Why Do Consumers Buy Extended Service Contracts?

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We examine purchases of extended service contracts, which are essentially insurance products, for electronic products in a retail setting. The primary insurance purchase determinants are perceived probability of loss, extent of loss, risk aversion, and amount of insurance premium. We examine how product characteristics (hedonic/utilitarian, manufacturer's warranty) and retailer actions (promotions, feature advertising) influence the purchase of extended service contracts. We also investigate the impact of consumer characteristics (income, gender, and prior usage) on these insurance purchase determinants. To test the predictions, we use revealed preferences from panel data of electronic purchases across several product categories.

Examining how consumers make decisions under uncertainty is a fertile field of research in several domains. The purchase of extended service contracts (ESCs) provides an excellent opportunity to understand consumer behavior under uncertainty in a field setting. Extended service contracts, also referred to as extended warranties or extended service plans, are usually offered by retailers and sometimes offered by manufacturers to lengthen the coverage provided by the manufacturer's basic warranty. Technically, ESCs are insurance products that require consumers to pay premiums up front for protection against possible failures or problems in later periods. Usually the seller recommends the purchase of the ESC immediately after the consumer buys a product.

Since their introduction by large electronics stores in the late 1980s, ESCs have become a core product for many retailers. Their cost usually ranges between 10% and 50% of a product's original price (*Business Week* 2004). Typically ESCs are priced at a category-specific level based on product price tiers. For example, the ESC for televisions below $199.99 costs $39.99, whereas that for televisions priced between $200 and $499.99 would be $59.99, and so on. Therefore ESC prices vary across price tiers but not across products or brands within a tier. The terms typically last from 1 to 4 years, depending on the product category. Generating approximately $15 billion dollars annually for retailers (*Warranty Week* 2005), ESCs are extremely profitable. For example, even though they account for only 3%–4% of the revenue, in 2003 they contributed more than 50% of Best Buy's profit and almost 100% of Circuit City's profits (*Business Week* 2004). Some analysts estimate that the average margin for the ESCs is 50%–60%, or approximately 18 times the margin for regular products (*Business Week* 2004). Thus, selling service contracts has become a dominant profit growth strategy for retailers of durable products (*Business Week* 2005; *Warranty Week* 2005).

Although most consumer magazines and experts advocate consumers not buy ESCs because they provide little value, it is intriguing that the demand for ESCs remains high. Consumers justify the ESC purchases because the plans provide them with "peace of mind" (ABC News 2006). Given the financial stake that retailers have and the costs to consumers, understanding the factors that affect consumer purchase decisions of ESCs and whether the process can be influenced is both theoretically and substantively important.

Literature on ESCs is sparse. Early empirical studies investigated correlations between attitudes toward ESCs and demographics (Day and Fox 1985). More recent research mainly has used an analytical paradigm. The literature addresses the issue of why manufacturers should offer extended warranties (Padmanabhan and Rao 1993) and examines the conditions, such as proportion of heavy users or competition with third-party insurers, under which the ESCs are profitable (Lutz and Padmanabhan 1995; Pad-

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John Deighton served as editor and Tülin Erdem served as associate editor for this article.

Electronically published June 25, 2009

 ● Vol. 36 ● December 2009
 0093-5301/2009/3604-0014$10.00. DOI: 10.1086/605298

manabhan 1995). Although the stream of analytical research is rich, the mechanism(s) underlying consumer behavior regarding the purchase of insurance products such as ESCs in a retail environment are not well understood.

Insurance literature identifies the major determinants of purchase as being the probability of loss, the extent of loss, the insurance premium charged, and buyer's risk aversion (Mossin 1968; Padmanabhan and Rao 1993; Schlesinger 1999). These determinants have been shown to influence purchase of flood (Browne and Hoyt 2000), life (Hammond, Houston, and Melander 1967), and health (Cameron et al. 1988; Feldman et al. 1989) insurance. With very few exceptions, the empirical literature in insurance considers these determinants to be objective. From the consumer decision-making perspective, however, these determinants can be subjective. For example, different consumers may have very different perceptions of the probability that the same model of a TV will fail. Most insurance literature also assumes risk aversion to be consumer-specific rather than product- or context-specific. Our focus in this article is on understanding how the likelihood of ESC purchase can be influenced by product characteristics and the marketing actions taken by retailers. In addition, consumer characteristics can accentuate or attenuate the effect of these insurance purchase determinants. We examine how differences in consumer characteristics affect ESC purchases.

