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CHAPTER

METHODS OF ESTIMATING THE PRICE-VOLUME RELATIONSHIP

The past four chapters have stressed the importance of demand in determining the price of a product or service. There has been an implicit assumption that there are ways to determine the responsiveness of demand to alternative prices. As indicated in Chap. 2, the measure of the responsiveness of demand to price differences is the price elasticity measure. If the concern is how volume sold for a product will change relative to a price change for that product, then the measure is price elasticity of demand. But if the concern is how volume sold for product A will change relative to a change in the price of product B, then the concern is the cross-price elasticity of demand. Numerical estimates of the degree of sensitivity of demand for a product to price differences can improve the ability of managers to set prices correctly. However, as the methods of estimating the price-volume relationship are reviewed in this chapter, it should be apparent that reliable estimates of price sensitivity require careful thought and planning. There are many ways to get quantitative estimates of the relationship; each method has advantages and limitations.

PRICING STRATEGY AND PRICING RESEARCH

Traditionally, business firms have not routinely used market research as a basis for pricing strategies. They rarely develop or maintain information systems that are up to date on market and competitive responses to price changes, short-term deals or promotions, or product introductions and deletions. Yet pricing has a major impact on the profitability of an enterprise (or on the ability of a not-for-profit organization to break even), and without information on the results of past pricing decisions or

on likely responses to contemplated pricing decisions, a firm is ill-equipped to make informed pricing decisions.

The usefulness of pricing research depends on the firm's pricing objectives and the pricing strategy chosen. If the firm follows a cost-plus approach to pricing, then pricing research on the nature of customer response or competitive response will not be very helpful except to forecast the likely results from a chosen price or price change. Similarly, if the firm primarily follows the pricing practices of competition, pricing research again will have little impact on the chosen prices, but rather may be used to forecast the likely impact of the decisions. However, as discussed in Chaps. 2-5, a well-developed pricing strategy begins with an understanding of how customers and competitors react to prices and their degree of sensitivity to specific prices or price levels and to price changes or price differences.

Some Fundamental Questions

To be able to estimate customers' and competitors' reactions to pricing decisions, there are a number of basic questions that need to be answered. These questions include the following:

- Does the product or service perform a particular function, solve a problem, or provide pleasure for customers? Can these particular functions, problems, or pleasures be identified?
- To what degree do customers tend to associate product or service quality with price?
- How easy or difficult is it for buyers to determine the relative quality of the product or service before purchase? Do buyers tend to search for alternatives before purchase?
- What are the benefits that the product or service provides to different types of buyers?
- What is the size of the market for this product or service?
- What is the maximum amount that customers are willing to pay?
- What is the minimum amount that customers are willing to pay?
- What is the most acceptable set of prices for these customers?
- How much would these customers buy at these different prices?
- To what degree is the demand for the product or service sensitive to price differences?
- Are there different groups of customers with different levels of price sensitivity?
- How do customers purchase the product?
- Are customers aware of prices for this product category?
- Do customers perceive that substitute products or services are available?
- How are competitors likely to react to a particular price change, relative price difference, or pricing tactic?
- To what extent have competitors' pricing strategies and tactics affected the firm's sales volume in the past?

- To what extent have competitors' sales been responsive to their price changes? To the firm's price changes?
- Have competitors' past pricing moves been a surprise?
- Whom do customers perceive to be the firm's major competitors?

Several of these questions can be answered by maintaining an information system that tracks customer and competitor responses to economic conditions and to pricing changes. Other questions can be answered by doing secondary research. However, many of the questions need to be addressed by specific primary research.

Three Basic Pricing Research Issues

A multitude of techniques can be used to conduct a specific pricing research activity. However, three important issues about the conduct of the research must be settled regardless of the technique.

First, will price sensitivity be tested for a single product or brand by itself or in the context of competing products? If there is no readily available reference product for customers, then initially testing the relative willingness to buy for the product in isolation is not too dissimilar from actual market conditions. However, when viable alternatives exist for customers, testing the effect of the price alternative in isolation implicitly assumes there will be no competitor reaction and buyers will be relatively unlikely to shift to a competitive offering.

Second, will customers' responses to the price be tested directly or indirectly? Often, a direct approach (e.g., asking customers if they would be willing to pay a specific price for a product) increases buyers' concern for the price and, as a result, they may respond in a way they think is "rational" rather than according to their perceptions or beliefs. However, an indirect approach (e.g., asking respondents pricing questions within the context of questions about brand name or advertising) requires the researcher to assume that the underlying beliefs and perceptions have been measured, without strong evidence that this is so.

Finally, will each person be asked to respond to one price or to several prices? Obtaining people's responses to a single pricing situation makes it less likely that they will guess the underlying research question and try to provide "rational" responses. However, a single-price scenario makes it more difficult to determine each buyer's relative price sensitivity, and only aggregate measures can be obtained.

As we review the different pricing research approaches, these issues will be developed further.

GENERAL PRICING RESEARCH APPROACHES

Surveys

Perhaps the most frequently used method of estimating price sensitivity is the survey of brand preferences and purchase intentions. A questionnaire is administered through personal interviews, telephone interviews, or the mail. Its basic objective is to elicit facts and opinions from respondents relating either to a prediction of the

quantity they would be willing to buy at various prices or to their intent to buy in the near future. In one brand preference study housewives were asked to indicate the amounts they would be willing to buy at selected prices.¹ It was concluded from the responses that baking powder was price inelastic and that higher prices could be charged. Analyzing a set of consumer questionnaires, another company determined that their product was being purchased primarily by high-income households, implying that sales could be increased at lower prices (demand was elastic).² This conclusion was verified when prices were lowered.

A different approach is used by the Survey Research Center at the University of Michigan. The Center periodically asks a representative sample of consumers about their attitudes toward spending, saving, credit, prices, and other economic matters. This information is used to construct an index of consumer sentiment toward the economy in general and a measure of intentions to buy certain types of consumer durables. Although there is some controversy about the predictive accuracy of the intentions approach, the intentions survey does provide a general estimate of demand for automobiles and other durables several months ahead of the demand. It does provide information useful in predicting consumers' reactions to changes in the price level, but it does not provide information on specific price elasticities for specific products.

Survey research to determine buyers' sensitivities to prices appears to be relatively easy to conduct and is one of the least costly research methods; nevertheless, it is possible to elicit unreliable responses unless care is taken to develop the questions. One problem is that people tend to anticipate the answers the interviewer or surveyor desires or to offer a socially desirable answer. Thus, when facing a direct question as to which of a set of prices would be preferred or acceptable, buyers often may indicate the lowest price option, since this would be a "rational" answer. Usually such direct questions overestimate the degree to which buyers are sensitive to price and lead to pricing decisions that are not reflective of what buyers are really willing to pay. A second problem is that the survey typically elicits responses from people at a time when they are not very interested in making a purchase of that type of product. Thus, they may not give much thought to their answer, and the answer may be considerably different than if they were seriously considering purchasing the product. There are ways to overcome these limitations; several approaches will be discussed later.

As an example of a direct survey that did not work well consider the approach used by a major hotel chain. Business guests were asked to complete a questionnaire distributed by the front desk clerks. The questionnaire was long and covered all aspects of the hotel's operations. To determine the relative price levels these business guests would be willing to pay at such a hotel, one of the questions asked for a price that the guest would consider to be too high, as well as the highest acceptable price. For some time this questionnaire indicated that the chain's prices in various cities

¹Edward R. Hawkins, "Methods of Estimating Demand," *Journal of Marketing*, 21 (April 1957), 428-438.

²Ibid., p. 430.

always seemed to be about as high as business guests would pay. Eventually, management realized that respondents also were asked to indicate the price they were currently paying and that they were unwilling to indicate that they would have paid more than the current rate. By biasing the responses to the current room rate, this direct survey did not provide information on what prices the business guests might actually have been willing to pay at this hotel.

Experimentation

Much of the research reported in the last three chapters on buyers' perceptions of prices resulted from controlled manipulation of prices. Indeed, many of the commercial techniques currently in use stem from the adaptation of the experimental techniques used to measure buyers' price perceptions. The advantage of the experimental approach is the opportunity it provides to isolate and control various market factors that may affect market demand and then to observe buyers' reactions to changes in one or more of these factors. However, in laboratory experimentation, the disadvantage is that the laboratory is not a natural shopping environment. Whether the findings from a laboratory study could be replicated in a natural environment is an important issue.

An alternative to laboratory experiments is to measure demand responsiveness to price and price changes in the marketplace by manipulating store prices in specific market areas and observing the effect on sales. Although such field experimentation is done in a natural shopping environment, the lack of control over other factors that affect sales—advertising, competition, weather—makes it difficult to know whether the changes in responses are the result of the price manipulations. Also, the passive observation of buyer behavior does not provide information about whether buyers actually perceived differences in prices, either from a previous shopping opportunity or from differences in alternative choices. If aggregate sales volume changes, the exact reason for the change is not known.

Perhaps the most serious problems associated with field experimentation are the time and expense required to change prices and monitor sales for the particular items. The availability of optical scanning equipment greatly increases both the speed and accuracy of obtaining sales volume data, but it still remains difficult to obtain estimates for more than a few products at a time. Careful application of experimental research designs, sampling methods, and statistical tests to evaluate the results will help control and measure the effects of extraneous factors.

Statistical Methods and Models

A number of approaches rely on regression or econometric analyses of price-sales volume data to estimate price elasticity. An econometric approach develops a mathematical equation or equations relating demand for a product to several variables, such as price, income, store location, and consumer density. Data are then collected on the dependent variable, sales volume, and the independent variable simultaneously. Statistical techniques are then used to estimate the parameters of the

equation(s) so as to derive an equation relating the independent variables to the dependent variable.

Often, however, some of the independent variables are also affected by demand, and to overcome this particular problem, a multiple-equation model is developed. For either single-equation or multiple-equation models, once the parameters are estimated from the empirical data, the equations may be used to predict the effect on demand of a change in price or any other independent variable.

