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The impact of brand credibility on consumer price sensitivity

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Abstract

Brands can affect various stages of consumer choice processes, and hence, various components of consumer utility functions. Previous conceptual and empirical work focused on the effects of brands on consumer perceptions of tangible and intangible product attributes. In this paper, we extend the work on brand effects with information economics underpinnings to analyze whether consumer price sensitivity, that is, the weight attached to price in a consumer valuation of a product's overall attractiveness or utility, is impacted by brand credibility. In other words, we investigate how the impact of product price on consumer utility is moderated by brand credibility. To explore the impact of brand credibility on consumer price sensitivity across categories that may involve different levels of consumer uncertainty, we conduct our analysis for four products: frozen concentrate juice, jeans, shampoo and personal computers. These categories vary in the degree of potential consumer uncertainty about product attributes, as well as in a number of other category-specific features that may affect consumer sensitivity to uncertainty. Our results indicate that brand credibility decreases price sensitivity. Our results also indicate that although the direction of the impact is the same, the magnitude of brand credibility's impact on consumer choices and price sensitivity vary across product categories, as a function of product category characteristics that affect potential consumer uncertainty and consumer sensitivity to such uncertainty.

Keywords: Brand equity; Brand choice models; Credibility; Information economics; Signaling theory

1. Introduction

Brands potentially play many roles in affecting consumer choice behavior. An important factor that underlies many of these roles is consumer uncertainty about product attributes and/or benefits. Consumer uncertainty about products arises from the condition of imperfect and asymmetric information that characterizes many product markets because firms are more informed about their own products than are consumers. In such environments, brands may play key roles in how consumers learn, encode and evaluate brand information (e.g. attributes). Brands may also influence consumer evaluations of the relative values of attributes/levels, attribute combination rules, perceptions of risk and information costs, consideration set formation and the decision rules used to make marketplace choices.

The stream of research on measurement and modeling the effects of brands on consumer utility using

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random utility choice models has focused on the impact of brands on consumer preferences and attribute perceptions. For example, Louviere and Johnson (1988) use conjoint analysis to measure brand effects, defined as differences in brand evaluations associated with measured and unmeasured attributes; Kamakura and Russell (1993) estimated the effects of brands on consumer utility from brand-specific constants in scanner panel brand choice models (after accounting for objective attributes). Similarly, Park and Srinivasan (1994) partitioned brand effects into attribute- and non-attribute-based utility components using choice models estimated from choice experiment data.

A separate stream of literature on brand valuation adopted the price premium approach as a valuation method, which involves calculating the profit premium and cash flows generated by a branded product relative to a non-branded product or a comparison set of branded products (see Barwise, Higson, Likierman, & Marsch, 1989, for a review). In addition, research on brand equity in marketing has linked brand values to the price premiums that consumers are willing to pay for established brands (see Aaker, 1996, for a review). Swait, Erdem, Louviere, and Dubelaar (1993) combined these two streams of literature to estimate consumer reservation prices that revealed the worth of brand names in designed choice experiments. They showed that brand reservation prices could be divided into three components: (1) intangible brand effects, (2) utility due to objective attributes and (3) utility due to perceptions of brand positions.

Thus, there has been great deal of attention devoted to capturing the effects of brands on consumer choice, as well as on the effects of the price premiums for strong brands, but there has been little systematic research into whether and how brands[3] affect consumer *price sensitivity* (i.e. the weight attached to price in a consumer valuation of a product's overall attractiveness or utility). In particular, price premium research only demonstrates that consumers are willing to pay a higher price for higher quality brands or brands with positive brand associations and the like. This suggests that if the non-price components of utility functions are highly positive for a brand, they should compensate for the disutility of higher prices (if a brand charges a higher price). Therefore, even if consumer price sensitivity is constant for all brands, one should observe that stronger brands command price premiums. Thus, while it may be obvious that stronger brands can charge higher prices, it is neither obvious nor well-established whether brands alter consumer price sensitivity per se, and if so, how this is accomplished. Indeed, the majority of empirical models estimated from scanner panel data assumed price sensitivity to be constant for all brands. The very few papers that allowed price coefficients to be brand-specific, on the other hand, have basically added a brand-specific subscript to the price coefficient, without providing an analysis of how such differences in price sensitivities may emerge. Hence, it seems fair to conclude that more research needs to be undertaken to investigate whether, and if so, how brands affect consumer price sensitivity. For example, many firms try to affect consumer price valuations by varying their marketing mix, which is well-documented in both economics and marketing in the literature on the effects of advertising and price promotions on price sensitivity (e.g. Eskin & Baron, 1977; Krishna, Currim, & Shoemaker, 1991; Mitra & Lynch, 1995). Thus, researchers have invested considerable effort to try to better understand the determinants of consumer price sensitivity because of its fundamental importance in informing and assisting firms and managers on product design, pricing strategy and brand equity management. However, despite a large literature on these topics, there has been little research into the effects of consumer uncertainty about brand or product attributes on price sensitivity, which is somewhat surprising given the central role of uncertainty in much of economic theory.

Thus, the primary purpose of this paper is to explore whether and how brands affect consumer price sensitivity when there is uncertainty about product attributes. In particular, we investigate the effects of *brand credibility* on consumer price sensitivity under uncertainty. That is, when imperfect and asymmetric information characterize a market, economic agents like consumers and firms may use *signals* (i.e., manipulable attributes or activities) to convey information about product characteristics (Spence, 1974). To be effective, such signals must be credible (Tirole, 1990); we define credibility as the believability of an entity's intentions

[3] A brand is defined as a name, term, sign, symbol or design, or a combination of them which is intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of competitors (Kotler, 1997, p. 443).

or claims at a particular time. Similarly, we define the credibility of a brand as a signal (i.e., brand credibility) to be the believability of the product position information contained in a brand (Erdem & Swait, 1998), which depends on a brand's willingness and ability to offer what it promises to consumers. The importance of credibility to the effectiveness of a brand as a signal of product positions (Wernerfelt, 1988; Rao & Ruekkert, 1994; Erdem & Swait, 1998) or of individual marketing mix elements as signals of quality, such as warranty (Boulding & Kirmani, 1993), price (Chu & Chu, 1994) and retailer choice (Davis, 1991), is well-established (see also the review in Kirmani & Rao, 2000).

A second objective of this paper is to investigate the extent to which the effects of brand credibility on price sensitivity differ across product categories. Specifically, we use four product categories to represent different degrees of potential uncertainty and sensitivity to such uncertainty (frozen concentrate juice, shampoo, jeans and personal computers). These categories vary in (1) the length of consumption history consumers need to perfectly evaluate product attributes or significantly reduce uncertainty, and (2) the extent of product and brand knowledge consumers can acquire purely from search activities to significantly reduce their uncertainty. The longer the consumption history a consumer needs, as well as the less a consumer can depend solely on search to evaluate a brand and verify its quality, ceteris paribus the more uncertainty a consumer should experience, which may affect the impact of credibility on consumer utility and price sensitivity. The four categories also differ on other dimensions, such as level of involvement, which may affect consumer sensitivity to such uncertainty. We expect product category characteristics that may affect consumer uncertainty and/or consumer sensitivity to uncertainty to affect consumer risk and information search behavior, which in turn may influence the impact of credibility on consumer choices. Finally, we expect the impact of brand credibility on consumer utility and price sensitivity to have a consumer-specific component, which we investigate by analyzing and modeling unobserved consumer heterogeneity in consumer tastes and price sensitivity, which were assumed homogeneous in much previous experimental work (e.g., Swait et al., 1993).

The remainder of the paper is organized as follows: the next section briefly reviews the relevant literature and discusses the conceptual foundations of our analysis; then we discuss the empirical analysis conducted and results obtained; we conclude with a discussion of our results and future implications.