More specifically, first, we examine the product categories in which consumers purchase ESCs. We use the categorization of hedonic versus utilitarian products and investigate whether consumer purchase patterns differ based on this product characteristic. Furthermore, there is evidence in the literature that the product price and the length of a manufacturer's warranty coverage signal quality (Boulding and Kirmani 1993). We examine whether the coverage length increases consumers' ESC purchase likelihood. Second, we examine retail influences on perceptions of ESCs, because retail environments and retailer-controlled decisions may affect ESC sales. Retailers decide on price promotions and whether to advertise these promotions, and we investigate whether advertised and unadvertised promotions alter consumers' risk attitudes and hence their propensity to purchase ESCs. Third, we examine whether consumers with certain demographic variables (gender, income, and past experience of ESCs) are more likely to purchase ESCs. To test our predictions, we use panel data provided by the electronic department of a retailer on the consumer purchase histories of ESCs across several categories. Thus, we test our predictions using consumers' revealed preferences.

To the best of our knowledge, our study is the first attempt to examine the consumer's purchase of ESCs in a retail environment using field data. We thus depart from existing research in several important ways. First, in contrast to the empirical testing in the existing literature that aims to verify analytical models, we are interested in understanding consumer decision making under uncertainty and how ESC purchase propensities are influenced by product, retail, and consumer factors. Second, unlike prior survey-based research, which generally covers only one category (e.g., automobiles), we use purchase history data across several categories. Third, unlike most previous research, which relies on self-reported risk attitudes and objective loss probabilities, we infer these factors from consumers' revealed preferences. Fourth, whereas prior literature largely views the ESC purchase decision as exogenous and based primarily on consumers' inherent risk aversion and usage patterns, we demonstrate that marketing actions can influence purchase likelihood. Fifth, and finally, we provide interesting insights into why the ESC purchase process may differ across demographics (e.g., between high- and low-income consumers).

CONCEPTUAL DEVELOPMENT

Product Characteristics

Hedonic and Utilitarian Products. A robust finding in the insurance literature is that the relationship between the monetary value of an object and the likelihood of purchasing insurance is positive (Browne and Hoyt 2000). Therefore, given the same price of any two products and an equal probability of breakdown of the two products, consumers should be equally likely to insure both products. However, this argument does not take into account that equally priced products may be valued quite differently by consumers. Products are characterized by a combination of utilitarian and hedonic attributes (Dhar and Wertenbroch 2000; Okada 2005). Utilitarian products provide consumers with functional benefits that are useful, practical, and necessary, whereas hedonic products are associated with fantasy, fun, and pleasure. Dhar and Wertenbroch (2000) show that equivalently priced hedonic products are valued more than utilitarian products in forfeiture situations but that both are equally valued in acquisition decisions. This finding is qualified by Okada (2005), who shows that the purchase context affects the relative consumer valuations of hedonic and utilitarian products even in acquisition decisions. Specifically, where consumers evaluate products one at a time in acquisition decisions, hedonic items are valued higher than utilitarian items.

When purchasing durable products, consumers typically decide the category prior to visiting the store and then make their brand or model selection within the store. After the purchase decision, a salesperson suggests the purchase of the ESC. When deciding on the ESC purchase, the consumer must elaborate on the possibility of losing the product, which is a state that approximates the forfeiture situation. Dhar and Wertenbroch (2000) suggest that hedonic items are valued more than utilitarian products in forfeiture situations for two reasons. First, because the attributes of hedonic products are more sensory and image evoking, consumers are more likely to imagine and elaborate on them (MacInnis and Price 1987). Second, forfeiture scenarios prompt upward prefactual thinking that may cause consumers to minimize their emotional loss by valuing the hedonic items more (Sanna 1999).

