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Pricing Strategy and the Formation and Evolution of Reference Price Perceptions in New Product Categories

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ABSTRACT

This study examines the formation and evolution of reference price perceptions in new product categories. It contributes to our understanding of pricing new products by integrating two important research streams in marketing — reference price theory and the theory of pioneer brand advantage. Prior research has focused solely on products in existing or incrementally new categories, and has typically examined fast moving consumer goods. Using a cross sectional experiment to study the formation of reference price perceptions, and a separate, but related, longitudinal experiment to study the evolution of reference price perceptions, the findings suggest that the pioneer brand's initial price defines a consumer's initial reference price, whether the pioneer is following a skimming or a penetration strategy. This effect endures in later time periods where the initial price affects consumer perceptions of value and purchase intention. The study also finds that the pioneer, due to its prototypicality, has a stronger influence on reference price perceptions than the follower, creating a systematic bias to both the formation and evolution of reference price perceptions in new product categories. Thus, reference price perceptions are shaped by what the pioneer does, rather than what the follower does. Furthermore, category level reference prices exist and explain purchase intention, but do not improve over brand specific measures in this regard. These findings have implications for pricing strategy and the theory of reference prices.

Key Words: Reference price; pioneer advantage; pricing strategy.

THE FORMATION AND EVOLUTION OF REFERENCE PRICE IN NEW PRODUCT CATEGORIES

The study of reference price has a long tradition in marketing and has made important contributions to our understanding of consumer behavior (Mazumdar, Raj & Sinha, 2005). Whilst a number of studies have examined the subjective nature of price (e.g., Monroe, 1973; O'Neill & Lambert, 2001; Sinha and Smith, 2000), few have studied *reference price effects* in new product categories, despite obvious differences between new product and existing product contexts, and despite calls in the literature to do so. For instance, Biswas and Sherrell (1993, p. 44) state "research should examine…reference price estimates for products in the early stages of market penetration". Instead, research often uses scanner data to model reference price effects for established, frequently purchased product categories such as saltines, coffee, yoghurt, and many more (see Mazumdar, Raj & Sinha, 2005 for a detailed review of the literature).

Some research has looked at reference price effects in new product categories (i.e., Doob, Carlsmith, Freedman, Landauer & Soleng, 1969; Slonim & Garbarino, 1999). However, Doob et al. (1969) study reference price effects by examining changes in sales for different pricing strategies of incrementally new products and do not specifically examine reference prices. Slonim and Garbarino (1999) perform a similar study in a lab setting, looking at how perceptions of expensiveness change for different pricing strategies of new products. However, they also do not examine reference prices, relying instead on measures of perceived expensiveness. Thus, the issue of reference price effects for new products has yet to be addressed in any detail, given that new product research does not examine reference prices, and reference price research has largely focused on existing products. This study address that gap using a cross sectional experiment to

study the formation of reference price perceptions for new products, and a separate, but related, longitudinal experiment to study the evolution of reference price perceptions.

Pricing, Pioneership and the Role of Price Histories

Typical prescriptions for the pricing of innovations include a penetration strategy or a skimming strategy. Although these strategies are commonly used in practice, the decision to use either is not straightforward. Little is known about their optimality, and the effect they have on reference prices and consumer perceptions of value. To what extent do marketers define consumer perceptions of a product's value by choosing a penetration or skimming strategy?

To answer this question, the reference price literature alludes to an averaging process, whereby consumers form some sort of average of current and past market prices to form a reference price. Therefore, a brand following a skimming strategy will obtain a high reference price, and a brand following a penetration strategy will obtain a low reference price.

Some pricing research has tangentially examined this area of study (i.e., Alba et al., 1999; Danzeger & Segev, 2006; Doob et al., 1969; Slonim & Garbarino, 1999). For instance, seminal research by Doob et al. (1969) involved a field experiment across five product categories in a matched sample of 12 stores to test the longer term impact of an introductory low price on sales, as opposed to a regular price. In general, the results showed sales were initially higher for those products with an introductory low price, and when the price increased to the regular price, sales declined. However, sales for these products declined further than sales of products which remained at the regular price from the beginning. One explanation relates to framing effects and initial reference prices. However, this explanation is an implied aspect of their work based on aggregate data from a field experiment. No specific measures of reference price and consumer perceptions of value were examined. Thus their conclusions, whilst important, have not been

explicitly tested. Further, their study did not test this theory for other commonly used new product pricing strategies such as a skimming strategy, and the products tested were not necessarily what one would define as "pioneers."

Slonim and Garbarino (1999) tested the effect of different price histories on demand. Consistent with reference price theory and the results of Doob et al. (1969), the brand that followed a penetration strategy was perceived as being more expensive than the brand that followed a skimming strategy, and had lower demand, even though prices were the same in later time periods. Alba et al. (1999) found that frequency and depth of discounts affected reference price, even though the price histories under examination had the same average. Finally, Danziger and Segev (2006) show how random versus ordered price sequence lists of seven and 10 prices for one product affects price judgments for the product (for an abstract, i.e., unnamed, product and for an airline ticket).

All these studies make valuable contributions but examined products in existing categories which were not entirely new to respondents. Therefore respondents' reference prices and perceptions of value may have been fairly well defined. Thus, whilst some pricing studies have hinted at how reference price perceptions, value perceptions, and purchase intentions form and evolve in new product categories, none has *explicitly tested* these mechanisms and relationships.

Categorization and Market Entry Order: The Pioneer Advantage

To further understand the formation and evolution of reference price perceptions in new product categories, the market entry order literature provides useful insight. Pioneer brands can attain a number of distinct advantages revolving around the pioneer's unique association with its category and its distinctiveness as the category exemplar (Carpenter & Nakamoto, 1989; Kardes & Kalyanaram, 1992; Kardes, Kalyanaram, Chandrasekaran and Dornoff, 1993).

The root of a pioneer's behavioral advantage stems from how the pioneer is defined. This is crucial not only in operationalizing pioneership but in distinguishing this study from prior studies on reference prices for existing product categories. Schmalensee (1982, p. 361) notes the potential confusion between differentiation and pioneering, offering a definition of the pioneer as "the first brand in any product class" (p. 360). However, such a definition is inherently a bit vague because it does not specify how broad or narrow a "product class" is. Of course, innovation is a matter of degree. Truly radical innovations such as the PC, the internet, the VCR etc. are few and far between. Products like these often represent such disparity from the prior technology that they do not come from an easily recognizable product category. For instance, Sood & Tellis (2005) trace their analysis of technological evolution through innovations within larger product categories such as desktop printers, beginning with dot matrix printers, then ink jet printers, laser printers, and finally thermal printers. In this case, 'desktop printer' is the category and the different types of desktop printers (i.e., dot matrix, ink jet etc.) represent what might be termed sub-categories.

Nagle and Hogan (2006, p. 267) imply a similar definition by giving examples of new product categories such as wireless internet, among others, when highlighting the challenges of pricing radical innovations. Wireless internet is not a revolutionary innovation, yet it is different enough to define a unique new category or, if you prefer, a new sub-category. For the purposes of this research, these "sub-categories" are sufficiently new to provide the context in which to examine initial reference price effects. Such new products also represent by far the majority of innovative products released in the market, relative to rare discontinuous innovations such as the internet, desktop printers etc., establishing an important context for this research.

Categorization determines how one organizes, interprets and learns about new information (Mervis & Rosch, 1981). The pioneer, as defined above, creates a new product category (Carpenter & Nakamoto, 1988) and therefore influences how consumers learn about and understand the new product class or category. Pioneering the product class allows the pioneer to become *prototypical* of the category. For instance, Rosch (1978) states that categories are represented by a prototypical member of the category. Carpenter and Nakamoto (1989) find that pioneer brands define category ideals when perceptions of product quality are poorly formed and ambiguous. Implicit in this is the ability of the pioneer to set the reference price as well, though this is yet to be addressed or tested.

Pioneership and the Formation of Reference Price Perceptions. Research has shown that past prices and other observed prices influence reference price (Mazumdar, Raj & Sinha, 2005). That is, the pioneer, as the first brand in the product category, acts as an anchor or point of reference (Carpenter & Nakamoto, 1989). As consumers have limited prior points of reference upon which to base price judgments in a new category, the pioneer, being the first and only brand in the category, influences the *formation* of the *initial* reference price.