2. Brand credibility and consumer price sensitivity

2.1. Brand credibility

As previously mentioned, we define brand credibility (i.e., the credibility of a brand as a signal) as the believability of the product position information contained in a brand, which entails "consistently delivering what is promised" (Erdem & Swait, 1998). Firms can use various individual marketing mix elements to signal product quality, such as charging higher prices, offering extended warranties or distributing via high-end channels. Such mix actions may or may not be credible depending on market conditions (e.g., competitive and consumer behavior), but the signal conveyed by a "brand" differs from other mix elements because a brand embodies and represents a firm's past and present marketing mix strategy, activities and brand investments (Klein & Leffler, 1981). Similarly, brand credibility differs from the credibility of individual marketing mix signals (e.g. advertising as a quality signal) because brand credibility represents the cumulative effect of the credibility of all previous marketing actions taken by that brand,[4] or as Kapferer (1997) put it, the "living memory of acts taken by a brand".

The concept of credibility has two main dimensions, namely trustworthiness and expertise. That is, to be

[4] The historical notion that credibility reflects the sum of past behaviors has often been referred to as "reputation" in the information economics literature (see Herbig & Milewicz, 1995, for a review). Similarly, the literature on corporate credibility in marketing asserts that corporate credibility refers to the extent to which consumers believe that a firm can deliver products that satisfy consumer needs and wants. This literature relates it to the reputation that the firm has achieved in the market place (Keller, 1998). Although the conceptual issues involved are very similar, note that corporate credibility and brand credibility are *not* the same. P&G has its corporate credibility, but Tide and Cheer, both P&G detergent brands, each have their own brand credibility. Obviously, firms can choose to use the corporate name to provide credibility to their individual brands. In this paper, we are focusing only on brand credibility, not on corporate credibility or on the interrelationship between corporate and brand credibility.

perceived as credible a brand needs to be perceived as willing and able to deliver what is promised. Trustworthiness implies that a brand is willing to deliver what is promised, while expertise implies that it is capable of delivering (Erdem & Swait, 1998). A brand may communicate an imperfectly observable product position through brand investments such as advertising, community involvement, product design and so forth. These investments represent expenditures that must be recouped from future sales. Hence, to the extent that sellers will lose their investments if product position information is not truthful, long-run future sales will suffer when true positions are revealed, which provides incentives for sellers who invest heavily in their brands to provide truthful product position information.

Thus, the more credible a brand's signal of its product positioning, the lower consumers' perceived risks and the less information gathering and processing costs consumers need to incur during decision making (Srinivasan & Ratchford, 1991; Shugan, 1980). Ceteris paribus, higher signal credibility also may increase consumer perceptions (or expectations) of quality insofar as consumers may infer that more credible brands are higher in quality than less credible brands (Wernerfelt, 1988). Finally, credible brands may increase consumers' quality perceptions (Aaker, 1991) because brand signals may affect the psychophysical process by which objective quality levels are transferred into perceived levels (Park & Srinivasan, 1994). Thus, two brands in the same "objective" quality-tier may be associated with different perceived quality levels due to different brand credibility levels. However, it is important to note that the impact of credibility on perceived quality does not necessarily imply that high credibility is associated only with high perceived quality; low to medium quality brands also can have high levels of brand credibility if they are truthful about their positioning. For example, the credibility of Suntrips (a discount travel agency) or K-Mart is not associated with high perceived quality, but instead with consistently delivering what they promise.

In short, brand credibility should increase expected utility by (1) increasing perceived quality and/or raising expected quality (ceteris paribus) and (2) decreasing perceived risk and information costs. Erdem (1998), Erdem and Swait (1998) and Montgomery and Wernerfelt (1992) investigated and verified these relationships empirically. It is also important to note that Erdem and Swait (1998) investigated and verified the importance of credibility in brand equity, but they did not incorporate brand prices in their analysis, did not integrate brands and prices into a choice modeling framework and did not investigate the generality of their findings across categories. Thus, the potential impact of brand credibility on price sensitivity, as well as whether and how category-specific factors moderate credibility's impact on consumer choices, have yet to be examined systematically.

2.2. Consumer price sensitivity under uncertainty

Marketing mix effects on consumer price sensitivity under uncertainty have been repeatedly investigated: some have argued that advertising leads to differentiation and lowers price sensitivity in brand choices (Comanor & Wilson, 1979), whereas others, such as Stigler (1961) and Nelson (1970, 1974), have suggested that advertising increases the size of consumers' consideration sets and leads to higher price sensitivity. Unfortunately, empirical tests of these relationships have yielded mixed results (see Kaul & Wittink, 1995, for a review), and to date, no researchers have examined the impact of brand credibility on price sensitivity.

As a starting point for our development, consider first that imperfect and asymmetric information leads to consumer uncertainty; this suggests that consumer price sensitivity may be a function of available information. For example, Tellis and Gaeth (1990) proposed that consumers tend to be price-seeking (implying under-weighting of price) or price-averse (implying over-weighting of price) as consumer uncertainty about product quality increases, which intimates that the availability of quality information should affect consumer price sensitivity. More specifically, if consumers are sensitive to uncertainty about brand attributes such as quality (e.g., when quality matters to consumers as proposed by Tellis (1987) and Tellis and Gaeth (1990), consumers will be more sensitive to quality uncertainty), uncertainty may reduce price sensitivity (i.e. price-seeking behavior). However, if consumers are not sensitive to uncertainty about brand attributes, uncertainty may increase price sensitivity (i.e. price-aversion behavior). This idea can be ex-

tended to all types of brands positioning (attribute) information, including horizontally differentiated product attributes (e.g., smoothness of peanut butter—some consumers may like it smoother, some may like it less smooth).

Thus, whenever there is uncertainty about any product attributes, this uncertainty may affect consumer price sensitivity. Furthermore, the effect of uncertainty on price sensitivity may be moderated by the sensitivity of consumers to uncertainty. Hence, product category specific factors that affect uncertainty levels, such as whether the product is a search or experience good, as well as factors that affect sensitivity to such uncertainty, such as involvement, are expected to affect the influence of brand credibility on consumer price sensitivity.

The following mechanisms constitute possible reasons why brand credibility should affect price sensitivity.

(1) Credibility may decrease perceived risk, which may affect price sensitivity. Under high levels of uncertainty about product attributes, consumers may want to minimize expenses or losses, which Kahneman and Tversky (1979) refer to as ''risk aversion''. Tellis and Gaeth (1990) suggest that under such circumstances, consumers should be more price-sensitive (i.e. if consumption outcomes are uncertain, consumers may derive greater disutility from a given price). By decreasing uncertainty and associated perceived risks, brand credibility may decrease sensitivity to price.

(2) Credibility may decrease information costs, which in turn may decrease price sensitivity due to cost reductions in information search and processing; that is, if consumers can save on ''information gathering and processing costs'', they may derive less disutility from a given price. For example, Lynch and Ariely (2000) found that although lowering the cost of price comparisons increased price sensitivity (holding the cost of search for quality constant), when the cost of search for quality information also was lowered, price sensitivity for wines purchased on-line decreased. Brands may indeed decrease the cost of search for quality and any other brand position information by providing credible information of this type (e.g., the ''McDonald's'' name and the ''Golden Arches'' logo provide a lot of information on the type and quality of meals offered, service, ambiance and the like at the fast food chain).

(3) As previously discussed, credibility may enhance expected and/or perceived quality, which may reduce price sensitivity. There are many examples of price premiums associated with higher perceived or expected quality brands or products (e.g. Aaker, 1991). This does not necessarily imply that higher perceived or expected quality is associated with lower price sensitivity, per se. However, consumers who are loyal to higher quality brands have been found to be less price-sensitive than consumers who are loyal to lower quality brands (Krishnamurthi, Mazumdar, & Raj, 1992). The latter finding does not necessarily imply a causal relationship between price sensitivity and (perceived) quality, but instead suggests that low price sensitivity may be associated with higher quality brands; in turn, this suggests either higher expected or perceived quality decreases price sensitivity, or less price-sensitive consumers are attracted to higher quality brands, or both.