Given the same price of a product, consumers are more likely to purchase a service contract for a product they

value more as compared with a product that is ascribed lower value. In a series of interesting experiments, Hsee and Kunreuther (2000) manipulate the emotional value of an identical object (e.g., a painting) by asking participants to imagine that they "fell in love" with the product. They find that, holding the level of expected compensation the same, people are more willing to purchase insurance for products for which they develop greater fondness. They argue that, when valuation increases due to higher affection for the product, the pain of loss is higher and the compensation from the insurance serves to provide a consolation for the loss. A related line of reasoning is that there are several instances of hedonic products, such as paintings, that are irreplaceable, but utilitarian products are usually replaceable. In the electronic categories that we examine, all products are replaceable. Even though the products are replaceable, because of their attachment and meaning, consumers may anticipate keeping hedonic products longer than utilitarian products.

Another set of arguments for why consumers are more likely to purchase ESCs for hedonic products is that, as compared with the purchase of utilitarian products, the purchase of hedonic goods is often seen as decadent and involving self-gratification, which can cause feelings of guilt (Khan, Dhar, and Wertenbroch 2005). Consumers then use coping mechanisms to reduce or minimize their feelings of guilt, such as finding reasons to support or justify the purchase. For example, consumers might consider the hedonic product a reward to themselves or they may categorize income they spend as obtained from a windfall (Strahilevitz and Myers 1998). The justification routes identified in the literature mainly address the reasoning that consumers use prior to their purchase decision. Instead of rationalization, an alternative route to such post-purchase justification is to take actions after purchase that serve the guilt reduction objective. One such sequential action is insuring the product by the purchase of an ESC, a behavior that is very prudent. Additionally, and more directly, there is evidence that guilt is associated with risk aversion (Mancini and Gangemi 2004). To summarize, given the same price, the extent of loss associated with hedonic products is greater than that for utilitarian products. Moreover, because the purchase of hedonic products induces more guilt, this may lead to greater risk aversion. We therefore predict that, all else being equal, consumers are more likely to purchase extended service contracts for products with relatively higher hedonic value than for those with relatively less hedonic value.

H1: Consumers are more likely to purchase ESCs for products with relatively higher hedonic value than for products with relatively higher utilitarian value.

Manufacturer's Warranty. Extended service contracts typically provide longer and more comprehensive coverage than the manufacturer's warranty. During the purchase decision, consumers do not have perfect knowledge about the reliability of the product and therefore of the likelihood of product failure in the future. There is a large body of evidence that, when decisions are made under uncertainty, consumers look for cues that help them infer product reliability (Dodds, Monroe, and Grewal 1991). Prior research has indicated that the product price and the terms of the manufacturer's basic warranty are important sources of information regarding product reliability. The literature on warranties shows that warranty terms affect consumers' perceptions of product quality (Shimp and Bearden 1982) and purchase intentions (Boulding and Kirmani 1993). Warranty terms include the length and scope of the warranty, while product quality dimensions cover overall quality, probability of breakdown, and specific attribute quality. A generalizable finding from this stream of research is that the length and the scope of the manufacturer's warranty indicate higher quality and, more specifically, lower perceptions of product failure (Boulding and Kirmani 1993; Purohit and Srivastava 2001). Padmanabhan and Rao (1993) find that consumers who buy cars with shorter manufacturer's warranty coverage are more likely to buy ESCs. Since consumers are less likely to purchase ESCs for highly reliable products, we predict that the likelihood of purchasing ESCs lowers when manufacturer warranties are longer.

H2: Consumers are less likely to purchase ESCs for products with relatively longer manufacturer warranties.

Retail Factors

Promotions. Price promotions are ubiquitous, and retailers spend a considerable amount of money communicating the promotions. While there is considerable research that examines promotions (see Neslin [2002] for an excellent review), the relationship between price promotions offered on products and the purchase of service contracts is not obvious.

There are three lines of reasoning that suggest that there could be a positive relationship between buying a product on promotion and buying an ESC. First, there is an income effect through the saving accrued by buying a discounted product. There is considerable evidence that the income effect resulting from a promotion can result in the purchase of more expensive brands (Allenby and Rossi 1991; Blattberg and Wisniewski 1989). Second, it is also possible that consumers will transfer the saving on the promotion to spending on insuring the product because both these components belong in the same mental account (Thaler 1999). Third, the fact that the product is being promoted could lead to a negative impact on product quality evaluations (Dodson, Tybout, and Sternthal 1978; Guadagni and Little 1983), though Raghubir and Corfman (1999) point out that the negative influence of promotions on quality perceptions is moderated by factors such as category promotional practices and the expertise of the consumers. Together, these arguments imply that promotions could enhance the consumer's willingness to pay for the ESC as well as increase the perceived probability of product failure. Therefore, we

hypothesize that, when a product is purchased at a discount, consumers are more likely to purchase ESCs.