Carpenter and Nakamoto (1989) show how a pioneer brand shapes consumer attribute preferences for a new product category. This preference structure may be weakly formed before exposure to the pioneer, but upon exposure and trial, these preferences update to take the attribute combination of the pioneer (e.g., to clear as the appropriate color for a petroleum jelly product because Vaseline, the pioneer, is clear). In other words the pioneer "defines" the ideal attribute combination. Does the pioneer brand also define the reference price for the new category? The situation is similar in that for consumers there may be ambiguity over what the price should be, within a credible range. Thus, in Figure 1, assume that consumers are shown a

new product without being exposed to the product's price. They may have some sort of hypothetical initial reference price, in this case indicated by 'P_r' (albeit a weakly formed and malleable reference price). Now suppose the pioneer enters, either with an initial high or an initial low price. Reference price perceptions will shift in the direction of the pioneer's entry price. For instance, reference price would increase to P_{rs} with a skimming strategy, and decrease to P_{rp} with a penetration strategy. In an extreme case of the consumer having no idea at all of the appropriate price for this type of product (within a broad credible range), the consumer's reference price will "emerge" near the pioneer's price.

− Insert Figure 1 about here −

This is consistent with other research that shows observed prices or price cues can shift reference price perceptions in the direction of those prices or cues (Kamins, Dreze & Folkes, 2004), even when price information is exaggerated or implausible (Urbany, Bearden & Weilbaker, 1988). This leads to Hypothesis 1, which predicts:

Hypothesis 1:   The reference price for the pioneer shifts in the direction of the pioneer's price.

However, the pioneer's effect on reference price may be even *stronger*. Research generally shows that observed prices will influence the reference price. Does the pioneer's price *become* the reference price, rather than just *influencing* the reference price? If the pioneer is *highly* representative of the category and a strong category exemplar, and if consumers do not have adequate prior adaptation levels upon which to base their reference price perceptions, then the pioneer will be able to not just shift reference price perceptions in the direction of the price at which it enters but will be able to also define the reference price, and therefore define an anchor by which subsequent prices and prices of follower brands are judged. This is consistent with Rajendran and Tellis' (1994, p. 30) speculation that "…if a category has a prototypical brand, its

price may well be the best contextual reference price." Likewise, Hardie, Johnson and Fader (1993) suggest that consumers have a reference brand, evidenced by their operationalization of reference price as the price of the brand last purchased. This leads to Hypothesis 2, a stronger test of Hypothesis 1:

Hypothesis 2:   The price of the pioneer becomes the reference price for that product.

Follower entry and the evolution of reference price perceptions. But what happens after a follower brand enters? How do reference price perceptions evolve? While the prior discussion addressed the *formation* of reference prices in new product categories, it did not address the *evolution* of reference prices when a pioneer's price changes and a follower is introduced.

Suppose the pioneer increases (decreases) prices to the "regular" price (long term price) to reflect a penetration (skimming) strategy? It was already shown how these *initial* prices in T_1 (time period 1) are likely to affect the reference price, but what happens to the reference price and consumer value perceptions if the pioneer's price converges in T_2 (i.e., the skimming price goes *down* to the "regular" price in T_2 and the penetration price goes *up* to the "regular" price in T_2)?

Regardless of past prices, economic theory would predict equivalent current prices to lead to equivalent levels of value and equivalent levels of purchase intention. Yet, reference price theory would predict reference price, value perceptions, and behavioral intentions differ in T_2 because of the different prices in T_1.

The basic proposition of reference price theory is that past prices determine the current reference price, though this has only been tested in the context of existing products. A large body of empirical evidence supports this relationship (see Mazumdar, Raj & Sinha, 2005). This suggests that even though prices are equal in T_2, consumer reference prices will have been

framed by the initial price due to learning effects. For the skimming strategy, where the price decreases to the regular price, consumers will likely revise down their reference price to somewhere between the initial price and the new price, whereas for the penetration strategy, where the price increases to the regular price, consumers will likely revise up their reference price to somewhere between the initial price and the new price. This anchoring mechanism has implications for consumer value perceptions too. Survey based approaches to reference price research have generally decomposed value into two related but theoretically distinct concepts – acquisition value and transaction value. Acquisition value relates to the "get", relative to the "give", component of value (Grewal, Monroe & Krishnan, 1998), and can be defined as P_h-P, where P_h is the highest price a consumer would be willing to pay and P is the product's actual price. In other words, acquisition value is the difference between what a consumer believes something is worth to them and what it costs them. Transaction value (Thaler, 1985), on the other hand, represents the notion of a deal. For instance, "what a great deal" or "what a rip off" might be terms to describe transaction value for a product, operationalized as P_r-P, where P_r is the reference price and P is the actual price. As reference prices evolve based on pioneer pricing strategy, the literature would then predict that transaction value would be higher for brands which were previously more expensive (i.e., following a skimming strategy) and lower for brands which were previously less expensive (i.e., following a penetration strategy).

Relatedly, if the change in price in T_2 is viewed as a loss (i.e., the penetration strategy) then this will lead to lower purchase intentions, and if it is viewed as a gain (i.e., the skimming strategy) then this will lead to higher purchase intentions. These links have been examined before (i.e., Bearden et al., 1992; Grewal, Monroe & Krishnan, 1998; Thaler, 1985; Urbany, Bearden, Kaicker, & Smith-de-Borrero, 1996), but have yet to be explicitly tested for new

product categories, and have rarely been tested in an experimental setting. Thus, exposure to prices in T_1 of an emerging market should define reference prices in T_2 which in turn define perceptions of value and purchase intentions, leading to Hypotheses 3a, 3b and 3c:

Hypothesis 3a: In T_2, the reference price for a pioneer using a skimming strategy will be higher than the reference price for a pioneer using a penetration strategy.

Hypothesis 3b: In T_2, transaction value for a pioneer using a skimming strategy will be higher than transaction value for a pioneer using a penetration strategy.

Hypothesis 3c: In T_2, purchase intention for a pioneer using a skimming strategy will be higher than purchase intention for a pioneer using a penetration strategy.

Pioneer advantage: effects upon reference price. Before proceeding with the development of this study, a necessary condition for subsequent hypotheses to hold is that pioneer advantage exists. Thus a key finding in the pioneer advantage area is replicated. Though this hypothesis is not new (Carpenter & Nakamoto, 1989; Kardes & Kalyanaram, 1992; Kardes et al., 1993), it is a fundamental hypothesis and worth replicating in additional contexts. Therefore:

Hypothesis 4:   A substantial proportion of respondents will prefer the pioneer brand, even though the follower is always at a discount to the pioneer.

Or phrased differently, despite always being at a lower price than the pioneer, the follower will not be universally preferred, even though the two brands should be equally preferred in the absence of entry order. When the order of entry manipulation is activated, pioneer advantage should be strong enough to exert a change in preference. Thus in the context of a pioneer brand advantage other new hypotheses in the area of reference prices and new product categories can be examined.

The pioneer, being prototypical, becomes the standard and referent against which others are judged, and in so being establishes the norm and represents *how a brand should be*. Similarly, the reference price literature revolves around the establishment of some norm or referent in order to make simpler judgments. Thus, for the first time, integrating the pioneer brand advantage and

reference price literature, the pioneer, and in particular the pioneer's price, heavily influences reference price perceptions in the category, whether for a particular brand or the category as a whole (the distinction between brand and category reference price is made later).

One of the key implications from prototype and category adjustment models of learning (i.e., Huttenlocher, Hedges & Vevea, 2000) is that memory about a category is biased towards category norms. The pioneer as the prototype and natural referent takes on this role in establishing norms within the category, thus subsequent reference price estimates should be biased towards the pioneer's reference price. Sailor and Antoine (2005, p. 840) draw these implications out, stating "… responses to a stimulus should be consistently biased toward the category prototype". Likewise, Rajendran and Tellis (1994, p. 30) state that the prototypical brand within the category may be the best contextual reference price, leading to Hypothesis 5:

Hypothesis 5: The pioneer's price plays a greater role in establishing the reference price in T_2 than the follower's price.

