Pricing: Economic and Behavioral Models

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INTRODUCTION

A major focus of academic research in marketing has been on what have traditionally been referred to as the marketing mix variables. Research on pricing, advertising, channels of distribution, sales promotion, and product policy (e.g., branding) are naturally important areas for research, as these are key decisions that marketing managers have to make. As an applied field, marketing has an obligation to perform not only basic research (e.g., how do buyers process information for new technological goods?) but also research that has the potential to help our practitioner counterparts do a better job.

The area of price, in particular, has been an extremely fertile ground for new concepts and methods. Not only is the number of papers published on the topic numerous, but a variety of edited volumes (see, for example, Devinney, 1988) and textbooks (Dolan & Simon, 1996; Monroe, 1990; Nagle & Holden, 2002) do an excellent job summarizing extant research and integrating it into marketing decision-making.

Pricing has received so much attention not only because of its key role in business but also because of its interdisciplinary nature. Academic researchers can and have attacked pricing issues from a traditional economics perspective, but also from a behavioral science perspective by incorporating psychological theories, constructs, and measurement tools into the research.

Given the many papers and books published on the topic of pricing, we decided to focus this chapter on the work that has been done within the last five years (the first section, on estimating price thresholds, is an exception). Even during this narrow time span, researchers have produced work that spans the set of topics covered in previous years, and have added some new perspectives. The areas covered in this chapter include:

- **Measurement and scaling issues**: An important basic question in pricing is how do we measure price response? Since the pioneering work of British researchers Gabor and Granger on price awareness and willingness-to-pay, researchers have developed more sophisticated approaches to price response measurement, such as price thresholds.
- **Behavioral models**: The classic approach to pricing is through the applications of microeconomic principles, as economists have been interested in the market clearing role of price for centuries. However, it is only relatively recently that academic researchers have looked to psychology to help understand that consumers are not simply price takers but actively process price information.
- **Empirical models**: Price and price-related promotions are routinely incorporated into brand choice models and other empirical research. This has been and continues to be the largest component of the academic body of work in marketing.
- **Competitive/normative models**: The last 10–15 years have witnessed the rapid diffusion of game theory into marketing. This set of work, although rather theoretical in nature, is a welcome addition to the literature because of
the importance of bringing competition into the models.

- **Pricing and the Internet**: The rapid growth of the Internet as a distribution and information channel has spawned interest in research on pricing issues in this context. With fixed prices rapidly disappearing in favor of a number of formats including auctions, the opportunities for price personalization, and the widespread availability of price comparison web services, a very interesting new avenue for research has opened up.

**MEASUREMENT/SCALING ISSUES**

Academic and applied researchers often measure consumer price knowledge and consumers' response to prices. This is essential for managers in the process of designing pricing and marketing strategies, and is an integral part of academic pricing research. Interestingly, although price response measurement is one of the oldest areas of pricing research, little has been done in this area for some time. Thus, this section relies more on past research and relatively little current research.

One may argue that given 50 years of applied and academic research in the pricing area, reviewing and examining measurement issues may be unnecessary. However, recent findings in behavioral pricing convincingly suggest that measurement task characteristics may bias the results and distort research conclusions.

An example of this potential for measurement bias can be drawn from research that focuses on consumer price knowledge. Marketing researchers have attempted to assess the degree to which consumers remember prices of recently purchased products (Dickson & Sawyer, 1990). The overall conclusion stemming from a substantial body of empirical research is that a relatively low percentage of consumers can recall prices accurately. This finding is opposed to neoclassical economic thinking, according to which consumers have complete knowledge of product prices (Marshall, 1890), and may suggest that consumers do not pay attention to prices they pay. Recently, Estalami et al. (2001) investigated the effects of macroeconomic factors on consumer price knowledge. They found that a simple task characteristic might have significantly biased the results. Using meta-analysis, they examined more than 200 studies and found that not forcing respondents to provide an exact price estimate accounted for a significant reduction in the percent of average deviations from actual prices. Removing these consumers' responses reduces the relative deviation from actual prices by more than 50 percent. Monroe (1976) found similar biases regarding price comparison tasks among brands. Thus, attention to a seemingly trivial measurement format may bias the results and change the scope of the conclusions.

The objective of this subsection is to review and examine measurement procedures and models designed to assess consumers' perceptions of prices, highlight limitations, and suggest new directions. Topics covered include:

- historical perspective
- current research on estimating price thresholds.

**Past Research on Price Thresholds**

Early research in behavioral pricing highlighted the difference between objective and subjective reactions to prices, and the comparative nature of processes underlying consumer judgments (e.g., Scitovsky, 1944–1945). Other early attempts at assessing consumer reactions to price, e.g., Stoetzel et al. (1954), Adam (1958), Fouillé (1960), and Gabor and Granger (1961, 1966), reported that low prices tend to be less acceptable because they are perceived as reflecting low quality, and that high prices tend to be less acceptable simply because they are increasingly judged as too expensive. These results led to the postulation of an inverted U-shaped price acceptability function linking subjective price acceptability and actual prices. The findings ran counter to the implications of economic theory that consumers will, in general, prefer lower to higher prices, leading to a price acceptability function decreasing from left (lower prices) to right (higher prices).

An idea emerging from this early work is that consumers have a lower and upper threshold: a lower threshold below which prices may signal suspect product quality, and therefore unacceptable, and an upper price threshold above which prices of a product are too expensive and not worth the product. It should be noted that economists only refer to an upper price threshold (referred to as reservation price), since it is assumed that 'cheaper is better' and, therefore, no lower price limit is assumed.