To get an understanding for this type of approach, consider a study designed to determine the effect of price-off coupons on sales of bathroom tissue. One of the underlying problems with couponing and other short-term price deals is that buyers frequently accelerate their purchases to take advantage of price promotions. In the current example, if buyers simply accelerate their purchases of the brand of tissue being couponed, then an apparent increase in sales due to the promotion would actually not be an increase at all. That is, the coupon promotion would be stealing sales from a future period, and really generating no net increase in sales. To consider this issue, the researchers included an independent variable called *interpurchase time*, the amount of time that elapses between purchases of the product. Further, it was reasoned that the quantity previously purchased would affect both the household's interpurchase time and the amount it would buy in the current period, because a household that purchased a larger quantity than usual as a result of the promotion would be able to delay future purchases because it would have a higher inventory of tissue on hand than usual. Thus, the effect of a promotion is to cause people to purchase more than usual in a given time by accelerating their purchases. Using consumer scanner panel data, over 7,000 purchase records were examined to develop and test the following model:

$$Q_t = bQ_{t-1} + cE_t + dP \quad (6-1)$$

$$E_t = gQ_{t-1} + hP \quad (6-2)$$

where Q_t = current quantity purchased

Q_{t-1} = quantity purchased on the previous occasion

E_t = elapsed time between current and previous purchases

P = average coupon effect averaged across brands

b, c, d, g, h = empirically derived regression coefficients

The results of the analysis produced estimates of the coefficients in quantity units (rolls of bathroom tissue) and time (days):

$$b = -0.042 \text{ rolls}$$

$$c = 0.013 \text{ rolls}$$

$$d = 0.806 \text{ rolls}$$

$$g = 1.154 \text{ days}$$

$$h = 0.049 \text{ days}$$

These values represent the average effects over the entire data set and have the following interpretation: (1) an increase in purchase quantity of one roll leads to the next purchase being reduced on average by 0.042 rolls; (2) increasing the interpurchase time by one day leads to an increase on average by 0.013 rolls on the next purchase occasion; (3) a coupon purchase involves on average 0.806 more rolls than noncoupon purchases; (4) increasing purchase quantity by one roll leads to an increase in interpurchase time by 1.154 days; and (5) a coupon purchase leads to an increase in interpurchase time of 0.049 days.³

Panels

The preceding example, besides illustrating the nature of econometric modeling, showed the use of data generated from a consumer panel. In a consumer panel, the few thousand households that comprise the panel record their purchases by brand and price in a daily diary. The data are then aggregated across the panel on a weekly or biweekly basis.

The advantage of these data is that observations accumulate quickly to establish an adequate data base to develop and test models. Also, it is possible to identify purchases made with the use of coupons or at a special lower price. The major disadvantage is that the panel is not likely to be representative of the general population and the ability to generalize is limited. Another disadvantage is the possibility of errors because the respondent either forgets to record a purchase or makes an incorrect entry. Today, a number of research companies are using scanner panel data whereby the purchases of the panel are recorded automatically at the time of store checkout. Panel members must identify themselves at the point of checkout for this procedure to work.

Panel data are limited to a small percentage of consumer packaged products, because of the difficulty of getting people to record all their purchases. There is still some question about the reliability of the estimates based on panel data, but they do offer a way to obtain observations over a short period of time, making the estimates closer to the reality of the market than are the results of other survey approaches.

SOME SPECIFIC PRICE RESEARCH TECHNIQUES

We now consider different ways of estimating how buyers' respond to prices, price changes, or price differences. The set of fundamental questions posed at the beginning of this chapter reflect the behavioral points discussed in Chaps. 2-5. That is, to estimate the maximum amount buyers are willing to pay one must determine their highest acceptable price, or reservation price, referred to as the upper price thresh-

³This example is drawn from Scott A. Neslin, John Quelch, and Caroline Henderson, "Consumer Promotions and the Acceleration of Product Purchases," in Katherine E. Jocz (ed.), *Research on Sales Promotion: Collected Papers* (Cambridge, Mass.: Marketing Science Institute, 1984), Report No. 84-104, pp. 22-46.

old. Questions about whether buyers infer product quality on the basis of price relate to buyers' unwillingness to pay low prices because of suspicions about quality. Thus, the lowest acceptable price or lower price threshold needs to be estimated.

An important issue in pricing products or services is determining what benefits buyers obtain from purchasing or acquiring the product. Part of the research issue here is determining what attributes or features of the product are valued by buyers and estimating the relative perceived value of these attributes. It is also important to determine whether buyers are aware of prices they pay and how sensitive they are to differences in prices occurring because of a price change or differential pricing by competitors.

The discussion in Chap. 4 on reference prices and framing is very important in developing and interpreting techniques for obtaining buyers' responses to prices. As pointed out in Chaps. 3 and 4, price judgments are comparative in nature. Thus, simply asking people to respond to a hypothetical price without carefully providing a frame of reference forces the respondent to use his or her own reference point. That this error can lead to incorrect inferences about a firm's prices is illustrated by the following example.

A restaurant in a university conference center was experiencing some difficulty in generating sufficient revenues to break even. Explanations offered for this situation included prices that were too high and an image that the restaurant catered to conference attendees and did not offer a full-service menu. To determine how people in the local area perceived the restaurant, a consulting firm was hired to conduct a market survey. On the pricing issue, respondents were asked to agree or disagree with this statement: "Prices at the Top Hat restaurant are about right." As would be expected, a proportion of the respondents agreed with the statement and almost as many disagreed with it. Interviews were conducted with a sample of the respondents to determine why they had answered this question in the manner they had. Some respondents disagreed with the statement because they compared the restaurant to a fast-food operation and judged the prices were too high; others disagreed with the statement because they compared the restaurant to a fancy restaurant and judged prices to be low. Respondents who agreed with the statement tended to compare the restaurant to another moderately priced restaurant in the area. Failure to provide respondents with a consistent frame of reference for answering the question could have led to a serious pricing error, because the management had interpreted the majority of disagreements to mean the restaurant should reduce its prices, when in fact the prices were not perceived to be too high by a majority of respondents. Thus, an important pricing research principle is to provide respondents a frame of reference that is consistent with the research question and is consistent across respondents, unless the research is explicitly studying the effect of varying the frame of reference on responses.

Estimating Price-Level Sensitivity (Absolute Price Thresholds)

The objective of determining buyers' upper and lower price thresholds is to determine the range of prices that are acceptable to pay for the product or service. As

suggested in Chap. 3, most buyers do not consider buying a product at only one specific price but instead are willing to buy within a range of prices.

Direct Question Approach One approach to determining upper and lower price thresholds, originally developed in France in the 1950s, simply asks respondents two questions:⁴

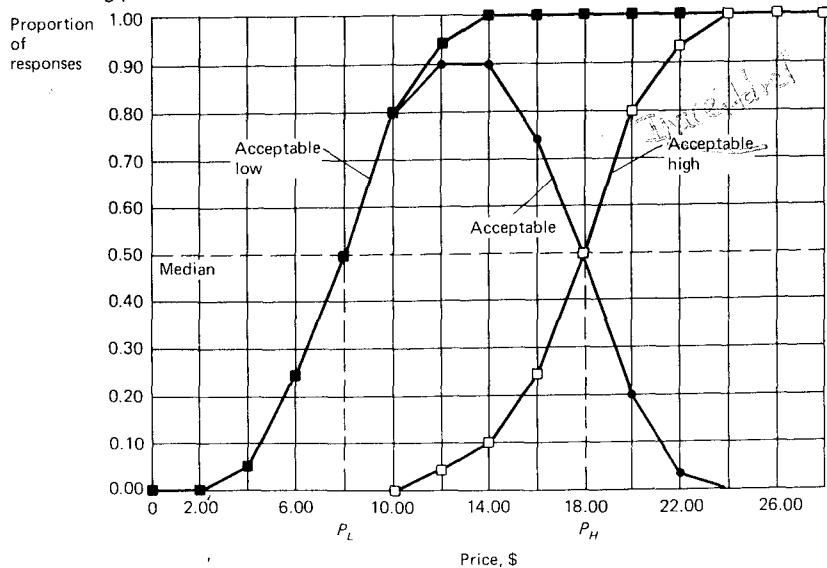
1. What is the *minimum price* you would be willing to pay for [product and/or brand specified]? (That is, below what price would you seriously doubt its quality?)
2. What is the *maximum price* you would be willing to pay for [product and/or brand specified]? (That is, beyond what price would you feel it would not be worth paying more?)

This procedure is simple and easy to implement, but it has the potential problem of being too direct. That is, it may put the idea into respondents' minds that there should be either a price that is too low or a price that is too high.

The analysis is also relatively easy. Excluding "don't know" answers, the proportions for each price are collected, beginning with the lowest price for those who would not buy because it is too low and ending with those who would not buy

⁴Jean Stotzel, "Psychological/Sociological Aspects of Price," in Bernard Taylor and Gordon Wills (eds.), *Pricing Strategy* (Princeton, N.J.: Brandon/Systems, 1970), pp. 70-74.

FIGURE 6-1
Determining price limits: direct question approach.



because it is too high. The cumulative proportion of those who find a price to be unacceptable because it is too low is labeled $L(P)$; the cumulative proportion of those who find a price to be unacceptable because it is too high is labeled $H(P)$. Subtracting $H(P)$ from $[1 - L(P)]$ at each price gives the proportion that would be willing to buy at each price, $[B(P)]$. An example set of data is shown in Table 6-1 and plotted in Fig. 6-1. To determine the lower and upper price limits for the product, usually the median percentage for each distribution (50 percent in the cumulative distribution) is used. As illustrated in Fig. 6-1, the low price limit is \$8.00 and the high price limit is \$18.00. And as indicated in Table 6-1, 90 percent of the respondents believed that prices of \$12.00 and \$14.00 were acceptable, with 75 percent of the respondents accepting a price of \$16.00. Thus, it would appear that a price around \$14.00 would have the highest acceptance in the market.