Following on from Hypothesis 5 the effect of the pioneer as the referent brand on purchase intentions is examined. The value decomposition model suggests perceptions of transaction value are determined by reference price. And since value perceptions explain purchase intentions, it is crucial to understand which reference price consumers use to judge transaction value.

If the pioneer is the referent brand and used as a proxy to judge the worth of that product, and other products within the category, one would expect that consumer's value judgments of the pioneer, and other brands within the category, would be based on the reference price of the pioneer brand. Thus perceptions of transaction value and acquisition value for all brands would be determined in relation to the reference price held for the pioneer as the ultimate reference point. Consequently, value perceptions for the pioneer and follower, and subsequent purchase intentions, would be better predicted by the gap between the pioneer's price and the pioneer's

reference price, than the gap between the follower's price and the follower's reference price. This leads to Hypothesis 6:

Hypothesis 6:   The gap between the reference price of the pioneer and the price of the pioneer is a better predictor of purchase intention than the gap between the reference price of the follower and the price of the follower.

A further issue in the reference price literature is the distinction between information at the category level and at the brand level. Categorization processes have been seen in the psychological literature as a way for consumers to simplify and learn about new information (Huttenlocher, Hedges & Vevea, 2000; Sailor & Antoine, 2005). Thus consumers might use a category reference price rather than a brand reference price in their purchase decisions. Some authors have attempted to make this distinction (i.e., Briesch et al., 1997), but limited support for the use of category reference price has been found so far. Indeed, Briesch et al. (1997, p. 212) state that despite its intuitive appeal "specifying a single reference price for all brands is not appropriate and reference price is brand specific." However, their measure of a category level reference price was a function of past prices of brands purchased. Theoretically, this seems to be a narrow measure of category reference price because it does not consider all brands in the category, only prior *purchased* brands. Therefore, this issue is not yet fully resolved. The brand reference price should be more influential for the reason that it is more closely related to the brand. This study tests this hypothesis directly asking consumers about their reference price perceptions, as opposed to making particular assumptions about the nature of the category reference price measure. For testing, Hypothesis 7 is phrased as:

Hypothesis 7:   Brand reference price is a better predictor of purchase intention than category reference price.

METHOD

These hypotheses are examined using an experimental framework with two separate but related experiments. Experiment 1 is a cross sectional experiment simulating an emerging market and the introduction of pioneer brands at different price levels. It is about the *formation* of reference prices and examines Hypotheses 1 and 2. Experiment 2 is a longitudinal experiment designed to extend Experiment 1 by introducing the concept of time to examine the *evolution* of reference prices as the pioneer's price changes and as a follower brand is introduced. Repeated calls to conduct reference price research under controlled experimental conditions such as these have been made in the literature.[1] An experimental study with hypothetical stimuli is suitable for this study into reference price perceptions for *new product categories* because of the ability to control consumer experiences and the stimuli they are exposed to.

EXPERIMENT 1

Experimental Design

The purpose of Experiment 1 is to understand *how initial reference price perceptions are formed based on the entry of a pioneer at different prices*. Experiment 1 began by exposing respondents to a pioneer in a novel product category. Respondents were either exposed to a pioneer following a skimming strategy (i.e., an initial high price), a pioneer following a penetration strategy (i.e., an initial low price) or a pioneer with no price (as a control group to test Hypothesis 1). After exposure to the pioneer at one of the price manipulations reference price measures were then taken and compared between treatments. Respondents could be

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[1] For instance, Rajendran and Tellis (1994, p. 31), in a scanner based pricing study, "Experiments provide rigorous tests of the causes of reference price and are especially useful in developing theory". Likewise, Chang, Siddarth and Weinberg (1999, p. 190) state "Laboratory and survey work could be used to uncover the mechanisms that consumers actually use to form reference prices in different product categories."

exposed to a pioneer from one of two new categories, in order to examine reliability and generalizability. This forms a simple 1x3 experimental design replicated over two different product categories.

The Instrument

Product concept statements. The emerging product category was simulated through the presentation of new product concept statements. Product categories to be used for testing were selected based on whether they satisfied certain criteria, including:

- Should represent a new category or sub-category that is more than trivially different from existing products

- Should be cheap enough to be accessible to most but not so cheap that a respondent may just 'buy to try'

- Should not be a product likely to involve a large degree of medical risk (i.e., a new pill), as respondents may simply not wish to buy the product, distorting the reference price effect

- Should be a product category which is relevant to the sample.

The final two product categories which were thought to best satisfy the above criteria were a new 8 hour sun protection product and a new set of wireless earphones. The 8 hour sun protection represents an innovation over the prior product generation of 4 hour sunscreens because users only have to apply the sunscreen once in a day, significantly changing usage behavior and providing a valuable benefit over existing sunscreens. That is, it is not just longer protection, but resolves the problem of "when do I need to re-apply sunscreen?" by eliminating the need to re-apply. The wireless earphones also represent an innovation over existing alternatives such as earphones with wires, because the wireless attribute enables more freedom of movement and is less awkward than earphones with wires. (It should be noted that wireless *headphones* already exist. However, headphones are different from earphones and can only be

used within the home). At the time of this study exploratory checks revealed no such products existed. As a further initial check, pilot studies revealed subjects had not heard of or used such products. Manipulation checks were used within the main study to evaluate innovativeness. Novel brand names were chosen to control for familiarity and prior brand knowledge (Kardes et al., 1993).

One way to enhance the realism of the products (and naturalness of the experiment) was to use photos of the products as well as text product concept descriptions. This is particularly pertinent to new products where text-based descriptions may not be sufficient for respondents' understanding. Photos for both new products were digitally created. Stimuli properties would not be a confound, as the same exact sun protection or wireless earphone stimuli were presented, except for the price information, and within-product comparisons were the only ones made.

Pilot Study 1: setting price levels for the pioneer brands. The purpose of Pilot Study 1 was to objectively set initial price levels for the skimming and penetration manipulations. Respondents were exposed to product concept statements (without price information), and asked two questions related to their highest acceptable and lowest acceptable price perceptions. This enabled us to construct demand curves to determine price acceptability at different price levels.

Thirty-nine respondents participated in the pilot study. The skimming and penetration price manipulations for Experiment 1 were determined by using the average *highest* price and the average *lowest* price from the price acceptability questions, following Monroe (2003). For the sun protection, this was $20 and $10 respectively and for the wireless earphones, this was $80 and $32. Prices were then rounded for consistent price endings in the experiment (Stiving & Winer, 1997). As such the skimming and penetration price manipulations respondents were

exposed to were $19.99 and $9.99 for the sun protection products and $79.99 and $29.99 for the wireless earphones.

Measures. Measures of transaction value and acquisition value were adapted from the battery of scales in Urbany et al. (1996) and Bearden et al. (1992). However, pre-testing of the surveys indicated that respondents found the questions somewhat repetitive and onerous, something that was also reflected in the extremely high Cronbach's Alphas. Correlations between the individual items and each of the summated measures were all above 0.9, and most were above 0.95. A key concern in a questionnaire's design is respondent fatigue and boredom. Thus the use of highly correlated, multi-item scales may do more harm than good (Rossiter, 2002). To achieve parsimony within the instrument without losing information, a reduced set of scales was used, taking two single-item scales from the battery to measure transaction value and acquisition value.

Recent research presents compelling evidence for carefully selecting a reference price measure, and distinguishes between the distinct effect of expected, fair and reservation prices on demand (Garbarino & Slonim, 2003). Other research highlights the importance of perceptions of price fairness (Xia, Monroe & Cox, 2004), and specifically points to the use of fair price as a better specification of reference price for new product categories than other commonly used measures such as an expected price (Lowe and Alpert, 2007). In particular a fair price, as a normative measure of reference price, is likely to be more appropriate *for new product categories* than an expected price, as consumers have yet to form price expectations, as is assumed in more positivistic models based on price histories. Therefore, the measures of reference price and highest price, which correspond with transaction value and acquisition value respectively, were open-ended questions asking respondents, "What is your best estimate of a

fair price for this product?" and "What would be the highest price you would be willing to pay for this product?"