Stoetzel et al. (1954) criticized economic theory for its assumptions regarding prices, and highlighted psychological aspects of price. In their research, exploring consumer perceptions of prices, they introduced a simple and easily implemented procedure in which consumers were asked to indicate minimum and maximum prices for a product, as follows: 'Below what price would you suspect that [a product] was of poor quality?' 'Above what price would you judge [a product] to be too dear?' (Stoetzel, 1970: 72). The results led them to conclude that consumers possess two thresholds and an acceptable range of prices between the thresholds.

Adam (1958) investigated price perception and the effects of historical pricing on consumer
perceptions and demand. He explicitly assumed the existence of lower and upper thresholds. In several studies he used the same direct questions of Stoezel (1970) to measure upper and lower thresholds, suggesting to consumers the existence of a price acceptability range with a lower threshold. Following Stoezel and Adam, Fouilhé (1969) further investigated the methodology of direct questions regarding price thresholds and some distributional assumptions. His results, based on using this methodology, led him to conclude and reconfirm the existence of minimum and maximum thresholds, but also indicated some empirical problems with the lower price thresholds and the distributional assumptions suggested by Adam (1958).

Stimulated by the early work of the French researchers, Gabor and Granger (1961, 1966) further advanced the ideas of lower and upper price thresholds and the resultant price acceptability range. They assumed three basic types of consumer responses to prices: too expensive, too cheap, and acceptable. The thrust of their work was to develop the distributional assumptions initially suggested by Adam (1958) and test them empirically. Gabor and Granger (1966) also compared various measures of direct questions and obtained similar results, leading Marbeau (1987) to conclude that the two direct questions suggested by Stoezel are superior and simple to implement. An extension of these measurement procedures is provided by the Price Sensitivity Meter method (Van Westendorp, 1976; for discussion see Monroe, 1990). This procedure required consumers to respond to four questions presenting different positions along a price acceptability continuum ranging from unacceptable-cheap ("At what price would you consider this [product/brand] to be so inexpensive that you would have doubts about its quality?") to unacceptable-too expensive ("... that the product is so expensive that regardless of its quality it is not worth buying"). Monroe added a fifth question to complete this scale (Monroe, 1990: 114).

**Some Current Work**

The above-mentioned measurement methods and procedures are based on the assumption that consumer response to price is represented by an inverted U-shape function; hence the direct questions force respondents to associate low prices with low quality and high prices as being too expensive. A potential problem with these methods is that they direct the consumer to perceive low prices as unacceptable due to potential quality problems and, therefore, it precludes the possibility that this assumption may not apply to all products and consumers. Low prices may be quite acceptable and highly attractive in some contexts. If this is the case, these methods and measurement procedures are inherently biased. Different methods are needed to avoid this problem (Ofir, 2001).

In order to empirically assess the existence of a potential bias, a recent study (Ofir et al., 2000) administered two measurement procedures to relatively low and below-average income consumers. The first procedure entails presenting a list of 10 prices for each product. Consumers were asked to indicate their price acceptability for each price on a seven-point scale (1 = very unacceptable price, and 7 = very acceptable price). Separated by several unrelated tasks, consumers then were asked to respond to Price Sensitivity Meter questions, which directly assess thresholds. The data revealed by the price acceptability rating for each product provide a clear indication whether a consumer for each product is concerned with low prices. As expected, a substantial proportion of low-income consumers were not concerned with low prices; rather they found them more acceptable. That is, their reaction to price is represented by a decreasing price acceptability function. Out of those economically price-orientated consumers, a substantial portion were biased by the direct questions regarding thresholds and responded to the Price Sensitivity Meter as if they possessed a lower price threshold. Specifically, the majority of low-income consumers had no problem with very low prices of rice, jam, flour and body lotion, exhibiting an economic price acceptability function. Out of those consumers, the majority were biased by direct questions, regarding low prices as being too cheap and directly to indicate a lower threshold. These results provide clear evidence supporting the criticism that direct questions regarding thresholds bias the results. Specifically, there are consumers who prefer cheaper products. The implications for these consumers is that they only have an upper threshold (the reservation price) and not a lower threshold as well.

Given the need for unbiased methods to research consumer reactions to price, an additional method is suggested: paired-comparisons. As researchers have observed throughout the last five decades, price judgments are inherently comparative (e.g., Emery, 1970; Monroe, 1990; Scitovsky, 1944–1945). Price paired-comparison task is assumed to be a natural task for consumers. Graded paired-comparisons were used. Overall, the results among hundreds of consumers are very consistent (transitive) and reliable. Moreover, in this research two functional forms were observed: one exhibiting the 'cheaper is better' reaction as implied by economic theory, and the second function, an inverted U-shape function, suggested by the marketing literature.

In another study, the effects of income and its involvement on the shape of the price acceptability function were examined. Each of the two functions reflected different price perception and acceptability judgments. It is reasonable to assume that low income consumers are more price-conscious than
high income consumers. This line of reasoning implies the hypothesis that higher income consumers, being less sensitive to price, less price conscious, and more engaged in price-quality inference, will tend to perceive low prices as being an indication of low quality and, therefore, will be more likely to react to price acceptability in a manner represented by an inverted U-shaped function. Hence, compared to low-income consumers, it is postulated that a significantly higher proportion of high income consumers will have an inverted U-shaped acceptability function. It was also postulated that involved customers are more concerned with the benefits of the product than with its price. It is hypothesized, therefore, that an increase in product involvement will be accompanied by an increase in the proportion of inverted U-shape acceptability functions among both low and high-income consumers.