H3: Consumers are more likely to purchase ESCs for products they have purchased on promotion.

Unadvertised Promotions. Very often retailers offer price promotions on products but do not advertise those promotions. The literature has identified two benefits of this strategy. First, using an analytical framework, Rao and Syam (2001) show that offering unadvertised price cuts is an equilibrium strategy for retailers as it helps them retain customers who frequent the store. Heilman, Nakamoto, and Rao (2002) find that unexpected in-store coupons cause consumers to increase their expenditures by making more unplanned purchases. One account for this behavior is that the increased spending is caused by the consumer's unexpected psychological increase in income. More important, they also argue that the unexpected windfall gain makes people feel good, resulting in an elevated positive mood.

Mood can affect risk-taking behavior. Isen and her colleagues have demonstrated that a positive mood can affect risk taking. In the domain of gains or in low-risk tasks, positive moods lead to risk seeking. However, in the domain of losses, such as insurance decisions, positive moods lead people to become more risk averse (Dunegan et al. 1992; Isen and Patrick 1983). Isen and Patrick (1983) find risk-averse behavior in lottery and gambling tasks when a positive mood is induced using gifts. Isen, Nygren, and Ashby (1988) also show that positive mood makes people become more sensitive to losses and that they prefer to minimize their losses rather than maximize their gains. In a business decision-making context, Mittal and Ross (1998) also show that positive mood causes low risk taking. The underlying mechanism is that the positive mood affects the subjective utility value of the potential outcomes. As compared with a neutral mood, a positive mood causes potential losses to appear worse. The reasoning is that, besides the negative financial outcome, the loss also leads to the demolishing of the positive mood. Interestingly, Isen and Geva (1987) find that people carefully elaborate about negative outcomes when they are in a happy mood. In summary, anticipating a loss is more unpleasant for those who are in a relatively happy mood as compared with those who are in a neutral mood.

As compared to consumers who expect a promotion, consumers who purchase a product on an unadvertised promotion are likely to have an elevated mood because of the unexpected positive surprise. When faced with the ESC purchase, this elevated positive mood, in turn, is likely to make them more risk averse.

H4: Unadvertised promotions are more likely to increase consumers' risk aversion and therefore increase their propensity to purchase ESCs.

Consumer Characteristics

We now discuss how consumer characteristics influence the ESC purchase decisions. The consumer characteristics we examine are gender, income, and prior experience with ESCs.

Gender. The role of gender in risk taking has received considerable interest in both the economics (Dekel and Scotchmer 1999) and psychology literatures (Magnan and Hinsz 2005). In a meta-analysis of research that uses an experimental paradigm, Byrnes, Miller, and Schafer (1999) conclude that women are less prone to risk taking than men. Empirical studies reinforce these results by finding that women do less risk taking in their allocation of retirement savings plans (Sunden and Surette 1998), selecting term life insurance (Halek and Eisenhauer 2001), and buying health insurance (Feldman et al. 1989). As ESC is essentially an insurance product, we also expect to confirm that women are more likely to purchase these contracts.

H5: Women are more likely to purchase ESCs than men because they are more risk averse.

Income. A decreasing absolute risk aversion that implies income is negatively related to insurance purchase is widely accepted in the theoretical analysis of insurance demand (Mossin 1968). However, the empirical findings in the insurance literature find mixed results, where some studies show a positive relationship between income and purchase of insurance (e.g., Browne and Hoyt [2000] for flood insurance), while others find a negative relationship (e.g., Cicchetti and Dubin [1994] for telephone line service contracts). Padmanabhan and Rao (1993) find that higher-income consumers are more likely to buy ESCs in the automobile category, but Padmanabhan (1995) did not find any correlation. We therefore view the effect of income as an empirical question.