Measures for purchase intentions were taken from past research (Bearden et al., 1992; Urbany et al., 1996) and refined for testing. Again, it was found that Cronbach's Alpha for these items was very high during pre-testing (i.e., 0.972), confirming some of the qualitative comments about repetitiveness made by respondents. Therefore, in the interests of parsimony, three of the initial four items were deleted, leaving the scale "Please indicate how likely or how certain you would be to purchase this product", anchored by "very unlikely" and "very likely."

Innovativeness was measured using a 7-point scale, adapted from Olshavsky and Spreng (1996), asking "How innovative is [brand]" anchored by one (minor variation of an existing product) and seven (completely new product). Perceived product quality was assessed using a single item, 7-point semantic differential scale adapted from Slonim and Garbarino (1999, p. 7).

Data Collection

The experiment was advertised on course websites with a number of prizes as incentives. Respondents were provided with a hyperlink which randomly allocated them to treatments. This, and the ability to keep respondents from moving back and forth through the experiment (which will be essential in Experiment 2), are useful features of a web experiment. The study was promoted in undergraduate and graduate marketing classes at a metropolitan university. Participation was voluntary, but encouraged with incentives. The products used in the experiment are very suitable for students, a student sample is more homogenous and suitable for causal research, and similar research has used student samples (e.g., Carpenter & Nakamoto, 1989). The sample size for Experiment 1 was 172, allocated evenly across experimental treatments.

Results, Analysis and Findings

Confounds and Manipulation Checks. Differences in each product's perceived innovativeness were compared across the three different price treatments using an ANOVA. No significant differences were found, indicating that the product concept statement dominated innovativeness perceptions, not price. Furthermore, the mean level on the perceived innovativeness scale was 4.65 for the wireless earphones and 4.0 for the 8 hour sun protection, which indicates that respondents viewed the products as more than a "minor variation" (anchored by 1) but less than "completely new" (anchored by 7), consistent with the earlier theoretical discussion of degrees of pioneer innovation from radical to sub-categories. It would have taken a product that was a big leap in imagination to get rated near a 7 on average. Furthermore, it would be harder to construct stimuli that were realistic and affordable for this experiment. Also, there were no significant differences in mean perceived quality by treatment.

Hypothesis 1. Mean reference prices for the two treatments and the control group (i.e., "no price") are shown in Figure 2. Figure 2 shows that if respondents do not see a price, their reference price will be somewhere in between the reference price for a skimming strategy and the reference price for a penetration strategy. Clearly, the reference price increases as the pioneer's introductory price increases and is biased in the direction of the pioneer's price. Interestingly, not only does it increase but it increases by a similar amount to the pioneer's price, suggesting that the reference price is the pioneer's price. The data indicates obvious differences in mean reference price by experimental treatment for the wireless earphones and the 8 hour sun protection. These differences are further tested with ANOVAs which show statistical differences in means (Earphones: $F(2, 77) = 23.24$, $p = .000$; Sunscreen: $F(2, 75) = 9.33$, $p = .000$), providing further support for Hypothesis 1 beyond the descriptive results. The range in reference prices

between the penetration and skimming conditions is large, suggesting a powerful and fundamental effect for pricing strategy on reference price perceptions.

Hypothesis 2. Hypothesis 2 extends Hypothesis 1 with a stronger test of this effect, by determining whether the pioneer's price becomes the consumer's reference price. Table 1 shows average reference price by pricing strategy.

− Insert Figure 2 and Table 1 about here −

Mean pioneer reference prices are close to the pioneer's price, but not exactly the same. One-sample t-tests between mean reference price and the pioneer's price show no statistically significant difference for the wireless earphones (Penetration: $t(27) = 0.781$, $p = .442$; Skimming: $t(25) = -1.915$, $p = .067$), supporting Hypothesis 2, but a statistically significant difference for the sun protection (Penetration: $t(29) = 2.572$, $p = .015$; Skimming – $t(26) = -2.812$, $p = .009$), not supporting Hypothesis 2.

For the sun protection, though mean reference price is statistically different from the pioneer's price, not supporting Hypothesis 2, substantively it is not that different. For instance, mean reference price for the skimming strategy is only 12.5% less than the pioneer's price, and for the penetration strategy, mean reference price is 19.6% more than the pioneer's price.

Thus Experiment 1 examines how reference prices form in new product categories. But how do reference prices evolve when the pioneer's price changes and when follower brands enter at a discount? Experiment 2 extends the analysis by constructing a longitudinal experiment to examine the evolution of reference prices as the market develops.

EXPERIMENT 2

Experimental Design

Experiment 2 significantly extends Experiment 1 by examining the effect of entry order and

competitive interaction upon reference price perceptions, with a longitudinal experiment. It starts with exactly the same procedure as in Experiment 1 (except the no price control condition is no longer needed). Again, the pioneer could be following a skimming strategy or a penetration strategy, with an initial high price or an initial low price. To simulate the passage of time in an emerging market (Carpenter & Nakamoto, 1989), respondents were then presented with a thinking task and a brain teaser, following Morrin and Ratneshwar (2000). After these tasks, respondents were told that the price in T_2 for the pioneer had changed to a regular price — either to a higher price if the pioneer was following a penetration strategy, or to a lower price if the pioneer was following a skimming strategy. They were then exposed to a follower brand. The follower brand was designed to be a me-too follower, similar to Carpenter and Nakamoto's (1989), varying by brand name, product description, and price. The follower was either presented at a small discount or a large discount to the pioneer's price in T_2.[2] Rigorous pilot testing, described in the next section, was performed to ensure that the pioneer and follower brands were perceived by respondents to be similar and not objectively better or worse than one another, in the absence of order of entry effects. Order of entry was counterbalanced between each pioneer (follower) brand half the time to control for possible confounds. After seeing the follower, respondents were asked questions to evaluate the pioneer and follower, as well as other general questions about the category. Therefore, with the pioneer's pricing strategy varying on two levels (i.e., penetration or skimming) and the follower's pricing strategy varying on two levels (i.e., small discount or large discount), this forms a 2x2 experimental design, counterbalanced for experimental control and replicated across two new product categories to enhance

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[2] An alternative strategy for a follower might be to enter with a higher price than the pioneer. Whilst methodologically straightforward, follower brands typically enter at a higher price if they offer "something extra." In this research, the brands were designed to be similar for experimental purposes. Therefore, the typical price strategy for a me-too follower is to try to make up for the pioneer's lead time by entering at a discount.

generalizability and reliability.

Pilot Study 2: brand name generation. The purpose of Pilot Study 2 was to develop novel brand names so that there could be no carryover of brand knowledge from known brands, but the brand names had to be believable, and equally important, comparable (i.e., neither was superior and therefore won preference just for the better brand name). Participants were presented with a list of possible brand names generated by another independent sample and asked to choose the five names they preferred the most, ranking them in order of preference. The names UV Amour and UV Protect were the most preferred for the sun protection products and the names Freedom Fones and Air Fones were the most preferred for the wireless earphones. Internal validity was a key concern and *similar* sounding names provide greater internal validity.

The Instrument

Concept Statements. The same product categories and basic product information were used for the concept statements in Experiment 2 as were used for the concept statements in Experiment 1. However, a new issue for Experiment 2 was that there were two brands in each product category which, for the purposes of internal validity had to exhibit *similarity*, yet avoid being perceived as exactly the same to enhance realism and avoid simple comparisons. That is, there had to be quality ambiguity so that one brand was not clearly superior and preferred. So, a key challenge was to design two different products which would be perceived as the same in the absence of entry order. The brands could not simply be different brand names stitched onto the otherwise same product statement, as respondents would detect that at the expense of the experiment's realism. To achieve this goal the brands exhibited subtle meaningless differences for certain attributes, enhancing differentiation, yet maintaining internal validity.

The fundamental concept of the innovation was used in the concept statements for the second brand (i.e., wireless earphones and 8-hour sun protection), but varied by subtle differences in other product attributes to enhance differentiation. One way to enhance meaningless differentiation was to include photos of each product so respondents could see they were in fact two different brands.

Pilot Study 3: brand similarity and establishing the follower's price levels. The main purpose of Pilot Study 3 was: 1) to empirically assess whether the two brands in each category were equally preferred in the absence of the pioneering effect, and 2) to assist in determining price level manipulations for the follower brands.