The results, based on about 280 consumers who responded to a paired-comparison task regarding 12 products, suggest highly consistent and reliable responses. Moreover for each product, a significantly higher proportion of higher income consumers, exhibited an inverted U-shape price acceptability function than low-income consumers. The results also suggest that the proportion of inverted U-shaped functions significantly vary as a positive function of the level of involvement. It is evident that both reactions to price (i.e., the ‘cheaper is better’ and an inverted U-shaped function) exist. Moreover, the cumulative results suggest that the price paired-comparisons method produces reliable and valid price scales.

Researchers have used direct questions to confirm the existence of price threshold and to obtain the acceptable price range. Attempts were also made to aggregate these results to determine the proportion of consumers accepting the resultant price range. Gabor and Granger (1961, 1966), building on the work of Adam (1958) and Foulithé (1960), assumed a lognormal distribution. This work was developed further by Monroe (1971b). Unfortunately, all these studies (and most of the follow-up ones since used) potentially biased direct questions to obtain consumer responses. These approaches are potentially biased since direct questioning assumes ex ante that people actually form price thresholds and can retrieve them from memory.

An interesting approach to measure thresholds and obtain the relevant consumers’ scales was suggested by Monroe (1971a). Consumers were provided with a list of prices which they classified into categories. These consumers were asked to use labels for each category (i.e., acceptable prices, etc.). The labels did not direct consumers in any way and thus were likely to be unbiased. In his recent discussion of this method, Monroe (1990) presented a mail survey version used in industry, which is potentially biased by directing consumers to labels such as ‘Unacceptable – too expensive’ (Monroe, 1990: 120). Thus, the use of category labels associated with various acceptability levels (without directing the consumer in any way) provides a viable method to obtain consumer reactions to price. Ofir et al. (2000) adopted a scaling model integrating a version of Monroe’s (1971a) classification method. The basic assumption, in line with the pricing literature, is that consumers compare prices with latent thresholds. This assumption is explicit in Thurstone’s method of successive intervals. Similar to Winer (1986), it assumes heterogeneous price acceptability across consumers. Two functional relationships are obtained from the model. The first is the proportion of price acceptors at different price levels. The second is the relation between subjective price acceptability and actual prices.

Finally, a recent study by Wertenbroch and Skiara (2002) develops an interesting lottery-based approach for estimating willingness-to-pay (WTP), or the upper price threshold, at point-of-purchase. A sample of consumers is drawn and are told that they can buy a target product without spending more money than they want to. They then learn that the buying price is p and will be determined randomly. They are then asked to offer a price s for the product which should equal their WTP. Next, the consumers each draw a p from a pre-specified random distribution (unknown to the consumers). If p is less than or equal to s, they are required to buy the product at price p. If p is greater than s, they are not permitted to buy the product. The consumer thus has an incentive to state his or her true WTP, since a too low s reduces the probability of buying with a surplus, and overstating s increases the probability of buying at a loss. The method is tested successfully on two inexpensive grocery items and an inexpensive durable good.

**Behavioral Models**

Many customers actively process price information; that is, they are not just price ‘takers’ (to use the conventional term from microeconomics). Customers continually assess the prices charged for products based on prior purchasing experience, formal communications (e.g., advertising) and informal communications (e.g., friends and neighbors), and point-of-purchase or web-derived listings of prices, and use these assessments in the ultimate purchase decision.

Some key concepts relating to the psychological aspects of pricing that have been the subject of recent research in marketing are the following:

- price judgments
- reference price
- ‘odd’ pricing
- the communication aspects of price.
Price Judgments

The previous section of this paper focused on measuring price thresholds, or judgments about whether prices are too high or too low. However, additionally, when confronted with a price or a set of prices, consumers process the price information and form preferences about the product or service in question. The prices could be in the same store, from multiple stores, from several types of channels (e.g., retail, Internet, catalog), and take a variety of forms (even price endings, endings with nines). In addition, consumers often have to make judgments about prices occurring over a period of time. For example, when asked to sign up for a fitness club, people are given the option of paying all at once or on a monthly basis. All of these different scenarios in which price processing occurs shows the importance of context in understanding how consumers form judgments of price.

The question of how consumers react to alternative pricing strategies has been studied by Alba et al. (1994, 1999). In the former study, the investigation concerned how consumers form judgments of how expensive one store is to another based on a market basket of goods and alternative pricing strategies utilized: everyday low pricing (EDLP) vs. high-low (regular retail prices using frequent temporary discounts). Although the two stores had equivalent market-basket prices, consumers judged the prices in the high-low stores to be lower. In the 1999 study, the authors add a longitudinal dimension to see how discounting patterns over time affect the results from the first study. In fact, the findings reverse: deep discounts (EDLP) lead to lower perceived prices than frequent, shallow discounts (high-low). Thus, it is clear that the competitive environment has an impact on how consumers form price judgments, both at a point in time and longitudinally.

Other research has examined alternative pricing strategies. One common marketing strategy is to make a large expense look small by advertising it in terms of the smaller amounts. For example, a $1,000 fitness club membership can be promoted as being only $3 each day. Gourville (1998) examined this phenomenon and called it the ‘pennies-a-day’ or PAD strategy. In the terminology of the field of judgment and decision making, this is an issue of framing. Gourville found that a PAD framing strategy can be effective. Other research in this area could use reverse PAD strategies for undesirable products (e.g., showing how much cigarette users spend annually vs. a per-pack mentality). A similar strategy is to partition prices into two parts such as one part for the product and the other for shipping and handling. Interestingly, Morwitz et al. (1998) show that partitioned prices decrease customers’ recalled total costs and increase their demand.