Thus, for the reasons discussed above, we expect that the higher the brand credibility, the lower the price sensitivity, ceteris paribus. Indeed, Hendel and Izerri (1999) showed in an analytical model that if brands in durable goods markets differ in reliability, unreliable brands (i.e. low credibility brands) should exhibit steeper price declines under asymmetric information (which implies that brand credibility would decrease price sensitivity), but there has been no empirical test of their proposition.

It should be noted that all the mechanisms mentioned in points (1) to (3) above may lead to brand differentiation. Thus, like advertising, credibility may increase differentiation among brands (due to lower perceived risk and information costs and possible higher perceived or expected quality associated with brand credibility), and consequently, lower price sensitivity. However, any of these mechanisms (e.g., decreased risks and information costs) could increase consumers' willingness to pay higher prices because brand credibility increases even if the weight attached to a given price remains constant. The important question addressed by this paper is whether these mechanisms decrease the weight attached to price, which in turn should decrease the disutility of a given price. That is, do these mechanisms lower price sensitivity itself? More specifically, is the impact of price on consumer utility and choice moderated by brand signal credibility in such a way that as credibility

increases price sensitivity (the price utility weight) decreases? Not only is the answer to this question far from obvious, but, as previously noted, the overwhelming majority of choice models estimated from scanner panel data have assumed constant price sensitivity for all brands, although they allowed unobserved heterogeneity in consumer sensitivities.

Finally, some mechanisms may produce outcomes contrary to our expectations with respect to credibility's impact on price sensitivity. For example, if price functions as a quality signal, the availability of a credible brand (name) to signal the brand's position may reduce the use of price as a substitute for missing information. However, instead of being substitutes, brand and price signals may be complements, in which case brand credibility may enhance the credibility of price as a quality signal because price signals alone often are not credible (Tirole, 1990). Indeed, empirical evidence seems to suggest that if price signals quality, brand name information seems to strengthen the use of price as a signal (Brucks & Zeithaml, 1991).

2.3. Generalizing across product categories

In the empirical section of the paper, we test the hypothesis that brand credibility decreases consumers' sensitivity to the prices of frozen juice concentrates, shampoos, jeans and personal computers. The purpose of this cross-category analysis is to determine the generality of our conclusions and explore category-specific factors that might influence the effect of brand credibility on consumer choices and price sensitivity. As previously noted, the effect of brand credibility on consumer price sensitivity should be largely driven by its effects on perceived and expected quality, information costs and perceived risks. Thus, category-specific factors that influence the levels of consumer uncertainty and sensitivity to such uncertainty should affect consumer information search behavior, consumer risk preferences and the like, and therefore impact the degree to which brand credibility impacts price sensitivity.

The degree of imperfect observability of product attributes (Nelson, 1970) is a category-specific factor that directly relates to potential consumer uncertainty, and hence, also to information costs and perceived risks. The attributes of product categories, whether tangible or intangible, vary in degree of imperfect observability; however, it is fairly easy to rank many products according to relative attribute observability (tangible or intangible). For example, calorie content may be a search attribute for frozen juice concentrate, and the observability of the level of that attribute should be perfect if consumers expend (minimal) information costs to read and process information printed on containers. However, consumers can learn the taste of a juice only after trial, though a few trials (perhaps just one) should suffice to inform about taste, suggesting that taste is a short-term experience attribute. Similarly, a personal computer (PC) has search attributes (e.g. amount of memory) as well as attributes that consumers can learn only after repeated use (e.g. manufacturer service levels).

Some product characteristics may be imperfectly observable even after long usage histories. Such "credence" attributes (Darby & Karni, 1974) include aspects of reliability like "crash-proneness" (of an operating system) or even certain service dimensions (e.g. consumers learn about how helpful a PC company is after a computer problem develops with their PCs) that cannot be known without several incidents, which may require observation periods longer than the average purchase cycle of a PC. Thus, attributes of frozen juices and PCs vary in degrees of imperfect observability, but juices clearly are more nearly search/short-term experience goods, while PCs are more nearly experience/credence goods.

It should be noted that imperfect observability of product attributes has two components: (1) the less dependable pure search is for evaluating and verifying brand quality prior to use, the less perfectly verifiable, and hence, less observable, product attributes will be; and (2) the longer the consumption history needed to evaluate products with certainty (or at least with less uncertainty), the less observable product attributes will be (ceteris paribus). The need for longer consumption histories may be the result of the noisiness of consumption experiences (e.g., whether a detergent can remove stains depends on the types of stains) or the time it takes to experience or observe outcomes (some operating systems may rarely crash; negative consequences of shampoos may not be apparent until long use).

There are also category-specific factors that may influence sensitivity to uncertainty and, hence, impact both potential perceived risks and information cost

levels, as well as consumer risk preferences and sensitivity to information costs. For example, the potential for higher perceived risks and information costs should be greater in complex, high-involvement categories and/or in categories with larger brand variations in quality and price (ceteris paribus). On the other hand, sensitivity to information costs may be higher in low involvement product categories because consumers may prefer to use cues rather than collect information, even if the actual information gathering and processing costs are very low.

The preceding discussion leads us to suggest that the impact of credibility on consumer utilities and price sensitivities should be higher, all else equal: (1) the less one can rely on pure search to evaluate products; (2) the longer the consumption history needed to evaluate products; (3) the higher the potential perceived risks and potential information costs, and the more risk-averse consumers are (due to higher involvement, higher price levels, complexity of the product category, unfamiliarity with the product category, etc.); and (4) the lower the sensitivity to information costs (due to low involvement, low price levels, less complexity, more familiarity, etc.). Because it is less obvious, we note that our fourth point reflects the notion that sensitivity to information costs due to low involvement may motivate consumers to rely on cues to save on information costs, even if potential information costs are low.

3. Modeling and measurement

3.1. Choice model specification

In order to test our hypothesis that consumer price sensitivity is moderated by brand credibility, we first define a formal, testable model specification. More precisely, we propose a model of the utility of product i for individual n on choice occasion r based on the random utility theory approach to modeling consumer choice behavior (we suppress the index for choice occasion for the sake of clarity). This model can be written as follows:

$$U_{in} = \alpha_{in} + \gamma C_{in} + \lambda_{in}\ln(p_i) + \delta_n C_{in}\ln(p_i) + \varepsilon_{in}, \quad \forall i \in M, \tag{1}$$

where $\theta_n=(\alpha_{1n}, \ldots, \alpha_{Mn}, \gamma_n, \lambda_{1n}, \ldots, \lambda_{3n}, \delta_n)'$ is an individual-specific vector of parameters, C denotes brand credibility, p is price, ε_{in} is an error term (or random component) and M is a choice set. We express price in logarithmic form to allow for diminishing marginal effects of price with increases in price.

We should note that the main credibility (C) effect in Eq. (1) captures the impact of credibility on utility due to its impact on perceived quality, information costs and perceived risk. Indeed, Erdem and Swait (1998) have shown conceptually and empirically that credibility affects perceived quality, perceived risk and information costs, which in turn affect utility. The individual specific preference parameters (α_{in}) capture consumer tastes, as well as consumer perceived quality, information costs, and perceived risk effects that are not due to credibility.

The interaction of price and the brand credibility construct is the basis for the test of our central hypothesis. That is, if our hypothesis is approximately true empirically, we expect the coefficient of $C\ \ln(p_i)$ to be positive, implying that as brand credibility increases, respondents should be *less sensitive* to price.

