

Previous marketing research on the effects of price has tended to ignore the role of such moderating variables as competitive context and the availability of additional information. The authors presented subjects with forced-choice decisions in several product categories. Using a multinomial logit formulation to measure price sensitivity, they find relatively lower price sensitivity (1) when a brand is placed at the upper price-quality boundary of a choice set rather than in the middle, (2) when only brand names are provided as opposed to only quality ratings, and (3) when quality information is added to available brand-name information. They discuss the theoretical and managerial implications of these findings.

Effects of Competitive Context and of Additional Information on Price Sensitivity

As a key variable in the marketing mix, price has been given considerable attention by marketing researchers studying the effects of pricing on consumer responses. However, excellent reviews by Gabor, Granger, and Sowter (1970), Monroe (1973, 1976), Monroe and Krishnan (1985), Olson (1977), and Parsons and Schultz (1976) suggest little effort has been made to determine those variables that moderate the effect of price on brand choices.

If such moderating effects are conceived as differences in price sensitivity (represented by the slope rather than the level of the demand curve), relatively few researchers have attempted to account for significant moderators of price effects. Early studies focused on the effect of price on perceived quality and showed that it increases when price serves as the only available cue in comparison with the inclusion of such additional information as brand name or store name (Olson 1977; Stafford and Enis 1969). In an elaborate factorial study, Monroe (1976) showed that sensitivity to within-subject price manipulations decreased when the price of the preferred brand was lowered rather than raised. Further work

has examined the effects of different ways to express price discounts (e.g., cents off or percentage reductions) and generally has found that greater self-reported willingness to buy derives from relative as opposed to absolute expressions of price (Barnes 1975; Berkowitz and Walton 1980; Della Bitta, Monroe, and McGinnis 1981). These studies have used such multiple indicators of the effects of price as (1) judgments of the quality or effectiveness-in-use of the brand, (2) estimates of how good a value the brand is for the money spent, and (3) indicators of willingness to purchase the brand. This multiple-indicator approach has the advantage of capturing various psychological pricing effects, but has generally stopped short of measuring effects on actual choice behavior (as opposed to purchase intentions).

In our experimental study, we extend the previous work using multiple indicators of price-effect moderators to a context of forced choice. Price sensitivity is operationalized as an elasticity that reflects the percentage change in choice share divided by the percentage change in price. Two potential moderators for this measure are investigated, (1) the competitive context of the brand and (2) the nature of additional available information. As these are somewhat unfamiliar variables, we first describe them and then explain how each is expected to moderate price sensitivity.

Competitive Context

Competitive context is defined here as the relative position of a brand in comparison with those with which

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The second author gratefully acknowledges the support of the Columbia Business School's Faculty Research Fund

it competes in a choice set. To simplify the concept of relative position, suppose all brands can be categorized meaningfully by the price charged and a measure of perceived quality. If dominated brands (higher in price but lower in perceived quality) are omitted from consideration, the remaining brands of interest form a price-quality continuum with the lowest quality, lowest price brands at one end and the highest quality, highest price brands at the other. We define *bracketed* brands in a choice set as those in the middle of this continuum, and the *low-boundary* and *high-boundary* brands as the two brands at the extremes.

The research question is:

- Does the addition or deletion of a competitor that alters the competitive context (bracketing) of a brand also change the brand's price sensitivity?

The practical importance of this question is readily apparent. It reflects the extent to which well-known high-boundary brands such as Chivas Regal scotch, Rolls Royce automobiles, and Joy perfume derive their profitability from their respective positions at the upper ends of price-quality continua. In particular, would the price sensitivity of such brands (and thus their optimal prices) change significantly if they became bracketed by competitors with positions at still higher levels of price and perceived quality? Of comparable strategic concern are the effects of bracketing low-end brands—for example, by the entry of generic offerings. We empirically test the effect of bracketing only at the upper end of the price-quality continuum. However, the hypothesized effect would occur regardless of whether the experimental brand is the low- or the high-boundary brand.

Specifically, we hypothesize that modification of a choice set that changes a brand from being bracketed to being at the boundary also decreases the brand's price sensitivity for two reasons. First, the relative price can be gauged more easily in the bracketed condition. Evaluating the price in a boundary condition is more difficult because, instead of being able to interpolate between competitive alternatives, one must extrapolate beyond them to evaluate the price of the boundary alternative. Besides the difficulty of such an extrapolation as a feat of cognitive algebra, it is not clear statistically or psychologically that the price-quality tradeoff between two items ought to extend beyond their range. For example, equal increments of perceived quality might decrease in value as one moves to higher price alternatives. Thus, any simple projection has more intuitive justification within rather than beyond a set.

Second, as developed more formally by Hauser and Shugan (1983), bracketing tends to place a brand in direct competition with a greater number of neighboring brands. Hence, if a brand is at a boundary of the choice set, a switch to a competitor is less likely simply because there are fewer adjacent competitors to which to switch.

Consideration of both information-processing and competitive-substitution effects thus suggests the hy-

pothesis that price sensitivity will be relatively greater for bracketed brands than for brands at the boundary.

Availability of Information

A second moderator of price sensitivity is the availability of information in addition to price that can be used to make the choice. We consider two questions in detail:

- Does the availability of brand information alone result in relatively more or less price sensitivity than is associated with the availability of quality information alone?
- Does the addition of perceived quality ratings to brand information result in relatively more or less price sensitivity than is associated with brand information alone?

