per bottle was the greatest in the single deal price condition ( $M_s = \$1.31$  vs.  $\$1.24$  vs.  $\$1.20$ ). Contrast analyses reveal that the average price paid per bottle was significantly lower only in the large difference in deal price condition compared with the single deal price condition,  $F(1, 40) = 5.99, p < .05$ . Average price paid was not significantly different in the single deal price and small difference conditions. In addition, total quantity purchased was larger in the small difference

versus single deal price condition;  $M_s = 15.94$  versus  $12.69$ ;  $F(1, 40) = 3.63, p < .05$ .

Thus, offering deals with a small difference in deal prices (versus a single deal price) results in greater responsiveness to deals (greater purchase quantity) and greater price willing to pay. In addition, the mean price paid for the product by the consumer in this strategy is not significantly lower (although directionally lower) than in the single deal price strategy. Furthermore, with multiple competing brands in the market, offering deals may prevent consumers from switching to other brands. If we assume that manufacturers and retailers operate with the goal of maximizing profitability, it appears that there are many factors contributing to higher potential profit when multiple deal prices are offered with a small difference compared with a single deal price. Therefore, manufacturers and retailers have an incentive to offer deals that have a small difference in price. This strategy can have a harmful impact on consumer well-being by altering consumer price perceptions, which in turn make consumers willing to pay a higher price.

## Survey

### *Method*

In addition to the longitudinal experiment which tested the external validity of our results over a longer time period, we also conducted a survey of supermarket shoppers to test the external validity of our experimental results in the real world. We maintained a record of prices of soft drinks at two stores. We found that a 2-L bottle of Pepsi (regular price of  $\$1.69$ ) was offered on sale at one of two deal prices ( $\$0.99$  and  $\$1.39$ ) every alternate week in one of the two stores. The regular dealing pattern that we observed was similar to the pattern used in the experiments. Therefore, we conducted a survey of Pepsi prices among shoppers at this store.

### *Procedure*

Two interviewers obtained the store manager's permission and spent 2 to 4 hours at the store each day of the week. They stopped all incoming shoppers and asked them to answer some questions for

approximately 5 min. Shoppers were promised a free gift. Each shopper who agreed to participate was asked to respond to the screener questions. If shoppers passed the initial screening, they were shown a 2-L bottle of Pepsi and asked the price they were willing to pay, the average deal price, the number of weeks in the last 8 weeks it had been on sale, and the regular price. The interviewer wrote down the responses on a questionnaire. Finally, the respondent was given a candy bar as a free gift.

### Screener Questions

Screener questions were used to ensure that respondents had been exposed to the three Pepsi prices over the past 8 weeks. Four questions were used to screen out respondents who did not fit this criterion. Respondents were asked whether they had shopped at the store for the last 2 months, how often they shopped at the store, how often they bought soft drinks at the store, and what soft drinks they considered buying. Respondents who shopped every week at the store in the last 2 months, bought soft drinks at least once a week at the store, and considered buying Pepsi were included in the sample.

### Results

Data were obtained from 52 respondents who fit the screening criteria. Table 5 provides the results of the survey. There were 32 (62%) respondents who thought that Pepsi was offered on deal at only

Table 5  
*Results of Survey of Actual and Perceived Data Related to Deal Recall Conditions*

Condition	Actual	Perceived
Recalled only one deal price ( $n = 32$ )		
Regular price (\$)	1.69	1.64
Deal frequency	4.00 <sub>a</sub>	1.74 <sub>b</sub>
Average deal price (\$)	1.19 <sub>a</sub>	1.07 <sub>b</sub>
Price willing to pay (\$)		1.38
Recalled two deal prices ( $n = 20$ )		
Regular price (\$)	1.69	1.64
Deal frequency	4.00 <sub>a</sub>	2.32 <sub>b</sub>
Average deal price (\$)	1.19 <sub>a</sub>	1.04 <sub>b</sub>
Price willing to pay (\$)		1.19

Note. Means in the same row with different subscripts are significantly different at  $p < .01$ .

one price. Therefore, we analyzed the data separately for those who recalled a single deal price and those who recalled two deal prices.

### Respondents Who Recalled Only One Deal Price

First, recall of the regular price was fairly accurate ( $M = \$1.64$  and actual = \$1.69,  $p > .8$ ). Results on perceived frequency and perceived average deal price are similar to results obtained in the experiments. Specifically, deals were perceived to occur significantly less frequently than they actually occurred; perceived mean deal frequency = 1.74 times in 8 weeks; actual = 4.0 times in 8 weeks;  $t(31) = 10.66$ ,  $p < .01$ . Of the participants, 90% underestimated deal frequency, and the median deal frequency was two.

Average deal price was also found to be underestimated significantly<sup>10</sup>; actual = \$1.19 and perceived = \$1.07,  $t(30) = 4.8$ ,  $p < .01$ . There were 67% who recalled the deal price to be \$0.99, which was the lower of the two deal prices in the market. This supported the argument that even if consumers do not accurately recall multiple deal prices, they are more likely to recall the lower of the two deal prices.