Respondents were first exposed to the emerging category and then simultaneously exposed to the full concept statements for the two brands within each category, complete with brand names, photos, and text. Respondents then answered questions on how similar the products were, using measures adapted from the literature (see Bijmolt et al., 1998, p. 254). Respondents were also asked their level of preference for the two brands at different prices, based on Monroe's (2003, p. 241) "Sequential Preferences Approach" for estimating demand. Mean perceived similarity (Sunscreens = 6.00; Earphones = 6.13) was not statistically different from 6 (highly similar) on the similarity scale (Sunscreens: $t(23) = 0.000$, $p = 1.000$; Earphones: $t(22) = 0.720$, $p = .479$), indicating concept statement equivalence between the different brands of the same product. Therefore, in Experiment 2, any difference in perceptions between brands is likely to have occurred because of the pioneership manipulation, rather than differences between brands.

The earlier study to determine price levels for the pioneer (Pilot Study 1) not only provided the penetration and skimming price, but also provides the "regular price" for the pioneer brands to

converge to in T_2. The results from the study indicate the "most acceptable price" for the sunscreen products to be around $15, and for the wireless earphones it was around $55.

This leads to the question of what discount from the regular price should follower brands use. The Sequential Preferences Approach to estimating demand of Pilot Study 3 provided experimental demand curves for the two brands at different price levels. The curves demonstrated flattening out at higher price differentials, indicating there was a point at which higher levels of price differential only evoked a marginal change in preference. For the sun protection products, these points were at around a ±26.7% price differential, and for the wireless earphones, at a ±27.2% price differential. Based on these results, the price levels for the follower's large discount was set at $39.99 (-27.3%) for the wireless earphones and $10.99 (-26.7%) for the sun protection products. The Sequential Preferences data was also used to establish the small discount manipulation. Small discounts of around 5% were sufficient in shifting preference from the pioneer to the follower, so the price level was set at around a 5% price differential — $51.99 (-5.5%) for the wireless earphones and $14.29 (-4.7%) for the sun protection products. Discounts were rounded for consistent price endings (Stiving & Winer, 1997).

Measurement. The same measures were used in Experiment 2 as were used in Experiment 1, with two additions. With the introduction of a follower brand into the product category, Experiment 2 involves explicit comparisons of two brands. Thus, because these price judgments are inherently comparative, a choice-based approach using a binary brand preference question is more realistic (Elrod, Louviere & Davey, 1992) and a more natural task. Finally, the category reference price was measured, adapted from the brand reference price measures, with the brand name in the brand reference price question replaced by the category name. As simple as this

measurement of category reference price is, it is the first direct measure of category reference price to the authors' knowledge. The only other category reference price measurement found was an indirect measure using scanner data (Briesch et al., 1997).

Experiment 2 Data Collection

The experiment was promoted in undergraduate and graduate marketing classes at a metropolitan university and was administered in the same way as Experiment 1. The sample size for Experiment 2 was 385, allocated evenly across experimental treatments.

Results, Analysis and Findings

Manipulation check. Independent samples t-tests revealed no difference in perceived innovativeness between each pair of pioneer brands for each product category (Earphones: $t(189)$ = 1.53, p = .128; Sunscreens: $t(191)$ = -1.16, p = .247).

Hypotheses 3a, 3b and 3c. These hypotheses involve simultaneous comparisons of the dependent variables by introductory pricing strategy and pioneer brand name. To control for Type I error, a MANOVA was used to distinguish differences in reference price, transaction value and purchase intention as a result of pioneer pricing strategy. The data for the wireless earphones did not deviate significantly from any of the MANOVA assumptions, so further multivariate testing was conducted using Wilks' Lambda (Hair, Black, Babin, Anderson & Tatham, 2006). The multivariate test for pioneer brand name (i.e., Freedom Fones or Air Fones) was not significant, so data across brand names was aggregated (Pioneer brand name: *Wilks' Lambda* = .997, p = .816) and, as expected, the multivariate test for pioneer pricing strategy was highly significant (Pioneer pricing strategy: *Wilks' Lambda* = .999, p = .981). The results were repeated for the sun protection data with a significant effect for pioneer pricing strategy (Pioneer pricing strategy: *Wilks' Lambda* = .930, p = .004). Again, the data for the sun protection products

were aggregated because of insignificant differences between the UV Armour and UV Protect brand names (Pioneer brand name: *Wilks' Lambda* = .997, *p* = .816).

As an extension to Hypothesis 1 and Hypothesis 2, Hypothesis 3a predicted that in T_2 the reference price for a pioneer would vary depending on the pioneer's initial price, *even though prices in T_2 are equal*. Mean reference prices by experimental condition are shown in Figure 3.

Figure 3 shows that even though prices are equal in T_2, reference price for a pioneer following a skimming strategy is still higher than reference price for a pioneer following a penetration strategy, and these differences are statistically significant based on the univariate tests from the MANOVA (Table 2). The results are consistent across the different product categories, providing strong support for Hypothesis 3a.

− Insert Figure 3 and Table 2 about here −

Hypothesis 3b predicted that in T_2, transaction value for a pioneer using a skimming strategy would be higher than transaction value for a pioneer using a penetration strategy, even though prices in T_2 are equal. This leads on directly from Hypothesis 3a if transaction value is a concurrently valid measure of the difference between reference price and actual price. Mean transaction value by treatment is shown in Figure 4.

Figure 4 shows that even though prices are equal in T_2, transaction value for a pioneer using a skimming strategy is still higher than transaction value for a pioneer using a penetration strategy.[3] The univariate tests from the MANOVA (Table 3) are statistically significant, confirming this difference for both product categories and providing strong support for Hypothesis 3b.

− Insert Figure 4 and Table 3 about here −

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[3] For transaction value, lower numbers indicate higher value.

For Hypothesis 3c, mean purchase intention by experimental condition is shown in Figure 5. Even though prices are equal in T_2, purchase intention for a pioneer using a skimming strategy is still higher than purchase intention for a pioneer using a penetration strategy. Differences in means were statistically tested in the MANOVA, shown in Table 4.

− Insert Figure 5 and Table 4 about here −

The F-tests are statistically significant for the wireless earphones data, supporting Hypothesis 3c, but for the sun protection data, despite a difference in means, this difference is small and is not statistically significant. Therefore, there is strong support for the wireless earphones and partial support for the sun protection data. In summary, there is strong support for Hypotheses 3a and 3b and partial support for Hypothesis 3c.

Hypothesis 4. Hypothesis 4 examines the extent of the pioneer's advantage. Within the experimental design, the pioneer was always priced higher than the follower. Thus Hypothesis 4 stated: "A substantial proportion of respondents will prefer the pioneer brand even though the follower is always at a discount to the pioneer." This behavioral advantage is analyzed based on the dichotomous brand preference question. Given these brands were perceived to be the same and equally preferred in the pilot studies, if there were no pioneer advantage effects then all respondents should prefer the follower all of the time. The results show a strong pioneer advantage effect for the wireless earphones data – 36% of respondents favored the pioneer *even though the follower was always cheaper*. For the sun protection products pioneer advantage was stronger, with 50% of respondents preferring the pioneer to the cheaper follower.[4] Although the word "substantial" in the hypothesis is subjective, the results show pioneer advantage was

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[4] Counterbalancing picked up the possibility of naming effects. Further Chi-square analysis was conducted using brand name as a variable. As with the MANOVA results, the findings for both categories were robust and no significant differences emerged when one brand was the pioneer and the other was the follower.

strong, which allows further hypothesis testing. Chi-square tests confirm these results are significantly different at p<.0000 for both categories.

Hypothesis 5. Hypothesis 5 examines the strength of the pioneer's price in influencing reference price perceptions relative to the follower's price. If the pioneer is prototypical and sufficiently strong as an anchor for consumers to judge expensiveness, then the pioneer's price should be used by consumers to establish reference price perceptions for other brands. Hypothesis 5 states: "The pioneer's price plays a greater role in establishing the reference price in T_2 than the follower's price." Given that multiple reference prices were measured in the experiment, the analysis proceeds by comparing the relative influence of the pioneer's pricing strategy with the follower's pricing strategy on each of the three dependent measures in T_2 (i.e., the pioneer's, the follower's, and the category reference price), using a MANOVA. The data for the wireless earphones and the sun protection did not deviate from any of the assumptions underlying the MANOVA procedure so further multivariate testing was conducted using Wilks' Lambda.