The first question concerns the relative effect of branding versus other information on price sensitivity. The second question concerns the relative impact of quality ratings on price sensitivity for known brands. The latter issue applies to consumerist groups or to marketers considering the dissemination of competitive ratings of the type collected by *Consumer Reports*. For both of these questions, directly relevant research is scant and has produced conflicting predictions.

Effect of Brand Names Versus Quality Ratings

We now consider how relative price sensitivity can be expected to change as a function of whether additional information includes brand names or perceived quality ratings. (Subsequently we address what happens when both types of additional information are included.) We present reasons why familiar brand names and perceived quality ratings should be associated with relatively lower and higher price sensitivity, respectively.

In comparison with a response to a quality rating, a familiar brand name evokes a more elaborate system of interconnected beliefs about the product (e.g., Olson 1977, p. 278). In particular a brand name can serve as a "gestalt" or "chunk" of information that alters the importance of other available cues (Lutz and Bettman 1976; Simon 1974). For example, in choice studies where subjects select cues needed for a simulated purchase decision, the acquisition of brand-name information tends to inhibit subsequent selection of other information (Jacoby, Szybillo, and Busato-Schach 1977). A consumer who thus treats the brand name as a "chunk" may ignore price or may simply assume that price is reasonable and thereby lower price sensitivity.

We expect perceived quality ratings to have the opposite effect. Unlike brand names, perceived quality ratings make it easier to assess the appropriateness of an accompanying price. They provide a way to determine value for the money by comparing marginal changes in perceived quality with marginal changes in price. Thus, the availability of perceived quality ratings should encourage one to balance price against quality with a resultant greater price sensitivity than is associated with brand information.

Effect of Adding Perceived Quality Ratings to Brand Names

From a theoretical perspective the effect on price sensitivity of making perceived quality information available *in addition to* brand names is much more ambiguous than the effect discussed for brand names *versus* quality ratings. Though there are good reasons to expect the availability of quality ratings on known brands to increase one's capability to evaluate price, the very presence of this new information may lessen the motivation to perform such an evaluation. Because the issues of capability and motivation lead to opposing predictions, we view this aspect of the study as exploratory.

Increased capability. There are two mechanisms whereby the addition of perceived quality to brand information is expected to raise relative price sensitivity. The first mechanism derives from the idea that a perceived quality rating enables one to evaluate the marginal benefit of given price increments, thereby facilitating a direct tradeoff of price and quality. The second mechanism derives from the idea that the new information makes one more certain about the quality of a given brand. If so, a smaller price change may be needed to alter the brand's acceptability. The latter account is consistent with the finding of Peterson and Wilson (1985) of higher price sensitivity under conditions of lower risk. To the extent that perceived quality ratings reduce expected quality risk, a relatively higher level of price sensitivity would be expected.

Decreased motivation. Though additional quality information may make the evaluation of a brand's price more feasible, the processing cost of the information may make that evaluation less likely. In particular, the addition of quality to brand information is expected to make a price-versus-quality analysis more difficult. A price-versus-quality analysis involves the assessment of how positively one values a brand in comparison with the negative value of its price. To the extent that this task is sensitive to the amount of information, the addition of *any* new data may reduce the likelihood that a price-versus-quality assessment is made. Further, perceived quality information puts particular demands on processing. As perceived quality ratings are added to brand names, the evaluation requires merging the two types of information and then comparing this merged utility against price. However, because perceived quality and brand information are in different forms, merging them may be difficult. Consumers in such a situation may avoid the analysis altogether rather than engage in a potentially difficult and time-consuming task.

Summary. The addition of quality ratings to brand names may increase the potential for price sensitivity while decreasing the extent to which the information actually is used. Thus, because considerations of capability versus motivation suggest different outcomes, we view this part of our study as an exploratory investigation of the net impact of these counterposed tendencies.

METHOD

To date, little theory and even less empirical work has addressed the moderating effects of competitive context and of additional information on price sensitivity. One reason for this gap is the difficulty of measuring even the main effects of price with any degree of realism. For example, in an effort to gain experimental control over the relevant independent variables, much research (ours included) involves laboratory techniques in which real-world income constraints fail to operate, thereby raising the possibility of underestimating price sensitivity and thus reducing external validity. We cope with the problem of unrealistic income constraints by focusing *not* on increases or decreases in absolute levels of price sensitivity within groups, but rather on differences in price sensitivity among experimental treatment groups exposed to contrasting competitive contexts and different types of additional information. In the following sections we show that by using experimentally manipulated stimuli and by capitalizing on the efficiency of a disaggregate logit model, we can estimate with remarkable reliability the differences in price sensitivity due to experimental manipulations.

Subjects and Task

The subjects were 72 residents of a suburban middle class community and 46 students in an urban university setting. We expected these contrasting groups to have somewhat different preference orderings, which would enable us to assess the generalizability of our findings. The choice task was conducted via individually administered questionnaires completed independently by subjects, typically at their homes or offices.

The primary task involved asking subjects to make choices in several product classes, with alternatives from each class listed on separate sheets of paper. The cover sheet contained the following instructions.

This survey is intended to assess your preferences for various products in six product classes. On each of the following six pages, please check the product that represents your first choice.

On some of the product descriptions you will be given a quality rating. This rating is based on a scale of -3 to +3, where -3 represents the lowest quality rating and +3 represents the highest quality rating. These ratings were assigned to these products based on an earlier survey of people like yourself.