### Respondents Who Recalled Two Deal Prices

Twenty respondents (38%) recalled two deal prices. Recall of the regular price was fairly accurate ( $M = \$1.64$  and actual = \$1.69,  $p > .8$ ). Again, deals were perceived to occur significantly less frequently than they actually occurred; actual = 4.0 times in 8 weeks and perceived = 2.32 times in 8 weeks;  $t(19) = 3.51$ ,  $p < .01$ . Of the participants, 68% underestimated deal frequency, and median perceived deal frequency was 2.0. Average deal price was also found to be underestimated significantly; actual = \$1.19 and perceived = \$1.04,  $t(19) = 4.05$ ,  $p < .01$ . The mean perceived lower deal price was \$0.99 (vs. \$0.99 actual), and the mean perceived higher deal price was \$1.14 versus \$1.39 actual,  $t(19) = 5.95$ ,  $p < .01$ .

We expected and found that in the real world, consumers may not realize that there are multiple

<sup>10</sup> Data screening of perceptions of average deal price revealed one outlier (more than 4 SDs from the mean) that was dropped prior to analyses.



deal prices and may only recall one deal price. In this case, the recalled deal price is more likely to be the lower deal price rather than the higher deal price. When two deal prices were recalled, the perceived deal frequency and perceived average deal price were underestimated. All these findings are consistent with our hypotheses and increase our confidence in the experimental results.

## General Discussion

### *Overview of Results*

#### *Perceived Deal Frequency*

Results from all three laboratory experiments suggest that exposure to two deal prices results in less accurate and lower perceptions of deal frequency than exposure to a single deal price. This result is explained by our experimental findings that the perception of deal frequency of higher priced deals is lower than that of the more accessible, lower priced deals. These results support the literature on frequency estimation that suggests that the accessibility of events in memory determines whether they are used in making frequency judgments (Menon, 1993). Results from the survey also support the hypothesis that deal frequency is likely to be underestimated when deal prices are varied. The longitudinal experiment also provides some support for this phenomenon in the large difference in deal prices condition.

#### *Perceived Average Deal Price*

Exposure to two deal prices results in less accurate and lower perceptions of average deal price compared with exposure to a single deal price. Results from all four experiments suggest that this effect is significant when there is a large difference in the two deal prices. A lower perception of average deal price when there are two deal prices versus a single deal price may occur because of two reasons. First, this result could be due to the effect of anchoring of deal prices at the lower deal price and then adjusting upward. Second, average deal price may be computed by weighting each perceived deal price with its perceived frequency. Because the lower deal price may be perceived to occur more often than the higher deal price, average deal price may be underestimated. This reason was tested and supported in Experiment 1.

Average deal price was also underestimated in the supermarket survey. The difference in the two supermarket deal prices was 40 cents compared with the difference of 20 cents and 60 cents used in the experiments. Therefore, the supermarket survey can be considered to be testing consumer perceptions when faced with a medium difference in deal prices relative to the prices used in the experiments. As in the case of results from the large difference in deal price condition in the experiments, average deal price was underestimated in the survey.

#### *Price Willing to Pay*

We also find from the three lab experiments and the longitudinal experiment that having two deal prices with small difference in deal prices results in consumers willing to pay higher prices compared with a single deal price situation. It has been shown that the lower the perceived deal frequency and the higher the perceived average deal price (i.e., lower the perceived average discount), the higher is the price that consumers are willing to pay for the brand. Because under small deal price difference conditions, perceived deal frequency is significantly lower than in the single deal price condition, whereas perceived average deal price is not, the effect of perceived deal frequency predominates. Under large deal price difference conditions, both deal frequency and average deal price are perceived to be significantly lower than in the single deal price case, and the opposing effects of these two variables on the price that consumers are willing to pay appear to cancel each other out. Prices consumers are willing to pay appear to be based on a weighted average price and on perceived deal frequency.

## *Contributions*

### *Theoretical*

From a theoretical standpoint, multiplicative models are developed to approximate consumer judgments regarding the price that they are willing to pay for the brand. These models are shown to predict consumer judgments fairly accurately. From a methodological perspective, this article demonstrates that compressed time scale laboratory experiments may give valid indications about effects

in long-term memory. Results from three laboratory experiments were replicated in a survey and in a longitudinal experiment suggesting that findings from memory research conducted in laboratory settings in a compressed time period may capture the effects of memory in the real world.

### *Practical*

Many brands are offered at multiple deal prices in the market (Raju, 1990). Our results suggest that consumers would be willing to pay more for a brand that is offered at two distinct deal prices having a small difference rather than at a single deal price that is the average of the two deal prices. Although these results depend on the relative sizes of the effects of perceived deal frequency and of average deal price on the price willing to pay, the findings are robust in that they were replicated in three experiments varying in deal frequency and in a longitudinal real time experiment.