An interesting area of research involving price judgments is how consumers process the digits of a price. A large number of studies have documented that certain price endings (0, 5, 9) occur much more often than others. In particular, interest has centered around 9 endings, often called ‘odd’ prices. In an effort to explain the frequent use of odd prices, academics often propose that consumers round prices down, essentially ignoring the right-hand digits. Other potential explanations are that consumers discern meaning from prices that end in 9 (e.g., good value) and that consumers compare prices from left to right. The main point of this work is that consumers do not necessarily process prices holistically but, instead, use some heuristic to process the digits separately. Almost all work in price assumes holistic processing.

This research area has been attacked from two perspectives. Work by Schindler and his co-authors (see, for example, Schindler & Kirby, 1997) have used field experimental methods to infer why certain digits occur more often than others. They have found support for the argument that the reason the numbers 0 and 5 occur more frequently is due to the high cognitive accessibility of those numbers, as the use of these round-number endings makes price information easier for consumers to perceive, compare, and remember. Endings with 9 occur most frequently with high potential underestimation prices, that is, those where the 9s represent a large psychological drop in price from the price with one penny added (e.g., $49.99 vs. $50.00).

The alternative perspective estimates empirical choice models with alternative formulations to capture different price processing heuristics (Stevig & Winer, 1997). Using two different frequently purchased product categories, the authors found consistent support for left-to-right price processing rather than holistic processing or rounding. These empirical results are consistent with those of Schindler and Kirby’s (1997) findings with respect to the 9 endings, since a large psychological drop in price using a 9 would occur if left-to-right processing was being used.

Not only does price represent revenues to the firm, it is also a communications device. High prices can be interpreted by customers as high quality, for example. There is a vast literature in this particular area of research (see Monroe, 1990). More currently, researchers have investigated the interpretation of promotions by consumers. Grewal et al. (1996) analyze the different wording or semantic cues of discounts such as ‘was $50, now $34.99.’ They consider different contexts (e.g., in-home or in the store) and discount sizes. Among a set of results, they find that consumers find a within-store price comparison more useful when they are situated in a retail store. Conversely, semantic cues that compare prices between stores are more effective on perceptions of value when consumers are at home. Raghurib (1998) hypothesizes that consumers use the values of coupons to
infer the retail prices of products. Her main finding is that higher percentage discounts are associated with higher prices, which can undermine the effectiveness of the promotion. Practitioners feel that prices endings with 9s are interpreted by consumers as ‘good deals.’ However, some recent work by Schindler (2001) on 99 price endings shows that they are not always the lowest priced in a shopping area. A comparative price survey involving a wide array of product categories provides evidence that 99-ending prices are actually likely to be higher prices than those prices ending in the digits 00–98.

Reference Prices

A particular form of a price judgment is a reference price. A reference price is any standard of comparison against which an observed price is compared. There are two kinds of reference prices: internal and external, sometimes referred to as temporal and contextual respectively (Briesch et al., 1997; Rajendran & Tellis, 1994). External reference prices are usually observed prices that, in a retailing setting, are typically posted at the point of purchase as the ‘regular retail price.’ Internal reference prices are mental prices used to assess an observed price. Some empirical work has found that different market segments use the internal and external reference prices (Mazumdar & Papatla, 2000). Since the product manager cannot easily manipulate internal reference prices, yet they have a strong effect on buying behavior, we discuss them in more detail.

A large number of internal reference prices have been proposed (Winer, 1988), including:

- the ‘fair’ price, or what the product ought to cost the customer
- the price frequently charged
- the last price paid
- the upper amount someone would pay (reservation price)
- the lower threshold or lowest amount a customer would pay
- the price of the brand usually bought
- the average price charged for similar products
- the expected future price
- the typical discounted price

Many of these considerations contribute to the concept we call the perceived price. the price the customer thinks is the current actual price of the product.

The research literature has generally found that reference price has a significant impact on brand choice of both durable and nondurable goods (see Kalyanaram & Winer, 1995, for a review), and that it can have important normative implications (Greenleaf, 1995). In particular, when the observed price is higher than the reference price (a ‘loss’), it can negatively affect purchasing because the consumer perceives this situation as an unpleasant surprise or a bad deal. For example, the large price increases for cars in the 1970s created what became known as a ‘sticker shock’ effect when consumer reference or perceived prices for cars were significantly lower than the prices they saw in the showroom. A happier situation occurs when the observed price is either at or below the reference price (a ‘gain’). This happens when a brand a consumer might buy anyway is being promoted at a lower price. Interestingly, following Kahneman and Tversky’s Prospect Theory, most empirical studies on reference price have found that the unpleasant surprises have a greater impact on purchasing probabilities than the pleasant surprises (see, for example, Mayhew & Winer, 1992).

Some research has followed up on the reference price asymmetry. Kopalle, Rao and Assuncão (1996) and Kopalle and Winer (1996) show the normative impact of reference price asymmetry. Erdem, Mayhew, and Sun (2001) find that loss-sensitive households show stronger reactions to price, display, and newspaper feature advertisements than the average household, while gain-sensitive households show no striking characteristics. Two studies have questioned this finding of reference price asymmetry. Chang et al. (1999) and Bell and Lattin (2000) both find that heterogeneity in price responsiveness can potentially confound asymmetric reference price effects.

A second important concept of reference price is expected future price. This is a particularly important concept for any product category that experiences significant price changes over time. For example, new consumer durables are subject to this phenomenon. The prices of personal computers, camcorders, DVD players, etc. are falling so rapidly that customers are worried they will overpay. Discretionary purchasers can simply wait until the prices decrease further as they are willing to forego the utility from owning the product sooner. This reference price concept has been studied much less in the literature, an exception being Winer (1985).