– Insert Table 5 about here –

The multivariate tests for the wireless earphones data were statistically significant for pioneer pricing strategy and follower pricing strategy (Pioneer pricing strategy: *Wilk's Lambda* = .811, *p* = .000; Follower pricing strategy: *Wilks' Lambda* = .908, *p* = .001). Results were similar for the sun protection data (Pioneer pricing strategy: *Wilks' Lambda* = .943, *p* = .015; Follower pricing strategy: *Wilks' Lambda* = .946, *p* = .019), suggesting further univariate testing by each of the dependent variables.

By examining the univariate tests the impact of each independent variable on each of the dependent variables can be examined. For the wireless earphones the results suggest that pioneer

pricing strategy has a strong and significant effect upon pioneer reference price ($F(1, 179)$= 40.943; $p = .000$), as expected, and also on follower reference price ($F(1, 179) = 11.754$; $p = .001$) and category reference price ($F(1, 179) = 16.408$; $p = .000$). When the impact of follower pricing strategy on reference price perceptions is examined, as expected, there is a significant impact upon the follower's reference price ($F(1, 179) = 13.177$; $p = .000$), but there is no impact upon the pioneer's reference price ($F(1, 179) = 0.194$; $p = .660$) and the category reference price ($F(1, 179) = 2.269$; $p = .134$).

For the sun protection data, the results follow the same pattern. Pioneer pricing strategy has a strong and significant effect upon pioneer reference price ($F(1, 182) = 10.675$; $p = .001$), follower reference price ($F(1, 182) = 5.361$; $p = .002$) and category reference price ($F(1, 182) = 5.499$; $p = .020$). Yet follower pricing strategy only has a strong influence on follower reference price perceptions ($F(1, 182) = 9.881$; $p = .002$), and does not have an influence on pioneer reference price perceptions ($F(1, 182) = 2.745$; $p = .099$) and category reference price perceptions ($F(1, 182) = 3.446$; $p = .065$). Across both categories these results provide strong support for Hypothesis 5, showing that the pioneer has a significant and systematic influence on reference price perceptions in new product categories.

Hypothesis 6. To analyze Hypothesis 6 a series of correlations were run using either the pioneer's reference price term (i.e., $P_{r\ (pioneer)}$-P) or the follower's reference price term (i.e., $P_{r\ (follower)}$-P) and purchase intention for each brand. For instance, row 1 in Table 6 shows the relationship between "Pioneer Reference Price – Pioneer Price" and "Purchase Intention for the Pioneer", whereas row 2 shows the relationship between "Follower Reference Price – Pioneer Price" and "Purchase Intention for the Pioneer." Therefore, if P_r-P is positive, then this means higher purchase intention. Differences in correlations were then compared using Fisher's Z

transformation as outlined in Cohen and Cohen (1983, p. 53). Fisher's Z transformation converts the correlation coefficients to a normally distributed Z statistic and then tests the difference between these Z statistics using a standard t-test procedure[5].

– Insert Table 6 about here –

For the wireless earphones, the correlations show that pioneer reference price is a better predictor of purchase intention for the pioneer than follower reference price, as was expected (i.e., $corr_{pioneer}$ = .553, p = .000 versus $corr_{follower}$ = .485, p = .000). However, the difference is not statistically significant using Fisher's Z-transformation (i.e., p = .369). Likewise, the follower's reference price is a better predictor of purchase intentions for the follower than the pioneer's reference price (i.e., $corr_{pioneer}$ = .403, p = .000 versus $corr_{follower}$ = .522, p = .000), though the difference is marginal and is not statistically significant (i.e., p = .143). Clearly the pioneer's reference price is a useful predictor of purchase intention for the pioneer *and* the follower, but Hypothesis 6 is not statistically supported for the earphones data. For the sun protection data the pioneer's reference price term is a better predictor of purchase intention for the pioneer than the follower's reference price term, as would be expected (i.e., $corr_{pioneer}$ = .589, p = .000 versus $corr_{follower}$ = .347, p = .000), and this difference is statistically significant using Fisher's Z transformation (i.e., p = .002), providing support for Hypothesis 6. To predict purchase intention for the follower, both pioneer and follower reference price terms are strong predictors of purchase intention (i.e., $corr_{pioneer}$ = .308, p = .000 versus $corr_{follower}$ = .447, p = .000) and the follower reference price has a higher correlation, but this difference is not statistically significant (i.e., p = .113). Even though there is no statistical support for the difference in predictive ability

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[5] Where $Z = \frac{1}{2}\ln\left(\frac{1+\rho}{1-\rho}\right)$ and the differences are calculated by $z = \dfrac{(Z_1 - Z_2)}{\sqrt{\dfrac{1}{n_1 - 3} + \dfrac{1}{n_2 - 3}}}$

of follower purchase intentions, still the data shows that the pioneer's reference price has a strong and significant impact upon purchase intention for the follower. So there is some support for this hypothesis in both product categories, but the support is stronger for the sun protection data. It is important to note that both product categories clearly show a strong, significant effect for both reference price terms on purchase intention. These results reinforce current work in the reference price area by showing the importance of the reference price effect, but also demonstrate the difficulty of separating the subtle and distinct effect of each brand's reference price.

Hypothesis 7. Hypothesis 7 tests whether brand reference price is a better predictor of purchase intention than category reference price. To test this, the actual price was subtracted from either the pioneer's reference price or the category reference price to create a pioneer and category reference price term. These terms were then correlated with the purchase intention variable for the pioneer. Again these coefficients were compared using a Fisher's Z transformation. The results are shown in Table 7.

– Insert Table 7 about here –

Regardless of which reference price is examined the correlations are all strong and highly statistically significant, suggesting that brand reference price and category reference price are *both* good predictors of purchase intention for the pioneer. For the wireless earphones, the brand reference price term is marginally stronger than for the category reference price term. The sun protection data exhibits the same results. However, the Fisher's Z transformation does not exhibit any statistical difference between the brand and category reference prices for either category. Similar to Hypothesis 6, these results indicate the difficulty in separating and empirically distinguishing between different reference price measures, but also highlight the

robustness of reference price as a concept, illustrating that reference price measures are highly interrelated. Nevertheless, Hypothesis 7, which tests whether brand reference price is a significantly better predictor, is not supported.

GENERAL DISCUSSION

Experiment 1. Taken together, the findings from Hypothesis 1 and Hypothesis 2 suggest that value perceptions are not necessarily exogenous (i.e., some ratio of benefits to costs) and can, to a large extent, be defined by the price of the pioneer. This is particularly the case for the wireless earphones where consumers reported they had less knowledge about the category. Product category knowledge about earphones was significantly lower than product category knowledge about sunscreens at $p<.05$ measured using the multi-item scales in Cowley and Mitchell (2003). Reference price research suggests this to be the case for transaction value, which represents the surprise at seeing a product priced at lower or higher than it *should* be, but *not* for acquisition value, which reflects a products total worth to a consumer, and therefore something that ought to be fixed. Thus, pricing at the highest possible price within some reasonable limit will condition consumers to the product's worth. Pricing lower will lead them to negate the value of the product. This is an important finding, and provides strong support for a strategy of innovation and pioneership.

In cases where perceived knowledge about a category is high, marketers should distance themselves from the prior product generation to minimize potential knowledge carry-over effects. By doing this, it will be less likely that knowledge from the prior category will be transferred to knowledge about the new category, lending credence to the new price. This implies that vastly different packaging is needed, or that there should be differences in how the product is promoted.

Experiment 2. The findings of Hypothesis 3a, Hypothesis 3b, and Hypothesis 3c provide further evidence of the pioneer's ability to define value perceptions, because Experiment 2 was a robust test of Experiment 1. Once prices converged in T_2, the rational consumer should value these products equally. Yet Hypotheses 3a and 3b predict and find that they do not because prices in prior periods were different, framing consumer perceptions of value. Lower initial prices *erode* value perceptions whereas higher initial prices *substantiate* value perceptions. Consequently, penetration pricing strategies should be used with caution and not simply to lull consumers into a quick purchase unless there are other strategic reasons for such a pricing strategy (i.e., creating awareness, establishing a market etc.). Although penetration pricing may entice some consumers to purchase early, consumers who are aware but do not buy initially may be less favorably inclined in later time periods. To some degree this may negate the pioneer advantage of stronger learning if consumers learn something that may have negative consequences (i.e., forming a lower reference price).