However, we also expect consumers to differ in their average brand preferences and sensitivity to product attributes (i.e., their preferences are heterogeneous); hence, we can increase the efficiency of our estimates and test the hypothesis of interest more robustly by taking this into account. Thus, we assume that individuals' parameter vectors represent draws from a multivariate distribution whose parameters are to be estimated. Specifically, if the ε's in Eq. (1) are conditionally distributed Gumbel random variates with scale factor $\mu \equiv 1$, we can specify the corresponding choice probability for alternative $i \in M$ as follows:

$$P_{in} = \int_{\theta} \left(\frac{\exp(\theta X_{in})}{\sum_{j \in M} \exp(\theta X_{jn})} \right) f_{\theta}(\theta)\mathrm{d}\theta, \ \forall i \in M, \tag{2}$$

where $f_{\theta}(\theta)$ is the multivariate pdf for coefficient vector θ, defined previously. Eq. (2) is a Random Parameters Multinomial Logit (RPMNL). This model has recently attracted attention as an alternative to Multinomial Probit (MNP) and other complex choice models that capture taste heterogeneity (e.g. McFadden & Train, 2000; Revelt & Train, 1998; Brownstone & Train,

1999). Advantages of RPMNL over more complex specifications are that (1) it avoids the IIA property of MNL that results from MNL's IID error assumption, and (2) it is simpler to estimate than MNP.

Estimation of the parameters of Eq. (2) proceeded via simulated maximum likelihood using the log likelihood function

$$L(\Theta) = \sum_{n} \ln\left(\int_{\theta} \left(\prod_{t=1}^{R} P_{ni_t^*}(\theta) \right) f_{\theta}(\theta) \mathrm{d}\theta \right) \qquad (3)$$

where i_t^* refers to the chosen alternative at the tth choice replication. Thus, the estimation procedure explicitly recognized the repeated measures, sequential nature of the choice data obtained from respondents using our data collection procedure. We turn now to the topic of the data that we used to estimate the proposed RPMNL model and test our hypothesis.

3.2. Data collection method

In order to estimate the parameters of the RPMNL model and test the research hypothesis, we designed and implemented a survey to obtain two primary types of data germane to our research interests. Our research required:

1. data to measure (estimate) the credibility (C) construct for representative sets of brands in the four product categories. To do this, we employed the items shown in Table 1 and used Confirmatory Factor Analysis (CFA) to obtain construct estimates for credibility at the individual level in each of the four product classes;
2. consumer choices of brands in response to price manipulations to test the impact of brand credibility on price sensitivity.

We obtained data relevant to the above two research issues in the following way:

1. each subject rated all five brands in two of the four previously mentioned product categories on the items listed in Table 1, which allowed us to estimate the credibility construct by subject and brand; and
2. subjects completed a simple pricing choice experiment involving 17 choice sets, or scenarios, in each of two product categories.

In between the two tasks, we placed a simple distracter task that included 23 questions relating to the importance of personal values (e.g. individual freedom, friendship). The purpose of the distracter task was to minimize chances that the subjects would associate the two main tasks.

In order to limit respondents' task burden, six versions of the main survey were developed, one for each possible pair of the four product categories. We chose five brands in each category, as follows:

1. frozen concentrated juice — Dole, Minute Maid, Sunkist, Tropicana and Welsh's;
2. jeans — Calvin Klein, Gap, Lee, Levis, Wrangler's;
3. shampoo — Clairol, Herbal Essence, Pantene Pro-V, Pert Plus, Salon Selective; and
4. PC — Apple, Compaq, Dell, Gateway, IBM.

The four product categories were chosen because they were relevant to our subject population (university students), and they span a range of inherent consumer uncertainty and sensitivity to such uncertainty. Indeed, we pre-tested the degree of imperfect observability of attributes of the product categories with 31 subjects drawn from the study population, who were asked to evaluate how confident they would feel assessing new

Table 1
Items used for credibility construct

Item text[a]	Mean[b]	Standard deviation[b]	Skewness[b]
1. This brand delivers what it promises.	6.3	1.9	−0.4
2. This brand's product claims are believable.	6.2	2.1	3.3
3. This brand has a name you can trust.	6.4	2.1	−0.7
4. This brand reminds of someone who's competent and knows what he/she is doing.	5.5	2.7	8.0

[a] All items drawn from Erdem and Swait (1998). All are measured on 9-point agree/disagree scale.

[b] All statistics based on full sample of 4,299 brand-level observations.

products in 21 different product categories (1) before trial, (2) after one trial and (3) after a year of use, using 7-point agree/disagree scales. These results suggested that, as a group, the subjects viewed frozen juice concentrate more as a search good, jeans and shampoo as more short- to medium-term experience goods, and a PC as a longer-term experience/credence good.[5]

We constructed the category pricing experiments by treating each brand as a factor, and assigning each four levels of price to span the price ranges in the locations where data was collected. Specifically, we used an orthogonal main effects design from the 4^5 factorial to construct 16 choice sets, which Louviere and Woodworth (1983) showed was sufficient to estimate the choice models of interest in this paper (see also Louviere, Hensher, & Swait, 2000). This design yields one choice set with all brands priced at their lowest levels, so we added a 17th set with all brands priced at their highest levels to capture a pure category demand effect; we also included a "None of these" option in each set to allow respondents to opt out of the category entirely if they did not like the brands, the prices or both. Thus, subjects could choose one of the five brands at the prices offered, or select "None of these".

To permit interpretation of cross-category differences, we collected additional data from a supplementary sample to better interpret the choice modeling results to be discussed below. Two types of data were collected: (1) respondents evaluated the degree of confidence they felt in assessing a new product in each of the product categories before trial, after one trial and after one year of use, using 7-point agree/disagree scales (just as did our pre-test sample described beforehand); and (2) they associated statements with each category that described their familiarity with it, potential risks involved in the purchase, the type of benefits offered, their level of involvement, hedonistic aspects of purchasing in the category, and so forth (see Table 2 for the specific items employed). It should be noted here that the supplementary sample, independently collected from the pre-test sample, supports the classification of the products previously described.

Subjects in the pre-test ($n = 31$), main and supplementary ($n = 170$) surveys were undergraduate students at two major North American universities who received course credit for participation and were randomly assigned to each survey version. Final sample sizes for the main survey were, respectively, 221, 232, 217 and 198 for juice, jeans, shampoo and PCs. The main survey took approximately 35–40 minutes to complete.

3.3. Estimation results

3.3.1. Confirmatory Factor Analysis

We developed a simple CFA for each product category to describe variability in the credibility construct. The items used for each construct, validated by Erdem and Swait (1998), are given in Table 1, along with certain descriptive statistics of interest; note that 4299 observations at the brand level were available for the CFA. The product class-specific CFA models were estimated by maximum likelihood using the AMOS program and yielded a total χ^2 statistic of 9.82 with 4 degrees of freedom (see Table 3 for results), with a p-value of 0.044. Another measure of goodness-of-fit is the GFI of 0.999, indicating that the fit is quite high, which also is supported by the RMR and RMSEA measures. The reliabilities (or squared correlation coefficients between items and latent variables) for the items are generally high, with one exception: Item 4 in PCs, which has an SMC of 0.14. While the chi-squared statistic (just) formally rejects the proposed model, the literature suggests that the χ^2 statistic tends to improperly reject correct models when sample sizes exceed 200 (e.g. Long, 1983, p. 65; Hair, Anderson, Tatham, & Bkack, 1992; Fujii & Ryuichi, 2000); because (1) our data set contains almost 4300 observations and (2) the other fit measures are congruent with good model fit, we conclude that the CFA models presented in Table 3 fit the data quite well.

3.3.2. Choice model

Earlier we briefly described and discussed the functional form and specification of the RPMNL model. In the empirical work reported below, we assume that the random parameter distributions (applied to the brand constants, prices and credibility

[5] Obviously, PCs also have search attributes, such as the amount of RAM. The pre-test result that PCs are viewed more as a long-term experience/credence good compared to the other three categories undoubtedly reflects PC attributes such as crash-proneness, after-purchase service levels, ease of upgrading, complexity of choosing, etc.