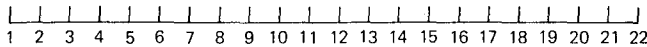
As is readily seen, this approach is convenient but does not provide sufficient information to understand whether the price that maximizes the percentage between the minimum and maximum acceptable price curves is the price that buyers find most acceptable. Moreover, each respondent provides only two prices, the lowest and highest acceptable prices. An easy extension is to give the respondents a price scale covering all the feasible market prices that might be charged for the product and ask respondents to indicate all the prices they would find acceptable. To determine whether the prices that have not been checked as acceptable are truly unacceptable, the respondents can be given a second scale and asked to indicate all unacceptable prices. Each respondent then can be asked to indicate the price that would be most acceptable to pay for the product. Figure 6-2 illustrates how these questions may be posed to respondents.

TABLE 6-1
DETERMINING PRICE LIMITS USING THE DIRECT QUESTION APPROACH

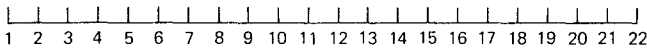
Price, \$	Low		High		Buy Price $B(P) = [1 - L(P)] - H(P)$
	Frequency, %	Unacceptable Cumulative $L(P)$	Acceptable Cumulative $[1 - L(P)]$	Frequency, %	
0.00	0.00	1.00	0.00	0.00	0.00
2.00	0.05	1.00	0.00	0.00	0.00
4.00	0.20	0.95	0.05	0.00	0.05
6.00	0.25	0.75	0.25	0.00	0.25
8.00	0.30	0.50	0.50	0.00	0.50
10.00	0.15	0.20	0.80	0.00	0.80
12.00	0.05	0.05	0.95	0.05	0.90
14.00	0.00	0.00	1.00	0.10	0.90
16.00	0.00	0.00	1.00	0.25	0.75
18.00	0.00	0.00	1.00	0.25	0.50
20.00	0.00	0.00	1.00	0.30	0.20
22.00	0.00	0.00	1.00	0.15	0.05
24.00	0.00	0.00	1.00	0.05	0.00
26.00	0.00	0.00	1.00	0.00	0.00
28.00	0.00	0.00	1.00	0.00	0.00

Product: Man's T-shirt (package of three, white)

Place X marks above the prices acceptable to you
(you would consider paying).



Place check (✓) marks above the prices unacceptable
to you (you would not consider paying).



Please indicate the price that would be most acceptable
to pay: \$ _____

FIGURE 6-2
Scales for determining acceptable prices.

The analysis of the data is similar to the analysis sketched earlier for the direct question approach. Cumulative percentages of each price that is judged to be too low, too high, and most acceptable are developed and graphed. As before, the median price that is too low is labeled the low price limit, the median price that is too high is labeled the high price limit, and the median most acceptable price is labeled the most acceptable price. The principal advantage of this approach is that individuals' evaluations of each price are obtained with little additional effort on their part. Also, it is likely that the curve depicting the distribution of acceptable prices is not a smooth, bell-shaped (normal) curve but rather is skewed, indicating that the subjective price scale is logarithmic in character.⁵ (Recall that the Weber-Fechner law discussed in Chap. 3 suggests this logarithmic relationship.)

Price Sensitivity Meter The disadvantage of the direct question approach is it forces a person to judge each price as acceptable or not. The price sensitivity meter (PSM) approach takes the direct question technique further. Instead of two questions, four questions are asked:

1. At what price would you consider this [product and/or brand] to be so inexpensive that you would have doubts about its quality?

⁵For evidence of this phenomenon see Andre Gabor and Clive Granger, "Price as an Indicator of Quality: Report on an Enquiry," *Economica*, 46 (February 1966), 43-70; Kent B. Monroe, "The Information Content of Price: A Preliminary Model for Estimating Buyer Response," *Management Science*, 17 (April 1971), B519-532; Kent B. Monroe, "Buyers' Subjective Perceptions of Price," *Journal of Marketing Research*, 10 (February 1973), 70-80.

2. At what price would you still feel this product was inexpensive yet have no doubts as to its quality?
3. At what price would you begin to feel this product is expensive but still worth buying because of its quality?
4. At what price would you feel that the product is so expensive that regardless of its quality it is not worth buying?

These four questions can be asked in an interview or as a part of a survey questionnaire. When used in a printed questionnaire, inclusion of a price scale like that in Fig. 6-2 gives respondents a better opportunity to recognize feasible prices for the product. Attempting to recall prices that might be feasible for a product without some retrieval cues makes the task quite difficult and probably introduces variation in responses across individuals.

The initial analysis is identical to that for the direct question approach. The cumulative frequency distributions for prices that are too low and too high are developed, and estimates of the lower and upper price limits are obtained using the median from each distribution (Table 6-2 and Fig. 6-3). As shown by the calculation of the buy response percentages, $B(P)$, the point of lowest buyer resistance is where $B(P)$ is the largest value, at about \$10. This point of lowest resistance is also where the unacceptable-high and unacceptable-low curves intersect. Note that at this price

TABLE 6-2
DETERMINING PRICE LIMITS USING THE PSM APPROACH

Price, \$	Low			High			Buy Price $B(P) = [1 - L(P)] - H(P)$
	Frequency, %	Unacceptable Cumulative $L(P)$	Acceptable Cumulative $[1 - L(P)]$	Frequency, %	Unacceptable Cumulative $H(P)$	Acceptable Cumulative $[1 - H(P)]$	
1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
2.00	0.05	1.00	0.00	0.00	0.00	1.00	0.00
3.00	0.05	0.95	0.05	0.00	0.00	1.00	0.05
4.00	0.05	0.90	0.10	0.00	0.00	1.00	0.10
5.00	0.10	0.85	0.15	0.00	0.00	1.00	0.15
6.00	0.10	0.75	0.25	0.00	0.00	1.00	0.25
7.00	0.10	0.65	0.35	0.00	0.00	1.00	0.35
8.00	0.20	0.55	0.45	0.00	0.00	1.00	0.45
9.00	0.20	0.35	0.65	0.05	0.05	0.95	0.60
10.00	0.05	0.15	0.85	0.05	0.10	0.90	0.75
11.00	0.05	0.10	0.90	0.10	0.20	0.80	0.70
12.00	0.05	0.05	0.95	0.20	0.40	0.60	0.55
13.00	0.00	0.00	1.00	0.25	0.65	0.35	0.35
14.00	0.00	0.00	1.00	0.15	0.80	0.20	0.20
15.00	0.00	0.00	1.00	0.05	0.85	0.15	0.15
16.00	0.00	0.00	1.00	0.05	0.90	0.10	0.10
17.00	0.00	0.00	1.00	0.05	0.95	0.05	0.05
18.00	0.00	0.00	1.00	0.05	1.00	0.00	0.00
19.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
20.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00
21.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00

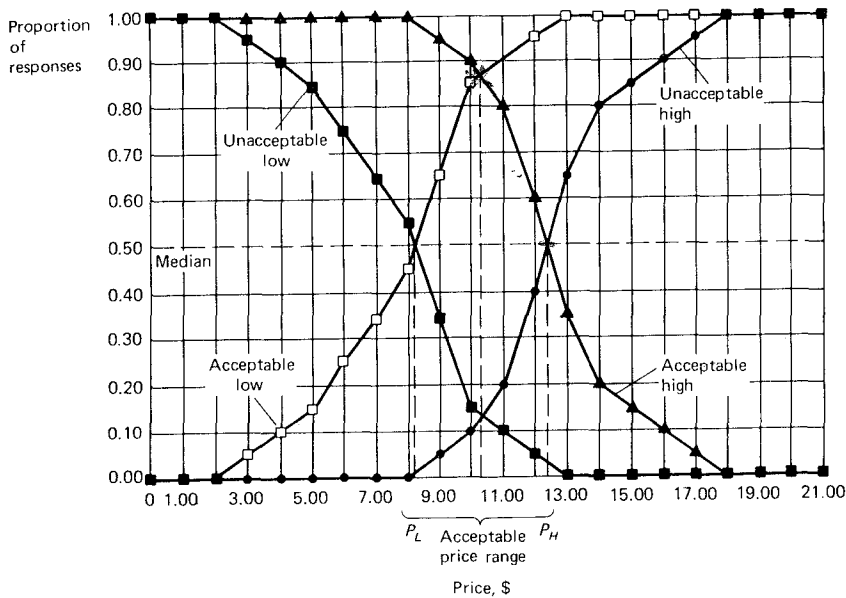


FIGURE 6-3
Determining price limits: PSM approach.

the two acceptable cumulative curves also intersect, indicating, as would be expected, the price of highest receptivity. The point where the unacceptable-low and acceptable-low curves intersect is the point at which 50 percent of the respondents are indifferent to the price because of quality concerns. Where the unacceptable-high and acceptable-high curves intersect is the price where 50 percent of the respondents are indifferent because of concerns of relative expensiveness. Between these low- and high-price limits is the acceptable price range. The buy response curve covering the acceptable price range for this data set is illustrated in Fig. 6-4. It should be noted that usually there will be some overlap between prices that are unacceptable or acceptable at both the high and low limits, providing for a small band of indifferent prices at the limits. Generally, most buyers are willing to go a little bit higher or a little bit lower before they completely refrain from a willingness to purchase. For this reason, it is useful to ask respondents to indicate those prices that are acceptable to pay as well as those prices that are unacceptable to pay.