The six product classes had the same structure as the sample in Figure 1 except, depending on the information condition, either the brand name or the quality ratings might have been omitted. The subjects took about 10 minutes to make the six choices. Then they were asked to indicate their beliefs about and familiarity with each of the brands in the six product classes.

Products and Brands

The six product categories, shown in Table 1, were peanut butter, pancake syrup, dishwashing liquid, type-

Figure 1
SAMPLE CHOICE QUESTION

(color TV sets, RCA is experimental brand, unbracketed condition, low price)

Small-screen color television sets

Built-in or clip-on VHF and UHF antennas

No vertical or horizontal hold control (none needed)

Lighted channel numbers

75-ohm cable TV connection

<i>Please check your first choice</i>	<i>Brand name</i>	<i>Price</i>	<i>Average quality rating (-3 to +3)</i>
	RCA	\$380	5
	Philco	\$370	-7
	J C Penney	\$330	-13

writers, 10-speed bicycles, and color television sets. Each product category had four brands from which three were selected to make up each choice set. The alternatives were designed to span the price-quality continuum from high price/high quality (e.g., Skippy peanut butter or Smith-Corona typewriters) to low price/low quality (e.g., A&P peanut butter or J.C. Penney typewriters).

The product classes and brands were pretested to meet certain criteria. All were relatively well known, reflecting the kinds of products that subjects might purchase. Further, the brands were chosen so that at least 90% of respondents in a pretest agreed with the rank order of the given quality ratings. Finally, both prices and perceived quality ratings were designed to be consistent with the subjects' prior beliefs. Specifically, prices were similar to those actually charged in stores at the time and perceived quality ratings were based on scores given by similar respondents in a pretest questionnaire. The pur-

pose of making the information consistent with the subjects' likely prior beliefs was to increase the realism of the task and to avoid contrast effects (Sherif and Hovland 1953).

Manipulation of Competitive Context

To generate choice sets in the boundary condition, the top brand was deleted from the four possible alternatives in Table 1 so that the experimental brand would have the highest levels of price and perceived quality in the offered set. For the bracketed condition the top brand was retained and the low price/low quality brand was deleted. Thus, in all cases, subjects were asked to choose one item from three offered in the product classes.

Two aspects of this way of manipulating competitive context bear comment. First, the bracketing effect is tested only in the upper boundary condition. The reason for this limitation is simply to provide as much statistical power as possible in an already complex experimental design. Second, competitive context is manipulated by replacing the highest price brand with the lowest price one. This design avoids confounding the bracketing-versus-boundary manipulation with the number of brands included in the choice set. The penalty is that the bottom price (low versus moderate) varies between the boundary and the bracketed conditions, as does the high price (experimental versus top brand). A test of what would happen if the low price brand were retained in all treatments is therefore of interest, but is left for future research.

Manipulation of Available Information

Availability of additional information was manipulated by varying the kinds of cues given to subjects as a basis for each choice. Relative prices were always available. In addition, depending on the experimental

Table 1
ALTERNATIVES IN PRICING STUDY
(stimuli, perceived quality ratings, and prices)

	<i>Peanut butter</i>	<i>Pancake syrup</i>	<i>Dishwashing liquid</i>	<i>Type- writers</i>	<i>10-speed bikes</i>	<i>Color TV sets</i>
Top brand	Skippy	Log Cabin	Ivory	S -Corona	Raleigh	Sony
Quality rating	2.4	1.7	1.1	0.9	1.2	1.5
Price	\$2.10	\$1.77	\$1.70	\$3.99	\$2.25	\$4.70
Experimental brand	Jif	G. Griddle	Palmolive	Royal	Schwinn	RCA
Quality rating	1.7	0.5	0.8	0.3	0.6	0.5
Price (high)	\$2.06	\$1.74	\$1.69	\$3.88	\$2.19	\$4.60
Price (low)	\$1.78	\$1.56	\$1.57	\$3.05	\$1.75	\$3.80
Moderate price brand	Numade	Embassy	Lux	Olympia	Nishiki	Philco
Quality rating	-0.7	-0.3	-0.2	-0.3	-0.3	-0.7
Price	\$1.73	\$1.53	\$1.55	\$2.95	\$1.70	\$3.70
Low price brand	A&P	A&P	A&P	J.C. Penney	J.C. Penney	J.C. Penney
Quality rating	-0.8	-0.9	-1.7	-0.9	-1.5	-1.3
Price	\$1.70	\$0.99	\$0.70	\$2.38	\$1.00	\$3.30

group, brand names, perceived quality ratings, or both pieces of information also were included.

It is relevant to ask why the design did not include a cell in which only price information was available, because such a cell would have completed a full factorial design representing the presence and absence of all combinations of brand and quality information. The reason is that subjects in pretests found choices with only price information to be highly problematic and unrealistic. They wanted to know what they were getting for the higher price—something that was known if brands or quality ratings were provided. Two choice strategies emerged in the price-only condition. Subjects either trivially chose the lowest price or tried to match the price they would pay. In either case, the concept of price sensitivity was found to have a different meaning to subjects than it did when either brand names or quality ratings were available. Thus, the price-only cell was dropped from the design.

Manipulation of Price

The price manipulation involved altering the price of the experimental brand given to the subject groups. The goal was to vary the price as much as possible while keeping it below that of the top brand and above that of the moderate brand. Accordingly, the price of the experimental brand was manipulated by setting its price at either 10% or 90% of the distance between the prices of the top and moderate brands.