Table 2
Item list and descriptive statistics for product category differentiation factors

Item	Percentage of sample associating item with product category			
	PC	Jeans	Shampoo	Juice
1. There's lots of information available about this product category.	79.3	19.4	41.5	12.2
2. Your choices in this product class would tell something about you.	63.1	54.3	42.9	9.0
3. If, after making a choice in this product class, it proves to be a poor one, I would be really upset.	74.2	27.6	20.7	8.1
4. Quality varies a lot between brands in this product class.	62.6	37.5	38.2	14.0
5. Whenever one chooses in this product category, one never really knows whether that is the one that should have been bought.	33.8	15.1	25.8	21.3
6. One can say that this product class interests me a lot.	59.1	36.6	28.1	7.7
7. I consider myself familiar with this product category.	54.5	41.8	47.5	19.9
8. My choices in this product class would give a glimpse of the type of man/woman I am.	47.5	50.9	42.4	6.3
9. I know how to get information about this product class when I want to make a choice.	77.3	33.6	35.5	22.2
10. It gives me pleasure to purchase in this product category.	52.5	48.7	24.9	10.4
11. A company in this product class must invest a lot in advertising to differentiate itself from other firms.	62.6	44.8	56.2	36.7
12. Making choices in this product category is rather complicated.	68.7	12.1	11.1	6.3
13. I attach great importance to this product class.	65.7	22.0	24.0	5.0
14. Talk about this product category leaves me totally indifferent.	12.1	15.9	23.0	45.7
15. When I face a choice in this product category, I always feel a bit at a loss to make my choice.	32.3	10.8	17.5	19.9
16. When one makes purchases in this product category, one is never certain of one's choice.	29.8	12.5	20.3	21.7
17. When you choose in this product category, it is not a big deal if you make a mistake.	9.1	25.9	46.1	62.4
18. Buying in this product category is like buying a gift for myself.	55.1	46.1	14.3	9.5
19. Most product features in this category are practical in nature.	52.5	25.9	41.9	30.3
20. Price varies a lot between brands in this product class.	62.6	46.6	36.9	9.5
21. When making choices in this product category, I am sensitive to how much I pay.	67.2	46.1	35.0	27.6

Items 2–3, 5, 6–8, 10, 12–18 were adapted from the Consumer Involvement Profiles Scale, (Laurent & Kapferer, 1985). Other items original to this research.

by price interaction) are multivariate normal (MVN) with diagonal covariance matrix (implying independence across distributions) for all parameters except the credibility by price interaction, in which case both the normal and lognormal distributions were tested. The hypothesis that the normal distribution is significantly different from the lognormal for this coefficient is approximately equal to 0.01 in all four cases, accord-

Table 3
Confirmatory factor analysis for credibility construct, by product class

	Juice	Jeans	Shampoo	Personal computers
Standardized loadings				
$C \rightarrow$ Item 1	0.77	0.81	0.79	0.81
$C \rightarrow$ Item 2	0.77	0.76	0.47	0.69
$C \rightarrow$ Item 3	0.69	0.67	0.61	0.75
$C \rightarrow$ Item 4	0.48	0.55	0.56	0.38
Correlations				
Item 3↔Item 4	0.12	0.29	0.14	0.17
Squared multiple correlations				
Item 1	0.59	0.66	0.62	0.66
Item 2	0.59	0.58	0.22	0.47
Item 3	0.48	0.45	0.37	0.56
Item 4	0.23	0.31	0.31	0.14
Latent scoring regression coefficients				
Item 1	0.211	0.228	0.297	0.266
Item 2	0.221	0.171	0.062	0.140
Item 3	0.127	0.091	0.105	0.155
Item 4	0.045	0.042	0.081	0.013
Number of observations	1089	1157	1079	974
Goodness-of-fit				
χ^2 (*df*) *p*	9.82 (4) 0.044			
GFI	0.999			
RMSEA	0.018			
(90% CI)	(0.003, 0.033)			
RMR	0.047			
Critical *N* (95%)	4153			

ing to the Ben-Akiva and Swait (1986) non-nested hypothesis test. Accordingly, we present only the results in which the coefficient of the credibility by price interaction has a lognormal distribution.[6]

The individual values of the credibility (*C*) construct were estimated from the latent score regression based on the CFA just described. As noted before, our hypothesis is that an *individual's* perception of a brand's credibility will decrease her price sensitivity. If we had simply used the construct directly from the CFA, we might have concluded incorrectly that our hypothesis was supported because the interaction term parameter captured differences between individuals, such that some individuals found all brand-based information credible, whereas others did not. Hence, to test the hypothesis more specifically, we center the *C* construct values about each individual's mean per category. Consequently, henceforth when we refer to credibility, we explicitly define it as the value of the construct mean-centered around each individual's mean construct value.

Parameters of the RPMNL model were estimated by Simulated Maximum Likelihood (SML, see Brownstone and Train, 1999) using log likelihood function (Eq. (3)) with 100 quasi-random Halton replicates for jeans, shampoo and PCs, and 200 replicates for juice. (The need for the increase in replicates for the juice category was determined empirically).

[6] The use of distributions other than the pure MVN is common in RPMNL models (see, e.g., Brownstone & Train, 1999; Revelt & Train, 1998; Train, 1998). The lognormal distribution is usefully applied when the support for a random variable is either the non-negative or non-positive segments of the real number line.

3.3.3. Empirical results

Table 4 contains the RPMNL model estimation results. The effects of C and price have the expected signs in the utility functions, and moreover, the estimated parameter values for the distribution of the interaction of price with credibility indicate that it is positive and significant. Thus, we reject the null hypothesis at the 95% confidence level, and conclude instead that *price sensitivity decreases as brand credibility increases* for all product categories and brands tested. Moreover, because the credibility construct values were mean-centered, decreases in price sensitivity were due to *within-person* variation in brand credibility, not *between-person* variation.

To understand what the model in Table 4 says about the impact of credibility on product utility, we introduce a measure we term the Value of Credibility (VOC), defined thus:

$$\mathrm{VOC}_{in} = \frac{\partial p_i}{\partial C_{in}} = \frac{\partial U_{in}}{\partial C_{in}} \left(\frac{\partial U_{in}}{\partial p_i} \right)^{-1} = p_i \left(\frac{\gamma_n + \delta_n \ln p_i}{\lambda_{in} + \delta_n C_{in}} \right). \quad (4)$$

The VOC measure is obtained by differentiating utility function (1) according to Eq. (4), which captures the marginal dollar value of a unit of the latent