Janiszewski and Lichtenstein (1999) propose a new reference point generated from range theory. Reference price models generally use Adaptation-Level theory (Helson, 1964) to make the assertion that consumers compare observed prices to some internal reference point. However, Janiszewski and Lichtenstein propose that the range of values of price can determine the value of any one price in the range. In other words, consumers may use a range of recalled price experiences to set a lower and upper boundary of price expectations; in this case, the attractiveness of a particular observed price is a function of its location in the range.
Empirical Price Response

As long as marketing academics have been interested in estimating market response functions, price response in the form of elasticities or other measures have been obtained. The famous Guadagni and Little (1983) paper sparked new interest in price response because of its focus on brand choice. The amount of work is sufficiently large that it has produced a meta-analysis over 10 years ago (Tellis, 1988) showing that the average price elasticity is about eight times larger (in absolute value) than the effects of advertising produced from a similar meta-analysis (Assmus et al., 1984).

Empirical research on price at the brand or store level has continued at a brisk pace. Some of the more recent topics examined include:

- short- and long-term effects of promotions
- the interaction of advertising and price
- retailing issues
- price search by consumers
- improvements in methodology.

Short- and Long-term Effects of Sales Promotion

Conventional wisdom from practitioners is that sales promotions (coupons, in-store price reductions, etc.) can have significant impact on sales in the short term but rarely, if ever, have long term effects. This is because consumers (and retailers) use the promotions to stock up, which creates a ‘peak’ in purchasing, but as the inventory is used, a ‘trough’ follows. Thus, long-term effects on a brand’s sales are negligible as the promotion tends to affect timing but not loyalty. In addition, many categories create brand loyalty rather than brand loyal customers due to the frequent use of promotions.

Recent research has examined this assertion using improved modeling approaches and longer time-series of purchasing data. Using a dynamic brand choice model, Papantle and Krishnamurthi (1996) find both traditional, negative aspects of promotions on brand loyalty but some positive results for the long-run. In particular, they find (for one product category) that the promoted brand does exhibit a decrease in brand loyalty and increased price sensitivity. However, they also find that prior purchases made on display and feature promotions, as well as purchases made when price decreases are paired with displays or features, improve subsequent response to such promotions. Mela, Gupta, and Lehmann (1997) use over eight years of scanner panel data to examine this issue. They find that promotions do indeed make both loyal and non-loyal consumers more price sensitive, and that these effects are more than four times greater for the latter group. Jedidi, Mela & Gupta (1999) incorporate competitive effects, but confirm the results of the Mela, Gupta & Lehmann (1997) study. In addition, based on their model and some cost and margin assumptions, they show that regular price decreases should have a generally negative impact on long-term profitability and increases in price promotions to be uniformly unprofitable.

Nijs et al. (2001) examined the effects of brand promotions on product category demand using Dutch data for 560 product categories over a four-year period. They found that the average effects lasted about 10 weeks, but that there was no persistent, long-term positive impact on category sales.

Another area of promotion research is on what is called the asymmetric price effect. Earlier research by Blattberg and Wisniewski (1989) showed that when a high-priced, higher-quality brand is promoted, consumers of a lower-priced/quality brand will switch. However, the reverse is not true. Several papers have continued to work in this area. Sethuraman (1996) questions if this asymmetric effect still holds depending upon whether the higher-price brand’s discounted price is still higher, equal, or lower than the lower-quality brand’s price. Assuming three tiers of brands, high quality, medium quality national brands, and a discount brand, he finds that the highest-priced brand needs to discount to only just above the medium-quality brand’s price for the promotion to be effective, that is, the highest-tier brand does not have to lower its price to the discount brand. Sivakumar and Raj (1997) extend this work to the category decision and find that the basic results hold. That is, high-priced/quality brands not only do better than low-priced/quality brands when they cut prices, but they also are less hurt from category defections when they raise prices. The basic asymmetric results are supported in a meta-analysis conducted by Sethuraman et al. (1999). The authors analyzed 1,060 cross-price effects on 280 brands from 19 different grocery product categories. Their results not only support the basic asymmetric effects, but they also find a strong ‘neighborhood’ effect whereby brands that are closer to each other in price have larger cross-price effects than brands priced farther apart.

A more general issue in the area of promotional effects is what category characteristics are associated with different levels of promotional elasticities. A study by Narasimhan et al. (1996) across 108 product categories showed that promotional elasticities are higher for product categories with fewer numbers of brands, higher category penetration, shorter interpurchase times, and higher consumer propensity to stockpile.

The Interaction of Advertising and Price

There are two competing hypotheses for the interaction between advertising and price. The first,
termed the market power hypothesis, is that advertising creates brand loyalty and product differentiation and, therefore, lower price elasticities. The competing hypothesis is that advertising is information; it increases consideration sets and thus competition, and therefore leads to greater price sensitivity. These theories have led to a considerable amount of empirical research, with mixed results (Kaul & Wittink, 1995). Some of these results have been rationalized by examining the kind of advertising used. Price-oriented advertising, not unexpectedly, does lead to greater price sensitivity, while non-price-oriented advertising has the reverse effect. There are also consumer behavior implications that come into play (Mitra & Lynch, 1995).

Some recent research has continued to examine the advertising – price interaction. Besides the promotion results noted previously, Mela, Gupta, and Lehmann (1997) also found that advertising decreased price sensitivity in their data. Kalra and Goodstein (1998) examine different advertising positioning strategies and find that only a value-oriented positioning decreased willingness-to-pay.