It would be useful to add a fifth question to this approach:

5. What price would be the *most acceptable* price to pay?

Because it is likely that the buy response curve covering the range of acceptable prices will be skewed, obtaining buyers' most acceptable price adds useful information about their perceptions of prices for the product category. In addition, questions

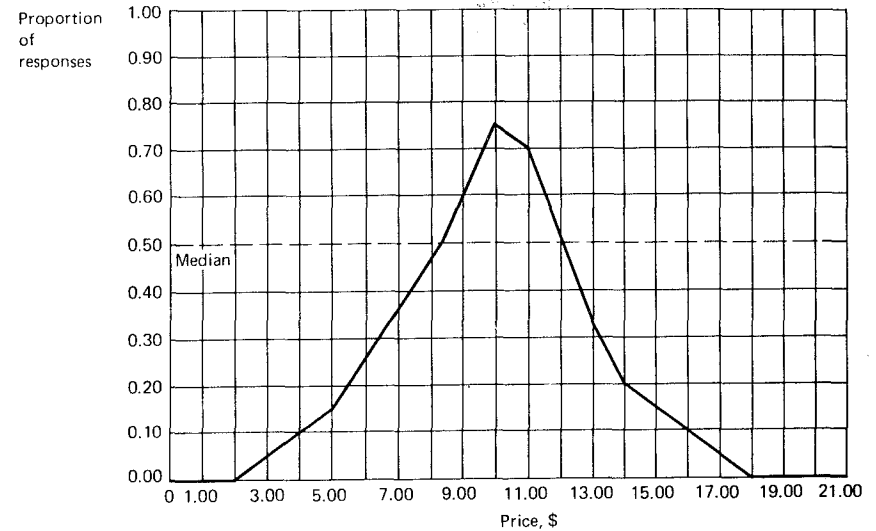


FIGURE 6-4
Buy-response curve.

about their relative knowledge of the alternative products or services available, their recent purchase and use history of the product, their estimate of the last price paid, and their belief about the relative spread of prices for the product category in their market area will help to determine whether there are segments of buyers with different acceptable price ranges and the reasons for these differences.

It has generally been the case that buyers who are frequent purchasers of a product have narrower and more distinct acceptable price ranges. Also, the more buyers believe that there are small differences in prices across suppliers, the narrower will be their acceptable price range.⁶ In any case, when doing pricing research, it is imperative to obtain information about buyers' perceptions and knowledge of prices as well as their purchase and use experience with the product category. Without this information, it will not be easy to interpret their responses to the price questions.

To illustrate this last point, consider the situation one research company faced after conducting a price-sensitivity study. The overall empirically derived demand curve seemed to have the expected inverse relationship between price and predicted sales volume, yet in the middle of the price range the demand curve appeared to be flat. Fortunately, the company had collected additional information about the respondents' perceptions and beliefs about the product category. A careful analysis of

⁶Rustan Kosenko and Don Rahtz, "Buyer Market Price Knowledge Influence on Acceptable Price Range and Price Limits," in Michael J. Houston (ed.), *Advances in Consumer Research*, Vol. 15 (Provo, Utah: Association for Consumer Research, 1988), pp. 328-333.

this information revealed a segment of buyers had a strong belief that there was a positive price-quality relationship, and this belief strongly influenced their responses in the middle of the price range. That is, consistent with the tradeoff model discussed in Chaps. 3 and 4, within their acceptable price range, their willingness to buy the product increased as the price increased, particularly around the price that was most acceptable to pay. The effect of this price-quality belief by a segment of the buyers made the aggregate demand curve flatten out as they were willing to increase their purchases while the other segment of buyers were reducing their willingness to buy as the price increased. Recognizing that there were two distinct market segments based on the strength of the belief in the price-quality association led the company to introduce a second brand with additional quality at a price premium.

Price Categorization As indicated at the beginning of Chap. 3, people perceive and classify objects according to categories. That is, whenever we notice a price, we compare it to the price that we use as a reference or standard. Another approach to determining buyers' acceptable prices and price thresholds is to ask buyers to sort a set of prices for a product into smaller groups or categories according to how they perceive these prices to be similar or dissimilar to each other. This technique can be done by personal interviews, mail surveys, or experiments.

When respondents are interviewed in a setting that allows them to have some working space, the instructions given in Fig. 6-5 (opposite) are used. If the research is being conducted by a mail survey, a response sheet similar to Fig. 6-6 is used. After the respondents sort the prices into categories, they should be asked to label any groups of prices that are unacceptable. If possible, they should be asked to indicate why the prices in these groups are unacceptable. For the groups of prices that are acceptable, they should be asked to label the set of prices that is most acceptable to them. Generally, a wide range of prices, perhaps as many as fifty, should be used. Experience has indicated that people will be able to group this many prices into five to seven categories.

The analysis proceeds as described for the direct question approach for each of the price categories identified: unacceptable-low, acceptable-low, most acceptable, acceptable-high, and unacceptable-high. If respondents are able to indicate the reasons for the unacceptable prices (e.g., too cheap or too expensive), then these labeled categories form the two additional categories. Respondents who can provide labels for the unacceptable price categories provide information on why they labeled the prices unacceptable. Figure 6-7 illustrates how the cumulative proportion curves might look for a particular research effort. As before, using the median response, when 50 percent of the respondents indicate that a particular price might belong in a particular price category or the price category adjacent to it, then that price forms a category limit. Thus, the category limits are defined as the prices where the probability of a price being included in a designated category equals the probability of its being included in the immediately adjacent category. A vertical line drawn from the price axis to the cumulative proportion curve for any category at the median response point represents the width of each price category in dollars. These procedures provide a quantitative record of the respondents' definitions of each

FIGURE 6-5
Instructions for price categorization.

1. Developing Categories

In a general way, you have just been told what you are going to be doing in the next few minutes. Now let us explain the complete procedure. If, after reading the procedure, you have any questions, please raise your hand and the research assistant will come to you and answer your questions.

Imagine that you are in a store to buy a pair of semicasual shoes and that each slip of paper that you have in the envelope (handed to you) is a price tag on the shoes. Assume you can buy the color, size, style, etc., of your choice. Since price is the only basis for your decision, you carefully sort through the price tags.

Now take out the price tags in the envelope and sort them into any number of piles you choose. To help you start we are providing you with two category designations for your piles: (1) Too Cheap to Buy, and (2) Too Expensive to Buy. If you find any prices that you think are too cheap to buy, pile those tags on the left and mark this pile with the Category Identification Slip marked "Too Cheap to Buy." Similarly, if you find any prices that are way too high for you—that are simply prohibitive in price—pile them on your right and mark this pile "Too Expensive to Buy." *Remember these two categories for your piles are provided as a starting point. You need not use these two categories if you do not find any prices (slips) that belong in these two categories.*

Decide on the piles on the basis of which prices (slips) seem to belong together. Do not be concerned about how many are in the piles or how many piles you create. If you change your mind, please feel free to rearrange things.

After you are finished placing prices in as many or as few piles as you like, raise your hand to indicate that you have completed this task. The research assistant will come to you and explain further procedures.

Are these instruction clear? If so, please proceed. If not, raise your hand and the research assistant will come and help you.

2. Labeling the Price Categories

Now you are provided with labels for naming the piles as categories. Use as many labels as you need. For naming the categories, follow these instructions:

1. On the one pile with the prices that are *most acceptable to you*, place the label "MOST ACCEPTABLE."
2. Place the "ACCEPTABLE" labels on any other pile or piles that are also acceptable. (Do not be concerned about how many piles you label "acceptable.")
3. Place the label "UNACCEPTABLE" on any pile or piles that are unacceptable to you.
4. On the piles labeled "UNACCEPTABLE" indicate, if you wish, any reason for their unacceptability.

Please return any unused labels to the research assistant. Please raise your hand to indicate that you have completed this part of the research study. Thank you for your cooperation.

FIGURE 6-6

Price categorization response sheet: mail survey.

PRODUCT:	Semicasual shoes																																													
DIRECTIONS:	For this product, we have listed a series of prices below. First look at all the prices. Then place each price <i>anywhere</i> you feel is appropriate, in the column marked "price," to indicate your rating of that particular price for this product. You can indicate any number of prices at any spot.																																													
ASSUME:	Your choices of style, color, and size are available.																																													
PRICES:	<table border="0"> <tr><td>\$ 5</td><td>\$ 6</td><td>\$ 7</td><td>\$ 8</td><td>\$ 9</td><td>\$10</td><td>\$11</td><td>\$12</td><td>\$13</td></tr> <tr><td>\$14</td><td>\$15</td><td>\$16</td><td>\$17</td><td>\$18</td><td>\$19</td><td>\$20</td><td>\$21</td><td>\$22</td></tr> <tr><td>\$23</td><td>\$24</td><td>\$25</td><td>\$26</td><td>\$27</td><td>\$28</td><td>\$29</td><td>\$30</td><td>\$31</td></tr> <tr><td>\$32</td><td>\$33</td><td>\$34</td><td>\$35</td><td>\$36</td><td>\$37</td><td>\$38</td><td>\$39</td><td>\$40</td></tr> <tr><td>\$41</td><td>\$42</td><td>\$43</td><td>\$44</td><td>\$45</td><td>\$46</td><td>\$47</td><td>\$48</td><td>\$49</td></tr> </table>	\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$10	\$11	\$12	\$13	\$14	\$15	\$16	\$17	\$18	\$19	\$20	\$21	\$22	\$23	\$24	\$25	\$26	\$27	\$28	\$29	\$30	\$31	\$32	\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40	\$41	\$42	\$43	\$44	\$45	\$46	\$47	\$48	\$49
\$ 5	\$ 6	\$ 7	\$ 8	\$ 9	\$10	\$11	\$12	\$13																																						
\$14	\$15	\$16	\$17	\$18	\$19	\$20	\$21	\$22																																						
\$23	\$24	\$25	\$26	\$27	\$28	\$29	\$30	\$31																																						
\$32	\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40																																						
\$41	\$42	\$43	\$44	\$45	\$46	\$47	\$48	\$49																																						
UNACCEPTABLE—TOO EXPENSIVE:																																														
UNACCEPTABLE—EXPENSIVE:																																														
ACCEPTABLE—HIGH:																																														
MOST ACCEPTABLE:																																														
ACCEPTABLE—LOW:																																														
UNACCEPTABLE—INEXPENSIVE:																																														
UNACCEPTABLE—TOO CHEAP:																																														

category. In particular, the width of the acceptable price range in Fig. 6-7 is categories 3 to 5. The dotted line (at about \$15) indicates the center of the respondents' price scale. The scale center is the limit between the two middle categories if the individual respondent used an even number of categories or the midpoint of the middle category if the individual used an odd number. Again, the median scale center across all respondents is used as the scale center for the sample.