Overall Design

Figure 2 summarizes the full design. There were two price conditions, two competitive context conditions, and three information conditions. These 12 cells were assigned systematically to the 708 choices (118 subjects \times 6 choices per individual), subject to various constraints. Each person made only one choice from each product class, two of which came from each of the three infor-

mation conditions. Further, though complete within-subject balance was obviously impossible, each subject received at least one case of each combination of the two price and the two competitive context conditions. Finally, the order of the product classes was randomized, subject to the constraint that the durable products (typewriters, 10-speed bikes, TV sets) and nondurable products (peanut butter, syrup, dishwashing liquid) appeared in separate contiguous sets.

The design enabled us to estimate price sensitivity efficiently for the experimental brand within each of the various conditions. This task was not expected to mirror directly price sensitivity in the marketplace for two reasons. First, no explicit reference was made to either a budget constraint or a need for the product. Second, there was no real cost—the exercise was clearly hypothetical. Despite its hypothetical nature, however, subjects in the exercise certainly acted as though a real budget constraint affected their decisions. That is, they spoke of brands as being “too expensive” or having “poor value for the money.” Thus, though there is some artificiality in the task, we believe the level of realism in the task is sufficient for the pattern of differences in price sensitivity across experimental groups to correspond reasonably to actual choice behavior.

RESULTS. AGGREGATE ARC ELASTICITY

We first examine the relative effects of the experimental manipulations on differences in aggregate arc elasticity. These effects are assessed separately for the two competitive conditions (bracketed versus boundary) and for the three information conditions (brand information alone, quality information alone, or both). Here, the data are pooled across the six product classes. This limited aggregate analysis gives a feel for the data. Subsequently, we apply more rigorous statistical tests to build product- and brand-specific effects into the context of a multinomial logit model.

Table 2 shows the effect of the price manipulation on the percentage choosing the experimental brand in the bracketed condition. Across all product classes, the experimental brand at its higher price received an average of 24% of the choices. At its lower price, representing an average 16% ($\Delta P/\bar{P}$) reduction, the experimental brand's share increased to 43%. Thus the percentage increase in share, $\Delta Q/\bar{Q}$, is 57%, resulting in an estimated arc elasticity, $(\Delta Q/\bar{Q})/(\Delta P/\bar{P})$, of -3.52 . Table 2 also gives the comparable shares for the experimental brand in the boundary condition, 61% versus 65%. The elasticity of the experimental brand drops across competitive conditions from -3.52 to -34 .

The data in Table 2 support the bracketing hypothesis by showing relatively greater price elasticity in the bracketed than in the boundary condition. Table 3 separates this analysis for the three information conditions. The first column indicates that for the quality-only treatment group the relative elasticity of the experimental brand changes from -6.31 to -92 between the bracketed and

Figure 2
EXPERIMENTAL DESIGN

Price conditions (2 levels)

- 1 Low Price of experimental brand (P_{exp}) is close to price of middle brand (P_{mod})

$$P_{exp} = P_{mod} + 10(P_{top} - P_{mod})$$

- 2 High Price of experimental brand (P_{exp}) close to price of top brand (P_{top})

$$P_{exp} = P_{mod} + 90(P_{top} - P_{mod})$$

Additional information conditions (3 levels)

- 1 Price and brand name
- 2 Price and perceived quality rating
- 3 Price and brand name and perceived quality rating

Competitive context conditions (2 levels)

- 1 Bracketed choice set = {top, experimental, moderate}
- 2 Unbracketed choice set = {experimental, moderate, low}

Table 2
EFFECT OF PRICE ON CHOICE PROBABILITIES

Price of experimental brand		Percentage choosing			<i>n</i>
		Top brand	Experimental brand	Moderate brand	
Bracketed condition	High	59	24	17	166
	Low	49	43	8	157
Estimated arc elasticity of experimental brand = -3.52					
		Experimental brand	Moderate brand	Low price brand	
Boundary condition	High	61	22	17	173
	Low	65	12	23	173
Estimated arc elasticity of experimental brand = -.34					

boundary conditions. Comparable figures for the brand-only treatment are -4.03 and -.20. Finally, when both pieces of information are provided, the estimated arc elasticity is -.61 and .02, respectively. Thus, within the three information conditions, price sensitivity is relatively lower for brands at the upper boundaries of their price-quality continua.

In terms of differences in price sensitivity due to the manipulation of additional information, elasticity is least extreme when both pieces of information are available, moderate when only brand names are given, and most extreme when only quality ratings are provided. These results support the hypothesis that the availability of brand names alone results in relatively lower price sensitivity, in comparison with the elasticity associated with the availability of quality ratings alone. It appears that, in accord with the motivational effect, the addition of quality information to brand names results in still lower price sensitivity. We discuss the implications of these results after using a multinomial logit analysis to estimate more precisely the relative magnitude and the statistical significance of these effects.

DISAGGREGATE LOGIT ANALYSIS

Though the preceding discussion of aggregate arc elasticity provides an understanding of the magnitude and meaning of the results, the pooling of heterogeneous subsets clouds any statistical inferences. Further, dis-

aggregate analysis is needed to estimate relative price sensitivity within experimental conditions and product classes in a manner that avoids potential problems due to small cell sizes.