Past Usage of ESCs. Consumers who purchase ESCs in any category consist of two segments post-purchase: the first segment does not experience product failure in the category purchased, and therefore does not avail of any benefits from the purchase of the ESC. The second segment does face a problem with the product and has to exercise the contract. We argue that consumers who do face a product failure problem, regardless of the category where product failure is experienced, are more likely to view purchasing the ESC more favorably on any subsequent purchase occasions. There is evidence that the purchase of insurance is prone to biases due to past claims (Johnson et al. 1993). Prior claims can distort future product failure rates due to availability and vividness biases. The past product failure is likely to increase the potential perceived probability of future related and even unrelated product category breakdowns. Therefore, if ESCs have been used in the past, consumers' perceived probability of failure will increase, which, in turn, increases their propensity to purchase ESCs for other related or unrelated products.

TABLE 1

SAMPLE STATISTICS

Variable	Explanation	Mean or frequency	Standard deviation
D_{ijt}	Whether ESC was purchased	.33	.47
Audio		.38	.49
Video		.24	.43
Phone		.31	.46
Camera		.45	.50
Computer		.34	.47
Game		.30	.46
Mobile audio		.52	.50
$\text{Price}_{jt}^{\text{ESC}}$	Price of ESC ($)	59.25	81.06
$\text{Cover}_{jt}^{\text{ESC}}$	Coverage period of ESC (years)	2.75	.90
Cover_{jt}^{M}	Coverage period of manufacturer's basic warranties (years)	.87	.33
Price_{jt}^{P}	Price of the product ($)	340.09	657.00[a]
Hedonic_{j}	The difference between hedonic and utilitarian values of a product	−.49	1.61
Prom_{ijt}	Price promotion ($)	59.22	100.96
Adprom_{jt}	Whether a promotion is advertised/featured	.28	.45
Unadprom_{jt}	Whether a promotion is unadvertised/unfeatured	.72	.45
Income_{i}	Income level on a 100-point index	64.48	23.63
Gender_{i}	Whether the consumer is a male	.62	.49
Use_{i}	Whether a previous purchase of ESC was availed	.08	.27

NOTE.—The sample contains 604 households that purchased 553 service plans for 1,676 products between November 2003 and October 2004.
[a]The standard deviation of price is relatively large because it reflects the variation across different product categories.

H6: Prior usage of a service contract increases consumers' perceptions of product failure rates and therefore makes it more likely that they purchase ESCs for other products.

In summary, we conceptualize that product characteristics, retailer actions, and consumer characteristics influence the purchases of ESCs. The mechanisms of these influences include altering the perceptions of the probability of loss, the extent of loss and risk aversion, and the psychological income effect. We test the predictions of the outcomes using data on observed choices made by consumers and the associated mechanisms permitted by the available data.

DATA DESCRIPTION

Our data come from the electronics department of one retailer. Some retailers, such as Circuit City and Wal-Mart, offer consumers a menu of ESCs that vary in length and price, whereas others, such as Best Buy and Target, provide only one plan. Our focal retailer offers only one plan. We have access to the consumer purchase histories of ESC plans of 604 households from November 2003 to October 2004; these include 1,676 purchases of products and 553 purchases of ESCs. More specifically, the data consist of the complete history of the households' purchases of electronic durables and service contracts during these 12 months. They contain detailed information about the products and service contracts, such as product type, product price, promotion offered on the product, presence of a feature (i.e., advertised promotion), price and length of coverage of the service contracts, and time and location of purchases. We also have access to consumer characteristics, such as income, gender, and a dummy variable that identifies whether a consumer has used an ESC in the past (even before the start of the observation period). Since the number of product types is unmanageable, we follow the retailer's practice and classify products into seven categories on the basis of their general function: video, audio, phone, camera, computer, game, and mobile audio.

We present the sample's statistics in table 1, which reveals that 31% of consumers purchase an ESC at least once during the observation period and that ESC purchases constitute approximately 33% of all purchase occasions. Among the seven product categories, consumers are most likely to purchase service contracts for mobile audio and cameras and least likely to purchase them for video and game systems. The average price of the products purchased is $340.09. The most expensive product is a plasma television, with prices ranging between $4,000 and $5,000. The average price of the service contracts is $59.25, which means that they are priced at roughly 17.42% of the product price. The average length of coverage is 33 months, varying from 24 to 48 months. Among the product purchases, 35% included a price promotion, with an average promotion discount of $20.53. Of the price promotions, 28% had been advertised through circulated publications and local newspaper inserts. Finally, 8% of consumers had used ESCs at least once during the observation period. Sixty-two percent of the sample are male consumers. In the data set, income is provided as a 100-point index, the average being 64.48.