Nalt et al. (2000) study the advertising – promotion interaction. Conventional wisdom is that sales promotion, being price-focused, should have a negative interaction with brand-focused advertising in that it draws attention away from brand equity and creates more price competition. In a dynamic, competitive framework, the authors do find empirical support for this notion, which has significant normative implications. More work is needed in this area of research.

Retailing

The increased availability of electronic scanner data and interest in ‘micro’ marketing (product assortments customized to the local clientele) have generated research focusing on the retailer’s pricing problem. Hoch et al. (1995) estimate store-level price elasticities for 18 product categories from a chain of 83 supermarkets. The authors then relate 11 demographic and competitive variables to these elasticities and find that they explain two-thirds of the variation in the elasticities. This provides empirical support for the micro-marketing concept. Montgomery (1997) improves the estimation procedure for store price elasticities using hierarchical Bayes estimation, and using a normative model, shows that micro-marketing strategies can increase gross profits anywhere from 3.9–10% over a uniform chain pricing strategy.

Some work has examined the impact of retailers’ promotions policies on product, category, and store sales. Anderson and Simester (2001) study the impact of sales signs and in-store promotions. They find that the impact of a sales sign on the demand for an item is decreased when more products are on sale at the same time, and that sales of a product category are maximized when some but not all of the brands in the category are on sale. Lam et al. (2001) break down sales into four components: front traffic, store-entry ratio, closing ratio, and average spending. Using store data and infrared counters to measure front and store traffic by the hour, they found that price promotions have little impact on front traffic, but that they have a positive impact on store entry and the likelihood that a consumer will make a purchase.

Other retailing issues that can be studied relate to the types of promotions run in stores. Two types are off-the-shelf price discounts automatically deducted at the check-out, and in-store coupons available right by the product. After running a series of field experiments, Dhar and Hoeh (1996) show that, on average, coupons lead to a 35% greater increase in sales and a 108% greater increase in retailer profits. Little other work of this type has been done.

Price Search

An interesting area of pricing research at the consumer level is price search. Prior work in this area has relied on Stigler’s search theory: people will search for price information to the point where the marginal benefits from search equal the marginal costs. Urbany et al. (1996) propose a model of price search incorporating three broad sets of factors: habit, non-economic returns to search (e.g., shopping enjoyment), and economic returns. They find that the first two additional categories help to explain price search behavior better than in previous studies. Bronnenberg and Vanhonacker (1996) incorporate search into a logit model of brand choice. They specify and estimate a two-stage model, where the first stage is how price affects the consideration set, that is, for how many brands the household actually searches for price. The second stage of the model is brand choice. They find that response to variations in shelf price is limited to the brands in the choice or consideration set.

Methodological Advances

Like other areas of academic marketing research, a considerable amount of effort in the pricing area has been devoted to improving our methods for estimating price elasticities. Kalyanam and Shivley (1998) take a stochastic spline approach to estimating market response to price. The authors use the new method to better estimate price response functions that are often far from smooth due to promotions, small price variations around category price points, etc. Montgomery and Rossi (1999) use Bayesian methods to improve the estimation of
store-based price elasticities by combining store-level and "pooled" or aggregate information across stores and brands.

**COMPETITIVE/NORMATIVE MODELS**

The last 10 years or so have witnessed an increased interest in the application of game-theoretic methods into marketing. Game theory allows modelers to add an important dimension to research competition. Using these methods permits the researcher to characterize equilibria under a variety of assumptions about competitive actions and reactions which are not possible using more static, empirically based models. In many cases, the 'competition' is between channel members competing for profit margin, that is, not necessarily between firms. The price of incorporating competitive interactions is that institutional richness is often forsaken for model solvability.

A number of areas relevant to pricing have been examined using competitive strategy tools. These include:

- sales promotion
- channels of distribution
- product policy issues.

While some of this work does have an empirical component, what separates it from the research described in the previous section is that the theoretical model is based on competitive interactions described above.

**Sales Promotion Research**

Promotions are offered by both manufacturers (consumer-oriented and trade) and retailers. One of the purposes of trade promotions is to induce retailers to pass some of promotion incentive on to consumers and to therefore stimulate sales. This is called the "pass-through." This can range from 0%, where the retailer basically pockets the money, to 100% where it is all given to the consumer. Tyagi (1999) analyzes this situation with a number of alternative demand functions, and finds, surprisingly, that the optimal amount of pass-through depends heavily on the specification of the demand function and that in some cases (convex demand functions), the optimal amount is greater than 100%.

A more complicated situation is where there are multiple competing manufacturers and retailers and a number of different market segments (e.g., price sensitive vs. insensitive) (Lal & Villas-Boas, 1998). The setup of the model assumes two manufacturers each selling two products through two competing retailers. The manufacturers set wholesale prices to the retailers. The retailers carry all products and set retail prices. Of particular importance are the four types of consumer loyalty: no loyalty, loyalty to a manufacturer, loyalty to a retailer, and loyalty to a particular brand at a particular retail outlet. The key finding is that the results are a function of the segment structure - in particular, the ratio of switchers to loyal consumers for the highest priced brand relative to the ratio of switchers to loyalists for the lowest priced brand.

A common practice in many supermarkets is double and sometimes triple couponing, where the retailer offers to multiply the value of a manufacturer coupon. Krishnan and Rao (1995) study whether such a policy is profitable and how it affects retail pricing in a product category. They produce three main findings: (1) manufacturers may increase coupon values in retail trade areas using double coupons; (2) double-coupon retailers try to prevent consumers from using them by discounting non-coupons brands; and (3) non-double-couponing retailers reduce their prices on the brands for which the double coupons are offered.