The advantage of the categorization approach is it does not implicitly assume that there is only one definable set of acceptable prices in the market. In both the direct question and PSM approaches, an attempt is made to force the data onto one buy response curve or distribution. In the categorization approach, using a wide range of prices and explicit evaluations of prices enables the researcher to determine whether there are actually several acceptable price ranges corresponding to buyers who are more interested in relatively lower prices, buyers who will accept medium-level prices, and buyers who accept relatively higher prices. Also, asking buyers to indicate those prices that are most acceptable provides a means of determining whether there might be one price that clearly emerges as the best price for the product or service. Moreover, in the two earlier approaches a judgment that a specific price is acceptable or unacceptable reflects a subjective evaluation by an individual and is based on that person's set of purchase-influencing variables, an evaluative set of categories already established from past behavior.

The categorization approach is designed to establish a measurement scale when

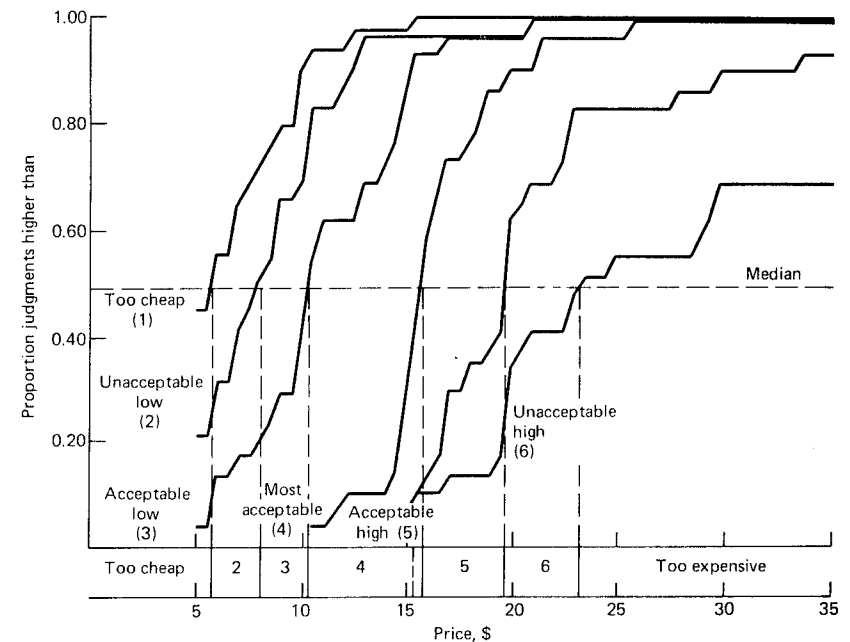


FIGURE 6-7

Using price categorization to determine respondents' price scale.

the underlying judgments are subjective in nature. In addition, this technique allows the respondent to react to a wider set of prices and removes the problem that the respondent knows the specific value of the price. This approach permits individuals to establish their own categories, both in number and width. Thus, the resulting scale is more likely to reflect their true subjective perceptions, without the researcher's perceptions being reflected in the scale.⁷

Magnitude Scaling The approaches just outlined directly or indirectly ask respondents to express their judgments by choosing among a limited set of categories labeled with such cues as acceptable-unacceptable. As noted, when the researcher limits the number of response categories, responses are constrained to this limited number of categories. In particular, attempting to categorize prices into either an acceptable or unacceptable category may overly constrain the respondents who are providing the relative price judgments. Moreover, no information is obtained concerning the intensity of people's feelings about the acceptability of the prices, which

⁷For a more detailed discussion of this approach, see Kent B. Monroe, "Measuring Price Thresholds by Psychophysics and Latitudes of Acceptance," *Journal of Marketing Research*, 8 (November 1971), 460-464.

also limits the value of these approaches. Although inferences can be made as to why some prices might be considered too low to be acceptable (e.g., buyers are suspicious of quality), no specific evaluations of a product's perceived quality or relative value are obtained. In magnitude scaling, it is possible to elicit information about the intensity of respondents' judgments and how they make price-quality or price-value judgments. Underlying the approach is the fundamental belief that people can provide meaningful information about the magnitude of their sensory experiences.

This approach asks respondents to judge a product, service, and/or price relative to a reference product, service, and/or price. It can effectively be applied in face-to-face interviews, telephone interviews, or mail surveys. The most widely used form of magnitude scaling is *numeric estimation*, where respondents are instructed to assign numbers to the stimulus product or price relative to a standard number for the reference product or price. This approach is similar to the technique used to judge gymnasts or divers in competition, where the judging is on a 1 to 10 scale.

When attempting to measure the price-value relationship for a particular product or service, the following procedure might be used:

1 Respondents are asked to describe the current product or service that they are using. In particular, they should be encouraged to indicate the attributes and features of the product that are most important to them and the benefits that they receive from these attributes or features. Then they are asked to assign the current or reference product an index value of 100.

2 The product or service to be evaluated is described in terms of its attributes, features, and benefits delivered. Respondents are asked to judge the relative quality of the "new" product by assigning it a number above or below 100. That is, they are asked to compare the "new" product to the "old" or "current" product. They are instructed to give the "new" product a number greater than 100 if they believe it is of better quality than the "current" product or a number less than 100 if it is perceived to be inferior. For this step, the instructions on how to assign the number are very important. For example, "If you think that the 'new' product is about 10 percent better in quality, then assign it a 110; if you think it is two times better, give it a number of 200. But if you think the product has about 10 percent less quality, give it a number of 90; if you think it is half as good, give it a number of 50. Choose a number that reflects how you rate the new product relative to the 100 you assigned to the product you currently use."

3 For their price judgments, respondents next are instructed to give the price they currently are paying a number of 100. (As discussed in Chap. 3, it is possible that a significant number of respondents may not be able to remember the price they paid for the reference product. However, this is not a serious problem, since the issue is how much more or less the person is willing to pay for the new product relative to the old one.)

4 Then, the same instructions given in step 2 are used to ask the respondents to indicate the price that would be acceptable for the new product, i.e., how much more or less they would be willing to pay for the product. It should be noted that the respondents do not have to remember the correct price for the current product, only that they evaluate the new product relative to an index of 100 for the old product.

5. If several product-price combinations are being evaluated, the procedure is repeated by asking the respondent to evaluate the next "new" product against the original reference product.

This approach provides proportionate judgments about a product's perceived value relative to the natural price scale. By using several product-price combinations, a scale can be developed that reflects the proportional perceived differences between price and different product attributes. The data can readily be analyzed using regression analysis. Usually, taking the logarithms of the numerical responses before doing the regression analysis provides for an estimated linear relationship between price and the different attributes used in the study.⁸

Estimating Sensitivity to Price Differences

The research techniques described thus far are concerned with determining the relative willingness of buyers to pay particular prices for a product or service. The primary objective of such research is to determine buyers' upper and lower acceptable price limits and the likelihood that there are several price-market segments for the product. Also, if the respondents in the sample represent the actual potential population of buyers, estimates of the relative size of these different price/market segments can be obtained. This type of information is of strategic importance when developing a price strategy for a new product that may be relatively novel to the market.

For established products, or when introducing a new model into an established product line, a second issue of price sensitivity concerns the degree that demand may be sensitive to price differences (differential price thresholds). As discussed in Chap. 3, sensitivity to price differences is important when deciding whether to change price for a product (demand price elasticity) or when attempting to establish a price differential for a product relative to comparable alternatives (cross-price elasticity). Strategically, it is an important issue when positioning products within a line or relative to competition. In this section, several techniques for estimating sensitivity to price differences will be presented.

Sequential Preferences: Two Brands When the objective is to determine sensitivity to price differences for comparable brands, one approach is to ask respondents to indicate their brand preference as the price of a brand is changed. This approach can be used in a mail survey or in either telephone or personal interviews. When comparing two brands, A and B (actual brand names would be used), it is important

⁸For additional technical information as well as marketing applications of this technique, see Milton Lodge, *Magnitude Scaling: Quantitative Measurement of Opinions* (Beverly Hills, Calif.: Sage Publications, 1981); Paul J. Hensel and Noel M. Lavenka, "On the Extension of Psychophysical Scaling and Cross-Modality Triangulation to the Measurement of Product Quality," *Proceedings, Summer Educators' Conference* (Chicago: American Marketing Association, 1984), pp. 411-415; Bruno Neibecker, "The Validity of Computer-Controlled Magnitude Scaling to Measure Emotional Impact of Stimuli," *Journal of Marketing Research*, 21 (August 1984), 325-331; and Paul A. Scipione, "Perceived Value Gauged by Indexing Purchaser Response," *Marketing News*, 20 (April 11, 1986), 15.

first to establish each respondent's preference when prices are equal. Then, while holding the price constant for one of the brands, the price of the other brand is systematically changed by constant amounts, both increases and decreases from the original equal price point.

Respondents' reactions to these price differences can be obtained by asking them to indicate which brand they would prefer, A or B. This simple response method permits estimating the price difference necessary to induce a switch from the preferred brand, but it does not indicate the relative intensity of respondents' preferences. The rating sheet illustrated in Fig. 6-8 permits a recording not only of their preferences, but also whether these preferences are relatively strong or weak. These additional data may provide sufficient information to determine the relative size of a loyal segment vs. a brand-switching segment. Moreover, allowing respondents to indicate an indifferent or no-preference response provides important information about the size of a price difference necessary before a switch might occur. In effect, a no-preference response when there are price differences indicates the differential price premium that one of the brands might successfully use in the market. To avoid

FIGURE 6-8
Response sheet for sequential preferences: two brands.

DIRECTIONS: Below are some pairs of brands of spray cologne mist. For each pair please indicate your brand preference by circling the number that corresponds most closely with the description of your brand preference. Assume that you are interested in purchasing this product for yourself or a friend and that the pair represents the only choice available.