*Implications for manufacturers.* These results have implications for manufacturers in terms of deal pricing. Specifically, they suggest that offering deals at two deal prices with a small difference can be a profit maximizing strategy. Use of this strategy is likely to increase the price that consumers are willing to pay in the long run versus a promotion strategy with a single deal price. Thus, in the long run, manufacturers can charge higher deal and regular prices if they have been running promotions with two deal prices with a small difference over a period of time. Similar implications also hold for retailers who finally sell the product to the consumer because the difference between the production cost and the price to the consumer is shared between the manufacturer and the retailer.

Manufacturers can also exploit these biases to make consumers more responsive to deals (i.e., purchase more on deals) because consumers faced with two deal prices with a small difference (compared with a single deal price) may expect fewer deals. This may increase consumer inventory of the product and hence reduce switching to other brands offered on deal. Thus, consumer price perceptions for one brand may also have an impact on their purchase behavior for other brands in the same product category.

*Implications for consumers.* What is beneficial to manufacturers in terms of increasing their profits may be harmful to consumers if increased

profits come from an increased price to consumers. As discussed above, offering deals at multiple prices can result in consumers being willing to pay a higher price and therefore result in a higher price being charged in the long run. The strategy thus results in consumers incurring higher expenditures for the brand without getting any corresponding benefits. Consumers are willing to pay more for the brand only because of salience effects that make lower priced deals more accessible than higher priced deals. Therefore, consumers need to become aware of the biasing effects of varying deal prices on deal perceptions and its effects on purchasing behavior. This suggests that future research is needed to examine how consumers can be alerted to these biases and trained to make more accurate assessments (cf. Fong, Krantz, & Nisbett, 1986; Fosterling, 1985; Nisbett, Fong, Lehman, & Cheng, 1987).

On the other hand, if the strategy of multiple deal prices is not used by the manufacturer to raise long-term prices but is used as a competitive strategy to make consumers purchase more of their brand on deal (because the perceived deal frequency is lower), then the strategy is not necessarily harmful to consumers.

### *Limitations and Future Research*

In this section, we discuss some caveats to our results. Price the consumer is willing to pay is related to perceived average price, which is computed as a weighted mean regular and deal prices weighted by their respective frequencies. However, the relationship between offering multiple (vs. single) deal prices and purchase likelihood may be more complicated than the price willing to pay results suggest.<sup>11</sup> For example, given a higher price willing to pay, consumers may be more likely to purchase the brand when it is not on deal and to buy a larger quantity when it is on deal, but may be discouraged from searching for the brand because they expect the brand to be higher priced on average.

Only the case of two deal prices, which occurred with equal frequency, was examined in this research. We expect that if more than two deal prices are offered with different deal frequencies, then

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<sup>11</sup> We thank Richard D. Johnson for pointing out these possibilities.

perceptions of deal frequency and average deal price depend on the difference between the various deal prices and their relative frequency. However, the lower deal prices are still expected to be more salient than the higher deal prices. Thus, easier recall of lower versus higher deal price should still lead to inaccurate computation of rates of occurrence or counts, and consequently underestimation of deal frequency and average deal price. Future research is needed to empirically examine the effects of more than two deal prices and unequal frequencies for these deal prices on consumer deal perceptions.

In the experiments reported here, deals were timed at regular intervals. If deals are irregular and there is less certainty in the timing of high and low discounts, perceptions of deal frequency and of average deal price may be less accurate compared with the regular dealing case studied here. In this case too, we would expect lower deal prices to be more salient versus higher deal prices, so that our results would still hold. However, future research that manipulates regularity of deals is needed to ascertain if our results still hold.

The survey results reveal that the experimental results should hold even in the real world where consumers may have inaccurate knowledge of prices. For consumers with inaccurate recall of deals, perceptions of deal frequency and average deal price may be based on this inaccurate recall of the observed prices. In this case too, if there are multiple deal prices, then perceptions of deal frequency and average deal price should be lower than if there were a single deal price. In addition, if consumers do not realize that there are multiple deal prices but can only recall one deal price, the survey reveals that the recalled deal price is more likely to be the lower rather than the higher deal price. Thus, regardless of consumer awareness of multiple deal prices in the market, the results of our research are likely to hold.

This research represents the first attempt to theoretically examine the effects of an increasingly utilized strategy in the market, namely, varying deal prices. We considered two levels of difference in deal prices (small and large) and a broad range of deal frequencies (across the three experiments) and examined the effect of differences in deal prices on consumer judgments of deal frequency, average deal price, and price they are willing to pay in the lab, as well as in a longitudinal real time

experiment. Future research is needed to extend our findings to scenarios where there are multiple brands, more than two deal prices, irregular deal timing, and different ranges of deal frequency and deal price.

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