Accordingly, we use a multinomial logit model to account parametrically for the various experimental conditions and product classes. This model takes the form

$$(1) \quad Q_i = U_i / \sum_j U_j,$$

where Q_i is the proportion of choices alternative i receives and U_i is a covert measure of the utility of brand i , which is a function of the brand's characteristics (x_{ik} 's, $k = 1, \dots, K$),

$$(2) \quad U_i = \exp\left(\sum_k x_{ik} B_k\right).$$

The x_{ik} 's reflect characteristics of the individual alternatives in the various choice sets and the B_k 's are their coefficients. For example, one x_{ik} is an indicator variable for the top brand of color TV sets. These variables primarily serve as covariates that facilitate more precise estimates of the price effects.

A group of the dependent variables, denoted X_{pk} (with subscript p to denote a price term), is defined as P_k/\bar{P}_k , where P_k is the experimental brand's actual price and \bar{P}_k is the average of the experimental brand's high and low prices in condition k . The price variable takes nonzero values only for the experimental brand because the prices of the other brands do not vary. Given this coding, the marginal effect of a price change on the probability (Q_k) of choosing the experimental brand can be shown by combining equations 1 and 2 and differentiating to obtain

$$(3) \quad \frac{dQ_k}{dP_k} = \frac{B_{pk}Q_k(1 - Q_k)}{\bar{P}_k},$$

where B_{pk} is the coefficient for price in the logistic

Table 3
ESTIMATED ARC ELASTICITY WITHIN EXPERIMENTAL CONDITIONS

Competitive condition	Information available		
	Quality ratings	Brand names	Both
Bracketed	-6.31	-4.03	-0.61
Boundary	-0.92	-0.20	0.02

regression model and Q_k is the estimated choice share of the experimental brand given the parameters. The estimate of elasticity then has a very simple form.

$$(4) \quad e = \left(\frac{dQ_k}{dP_k} \right) \left(\frac{\bar{P}_k}{Q_k} \right) = B_{pk}(1 - Q_k)$$

This enables us to examine elasticity levels (for relative comparisons among treatments) by considering the B_{pk} coefficients.

We estimated the multinomial logit model by means of a computer routine using an adaptive search procedure to find parameters that maximize the likelihood of the actual choices given the model specification. Chi square tests on the likelihood ratio enable one to test the significance of composite nested hypotheses. In addition, t -tests for specific variables are possible because the routine supplies asymptotic estimates of the variances and covariances of the parameters. These estimates are derived from the inverse of the matrix of second derivatives of the likelihood function with respect to the parameters (Wilks 1962, p. 418).

RESULTS OF MULTINOMIAL LOGIT ANALYSIS

The multinomial logit model was applied to the choices of 118 respondents each making six selections. This analysis used a total of 28 parameters, and the resulting fit was significantly better than that of the null model ($\chi^2(28) = 308, p \leq .0001$). Twenty-four of the parameters were needed as covariates to model the 708 choices in one equation. These 24 covariates account for heterogeneity across subjects, products, and experimental conditions, thereby mitigating the problem of pooling cross- and within-subject data.

Role of the Covariates

Tables 4 and 5 show results for the covariates in the multinomial logit analysis. At the top of Table 4 are the average coefficients for the four competitive positions. All four coefficients in each group are given for clarity; however, in the model one is redundant and was not included in the estimation procedure. To derive probabilities these coefficients must be modified by an exponential transformation and then entered into equation 1. For example, the top brand has a coefficient of .83, whereas the experimental brand (whose price is defined here as half way between its high and low experimental conditions) has a coefficient of .48. These coefficients translate into an odds ratio of $\exp(.83)/\exp(.48) = 1.5$. The model therefore indicates that the top brand has about one and one-half times as many choices overall as the experimental brand. The prediction of shares within a choice set follows similar logic. Thus, the probability of choosing the experimental brand in a set that includes the top and the moderate brand as competitors is $\exp(.48)/[\exp(.48) + \exp(.83) + \exp(-.82)]$ or .37.

Substantively, these results show that, across product classes, the top brand was generally most preferred, fol-

Table 4
LOGIT ANALYSIS OF CHOICE EXPERIMENT: COVARIATES

	Coefficient	S.E.
<i>Average utilities of competitive positions</i>		
Top brand	.83	.10
Experimental brand	.48	.07
Moderate brand	-.82	.10
Low price brand	-.49	.10
<i>Deviations due to quality ratings</i>		
Top brand	.09 ^a	.13
Experimental brand	-.06	.09
Moderate brand	-.11	.13
Low price brand	+.08	.13
<i>Deviations due to brand name</i>		
Top brand	-.39	.13
Experimental brand	-.29	.09
Moderate brand	-.24	.12
Low price brand	.92	.14
<i>Deviations due to both together</i>		
Top brand	.30	.12
Experimental brand	.35	.09
Moderate brand	.35	.13
Low price brand	-1.00	.14

^aThe effects are additive so that the coefficient for the top brand in the quality condition is $(.83) + (.09) = .92$. This means that, when accompanied by quality ratings, the top brand had a utility score that was .92 above the utility of the other competitive positions. Note also that the fourth parameter in each set is redundant because they are coded to sum to zero. For example, in the case of the average utilities $(.83) + (.48) + (-.82) + (-.49) = 0$.

lowed by the experimental brand, then the low price brand, and finally the moderate brand. Recall that these coefficients include the price impact and thus reflect the purchase utility of each alternative.

Table 4 also shows how the coefficients for the various competitive positions change under the various information conditions. For example, the coefficient for the top brand increases by .09 over its normal coefficient when only quality ratings are available.