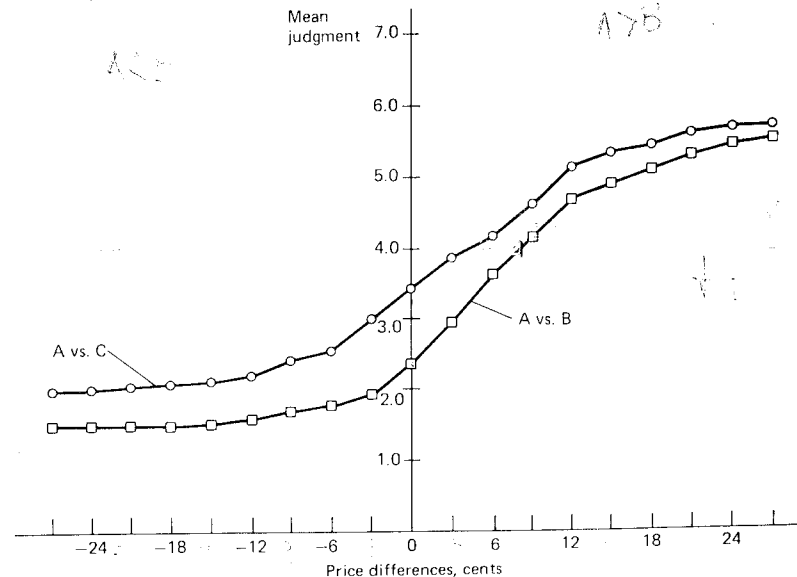
Brand A				Brand B				Price
Price	Prefer A to B Strongly	Prefer A to B Moderately	Prefer A to B Slightly	No Preference	Prefer B to A Slightly	Prefer B to A Moderately	Prefer B to A Strongly	
\$14.00	1	2	3	4	5	6	7	\$ 14.00
14.00	1	2	3	4	5	6	7	14.25
14.00	1	2	3	4	5	6	7	14.50
14.00	1	2	3	4	5	6	7	14.75
14.00	1	2	3	4	5	6	7	15.00
14.00	1	2	3	4	5	6	7	15.25
14.00	1	2	3	4	5	6	7	15.50
14.00	1	2	3	4	5	6	7	15.75
14.00	1	2	3	4	5	6	7	16.00
14.00	1	2	3	4	5	6	7	16.25
14.00	1	2	3	4	5	6	7	16.50
14.00	1	2	3	4	5	6	7	13.75
14.00	1	2	3	4	5	6	7	13.50
14.00	1	2	3	4	5	6	7	13.25
14.00	1	2	3	4	5	6	7	13.00
14.00	1	2	3	4	5	6	7	12.75
14.00	1	2	3	4	5	6	7	12.50
14.00	1	2	3	4	5	6	7	12.25
14.00	1	2	3	4	5	6	7	12.00
14.00	1	2	3	4	5	6	7	11.75

potential order of presentation effects, the order of the brands, the order of the price manipulations, and the reference brand should be randomly varied over respondents. Standard statistical significance tests can be used to determine whether there are significant differences in preferences across the price difference conditions and at what specific price differences these results are significant.

The mean preferences for the various price differences can also be graphed as seen in Fig. 6-9. Negative price differences indicate a price advantage for the test brand, and hence low mean judgments indicate preferences for the test brand. The opposite situation exists for positive price differences (a scale value of 4.0 represents a neutral or indifferent preference). In Fig. 6-9, brand A exhibits a clear preference strength over brand B at all price differences. Note that until brand A has a 9-cent price premium over brand B, it enjoys a stronger brand preference. However, while brand A has some preference strength relative to brand C, it is not as strong because at a price premium of 3 to 6 cents respondents are essentially indifferent in their preferences between brands A and C.

Sequential Preferences: Multiple Brands In an extension of the two-brand preference test, respondents are presented with several brands with identical prices and are asked to indicate a preference for one brand. The price of one of the brands is then systematically varied up or down over a sufficient range of prices to determine preference changes relative to the price structures. The brand whose price is changed

FIGURE 6-9
Sensitivity to price differences: sequential preferences approach.



is varied over respondents, and the order of presentations is randomly varied as described above; this provides additional information about the relative price positions of the various brands being tested. The analysis is similar to that for two brands. In addition, it is possible to graph (1) the proportion of times a brand was chosen at different price scenarios (brand share) and (2) the proportion of times a brand was chosen at various prices or price differences with other brands.

Experimental Demand Curve In an approach similar to the sequential multiple-brand preference task, only the price of the test brand is varied over conditions. The purpose is to estimate the demand curve of the test brand relative to the prices of competing brands. The sample should be divided into a minimum of five different prices for the test brand. (Depending on resources, using up to eight different prices would provide better information.) Each respondent is given one array of brands including the test brand and the price of each brand is clearly marked. For each brand, the respondent is asked to use a rating scale to indicate the likelihood of buying. The only variation across the five to eight treatments is the price of the test brand.

Using analysis of variance and multiple comparison tests, those prices for the test brand that produced significant differences in respondents' perceptions can be determined. Trend analysis can be used to determine the relative price-volume relationship for the test brand. The actual shape of this relationship can be found using regression analysis. In addition to obtaining respondents' ratings of their intentions to buy, it would also be relatively easy to get them to rate their perceptions of product quality and relative product value.

Tradeoff Analysis As developed in Chaps. 3 and 4, buyers generally make tradeoffs when evaluating alternative product offers. Indeed, the notion of acquisition value explicitly suggests that buyers compare the actual price of the item with the highest price that they would be willing to pay, P_{\max} . Also, the notion of transaction value suggests that buyers compare a reference price to the actual price. When we recognize that most product or service choices, for consumers or for organizational buyers, requires not only comparing prices, as indicated earlier, but also comparing different attributes at varying levels, it is clear that some form of conscious or unconscious tradeoff must occur. The need to make tradeoffs while simultaneously evaluating multiple alternatives with multiple attributes occurs because no one alternative is likely to be perceived as superior on all evaluative dimensions. For example, buyers may have to trade off a higher price against higher perceived quality or a higher price against faster delivery.

As pointed out in Chaps. 3 and 4, it is buyers' perceptions of the total relative value of an offering that may result in a willingness to pay a premium price for that offering. These perceptions are acquired through experience and prior knowledge as well as communications from sellers. The buyers' relative perceived value of one alternative versus another can be conceived as the price differential that would make them indifferent to the choice of alternatives. Strategically, it would be useful to know not only that one alternative is perceived as representing a better value but also what aspects of the offering contribute to its perceived value. Tradeoff analysis

is designed to determine the relative value buyers place on different factors or attributes of alternative offerings.

In a general sense, tradeoff analysis uses either what may be called a *limited-profile approach* or a *full-profile approach*. In a limited-profile approach, attributes which comprise a subset that buyers perceive to be important are varied in alternative scenarios, usually in a limited number of levels. In a full-profile approach, called *conjoint analysis*, all of the important attributes are varied over as many levels as is reasonable for the respondents. We begin with an example of limited-profile tradeoff analysis and follow that with a discussion of conjoint analysis.

The management at DuPont was interested in determining the relative values placed on six of the important attributes of a specialty industrial product. A survey of decision makers in the market was conducted by an outside market research firm under the direction of the corporate market research division.⁹ Two levels of performance for each of six attributes were defined and respondents were asked to consider an offering with all the attributes at the high level. They were then told to assume that the selling company was faced with increasing costs and was considering sacrificing performance on one attribute by reducing it to the lower level rather than raising price (see Table 6-3). Each respondent was then given a pair of attributes (e.g., quality and retraining) and asked to indicate which attribute should be kept at the high level and the strength of this preference. Next, the respondent indicated the dollar values to the price difference that would be acceptable to retain the higher level of performance on each attribute. (A number of other paired comparisons were provided for a similar ranking and dollar assignment.) Finally, the respondents were asked to rate DuPont and its major competitor on their perceptions of how these two firms performed relative to the six attributes.

Based on the data and statistical analysis, a scale of relative dollar value for each attribute was constructed for each respondent. Figure 6-10 shows the average scale

⁹This example is adapted from Irwin Gross, "Insights from Pricing Research," in Earl L. Bailey (ed.), *Pricing Practices and Strategies* (New York: The Conference Board, 1978), pp. 34-39.

TABLE 6-3
LIMITED PROFILE TRADEOFFS

Attribute	High Level	Low Level
Quality	Impurities less than one part per million	Impurities less than 10 parts per million
Delivery	Within one week	Within two weeks
System	Supply total system	Supply chemical only
Innovation	High level of R&D support	Little R&D support
Retraining	Retrain on request	Train on initial purchase
Service	Available locally	Available from home office

Source: Adapted and reprinted with permission from Irwin Gross, "Insights from Pricing Research," in Earl L. Bailey (ed.), *Pricing Practices and Strategies* (New York: The Conference Board, 1978), p. 37.

results. To determine the maximum premium that a buyer would pay for the DuPont offering relative to its competitor, the relative dollar values for each attribute were weighted by the perceived performance differences between DuPont and the competitor using this equation with all six attributes:

$$RPV = Q[PPQ_d - PPQ_c] + I[+PPI_d - PPI_c] + \dots + R[PPR_d - PPR_c] \quad (6-3)$$

where RPV = relative perceived value, or price premium for indifference

- Q = quality
- PPQ_d = perceived performance quality, DuPont
- PPQ_c = perceived performance quality, competitor
- I = innovation
- PPI_d = perceived performance innovation, DuPont
- PPI_c = perceived performance innovation, competitor
- R = retraining
- PPR_d = perceived retraining level, DuPont
- PPR_c = perceived retraining level, competitor

Table 6-4 lists the calculated average contribution of each attribute to DuPont's price premium relative to its nearest competitor. Note that even though quality was

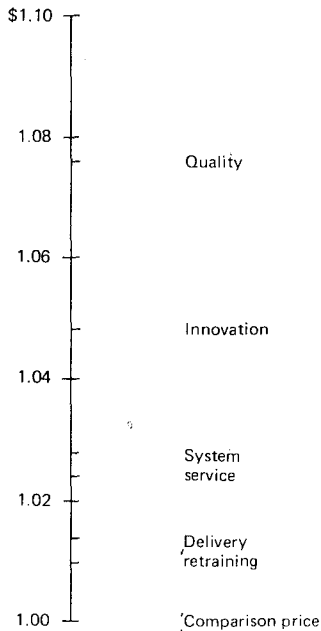


FIGURE 6-10
Relative attribute values. (Adapted and reprinted with permission from Irwin Gross, "Insights from Pricing Research," in *Pricing Practices and Strategies*, Earl L. Bailey [ed.], [New York: The Conference Board, Inc., 1978], p. 38.)