Though robust across product categories, the findings for Hypothesis 3a and Hypothesis 3b are stronger for the wireless earphones than for the 8 hour sun protection, and Hypothesis 3c is supported by the wireless earphones data but not by the sun protection data. This may be because of different degrees of perceived innovativeness. Thus, in light of existing work that has examined the linkages between reference price, transaction value and purchase intentions (i.e., Grewal, Monroe and Krishnan, 1998), it may be that perceived innovativeness moderates the strength of these associations. Even though both products were clearly perceived to be innovative, given the nature of the two product categories under investigation, differences in perceived innovativeness may exist. For instance, the wireless earphones appear high tech because they rely on technology that is readily observable by consumers. However, with the sun

protection products, even though they may be just as *new*, they do not appear to be as high tech and may still be perceived to some degree as a conventional sunscreen. Future research might directly investigate the nature of the relationship between perceived innovativeness and the extent of the pioneer's impact upon reference price and value perceptions, and indeed perhaps the extent of its influence in shaping all ambiguous attributes.

Based on exposure to other brands and different prices, Hypothesis 3a showed that reference prices evolved in the direction of the price changes. This represents an important implication for new product pricing strategy, but also adds to the debate about the underlying form of the reference price that consumers use. Past operationalizations of reference price can be contradictory and it is unclear whether individuals average the price of several brands to form a reference price or whether they refer to the price of just one brand, such as the last price paid (i.e., Kalwani et al., 1990; Mayhew & Winer, 1992). These results provide evidence that consumers use an underlying averaging process to form a reference price, rather than relying *exclusively* on one brand (even a prototypical pioneering brand), though this average is weighted towards the prototypical brand.

For Hypothesis 5, the findings for the wireless earphones suggest that it does not seem to matter what the follower does — the pioneer's price always plays a greater role in establishing reference price perceptions, systematically biasing the formation of the reference price (except for the follower's brand-specific reference price). The pioneer's unique association with the category allows it to become the *strongest*, but not *only*, anchor for reference price perceptions. For Hypothesis 6, both pioneer and follower reference prices seem to predict purchase intentions for their respective brands equally well, suggesting that reference price utilization is a *brand-specific phenomenon*. This conclusion is partially supported by the results for Hypothesis 7,

which found that reference price effects might be slightly more brand specific than category specific, though this finding is not statistically significant. This is not to say that there is no category reference price, because this data shows that there is, but rather that brand reference price effects is at least as good and maybe slightly better. Thus, to analyze and predict preference for a brand at any particular time, the best reference price to use is one for that brand.

CONCLUSIONS

The experimental method offers a number of advantages over research methods typically used in prior reference price research, particularly in the new product context. However, external generalizability is limited to the products and sample used. As always, future research should examine the findings under different conditions. The specific psychological processes underlying reference price change would be interesting to examine and test. In particular, how do consumers form an average and what factors, other than the pioneer brand, systematically bias this average? How do consumers integrate prices from prior product generations to form a reference price for a new product? Some work in the new product learning literature has begun to analyze the analogical processes of internal knowledge transfer (i.e., Moreau, Lehmann & Markman, 2001). However, little is known about how consumers incorporate price information from prior categories and about the weighting processes that are used to form initial price perceptions. Research in this area would be useful and interesting.

This study extends a growing body of research by trying to understand reference price formation and evolution in new product contexts. Two important research streams in marketing – the reference price literature and the literature on pioneer brand advantage – were integrated to examine how reference prices are formed and how they evolve in new product categories. The

experiment found that the pioneer brand does appear to define the reference price. When the pioneer brand is at a high price, the reference price is strongly biased upwards, and when the pioneer brand is at a low price, the reference price is strongly biased downwards. This would favor a skimming strategy over a penetration strategy, all else equal. Furthermore, as this market emerges and evolves, the pioneer's reference price evolves. But when the pioneer's price starts high, the reference price is higher at the "regular price" than when the pioneer's price starts low. That is, even when the pioneer price is the same in a later time period, the reference price is not always the same and varies depending upon the initial price. This result also favored a skimming strategy. Even though a penetration price may win more initial sales, and many of those buyers may be satisfied with the brand, come replacement time they may be influenced against repurchase by perceptions of a lower transaction value when the price has risen, and those consumers who only saw the initial low price, but did not buy may not even try the pioneer which followed a penetration pricing strategy because of similar less favorable fair price perceptions. Penetration versus skimming price decisions are complex and specific to a particular product, but these are additional factors to consider. The study also found that reference price tends to be brand specific.

In sum, this study contributes by providing a model for the formation and evolution of reference price perceptions in new product categories. It found, as another pioneer advantage, that pioneers can form the reference price, and to some extent become the anchor by which reference prices evolve. It further found that value, a concept central to the marketing discipline, is not necessarily fixed and can, to some extent, be defined by the price that is initially set.

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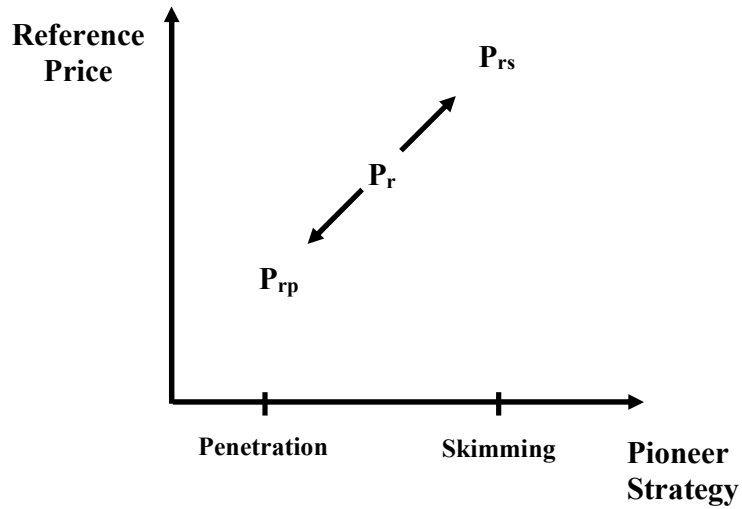
Figure 1. Mechanism for the formation of reference price in a new product category
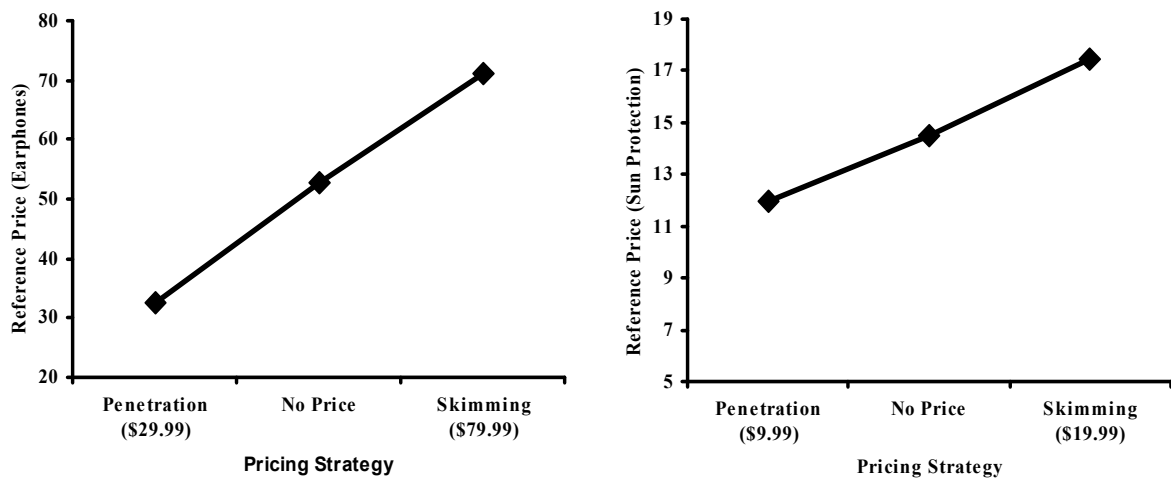

Figure 2. Mean reference price by experimental condition.