Table 4
Random coefficients MNL models

	Juice		Jeans		Shampoo		Personal computers	
	Asymptotic t-statistics							
Mean parameters								
Brand 1	5.728	(21.84)	32.783	(30.98)	25.605	(21.26)	47.790	(12.68)
Brand 2	7.086	(31.58)	37.289	(48.01)	25.026	(35.45)	48.157	(28.19)
Brand 3	5.514	(25.43)	19.090	(13.86)	26.850	(35.97)	51.883	(27.87)
Brand 4	7.676	(37.29)	33.953	(39.87)	20.928	(21.04)	40.742	(20.97)
Brand 5	3.687	(11.71)	20.731	(6.93)	21.454	(25.73)	53.479	(28.20)
None	0		0		0		0	
C'_{in}	3.391	(28.91)	0.660	(5.65)	2.850	(31.41)	1.504	(18.47)
Ln(p_1)	−14.942	(−25.92)	−9.246	(−30.51)	−20.279	(−22.44)	−7.623	(−13.35)
Ln(p_2)	−15.066	(−32.27)	−10.271	(−46.57)	−17.925	(−35.20)	−6.884	(−27.90)
Ln(p_3)	−14.391	(−26.05)	−6.230	(−15.10)	−18.710	(−35.91)	−7.328	(−27.57)
Ln(p_4)	−15.904	(−35.47)	−9.632	(−40.34)	−16.260	(−22.38)	−5.824	(−20.52)
Ln(p_5)	−15.915	(−18.93)	−7.494	(−8.07)	−16.303	(−26.23)	−7.726	(−28.08)
Ln(*variance*) *of parameter distributions (independent normal variates)*								
Brand 1	2.844	(36.45)	2.491	(35.46)	1.823	(15.92)	2.731	(26.67)
Brand 2	2.886	(35.84)	2.039	(25.28)	2.338	(36.84)	1.254	(15.24)
Brand 3	2.096	(18.22)	1.741	(11.98)	2.559	(39.84)	1.254	(–)
Brand 4	2.441	(34.00)	2.145	(30.72)	0.803	(6.65)	0.488	(2.66)
Brand 5	3.180	(32.28)	2.925	(21.21)	1.889	(21.7)	1.297	(11.82)
Ln(p_i), $\forall i$	−2.863	(−2.40)	−1.916	(−25.36)	0.924	(19.22)	−4.373	(−30.96)
Ln(p_i) × C_{in} *lognormal distribution*								
Mean of Ln[Ln(p_i) × C'_{in}]	−1.708	(−2.75)	−1.834	(−9.5)	−4.435	(−3.83)	−3.331	(−13.40)
Ln(Var of Ln[Ln(p_i) × C'_{in}])	1.705	(5.33)	0.977	(6.66)	2.052	(4.77)	1.715	(13.47)
Goodness-of-fit								
Number of respondents	221		232		217		198	
Number of choices	3752		3940		3680		3354	
Log likelihood (random)	−6722.68		−7059.53		−6593.67		−6009.56	
Log likelihood (conv.)	−2613.92		−2792.77		−2727.49		−3092.22	
Number of parameters	19		19		19		18	
$\bar{\rho}^2$	0.6084		0.6017		0.5835		0.4825	

(1) All SML estimates based on $R = 100$ Halton quasi-random replicates except juice model, where $R = 200$.

credibility construct.[7] In Eq. (4) it can be seen that VOC is a multiple of the price of a brand, hence it has the desirable property that credibility is potentially more important for higher priced goods, all else equal. The different panels in Fig. 1 depict graphs of VOC for the four product categories against the price for an arbitrarily selected brand (the first in each product category—note that all substantive results discussed below hold for all brands used in the study). Although the graphs are drawn at the average price sensitivity for the particular brand, it should be noted that our model also describes an entire family of curves with different positive slopes. Fig. 1 also displays VOC for three levels of credibility for each product category (i.e. low, average and high mean-centered credibilities, respectively, -2, 0, $+2$ on the mean-centered estimated latent scales).

Fig. 1 suggests several conclusions about the impact of credibility on utility and price sensitivity.

(1) For a given level of credibility, the impact of C on utility increases with price, which is reasonable. Of course, this is determined by the positive slope of the VOC curves.

(2) For any given product category, holding price constant, the graphs also show that individuals who perceive a brand to have low credibility are more adversely impacted than individuals who perceive it as average in credibility: the latter individuals, in turn, are more adversely impacted than those who believe the brand is highly credible. Fig. 1 shows this through the vertical separation of the low, average and high credibility curves within each product category (in these graphs, low credibility is represented by a value of -2 in the centered construct, average credibility is 0, and high credibility is $+2$).

(3) Between product categories, the absolute impact of credibility on utility is most striking in PCs, followed in rank order by jeans, juice and shampoo. This can be seen in Fig. 1 by comparing the change in VOC between the low and high credibility curves across product categories. The maximum absolute difference in VOC between low and high credibility levels is

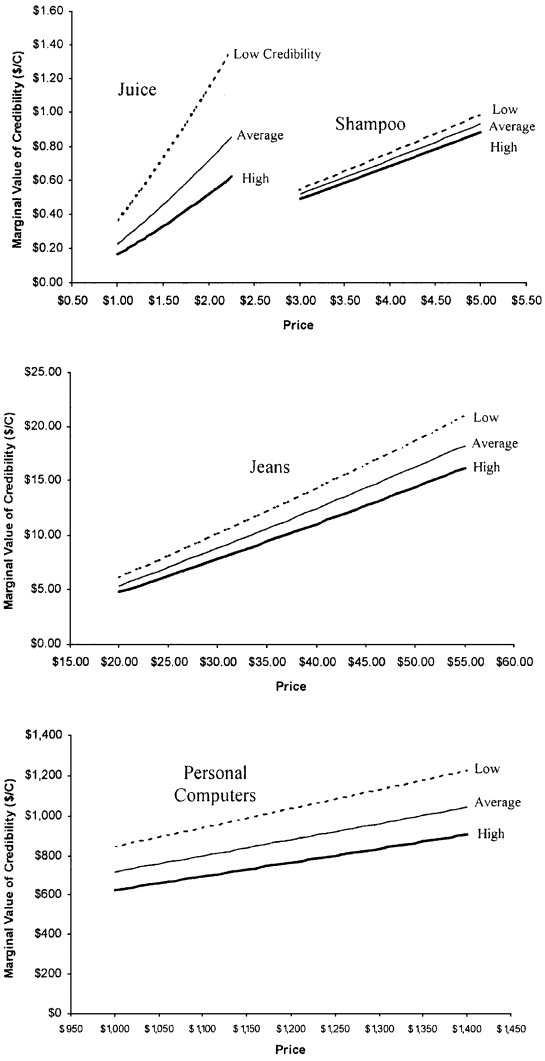

Fig. 1. Estimated value of credibility for all product categories.

US$322 for PCs, US$4.86 for jeans, US$0.76 for juice and US$0.11 for shampoo (for the particular situation shown in the graph).

(4) Note that for each product category, the rate of change of VOC is highest among low credibility individuals, lower for those ascribing average credibility to the brand, and lowest for people who think the brand is highly credible. This can be seen in Fig. 1 by observing that the slopes of low credibility curves are greater than those of average credibility curves, which in turn are greater than those of the high credibility condition. While visually the impact is

[7] VOC is similar in interpretation to the concept of the "value of time" in transportation demand, which is used to describe the worth of travel and wait time to transport users, often as a function of the hourly wage. It is one of the pillars for benefit–cost analyses evaluating proposed changes to the transport system.

most striking for the juice category, this relationship holds for all categories tested.

(5) Price changes cause the largest impact in PCs, juices, jeans, and finally, shampoo. This is visible in Fig. 1 via the estimated slopes of the VOC curves: the slopes are highest in PCs (1.40 VOC/US$ for high credibility to 1.90 VOC/US$ for low credibility), then in juice (0.37 VOC/US$ to 0.81 VOC/US$), jeans (0.33 VOC/US$ to 0.43 VOC/US$) and shampoo (0.20 VOC/US$ to 0.22 VOC/US$).

In short, credibility affects price sensitivity, as well as overall utility directly, statistically and significantly in all categories studied, suggesting that our results generalize across categories. In regard to credibility's absolute impact on price sensitivity, the effect is largest for PCs, followed by jeans, then juice and shampoo. In terms of rate of change of VOC with respect to price, however, this ordering changes to PCs, juice, jeans and shampoo.

Thus, overall, these results are consistent with the expectations we described in Section 2.3, to wit, that credibility's impact on price sensitivity and on overall utility should increase in consumer potential uncertainty, ceteris paribus. Recall that our pre-tests suggested that PC was perceived as a credence/long-term experience good and juice as a relatively short-term experience/search good, whereas jeans and shampoo were in the middle of this continuum. Since this continuum with respect to the imperfect observability of product attributes determines uncertainty levels, our empirical results are largely consistent with our expectations.

However, the varying degrees of credibility's impact on price sensitivity and overall utility, as well as our finding that credibility's absolute impact on price sensitivity is greater in juice than in shampoo, suggests the need for further cross-category analysis. As mentioned before, we collected data from a supplementary sample to better interpret the results above. These data are presented in the form of two maps discussed below, which serve only to summarize succinctly and visualize the insights afforded by the supplementary data.