TABLE 6-4
RELATIVE ATTRIBUTE
CONTRIBUTION TO PRICE
PREMIUM

Attribute	Premium
Quality	\$1.70
Innovation	2.00
System	0.80
Service	0.25
Delivery	0.15
Retraining	0.40
Total	<u>\$5.30</u>

Source: Adapted and reprinted with permission from Irwin Gross, "Insights from Pricing Research," in Earl L. Bailey (ed.), *Pricing Practices and Strategies* (New York: The Conference Board, 1978), p. 39.

the most important attribute to the buyers, because there were few perceived performance differences between DuPont and its competitor, it does not contribute as much to the price premium as does innovation. Thus, not only did DuPont determine its relative price premium over a competitor, but it also was able to determine the relative contribution each attribute made to this premium. This additional information about relative perceived performance and customers' perceived importance of these attributes provides a basis for developing not only a pricing strategy, but also an integrated marketing strategy.

Conjoint Analysis Perhaps marketing management's most perplexing pricing problem is determining the volume effect of a change in price. To evaluate the effect requires estimating buyers' sensitivity to the price change, likely competitive reaction to the price change, and the impact of competitors' pricing actions on sales volume. Moreover, the price change must be coordinated with other product and promotion decisions to provide an effective marketing program. As observed previously, buyers seldom are able to find a purchase alternative that is ideal on all dimensions. Thus, they trade off perceived negatives of one offer against perceived positives of that offer and compare the relative attractiveness of the offer to other offers. An individual's decision to purchase is a function of many individual personal variables and many subtle buying influences that are a part of the perceived benefits of the product or service, the purchase situation, the use occasion, the buyer's reference group, and associated perceptions and values. Conjoint analysis has been designed to provide a flexible diagnostic method of exploring these buying complexities to determine the relative perceived value in different product attributes including price.

To understand how conjoint analysis works, it would be helpful to present three

TABLE 6-5
HOTEL FACTOR DESCRIPTION AND LEVELS

Factor	Level	Factor	Level
Associated services		Lounge/entertainment	
Message service	2	Type of lounge	3
Limo to airport	2	Atmosphere	2
Laundry/valet	3		
Atmosphere/facilities		Security/safety	
Hotel size	2	Sprinkler system	3
Corridor/view	2	Smoke detector	2
Pool location	2	Security guard	3
Room		Price range	
Quality of decor	4	Very low price	5
Size	3	Low price	5
Bathroom amenities	3	Medium price	5
In-room TV/entertainment	3	High price	5
Recreation			
Game room	2		
Tennis courts	2		
Whirlpool/Jacuzzi	2		
Sauna	2		

terms commonly used when discussing conjoint analysis: factors, levels, and utility. *Factors* are the product or service attributes that provide the relative benefits buyers derive from acquiring and using the product. Table 6-5 lists such factors for a hotel. *Level* refers to the number of different options available for a particular factor. In Table 6-5, note that two levels of hotel size are being considered, but five levels of price, characterized as price ranges, will be studied. *Utility* refers to the quantified degree of preference a person has for a particular factor.

The underlying assumption of this approach is that buyers can be modeled as perceiving a product option as a combination or bundle of features; each feature has a separate utility that can be exchanged with any other feature that has the same utility value. Purchase decisions are made on the basis of these utilities. However, buyers are unaware of the utilities that they attach to different features. All that buyers can do is indicate their preferences for different combinations of features. Conjoint analysis is a quantitative technique for breaking down buyers' overall preferences into utilities for each product or service feature.

To see how conjoint analysis works, assume a buyer is presented with a choice of two types of hotel and that the buyer has the utilities for the different features listed in Table 6-6. Hotel A is a small hotel with small rooms, an outdoor pool, and color TV with HBO; it is priced at \$55 per night. Hotel B is a large hotel with standard-size rooms, indoor pool, whirlpool and sauna, and color TV with HBO; it is priced at \$95 per night. For this buyer, Hotel A has a total utility of 4.7 (1.0

TABLE 6-6
FEATURES AND UTILITIES FOR A HOTEL

Feature	Utility
Facilities (two levels)	
Small, two-story hotel, 100 rooms	1.0
Large, multistory hotel, 500+ rooms	0.8
Room (three levels)	
Standard-size room	0.6
Large room	0.8
Small room	0.2
Recreation/entertainment (four levels)	
Indoor pool	1.0
Outdoor pool	0.4
Color TV, HBO	1.2
Whirlpool, sauna	0.8
Price (single room) (three levels)	
\$55	1.9
75	1.7
95	1.5

+ 0.2 + 0.4 + 1.2 + 1.9); Hotel B has a total utility of 5.9 (0.8 + 0.6 + 1.0 + 0.8 + 1.2 + 1.5). Given this choice, the buyer would select Hotel B. For Hotel A to be successful with this buyer, it would have to increase the total utility by at least 1.2. One way to do that would be to enclose the pool and add a whirlpool and sauna, leading to an increase in utility of 1.4.

How are these utilities obtained? To determine the buyers' utilities, a researcher in consultation with the hotel manager decides on the particular combinations that are of interest to the buyers and develops presentation packages. Different "hotel packages," usually summarized on cards, are given to the buyers, who are asked to indicate their relative preference for each package. Possible hotel packages include the following:

- small hotel, small room, outdoor pool, color TV with HBO, \$55;
- small hotel, small room, indoor pool, color TV with HBO; \$75;
- small hotel, medium room, outdoor pool, color TV with HBO; \$75;
- large hotel, small room, outdoor pool, color TV with HBO; \$75;
- large hotel, medium room, indoor pool, whirlpool, color TV with HBO, \$95.

In the example in Table 6-6, there are 96 possible combinations ($2 \times 3 \times 4 \times 3$). In the larger illustration in Table 6-5, there are over 16 billion combinations. A computer can estimate a utility for each feature for each respondent. Figure 6-11 illustrates some possible utility results.

Conjoint analysis has been widely used in commercial market research and price

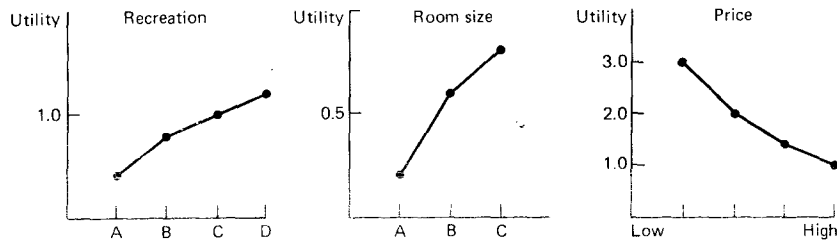


FIGURE 6-11
Different utility curves for hotels.

has been the focus of application approximately 40 percent of the time.¹⁰ Yet there are some issues that need to be understood when considering its application. First, the underlying model of buyer behavior may not be appropriate. Instead of adding up each feature utility individually, buyers may prefer a particular bundle of features more than the simple sum of their parts. For example, some people may perceive that certain amenities of a hotel should come as a package rather than individual add-ons.¹¹ Second, the same feature may have different utilities in different products. A security guard may have a higher utility for a city hotel than for a hotel in a suburban or rural location. Conjoint analysis assumes that a feature has the same utility across similar products.

A third problem occurs when different people interpret a particular attribute differently. For example, large-size room might be interpreted as a 20- by 20-foot room by one person and a 14- by 14-foot room by another. It is likely, therefore, that utilities for the same descriptive feature may vary due to the respondents' interpretations as well as to reactions to a "large-size room." A fourth problem occurs when no attempt is made during analysis to determine whether there are distinct market segments for the product or service. As suggested earlier in the chapter, a price-quality segment and a price-conscious segment could lead to average utilities for price that are incorrect. Finally, there may be so many combinations that not all are tested. One way to overcome part of this problem is to ask some additional questions about features not in the combinations used.

Despite these issues, conjoint analysis has been widely used in pricing research. Careful use of the technique is necessary to reap its potential advantages.¹²

¹⁰Dick R. Wittink and Philippe Cattin, "Commercial Use of Conjoint Analysis: An Update," *Journal of Marketing*, 53 (July 1989), 91-96.

¹¹Stephen M. Goldberg, Paul E. Green, and Yoram Wind, "Conjoint Analysis of Price Premiums for Hotel Amenities," *Journal of Business*, 57 (January 1984, part 2), S111-132.

¹²Some additional sources to consult for applications of conjoint analysis are Paul E. Green and Yoram Wind, "New Way to Measure Consumers' Judgments," *Harvard Business Review*, 53 (July-August 1975), 107-117; Earnestine Hargrove, "Conjoint Study Lends Support to Financial Decisions," *Marketing News*, 20 (August 29, 1988), 28; Patrick J. Robinson, "Applications of Conjoint Analysis to Pricing Problems," in David B. Montgomery and Dick R. Wittink (eds.), *Market Measurement and Analysis* (Cambridge, Mass.: Marketing Science Institute, 1980), pp. 183-205.

Simulated Shopping Experiments One criticism often raised about the foregoing methods is that, in one way or another, each is a variation of paper and pencil tests; none measures how buyers would actually behave in a real purchase situation. That is, buyers are not making actual product choices but are only indicating preferences or perceptions. To overcome this criticism, some researchers have devised a purchase simulation wherein buyers are asked to assume they are actually shopping and to make choices as normally as possible. The respondents are shown pictures, given descriptions, or given product samples and are asked to make actual selections. Prices are varied in different versions (treatments) to enable the researcher to estimate the buyers' sensitivity to price differences. When product samples are available, respondents are often allowed to keep their choices. The locations used for these simulations can be the individuals' homes, an area in a shopping center or mall, a laboratory designed to represent a store, or a mobile trailer in a parking lot. The advantage of the simulated-purchase experiment is that buyers have no way of identifying the test brand and should make a choice based on their thought processes.