Table 1. Average Reference Price by Pricing Strategy

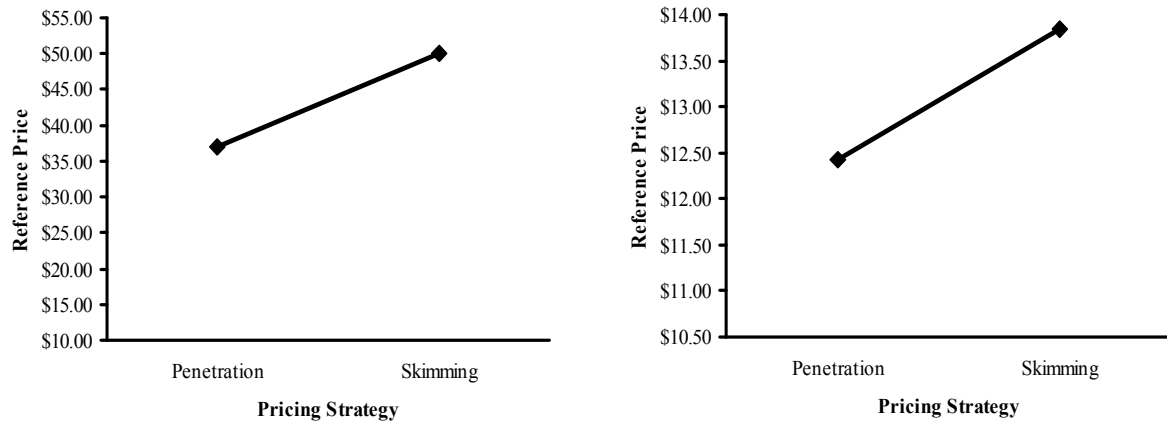|	Pricing Strategy	Pioneer's Price	N	Mean	Median
Wireless Earphones	**Penetration**	$29.99	32	$32.57	$30.00
	Skimming	$79.99	27	$71.23	$70.00
Sun Protection	**Penetration**	$9.99	32	$11.95	$10.00
	Skimming	$19.99	27	$17.48	$17.50

Figure 3. Mean reference price by pricing strategy

Table 2. Univariate Tests for Differences in Reference Price

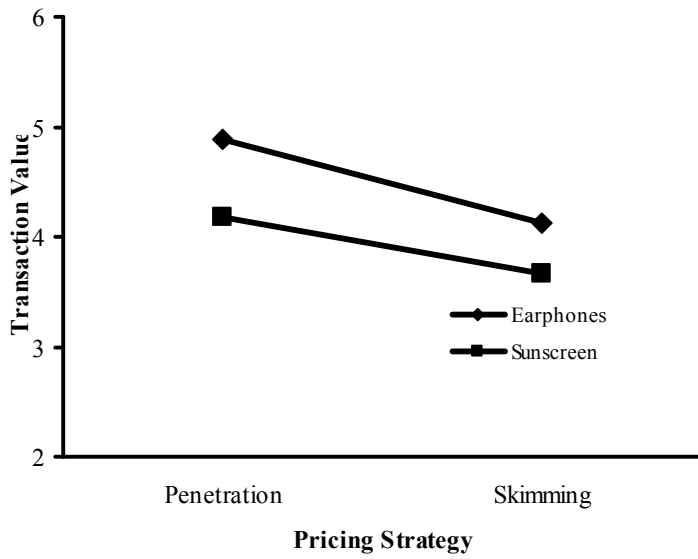|	Wireless Earphones		Sun Protection	
	Penetration	**Skimming**	**Penetration**	**Skimming**
Mean Reference Price	$37.04	$50.16	$12.43	13.84
SD	10.51	16.63	3.06	2.95
F-value (p)	41.77 (0.000)		10.45 (0.001)	

Figure 4. Mean transaction value by pricing strategy

Table 3. Univariate Tests for Differences in Transaction Value

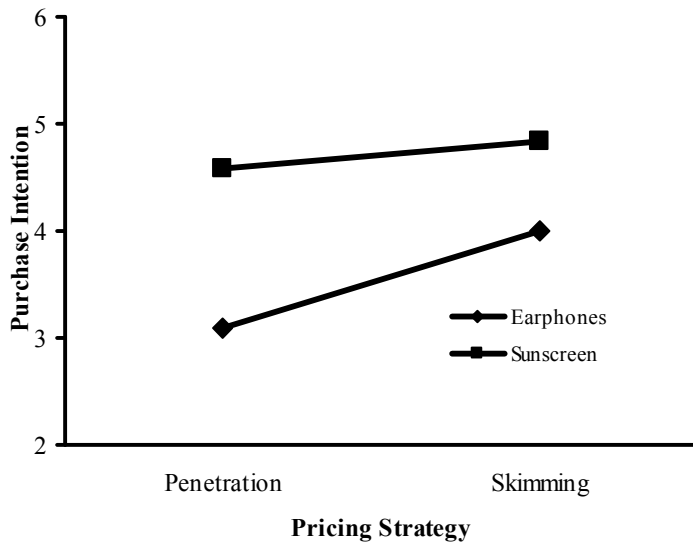|	Wireless Earphones		Sun Protection	
	Penetration	**Skimming**	**Penetration**	**Skimming**
Mean Transaction Value	4.88	4.12	4.18	3.66
SD	1.47	1.34	1.42	1.38
F-value (*p*)	13.60 (0.000)		6.47 (0.012)	

Figure 5. Mean purchase intention by pricing strategy.

Table 4. Univariate Tests for Differences in Purchase Intention

	Wireless Earphones		Sun Protection	
	Penetration	**Skimming**	**Penetration**	**Skimming**
Mean Purchase Intention	3.08	4.00	4.58	4.82
SD	1.79	1.78	1.71	1.76
F-value (*p*)	12.51 (0.001)		2.90 (0.328)	

Table 5. Relative Effect of Pioneer Pricing Strategy and Follower Pricing Strategy on Reference Price

		Wireless Earphones		Sun Protection	
Multivariate Tests		*Wilks'*	*p*	*Wilks'*	*p*
Pioneer strategy		0.811	0.000	0.943	0.015
Follower strategy		0.908	0.001	0.946	0.019
Brand name		0.993	0.737	0.999	0.973
Univariate Tests					
Independent	*Dependent*	*F*	*p*	*F*	*p*
Pioneer strategy	Pioneer P_r	40.943	0.000	10.675	0.001
	Follower P_r	11.754	0.001	5.361	0.002
	Category P_r	16.408	0.000	5.499	0.020
Follower strategy	Pioneer P_r	0.194	0.660	2.745	0.099
	Follower P_r	13.177	0.000	9.881	0.002
	Category P_r	2.269	0.134	3.446	0.065

Table 6. Relative Effect of the Pioneer's and Follower's Reference Price Term

	Relationship		Wireless Earphones			Sun Protection		
			Corr. (*p*)	n	Fisher's Z Transformation	Corr. (*p*)	n	Fisher's Z Transformation
1	P_{rpio}-P_{pio}	PI_{pio}	0.553 (.000)	190	.369	0.589 (.000)	193	.002
2	P_{rfol}-P_{pio}	PI_{pio}	0.485 (.000)	188		0.347 (.000)	192	
3	P_{rpio}-P_{fol}	PI_{fol}	0.403 (.000)	190	.143	0.308 (.000)	193	.113
4	P_{rfol}-P_{fol}	PI_{fol}	0.522 (.000)	189		0.447 (.000)	192	

Table 7. Relative Effect of Pioneer and Category Reference Price on Brand Preference

		Wireless Earphones		Sun Protection	
Relationship		Corr. (*p*)	n	Corr. (*p*)	n
Prpio-Ppio	**PIpio**	0.553 (0.000)	190 (0.000)	0.589 (0.000)	193 (0.000)
Prcat-Ppio	**PIpio**	0.534 (0.000)	186 (0.000)	0.479 (0.000)	193 (0.000)
Fisher's Z Transformation		0.795		0.132	