Using the supplementary data on the degree of confidence in evaluating a new product in a category before trying it (Before), after trying it once (Once) and after using it for one year (Year), Fig. 2 positions the four categories on a 2D-map based on scores calculated from the ratings provided by the respondents. Specifically, the horizontal axis score (D1) is defined as score [−Before], while the vertical axis score (D2) is defined as [−(Once + Year)]. The rationale behind these formulae are that D1 attempts to distinguish between search and non-search goods, whereas D2 attempts to distinguish more experiential goods from the credence goods, among non-search categories. The size of each circle in the graph is proportional to the amount of sample variability in the scores.

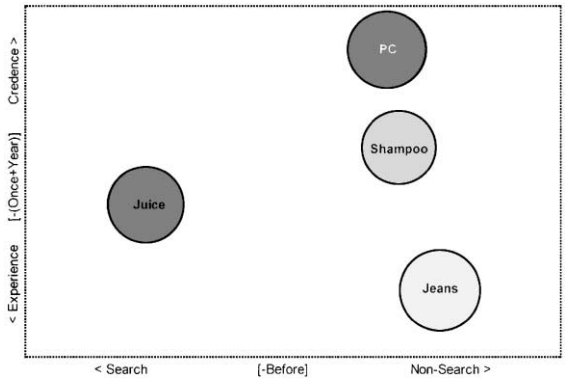

Fig. 2. Evaluation confidence map.

Fig. 2 suggests that for this sample of students, juice distinguishes itself from the other product categories as more of a search good. Among the non-search goods, PCs tended to score highest on the vertical dimension, suggesting that this sample believes that PCs require the longest time to be evaluated with confidence, which is consistent with PCs being considered more of a long-term experience, or even a credence good. Fig. 2 shows that jeans require the least time to evaluate among non-search goods; shampoo lies between jeans and PCs, perhaps because respondents believe that they need more time to decide if there are any adverse side-effects from using the product.

We expected the impact of credibility to be larger the longer it takes to evaluate the product and the less one is able to depend on search in that category to eliminate uncertainty about product attributes. Fig. 1 shows that the choice modeling results indicate that the absolute impact of credibility is greatest in PCs, followed by jeans, then juice, and finally, shampoo. Fig. 2 shows that juice is the closest to being a search good compared to PC, shampoo and jeans, which is consistent with our pre-test results that we dis-

cussed earlier. Fig. 2 also supports our expectation that the product attributes of PCs are relatively more imperfectly observable and verifiable. Furthermore, although jeans is perceived to take the least time to evaluate among non-search goods (see Fig. 2), jeans are also perceived as being the category where consumers can get the least information prior to purchase. Our modeling results suggest that credibility's impact on price sensitivity is greater for jeans than for juice, which is consistent with the view that jeans are more of an experience good. The shampoo product category, which showed the smallest (though still significant) impacts of credibility on price sensitivity, is perceived to be closer to PCs than jeans in terms of the vertical axis. This suggests that although the jeans category is less a search good than shampoo (please refer to the horizontal axis in Fig. 2), consumption experience provides more reliable information in jeans than shampoo.

Although Fig. 2 provides overall support for our expectations, it does not explain why the shampoo category, where less information can be obtained prior to purchase relative to juice and where consumers require relatively longer consumption histories relative to juice to evaluate the product attributes, is subject to smaller credibility effects than juice category. To shed further light on this and on various other factors that may affect consumer uncertainty and sensitivity to uncertainty, we produced a second map (Fig. 3) that positions the categories of interest on other factors that were expected to influence credibility's impact on price sensitivity. The 21 items used to capture these various factors are listed in Table 2, along with descriptive statistics. These items were either developed by us for this research project, or were borrowed from the Consumer Involvement Profile Scales of Laurent and Kapferer (1985) as indicated in the table. The items covered topics like

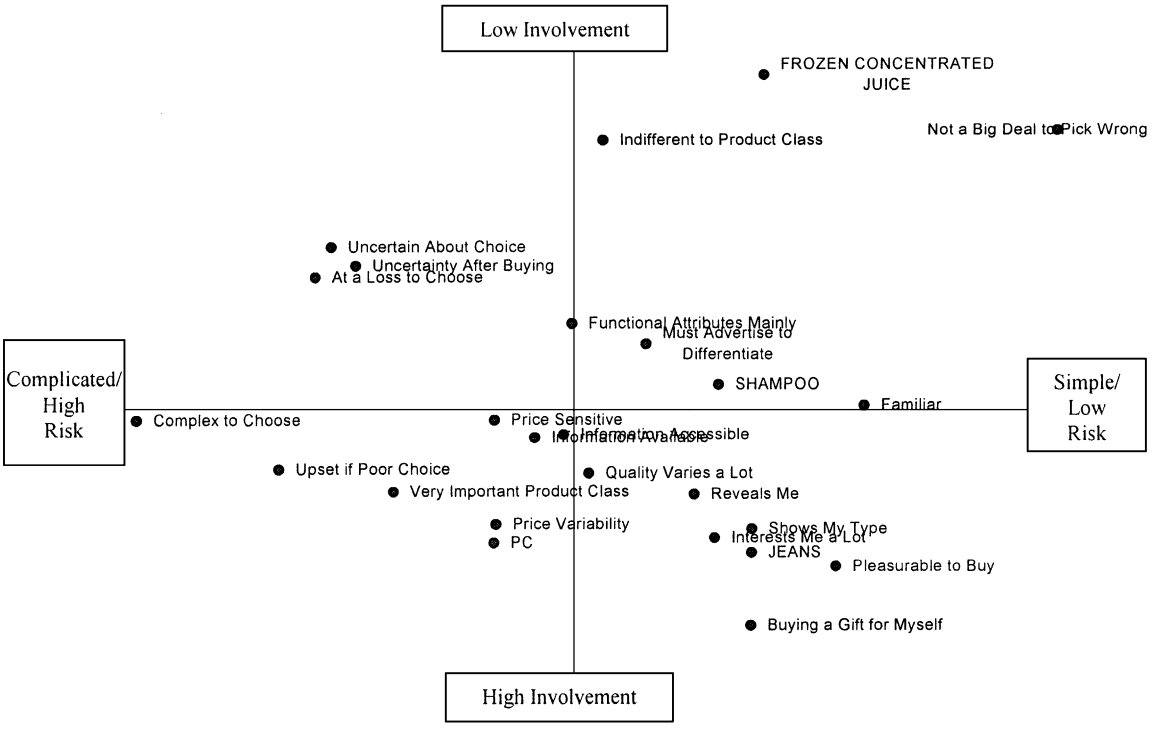

Fig. 3. Product categorization correspondence analysis map.

product category familiarity, potential risks involved in purchase, types of benefits offered, consumer involvement levels, hedonistic aspects of purchasing in the category, and so forth. The data associated with the item responses are discrete because respondents either did or did not associate each item with each product category, so we used Correspondence Analysis (CA) to produce a descriptive map (e.g. see Kaciak & Louviere, 1990; Swait et al., 1993, for similar applications of CA). The map in Fig. 3 displays both product category and item locations (the first two CA dimensions account for 82% of the variation in the data, suggesting that differences between products and/or items are small for higher-order dimensions). Individual item map locations lead us to suggest that the horizontal axis depicts complicated/high risk vs. simple/low risk; this interpretation is supported by noting that an arrow drawn from the origin to item 12 (''Making choices in this product category is rather complicated'') would be the longest arrow, closest to the horizontal axis. We interpret the vertical axis as low vs. high involvement, which is supported by the position of item 14 (''Talk about this category leaves me totally indifferent''), located almost on the vertical axis and farthest away from the origin.

Turning our attention to the product category locations in Fig. 3, PCs seem to be perceived as the most complicated/high risk category. Shampoo and jeans are very similar on that dimension, while juice is the least complicated/risky product category. In terms of involvement, PCs and jeans are higher involvement goods than shampoo and juice (the lowest involvement category).