To determine the hedonic and utilitarian values of each product, we conducted a survey on a sample of 107 adults, using the methodology of Okada (2005). Respondents were asked to rate each product category on one hedonic scale, anchored between "not at all hedonic" (0) and "extremely hedonic" (6), and one utilitarian scale, anchored between "not at all utilitarian" (0) and "extremely utilitarian" (6). Following Okada (2005), hedonic items were described as fun/pleasant/enjoyable, whereas utilitarian products were described as useful/practical/functional. We report the results in table 2. We code Hedonic_j as the difference between the hedonic and utilitarian values of a category.

TABLE 2

HEDONIC CATEGORIES VS. UTILITARIAN CATEGORIES

Categories	Hedonic value		Utilitarian value	
	Mean	Standard deviation	Mean	Standard deviation
Audio-visual receiver	3.92	.16	4.02	.15
Boom box	4.63	.15	3.47	.20
Car stereo	4.81	.16	4.38	.19
CD recorder	2.93	.31	3.93	.29
Cell phone	3.61	.31	5.36	.16
Computer peripheral	2.89	.33	4.32	.23
Desktop	2.50	.30	4.88	.23
Digital camcorder	4.56	.15	4.42	.14
DVD player	4.90	.16	4.34	.17
High-end camera (>$400)	4.51	.25	3.06	.29
High-end speaker (>$200)	4.11	.26	3.03	.31
Home CD changer	4.17	.19	3.49	.18
Home phone	1.75	.32	4.57	.31
Home theater	4.66	.25	3.83	.30
Ipod	4.54	.24	3.23	.28
Low-end camera (<$400)	4.72	.15	5.01	.12
Low-end speaker (<$200)	2.53	.29	3.63	.29
Notebook	3.61	.28	5.21	.16
Pay phone	1.79	.29	4.40	.35
PDA	4.11	.16	5.03	.14
Portable CD player	4.91	.27	4.17	.30
Portable DVD player	3.97	.23	2.76	.28
Printer	2.25	.33	5.06	.21
Projection TV	4.77	.28	3.21	.32
Regular TV (<$1,000)	3.12	.25	5.23	.24
Shelf stereo system	4.46	.16	3.99	.17
Two-way radio	3.13	.20	4.15	.18
VCR	2.65	.30	3.91	.29
Video game console	4.53	.30	2.59	.31
Video game controller	4.30	.31	2.26	.32
Voice recorder	3.06	.18	4.46	.15

EMPIRICAL ANALYSIS

Model

We consider consumers, $i = 1, \ldots, I$, who bought electronic products in product categories, $j = 1, \ldots, J$, during purchase occasion t; we therefore use D_{ijt} to represent whether consumer i purchases an ESC for product j at occasion t:

$$D_{ijt} = \begin{cases} 1 & \text{if consumer } i \text{ buys ESC for product } j \text{ at time } t, \\ 0 & \text{otherwise.} \end{cases} \quad \textbf{(1)}$$

Perceived Failure Rate. Because consumers buy ESCs to cover the risk of future replacement or repair cost incurred by product breakdowns, purchase decisions should depend on the likelihood of product failure. However, at the time of purchase, consumers face uncertainty regarding this precise probability. According to the literature, consumers often use the price of the product and the length of coverage of the manufacturer's warranty as quality cues for assessing product reliability (Boulding and Kirmani 1993; Erdem, Keane, and Sun 2008; Purohit and Srivastava 2001). Consistent with the literature, we model the consumer's perceived product failure rate using the following function:

$$V_{ij} = \beta_{0i} + \beta_{0j} + \beta_{1i}\text{Rprice}_j^P + \beta_{2i}\text{Cover}_j^M + e_{ij}, \quad \textbf{(2)}$$

where $V_{ij} = \overline{V}_{ij} + e_{ij}$. This formulation is based on Erdem et al.'s (2008) empirical finding that price signals quality and Boulding and Kirmani's (1993) finding that the manufacturer's warranty signals quality. The variable Rprice_j^P represents the price of product j relative to the average price of all products within its category. It reflects how much more expensive or cheaper the price is relative to the prices of other brands in a given category. The variable Cover_j^M is the length of coverage of the manufacturer's basic warranty, which comes free with the product. We include this variable to control for the potential association of a longer manufacturer's warranty coverage with lower failure rates, which would affect ESC purchase propensities. Finally, e_{ij} refers to unobservable factors that affect consumers' perceptions of breakdown rates.