Table 5 lists the coefficients representing utility deviations for brands within each product category. In the present analysis these coefficients serve primarily to account for expected heterogeneity and, as covariates, to permit more powerful tests of the hypothesized contrasts to which we now turn.

Test of Competitive Context and Addition of Information Effects

Table 6 summarizes the analysis of the price-change terms. As only the experimental brand's price was manipulated, all results refer to its estimated elasticity. Its average price coefficient is -3.63. According to the logit model the elasticity depends on the market share of the experimental brand ($e = B_{pk}(1 - Q_k)$). This market share, Q_k , varies across the product classes, and among the competitive and the information conditions. Because the

choice set always comprised three items, a reasonable way to set Q in summarizing the results is at the point of equal shares where $Q = .33$. Other transformations would result in estimates that differ by only a multiplicative constant from those given.

The elasticity estimates in the experimental conditions shown in Table 6 parallel the aggregate arc elasticity levels of Tables 2 and 3. In the bracketed condition, estimated elasticity is -4.1 , whereas in the boundary condition it drops to $-.7$. The difference between these two effects is statistically significant ($t = 2.8, p \leq .01$). This result supports the bracketing hypothesis.

In the three information conditions, the quality ratings alone resulted in the most extreme estimated elasticity ($e = -4.3$), followed by brand names alone ($e = -2.5$) and then by both pieces of information together ($e = -.5$). As hypothesized, the availability of brand names alone produced significantly lower estimated price elasticity than did quality ratings alone ($t = 1.7, p \leq .05$). The addition of quality information to brand names produced lower estimated elasticity ($t = 2.6, p \leq .01$) in comparison with brand names alone.

Table 5
DEVIATIONS IN UTILITIES FOR BRANDS WITHIN
PRODUCT CATEGORIES

Product class	Product	Price (\$)	Coefficient	S E
Peanut butter	Skippy	2 10	-.20*	23
	Jif	2 06-1.78	.33	20
	Numade	1 73	-.51	20
	A&P	1 70	+.38	29
Pancake syrup	Log Cabin	1.77	-.28	20
	Golden Griddle	1.74-1.56	-.06	21
	Embassy	1.53	.44	18
	A&P	0.99	-.10	23
Dishwashing liquid	Ivory	1.70	.04	17
	Palmolive	1.69-1.57	-.25	21
	Lux	1 55	-.31	19
	A&P	0 70	+.52	23
Typewriters	Smith-Corona	399	-.12	18
	Royal	388-305	-.30	17
	Olympia	295	-.11	17
	J C. Penney	238	+.53	18
10-speed bikes	Raleigh	225	.05	18
	Schwinn	219-175	.45	21
	Nishiki	170	.12	19
	J C Penney	100	-.62	21
Color TV sets	Sony	470	.51	20
	RCA	460-380	-.17	22
	Philco	370	.37	20
	J C. Penney	330	-.71	22

*This coefficient can be interpreted as the deviation from the average of that brand. Thus the utility of Skippy at \$2 10 is (.83) for the utility of the top brand plus (-.20) for its deviation from the average

Table 6
RESULTS FOR LOGIT ANALYSIS OF PRICE-CHANGE
TERMS

	Coefficient		Elasticity ^a	
	Est.	S E	Given $Q = .33$	S E.
Average price effect	-3.63	0.9	-2.4	0.7
<i>Effect given competitive condition</i>				
Brand is bracketed	-6.18	0.9	-4.1	1.0
Brand is at boundary	-1.09	0.9	-0.7	1.0
<i>Effect given information condition</i>				
Quality ratings	-6.49	1.3	-4.3	1.1
Brand names	-3.97	1.3	-2.5	1.1
Both	-0.79	1.3	-0.5	1.2

^aThe elasticity estimator is derived by $B_{pk}(1 - Q)$. Thus for the quality condition this is $(-6.49)(1 - .33) = -4.3$

Sensitivity of the Results to Different Specifications

The elasticities from the logit analysis are remarkably similar to the arc elasticities. However, by accounting for the various covariates, the multinomial logit procedure affords greater confidence in and more powerful statistical tests of the results. In addition, the parametric framework permits further tests of the stability of the results.

Several runs were made to test the sensitivity of our results to different model specifications. The basic conclusion was that, even when additional covariates were statistically significant, they had very little effect on the findings relevant to the three major research questions. For example, one analysis allowed each product class to have its own idiosyncratic elasticity term. The gain in likelihood due to these six additional variables was significant ($\chi^2(5) = 18.2, p \leq .001$) but, in part because of the orthogonal nature of the design, they had virtually no impact on the degree to which the experimental conditions moderated the relative price sensitivity.

A second test of stability concerned possible interactions between bracketing and the information conditions. We suspected that, once price sensitivity was diminished in the boundary condition, the differences due to information availability might disappear. A test of this potential interaction on the effect of adding quality information was in the expected direction, but did not reach conventional levels of significance ($t = 1.1, p \geq .10$). The analogous test for brand versus quality information was in the opposite direction, but again did not reach significance ($t = -.1, p \geq .50$). Thus the competitive-context and information conditions appear to have exerted independent effects on the estimates of price elasticity.