**Channels of Distribution Research**

One channel issue is how supermarkets compete against each other using different pricing formats: everyday low pricing (EDLP) vs. high-low or regular prices with in-store promotions. Lal and Rao (1997) examine the conditions under which EDLP can be successful. They assume two segments of consumers: time constrained, and 'cherry pickers' who go from store to store seeking the lowest prices. The show that EDLP and high-low strategies are more than simply pricing strategies, in that EDLP stores use lower basket prices to attract both segments, and high-low stores use service to compete in the time-constrained segment and price specials for the cherry-picking segment. Their study has implications for communications strategies as well.

One of the manifestations for a firm of having a channel system other than direct sales is that the power in the channel may be controlled by either the firm or the channel, depending upon a number of factors. At the same time, there has been considerable interest among marketers in what has become known as the New Empirical Industrial Organization literature in economics, which specifies a model with strategic interactions common to game theory. Kadiyali et al. (2000) examine the channel power issue in this context and develop a method to measure the power that channel members have and the underlying reasons for that power. They find that for two grocery items, the retailer's market power is very significant.

Another characteristic of channel relationships is that often a substantial amount of bargaining is conducted among the members. For example, retailers
may try to extract better promotional allowances, while manufacturers attempt to get more shelf space. Srivastava et al. (2000) analyze a situation where a manufacturer and an exclusive, independent distributor are negotiating the transfer or wholesale price of a new product. They adopt a game-theoretic model (sequential equilibrium) to predict bargaining behavior and outcomes for this scenario. They derive predictions from the model about how the participants should behave. However, after conducting experiments, they find that the players bargained suboptimally, took longer to agree, and differed in a number of other respects. This experimental economics approach to understanding bargaining situations is a fruitful avenue for future research.

**Product Policy**

A variety of pricing issues relating to product policy have also been studied by marketing academics, each of which opens up a potential area for research. Vandenbosch and Weinberg (1995) extend prior game-theoretic work looking at product differentiation from a single-dimension to two dimensions, product positioning and price. They find that unlike the one-dimensional differentiation model, firms do not tend to maximize differentiation, but rather maximize differentiation on one dimension and minimum differentiation on the other. An interesting product policy question is how to price products that have branded components, such as Intel inside Compaq personal computers (Venkatesh & Mahajan, 1997). Desiraju & Shugan (1999) examine the pricing problems facing service companies such as airlines where, since the product is perishable, revenue is lost forever when a plane takes off with empty seats. This is referred to as 'yield management.' Krishnan et al. (1999) take the Generalized Bass Model (Bass et al., 1994) and develop optimal pricing policies for new product introductions that do not follow observed sales-growth patterns (which is commonly assumed) and are more consistent with observed pricing patterns, which either decline monotonically or increase and then decrease.

**Pricing and the Internet**

The increased penetration of the Internet and its emphasis on personalization has created a new pricing environment for marketing managers. The notion of a fixed price charged to all customers has virtually disappeared in the e-commerce world in favor of 'personalized' pricing. In addition, the Internet is characterized by shopping agents checking for the lowest price, customers specifying the prices they are willing to pay, and the lower search costs creating an environment where it is very easy to comparison shop even without shopping agents. Some industries such as music distribution are investigating the use of 'micro' or small payments for unbundled products, such as individual songs that can be downloaded to create customized CDs. Despite the recent drop in interest in the Internet as a way to make money, it is an exciting area for future research and the relative newness of the area means that there is little extant research.

One way to conceptualize the pricing structure afforded by the Internet is the following (Dolan & Moon, 2000):

**Type I: The Set Price Mechanism**

Many retail websites, such as BarnesandNoble.com, offer fixed prices for their products. As in the off-line or catalog contexts, customers can choose to buy or not buy at the posted prices. These are the kinds of sites that are heavily affected by price search tools such as MySimon.com, as it is simple for the customer to type in the name of a brand or book title and find the lowest price available. Except for the segment of customers that is uninformed about the price comparison mechanisms available, in this situation the marketing manager has only two choices: match the lowest price available or add value through branding or other mechanisms. Amazon.com does not have the lowest prices for books or CDs. However, the company has been able to develop loyal customers by adding value through brand-building and convenient shopping through its one-click purchasing process.

A useful framework for thinking about how e-tailers and other web participants can differentiate themselves and subdue price competition was offered by Alba et al. (1997). The authors suggested the following five possible approaches to seeking competitive advantage in electronic retailing:

- distribution efficiency
- assortments of complementary merchandise
- collection and utilization of customer information
- presentation of information through electronic formats
- unique merchandise

Some sites can change prices at the time a particular shopper is at the site depending upon his or her past history, the prices of the products being examined, and the sites from which they came. This is an excellent application of first-degree price discrimination and has the potential to optimize profits. For example, if you are visiting a site and do a price
comparison, some sites will automatically adjust their prices to the lowest price as they 'sense' that you are price elastic.

Other than research on how to implement dynamic pricing in this context, interesting issues are the brand equity and ethical dimensions of price discrimination. Although it is not illegal to price discriminate to end customers, recent discoveries by Amazon customers that they were receiving different prices did not create favorable public relations for the firm. More importantly, a company can get into serious trouble if the pricing mechanism is tied to demographics such as race, resulting in a kind of electronic redlining.

Type II: Buyer/Seller Negotiation

Online price negotiation is an alternative to face-to-face interactions, which many people dislike. While popular in B-to-B applications (e.g., energy, metals), of the three types of pricing mechanisms, this kind of real-time negotiation is the least common.

Type III: Auctions and Exchanges

One of the most popular innovations of the Internet, on-line auctions are forecasted to generate over $20 billion in sales by 2003 (Industry Standard, April 24, 2000). There are three types of pricing mechanisms in this category where competition across buyers and/or sellers results in prices that can vary widely across transactions.