The coefficient β_{0i} is a consumer-specific constant term that captures unobserved factors that may affect perceptions of failure rates across product categories. For example, consumers with children may perceive a higher probability of product failure. Next, β_{0j} is a category-specific constant term that captures different failure rates across categories. For example, product categories with the newest technology or multiple sophisticated features may be perceived as more likely to break down. Coefficient β_{1i} captures the effect of product price on perceived failure probabilities, and coefficient β_{2i} measures the effect of the length of the manufacturer's basic warranty.

Assuming that e_{ij} follows an independent and identically extreme value distribution, the probability of product failure is given by a binary logit model:

$$\rho_{ij} = \frac{e^{\overline{V}_{ij}}}{1 + e^{\overline{V}_{ij}}}. \quad \textbf{(3)}$$

Expected Benefit of Purchasing Service Contract. The decision to purchase an ESC requires a comparison be-

tween the cost and the benefit of owning it. Whereas the price represents the cost to the consumer, uncertainty surrounds the benefits, which accrue only if the product breaks down. If the product does not fail, an ESC purchase involves only the cost; if the product fails, the ESC enables consumers to avoid out-of-pocket expenses to repair or replace the product.

At the time of purchase, consumers must assess the benefits according to the expected replacement or repair costs they may avoid by buying the ESC. For simplicity, we assume that the terms of the ESC include replacing the failed product with a similar product at a similar price. Because consumers do not observe information about repair costs, the cost of replacement provides a reasonable surrogate; high labor costs mean many consumers simply elect to replace rather than repair their durable products. In addition, repair cost usually is proportional to replacement cost.

Because consumers' perceived failure rate is ρ_{ij}, the expected cost of replacement is given by $\rho_{ij}\text{Price}_j^P$, where Price_j^P is the price for product j paid by consumer i. Thus, the expected benefit of owning a service contract equals the replacement price weighted by the perceived probability of product failure. According to the special property of Bernoulli distribution, the variance of the expected replacement cost is $\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2$.

Purchase Decisions. Under uncertainty, consumers make purchase decisions on the basis of their expected utilities, given the perceived probability of failure ρ_{ij}, which consumer i develops for product j. We then assume that the expected utility that affects the ESC purchase decisions is given by

$$\begin{aligned} E[U_{ijt}|\rho_{ij}] &= \alpha_{0i} + \alpha_1\text{Hedonic}_j + \alpha_{2i}\rho_{ij}\text{Price}_j^P \\ &+ \alpha_{3i}\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 + \alpha_{4i}\text{Prom}_{ij} \\ &+ \alpha_{5i}\text{Price}_j^{\text{ESC}} + \alpha_{6i}\text{Cover}_j^{\text{ESC}} + \alpha_{7i}\text{PP}_{it} \\ &+ \alpha_8\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 \times \text{Hedonic}_j \\ &+ \alpha_9\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 \times \text{Unadprom}_{ij} \\ &+ \alpha_{10}\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 \times \text{Adprom}_{ij} + \varepsilon_{ijt}, \end{aligned} \tag{4}$$