A final test of the stability of our results concerned whether they hold across various subgroups within the experiment. One important contrast compared the urban students with the suburban homeowners. A second com-

pared nondurable products with durable products. Both of these potential interactions were tested by building the appropriate cross-product terms into the price coefficients. Neither the terms involving competitive-context interactions ($\chi^2(2) = 1.2, p \geq .50$) nor the terms pertaining to additional information ($\chi^2(4) = 5.6, p \geq .20$) were significant. This finding means that the pooling of heterogeneous groups did not affect results for the critical price contrasts. It might be noted, however, that the groups differed in terms of their average price sensitivity. For example, homeowners were generally more price sensitive than students. The statistical tests, however, indicate that the *change* in price sensitivity due to the context and information manipulations did not differ across groups. This finding supports the generality of the contextual findings even across groups with different base rates of price sensitivity.

In sum, we found that altering the specification of the multinomial logit model had little effect on the particular hypotheses of interest. This outcome suggests that our results are stable over a broad range of conditions.

DISCUSSION

We organize the discussion around the three research questions and examine each in an attempt to assemble a coherent account of the data. Throughout, we emphasize a distinction between respondents' treating price as a tradeoff against perceived quality (price-versus-quality strategy) and their treating price as consistent with perceived quality (price-with-quality strategy). Thus, as an explanatory mechanism, we interpret the experimental manipulations as modifying the relative likelihood of the price-versus-quality (higher elasticity) and price-with-quality (lower elasticity) orientations.

Result 1. Bracketing Produced Relatively Greater Price Sensitivity

In the bracketed condition, the experimental brand was surrounded by competitors. By contrast, in the boundary condition, the top brand was replaced by the low price brand and thus the experimental brand was at the top of the price-quality continuum. As expected, this difference in competitive context affected price sensitivity, which was relatively higher (lower) for the bracketed (boundary) condition. This finding supports the two possible explanations mentioned before. First, it supports the idea that making a price-versus-quality evaluation is more difficult and has less justification in the bracketed than in the boundary condition. Second, it supports the idea that adding an adjacent competitor in the bracketed case increases price sensitivity of the experimental brand by increasing its substitutability in the choice set.

The processing and substitutability explanations afford very different accounts of the result found. Testing these alternative explanations requires a study manipulating the number of brands offered in a manner that allows substitution effects to be separated from processing effects.

Managerially, our results are intriguing regardless of

the underlying process. They account, in part, for the desire of firms to be positioned at the high price/high perceived quality boundary (e.g., Chivas Regal or Rolls Royce). The implication for brands on the low price end of the spectrum was not explicitly tested and is therefore less clear. However, if price sensitivity is greater for a low price brand when a still lower price brand is added to the field, adding such "decoys" (cf. Huber and Puto 1983) may generally increase low-end price sensitivity. This conclusion must remain speculative, however, until further research extends the domain of the bracketing hypothesis to lower price alternatives.

Result 2. Brand Name Alone Produced Relatively Lower Price Sensitivity Than Quality Ratings Alone

The second result stemmed from contrasting the price sensitivity of choices based only on additional perceived quality information with that of choices based only on additional brand information. The finding of relatively lower price sensitivity in the latter condition was hypothesized because the well-known brand names were expected to be treated as "chunks" of information. This "chunking" could lead respondents to assume that the price is reasonable and therefore to pay less attention to it. Indeed, this attentional simplification has a rational base beyond the immediate saving in processing time. Specifically, because the items tested were available in the competitive marketplace, market mechanisms would have provided considerable assurance that items were priced at appropriate levels.

Our finding of the relatively lower price sensitivity with brand names alone parallels the development of brand loyalty. For example, McConnell (1968) showed that simple usage of identical products could instill differential loyalty and significant price inelasticity. Thus, our findings corroborate the effort of many firms to establish a unique brand identity.

To summarize, our finding of relatively lower price sensitivity due to providing brand names with price instead of quality ratings with price corresponds to empirical results for brand names in other simulated choice situations. It is normatively reasonable in a competitive marketplace. Finally, it supports the practitioner's belief in the value of established brand identities.

Result 3. Brand Name Plus Quality Information Produced Relatively Lower Price Sensitivity Than Brand Name Alone

The third result emerged from contrasting the price sensitivity of groups given only brand names with that of groups given both brand names and perceived quality ratings. We found that the latter groups exhibited consistently lower price elasticity. Thus the increased potential to evaluate price appears to have been overcome in our experiment by the motivation to simplify the decision. It is useful, then, to explore why this effect occurred and to discuss the degree to which it can be expected to generalize to other choice situations.

EFFECTS ON PRICE SENSITIVITY

The motivational disincentives to evaluate price in the face of additional quality information have several explanations. First, it may be that the addition of *any* piece of information has a negative impact on the weight given to the other information. Such an account would posit that price sensitivity depends primarily on the number of other pieces of information provided. This account could be tested by experimentally manipulating both the number and importance of available pieces of information. Alternatively, quality ratings may provide information that is difficult to merge with the valuation attached to the brand name. Finally, a specific factor in the design of the quality ratings may have further lowered elasticity. The perceived quality ratings displayed were associated positively with both subjects' expectations for the brand and the prices given. This information may have reinforced the positive associations between price and quality and thereby favored a price-with-quality strategy.

Whatever the detailed explanation, the addition of quality information that could have made a price-versus-quality assessment more accurate appears to have made it more difficult. This effect led to the simpler price-with-quality processing wherein the conflict between price and quality was effectively ignored. Though this result is found to hold in the context of our relatively low involvement task, the motivational explanation leads to an interesting prediction in the case of high involvement decisions. In that case, the value of additional quality information could overcome the disincentives to process it. Such a hypothesis could be tested by manipulating the importance of the decision to the subjects. We then could ascertain whether the relative lessening of price sensitivity due to the addition of quality ratings is general or limited to low involvement decisions.