In one simulated experiment adult women shoppers in three suburban shopping centers near Boston were asked to choose from four brands of maple syrup. Within this research, the researchers varied three levels of product grade (Fancy, Grade A, Grade B), two levels of content information (present and not present), and five prices for the test brand, Vermont pure maple syrup (\$1.50, \$1.75, \$2.00, \$2.25, \$2.50).¹³ A price of \$0.75 (the prevailing retail price at the time and place of the study) was placed on a card in front of the three commercial brands (Aunt Jemima, Log Cabin, and Vermont Maid) while the price of the pure maple syrup was varied according to the specific price treatments. The subjects first rated each of the four brand choices on five dimensions including perceived quality, and then were given the following instructions:

Now you may select and take home a bottle of syrup of your own choosing. Here is \$2.75. We would like you to purchase one of these 12-ounce bottles of syrup, using this money. Select a bottle from the table, priced as marked. Any change remaining after you have made your purchase is yours to keep, along with the bottle of syrup. Let me remind you again that all four bottles contain 12 ounces of syrup. Which one would you like to purchase?¹⁴

Results of this study indicated that demand for pure maple syrup was inversely related to price. However, a complete contribution-to-profit analysis (see Chap. 8) revealed that the most profitable prices were \$2.25 and \$2.50. Three years after this experiment, the price of the pure syrup was \$2.40, and the commercial brands were priced at \$0.85. The large price increases in pure maple syrup after the study did

¹³Alan G. Sawyer, Parker M. Worthing, and Paul E. Sendak, "The Role of Laboratory Experiments to Test Marketing Strategies," *Journal of Marketing*, 43 (Summer 1979), 60-67.

¹⁴*Ibid.*, p. 61.

not lead to a decrease in sales; in fact, demand was so strong that promotion budgets were decreased.¹⁵

Multiple-Choice Simulated Experiments One problem with the single-choice simulation is that it is unclear whether inferences can be made about buyers' relative sensitivity to price differences across choices. That is, some respondents may be more predisposed to exhibit a degree of price sensitivity regardless of the product category, i.e., there may be a price-conscious segment of people. One way to study whether there are respondents who are prone to be price conscious and whether they have an unrealistic effect on the test results is to have the respondents make multiple choices. An example of one such simulation is described next.

The research department of a large national advertising agency conducted two experiments in the Chicago area to measure buyers' sensitivity to price differences.¹⁶ The first experiment involved one product, packaged cake mix; the second experiment involved several product categories and prices. In the second experiment, 900 women participated in two shopping centers and at a downtown Chicago location in mobile research trailers. Subjects were shown a sequence of colored slides. Each slide showed a picture of a grocery shelf containing the products with prices. Each subject saw each product category once with only one set of prices. Subjects were instructed to assume they were doing their regular shopping and that the prices were typical of the prices in the Chicago area. After looking at each slide, the respondents indicated the brand they would prefer to buy. The experimental design for the second experiment is shown in Table 6-7.

One of the important results of this multiple-choice experiment was that responses to price changes were different for price increases as opposed to price decreases, as pointed out in Chaps. 3 and 4. Further, response patterns toward the brand that changed price differed and response patterns for the other brands in the tests differed depending on whether price for the test brand was increased or decreased. A second important observation was that preferences tended to gravitate toward the "middle-priced" brands. In particular, there was a tendency to not prefer the test brand at either the high or low price treatments. Further, preferences for non-test brands also were greatest when they were the middle-priced alternatives. These results clearly indicated the concept of the absolute price threshold and the resultant implication that buyers do have ranges of acceptable prices that are bounded by relatively low and high prices, even for name brands.

¹⁵Other reports about shopping experiments can be found in Gerald J. Eskin and Penny H. Baron, "Effects of Price and Advertising in Test Market Experiments," *Journal of Marketing Research*, 14 (November 1977), 499-508; Andre Gabor, Clive W. J. Granger, and Anthony Sowther, "Real and Hypothetical Shop Situations in Market Research," *Journal of Marketing Research*, 7 (August 1970), 355-359; William M. Motes, Stephen B. Castleberry, and Susan G. Motes, "A Longitudinal Test of Price Effects on Brand Choice Behavior," *Journal of Business Research*, 12 (December 1984), 493-503; John R. Nevin, "Laboratory Experiments for Estimating Consumer Demand: A Validation Study," *Journal of Marketing Research*, 11 (August 1974), 261-268.

¹⁶Kent B. Monroe and David M. Gardner, "An Experimental Inquiry into the Effect of Price on Brand Preference," *Proceedings*, Fall Conference (Chicago: American Marketing Association, 1976), pp. 552-556.

TABLE 6-7
RESEARCH DESIGN: MULTIPLE-CHOICE EXPERIMENT

Product	Brand	Price Treatment			
		1	2	3	4†
Cake mix	A	39	39	39	39
	B	39	39	39	39
	C	13	13	13	13
	D	35	43	33	39
	(test)				
Canned vegetables	A	25	25	25	25
	B	26	28	25	25
	(test)				
	C	25	25	25	25
	D	21	21	19	21
Canned beans*	E	25	25	25	25
	A	25	25	25	25
	B ₁	24	24	24	24
	B ₂	17	17	17	17
	C ₁	25	24	24	24
	C ₂	15	20	13	17
	(test)				
D	17	17	17	17	
Frozen dinners*	A	29	33	35	39
	(test)				
	B	33	39	45	39
	C	33	39	49	39
	D ₁	59	69	59	59
	D ₂	65	69	65	65

*Brands indicated by a subscript were represented by two varieties of the product category.

†Control treatment.

Note: All prices in cents.

Source: Kent B. Monroe and David M. Gardner, "An Experimental Inquiry into the Effect of Price on Brand Preference," *Proceedings*, Fall Conference (Chicago: American Marketing Association, 1976), pp. 552-556.

SUMMARY

As noted in Chap. 1, the prerequisites for taking a proactive approach to pricing include (1) knowing how prices work, and (2) understanding how customers perceive prices. As detailed in Chaps. 2-5, the assumption that prices work exactly as prescribed in traditional economic theory, and that buyers simply use price as an indicator of their sacrifice or cost, leads to naive and often unprofitable pricing strategies and tactics. It should be clear that the role of price in buyers' decision making is complex and dynamic. Recognizing these complexities means that pricing decision makers must consciously develop and maintain an information system that continuously provides information about markets, competitors, and current clients or customers as well as prospective buyers. The complexity of buyer behavior relative to price means that such an information system must be augmented with

carefully designed and executed pricing research. Pricing research implemented without a working knowledge of how buyers behave relative to price may lead to irrelevant research results.

To illustrate this last point, recently a major airline decided to determine the degree of price sensitivity of a one-way ticket between two cities. The price of a coach fare between the two cities had been \$149 and was the price initially set by the discount-oriented competitor. The major airline set an experimental price for the one-way fare at \$199 and quickly found out that a \$50 price differential shifted traffic to the discount carrier. When asked how they had decided on a \$50 price differential, the response was "we pulled a nice round figure out of the air." Surprisingly, an important aspect of pricing, determining the relative price premium to charge, was pulled out of the air! A more careful research effort would have developed a systematic approach by slowly raising the price of the fare, perhaps initially up to \$155, to determine when travelers would believe that the tradeoff between the perceived better airline service and the higher price made them indifferent between the two airlines. Several of the techniques described in this chapter could have been used to determine this price differential before executing the actual market experiment. As it was, the results of the \$199 trial simply scared the airline from doing additional and more carefully developed price-sensitivity research.

In a more successful effort, a hospital introduced a program to establish overnight accommodations for their patients' families. After a careful internal analysis of costs and rates charged by nearby full-service hotels, a nightly rate of \$55 was set. However, after four months, the program had an average monthly use of only 2–8 guests instead of the projected 21 guests per night. Market research indicated that the hotels and motels within a mile of the hospital charged, on average, \$38 per night, with a range of \$27–\$54 per night, single occupancy. Respondents to a survey indicated that the maximum acceptable room rate for a majority of them was \$35. After the price was reduced to \$36, the use rate increased from 114 nights in August 1987 to 243 nights in January 1988, with no additional marketing activity. What the hospital concluded was that "pricing a hospital product should be based on the market value instead of product cost."¹⁷ Indeed, despite a price reduction of \$19 per night, there was a net monthly revenue gain of \$2,478.

These examples and the material presented in the last five chapters indicate three important principles about price and the need to develop a careful research program to facilitate pricing decisions. First, it is abundantly clear that price is an important part of the marketing mix. To make pricing decisions primarily on the basis of internal financial considerations ignores this important principle. Customers make their purchase decisions on the basis of perceived value, not what it costs the seller to produce and have available for sale. Thus, the second principle is that a buyer's perception of value is the important consideration in purchase decisions. Similarly, the third principle is that it is relative price, not absolute price, that is the key to

¹⁷Donna A. Newman and Terrance M. Tucker, "Research Shows Hospital Best Pricing Strategy," *Marketing News*, 22 (August 29, 1988), 16.

understanding how pricing works in the marketplace. Buyers' determinations of perceived value are contingent on their perceptions of relative price differences, not absolute price level. A successful pricing research program must consider these fundamental principles of how price influences buyer behavior.

DISCUSSION QUESTIONS

- 1 When doing research concerning buyers' responses to price, what are some specific differences about the price variable that make it difficult to ask people directly about their reactions?
- 2 Compare and contrast the different techniques for determining the maximum amount that buyers are willing to pay.
- 3 What are some specific conceptual differences between determining buyers' sensitivities to price levels and their sensitivities to price differences? What are the different types of pricing decisions relevant to each type of research issue?
- 4 As a project, develop an approach for determining the degree to which buyers can remember the prices they have paid for different products and services.
- 5 For a particular product that would be of interest to your fellow students, develop a questionnaire to determine the degree they tend to associate product quality with price.
- 6 As an alternative project for the product considered in Question 5, develop either a tradeoff or conjoint analysis research project.
- 7 Discuss the relative importance of developing a pricing information system for pricing decisions. What would be the role of specific pricing marketing research projects in this information system?
- 8 Discuss this statement: "Anyone can set price; all you have to do is add up your costs, add the profit margin you want, and your price is the result."

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