The higher impact of credibility on price sensitivity in PC and jeans relative to juice and shampoo can be explained by the former two categories being perceived as more complicated/risky and higher involvement than the latter two. The result that PCs seem to have the highest impact of credibility on price sensitivity is explained in Fig. 3 by the strong association that the category has with items indicating that the product category is important, that respondents would be upset if a poor choice were made, and that there is a perception of high price variability in the product category: these combine to indicate a high degree of uncertainty in making a choice between PCs, hence credibility plays a correspondingly larger role than in other product categories. Jeans has the second largest impact of credibility on price sensitivity, and is perceived as being less risky than PCs. However, the decision of which jeans to purchase is perceived to be just as highly involving as choosing PCs, which are far more expensive, although the reasons for the level of involvement seem different than for PCs. That is, respondents perceive that jeans say something about them to others (''reveals me'', ''shows my type''), besides being interesting to them and ''pleasurable to buy''. More than other categories, jeans are associated with symbolic/experiential and hedonistic attributes (''buying a gift for myself'', ''pleasurable to buy''), and hence there may be high perceived risks associated with jeans, leading to a stronger impact of credibility on price sensitivity.

The juice and shampoo product categories were found to have statistically significant impacts of credibility on price sensitivity, though much smaller than for the other two product categories. This seems consistent with Fig. 3, in which juice and shampoo generally are perceived to be lower in risk than PCs and lower in involvement than both PCs and jeans. Additionally, note that although shampoo is associated with somewhat higher risk than juice in terms of consequences of a bad choice, subjects seem to be much more familiar with shampoo than with juice, and their involvement with juice is far lower than that of shampoo. These factors may explain why credibility's impact on utility and price sensitivity was found to be similar for juice and shampoo (even somewhat smaller for shampoo than juice), despite juice being considered more of a search good than shampoo. According to Fig. 3, as a group, these undergraduate subjects were more familiar with the shampoo category and felt more comfortable choosing among shampoos than juices. Familiarity implies a lesser need for information search and less uncertainty, even though shampoo is more of an experience good than juice, thus leading to the observed result that credibility has more impact for juice than for shampoo. Also, their low involvement with the juice category may sensitize these consumers to information costs, leading them to greater reliance on brands as information sources to save on information costs, even if they are low, ceteris paribus. In segments in which juice purchases are more important (e.g. households with children), we would expect less sensitivity to information costs in juice than in the case

of students. Thus, the use of student subjects may have resulted in shampoo, an experience good, being subject to lower credibility effects than juice, a search/short-term experience good.

4. Discussion and conclusions

We argued in this paper that the impact of price on consumer utility may be moderated by brand credibility when there is consumer uncertainty about brands and asymmetric information in the market place. We used an information economics framework to guide the design of a price experiment and develop a choice model specification to test our hypothesis about the impact of credibility on consumer price sensitivity. Our empirical results strongly suggest that brand credibility moderates consumer price sensitivity under uncertainty.

We tested this hypothesis in four product categories that varied in regard to the imperfect observability of their attributes. We also investigated category-specific factors that might have affected the magnitude of the impact of brand credibility on the price sensitivity of our respondents: we found that the effects were larger in categories in which long consumption histories may be needed to evaluate products and most consumer uncertainty may not be reduced by simple external search. Our results also suggest that in high potential risk categories, in which case consumer purchase decisions may be quite complicated, as well as in higher involvement categories, the predicted effect was larger (ceteris paribus).

Standard microeconomic theory of choice behavior has underpinned the habit of choice modelers, both those working with revealed preference data (e.g. scanner panel data in marketing) as well as stated preference data from choice experiments, to specify generic price effects. Our results strongly suggest that more credible brands generate a number of consumer benefits that are then rewarded, as it were, by decreased price sensitivity. This consequently argues that analysts should consider using brand-specific price variables to capture this source of differentiated price sensitivity. The brand credibility scale developed by Erdem and Swait (1998) and used in our research can serve as the basis for specifying improved choice models, or certainly for creating segments wherein one would expect different levels of price sensitivity for given brands.

From the perspective of pricing policy, brand managers might wish to consider the likely implications of our findings for the intimate relationship between brand credibility and consumer price sensitivity. Pricing strategy should strive to reflect consumers' higher utility, as well as lower price sensitivity,

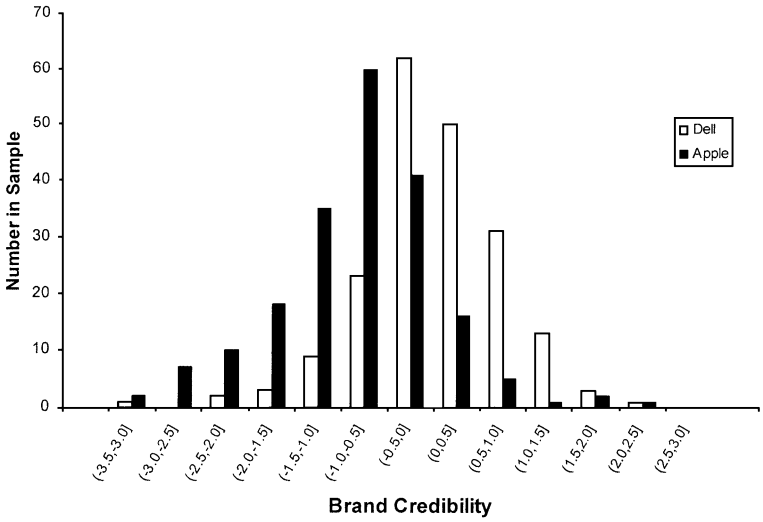

Fig. 4. Empirical credibility construct distributions for two brands in the PC category.

associated with the reductions in perceived risk and information costs that credible brands provide. In addition, brand managers should take brand credibility heterogeneity into account in their brand markets. Fig. 4 shows differences in sample distributions of the brand credibility construct for two PC brands (Apple and Dell). In this sample of undergraduate university students, Apple's brand credibility distribution was somewhat more dispersed than Dell's which was skewed towards the higher end of the scale. Based on our modeling results, the greater proportion of individuals with lower credibility perceptions for Apple than Dell will tend to make them significant-ly more price-sensitive to Apple prices than to Dell prices. Clearly, the type of information produced by our research approach would make it possible to quantify gains and losses and permit managers to make pricing decisions that take into account the value of brands to consumers.

Our findings regarding the effects of brand credibility on price sensitivity suggest that brand managers should be zealous about managing and protecting their brand's credibility levels. Brand management should include all aspects of credibility, such as consistency among all of a brand's marketing mix elements, consistency of a brand's marketing mix strategies over time, minimal changes to a brand's product quality levels, and/or careful consideration of the consequences of extensions to brands (see Erdem and Swait, 1998). In short, consistency should be a concern of every functional area of a business: if any one area is not in harmony with the overall program, there will be a loss of consistency, and hence loss of brand credibility and increased price sensitivity. Moreover, consistency should be regarded as an objective to be optimized by firms, and all functional area managers should be charged with the responsibility of insuring that all employees whose activities might impact customers understand the role(s) that they play in touching customers and helping to optimize consistency.

We see many future brand credibility research issues worthy of attention. For example, in this paper, we focused on product category factors that could affect the impact of brand credibility on price sensitivity. However, consumer characteristics also may determine the extent of this impact; for example, our empirical results suggest that the interaction between brand price and credibility is heterogeneous, which in turn suggests that it is likely to be associated with consumer-specific characteristics. Future research should seek to explain the causes of this identified source of stochastic heterogeneity. Last but not least, a very important avenue for future research would be to understand the evolution of consumer perceptions of brand credibility and its impact on price sensitivity over time. Cognitive psychological and information economics paradigms can be integrated to shed light on this process.

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