The managerial implications of a finding that the promotion of relative quality information for branded products lowers price sensitivity could prove very important, particularly if generalized to high involvement choices. Our results suggest, for example, that providing the customer with comparative quality information may divert attention from evaluating relative prices. Though this result might merely reinforce the general strategic recommendation that producers should try to get buyers to focus on quality differences rather than price differences, the data imply that the justification for such a recommendation can have an information-processing as well as a product-differentiation basis.

Conclusions

The conclusions drawn from this study must be tempered by its limitations. Specifically, many relevant aspects could not be included in the design. For example, the tests of elasticity occurred in a laboratory setting where both the desire to simplify the process and the countervailing demand to exhibit rationality were certainly greater than for choices in the marketplace. Second, respondents were required to choose within each product category; elasticities might have been substantially greater in the

presence of an income constraint or with an option to reject all of the alternatives. Third, the price manipulations always affected the top or the second brand and thus the implications of the study for low price/low quality brands remain uncertain. Finally, all price manipulations and perceived quality ratings adhered to a strict price-quality ordering to avoid dominated alternatives (e.g., an alternative with higher price and lower perceived quality) that might have lowered price sensitivity.

The preceding limitations indicate areas where the study can and should be expanded. Within its present confines, however, the major conclusions seem strong. Specifically, differences due to competitive context or additional information typically brought about large changes in relative levels of elasticity. First, placing a brand at the boundary of a choice set lowered its relative price sensitivity. Second, presenting only brand names as opposed to only quality ratings also lowered the relative price elasticity. Finally, adding quality ratings to brand names had a strong negative impact on relative price sensitivity. Though these findings are clear within their limited context, the most exciting prospect is the further testing of these results in different experimental and field settings to establish the domains in which they apply.

REFERENCES

- Barnes, James G. (1975), "Factors Influencing Consumers' Reactions to Retail Newspaper Sales," in *Proceedings, Fall Educators' Conference*. Chicago: American Marketing Association, 471-7.
- Berkowitz, Eric N. and John R. Walton (1980), "Contextual Influences on Consumer Price Responses: An Experimental Analysis," *Journal of Marketing Research*, 17 (August), 349-58.
- Della Bitta, J. Albert, Kent B. Monroe, and John M. McGinnis (1981), "Consumer Perceptions of Comparative Price Advertisements," *Journal of Marketing Research*, 18 (November), 416-27.
- Gabor, Andre, Clive W. Granger, and Anthony Sowter (1970), "Real and Hypothetical Shopping Situations in Market Research," *Journal of Marketing Research*, 7 (August), 355-9.
- Hauser, John R. and Steven H. Shugan (1983), "Defensive Marketing Strategies," *Marketing Science*, 2 (Fall), 319-60.
- Huber, Joel and Christopher Puto (1983), "Market Boundaries and Product Choice: Illustrating Attraction and Substitution Effects," *Journal of Consumer Research*, 10 (June), 21-31.
- Jacoby, Jacob, George Szybillo, and Jacqueline Busato-Schach (1977), "Information Acquisition Behavior in Brand Choice Situations," *Journal of Consumer Research*, 3 (March), 209-16.
- Lutz, Richard J. and James R. Bettman (1976), "Multiattribute Models in Marketing: A Bicentennial Review," working paper, University of California, Los Angeles (February).
- McConnell, Douglas J. (1968), "An Experimental Examination of the Price-Quality Relationship," *Journal of Business* (October), 439-44.
- Monroe, Kent B. (1973), "Buyers' Subjective Perceptions of Price," *Journal of Marketing Research*, 10 (February), 70-80.

- (1976), "The Influence of Price Differences and Brand Familiarity on Brand Preferences," *Journal of Consumer Research*, 3 (June), 4-49.
- and R. Krishnan (1985), "The Effect of Price on Subjective Product Evaluation," in *Perceived Quality*, J. Jacoby and J. Olson, eds. Lexington, MA: Lexington Press, 212-32.
- Olson, Jerry C. (1977), "Price as an Informational Cue: Effects on Product Evaluations," in *Consumer and Industrial Buying Behavior*, A. Woodside, J. Sheth, and P. Bennett, eds. New York: North-Holland Publishing Company.
- Parsons, Leonard J. and Randall L. Schultz (1976), *Marketing Models and Economic Research*. New York: Elsevier.
- Peterson, Robert A. and William R. Wilson (1985), "Perceived Risk and Price-Reliance Schema as Price-Perceived-Quality Mediators," in *Perceived Quality*, J. Jacoby and J. Olson, eds. Lexington MA: Lexington Press.
- Sherif, Muzafer and Carl Hovland (1953), "Judgmental Phenomena and Scales of Attitude Measurement: Placement of Items with Individual Choice of Number of Categories," *Journal of Abnormal and Social Psychology*, 48, 135-41.
- Simon, Herbert A. (1974), "How Big is a Chunk," *Science*, 183, 482-8.
- Stafford, James E. and Ben M. Enis (1969), "The Price-Quality Relationship: An Extension," *Journal of Marketing Research*, 6 (November), 456-8.
- Wilks, Samuel S. (1962), *Mathematical Statistics*. New York: John Wiley & Sons, Inc.

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