(a) In this case, competition across buyers leads to a price. This is the classic auction model, also called the English auction. Yahoo! and eBay offer this kind of system for consumers to interact with each other. The classic auction has been around for hundreds if not thousands of years.

(b) A reverse auction is where sellers compete for a buyer's business. The most noteworthy example of this is Priceline.com that started with auctions for airline seats and has moved to hotel rooms and groceries. Some sites, such as Mercata.com, permit groups to get together and offer a larger sale to potential bidders.

(c) Exchanges are electronic marketplaces where a group of buyers and sellers interact to trade and set prices for transactions. Most of the Internet sites in this category are designed around a particular industry such as metals, steel, and automobile parts. Some companies such as VerticalNet, Ariba, and Commerce One have been very successful in this segment. Other companies focus on small businesses.

Research on Auctions

The research literature on auctions is vast as it has been an active area of research for economists since Vickrey's 1961 paper describing basic auction mechanisms. Some recent papers in the marketing and economics literatures shed some light on possible research areas related to Internet auctions.

One stream of literature relates to the basic auction format (Lucking-Reiley, 1999). Other than the English auction described above or its variants (reverse English auctions), three other basic auction mechanisms are Dutch, first-price sealed-bid, and second-price sealed-bid. A Dutch auction involves decreasing prices; a public price clock starts out at a very high level and the price falls until a participant bids. Both the Dutch and English auctions are 'real time' auctions, in contrast to sealed-bid auctions where bidders submit a bid by a deadline. In the first-price auction, the highest bidder wins. In the second-price auction, the winning bidder pays the second-highest bid. Vickrey (1961) showed that under some standard bidding assumptions, the expected revenue to be collected by the auctioneer is the same in all four formats. Using a real Internet context (magic game cards), Lucking-Reiley (1999) showed that the Dutch auction format produced significantly higher revenues than the others, violating the theoretical predictions.

Even within a format, there are often characteristics of particular auctions that can be tested. In English auctions, for example, sellers can set what is called a reserve, the minimum acceptable price that is unobservable to buyers. Greenleaf (2000) argues that behavioral phenomena such as anticipated regret and rejoicing can affect the seller's reserve level. In a related paper, Greenleaf and Sinha (1996) examine buy-in penalties—the amount a seller must pay if the item does not sell. These and other auction format issues can be studied in Internet contexts.

An interesting question is how to attract customers to an auction (Sinha & Greenleaf, 2000). While more customers are almost always incrementally profitable to a firm using 'posted' prices, more bidders does not necessarily increase actual profits from an auction. Are there types of people who are attracted to auctions? Do they have different risk profiles than non-auction customers? How does an auction site optimally allocate resources between bidders and sellers?

The Internet and Information

A key characteristic of the Internet is the low cost of information search. While the Internet has the potential to permit firms to differentiate along a
number of dimensions and thus extract a high price from that value, economic theory would dictate that low search costs ultimately create price competition. Interestingly, some studies show that prices on the Internet are actually higher than they are in the offline world (Smith et al., 1999) and that consumers are often willing to pay more for the same good from a brand name retailer (Smith & Brynjolfsson, 2001). An important research area, therefore, is how the information environment on the web affects customer and firm behavior.

One area of potential research is on the efficiency aspects of the web, that is, is the web more efficient than its offline counterpart? Smith et al. (1999) describe four dimensions of web efficiency that can be investigated:

- Price levels: are the prices charged on the Internet lower?
- Price elasticity: are consumers more sensitive to small price changes on the Internet?
- Menu costs: do retailers adjust their prices more finely or frequently on the Internet?
- Price dispersion: is there a smaller spread between the highest and lowest prices on the Internet?

While lower search costs should make it possible for customers to easily collect price information, it could also lower the cost of collecting information about product quality. Some research has found that lowering the search costs for quality of differentiated products (e.g., wine) decreases price sensitivity (Lynch & Ariely, 2000). An interesting question is whether there is learning in this kind of environment. Theoretical work has examined the impact of search costs on market structure and firm incentives with differentiated products (Bakos, 1997).

Some work has focused on the implications of the Internet for price competition among firms, both online and offline. Lal and Sarvary (1999) look at the conditions under which the Internet could actually decrease price competition and show that two factors—the attribute types of the products in question and the channels being used—can lead to higher prices and less search. Zettelmeyer (2000) relates the ‘size’ of the Internet in terms of its reach to competitive pricing and communications policies.

**Conclusion**

Of the five areas covered, we believe that three in particular deserve more attention from marketing academics.

As we noted earlier, except for the several studies described in this paper, issues related to measurement and scaling have not been extensively studied since the 1970s. This is a very important, practical area in which marketing academics can have a large impact. In today’s price-sensitive market, understanding price thresholds and willingness-to-pay is critical to marketing managers’ being able to price appropriately and not succumb to extreme pressure to drop prices. Yet, both authors have seen numerous instances of poor marketing research methods used to help set price.

More work is also needed to better understand customers’ reactions and processing of price information. Measurement research can help set prices, but we also need to study how customers are utilizing the price information they see and make decisions.

Finally, given the rapid growth of the Internet and e-commerce, we need to better understand appropriate pricing policies and mechanisms for this new distribution channel and communications medium. It is clear that the Internet is attracting both price-sensitive and price-insensitive customers. In addition, pricing policy is inextricably tied into product policy; mass customization or individually tailored products and services should imply pricing flexibility. Price experimentation should be easy and inexpensive to do. However, at this stage in the development of the Internet, we do not know very much about optimal pricing policies or behavioral aspects.

**References**