where Hedonic_j is the difference between the hedonic value and utilitarian value of product j. We include this variable to test whether a product with greater hedonic value makes consumers more likely to purchase ESCs. The term ρ_{ij} refers to consumer i's perceived failure rate for product category j, as described by equations 1–3, and $\rho_{ij}\text{Price}_j^P$ is the expected cost of replacement. In addition, $\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2$ equals the variance of the expected cost of replacement, which contains information about the accuracy of consumers' perceived failure rate. This formulation is consistent with Levy and Markowitz (1979), who allow the mean and variance to affect expected utility functions. As in the standard marketing and economics literatures, we interpret coefficient α_{3i} as sensitivity to uncertainty, a measure of consumer risk attitude (Erdem and Keane 1996). We include Prom_{ij}, the depth of the price promotion on product j that consumer i receives, to test whether a price discount makes consumers more or less likely to purchase service contracts. The variable $\text{Price}_j^{\text{ESC}}$ is the price of the ESC charged by the retailer, which represents the cost for consumers to buy the ESC. The variable $\text{Cover}_j^{\text{ESC}}$ refers to the additional length of coverage provided by the ESC over and above the length of the manufacturer's warranty. Finally, PP_{it} captures consumer i's ESC purchase history. Conceptually similar to Guadagni and Little's (1983) loyalty index, PP_{it} is the weighted average of purchases of ESCs prior to occasion t; it includes the purchase of an ESC in any product category. Therefore,

$$\text{PP}_{it} = \theta\text{PP}_{it-1} + (1-\theta)\sum_{j=1}^{J} D_{ijt-1}, \tag{5}$$

where θ is the smoothing factor.

To test whether purchasing a hedonic product makes consumers more risk averse, we include the interaction term between hedonic value and uncertainty (variance of the expected replacement cost), $\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 \times \text{Hedonic}_j$. Variable Unadprom_{ij} indicates an unadvertised price promotion, and its interaction with uncertainty, $\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 \times \text{Unadprom}_{ij}$, enables us to test the possibility that consumers become more risk averse with a surprise promotion. Similarly, Adprom_{ij} indicates if the promotion is advertised, and we again include its interaction with uncertainty, $\rho_{ij}(1-\rho_{ij})(\text{Price}_j^P)^2 \times \text{Adprom}_{ij}$.

We use the vector Θ_i to represent the parameters to be estimated, that is, $\Theta_i = (\beta_{0i}, \beta_{0j}, \beta_{1i}, \beta_{2i}, \alpha_{0i}, \alpha_1, \alpha_{2i}, \alpha_{3i}, \alpha_{4i}, \alpha_{5i}, \alpha_{6i}, \alpha_{7i}, \alpha_8, \alpha_9, \alpha_{10})$ for all j. We define $\bar{U}_{ij} = U_{ij} - \varepsilon_{ij}$ as the deterministic part of the utility functions. Assuming the error term ε_{ij} is independently and identically extreme value distributed, we obtain the probability of consumer i choosing an ESC for product j conditional on Θ_i:

$$\Pr(D_{ijt} = 1|\Theta_i) = \frac{e^{E[\bar{U}_{ijt}|\rho_{ij}]}}{1 + e^{E[\bar{U}_{ijt}|\rho_{ij}]}}. \tag{6}$$

Consistent with the insurance literature, we allow consumers to make purchase decisions on the basis of perceived failure rates, expected replacement cost, and uncertainty associated with the future replacement costs.

Heterogeneity and Estimation. To measure the effect of consumer heterogeneity on responses to the main variables (i.e., coefficients in the perceived failure rate and utility functions), we assume each parameter is a linear function of consumer demographic variables, such as income, gender, and experience with ESCs, and thereby characterize how the coefficients in the utility function differ across consumer demographics and past usage with ESCs:

$$\Theta_i = \gamma_0 + \gamma_1\text{Income}_i + \gamma_2\text{Male}_i + \gamma_3\text{Use}_i + e_i, \tag{7}$$

where Income_i and Male_i refer to the income and gender of consumer i and Use_i is a dummy variable indicating whether consumer i has ever used a service contract. The coefficients of these consumer-specific variables measure how the impact of these factors on perceptions of failure probabilities and ESC purchase probabilities differ across consumers. Note that, by modeling this heterogeneity, we introduce interaction terms among the three consumer demographic variables and all coefficients from the perceived failure rate and utility functions in a parsimonious way. The coefficient estimates in the heterogeneity equation 7 reveal how consumer characteristics moderate all the main effects. For example, if α_{2i} is estimated as positive and γ_1 is estimated as negative, it implies that consumers are sensitive to expected replacement cost on average but that higher-income consumers are less so.

We assume that the unobserved part of equation 7 is distributed as normal. We use a hierarchical Bayesian approach to estimate the model. For identification, β_{04} is fixed. Readers interested in the estimation procedure are referred to Allenby and Rossi (1999) and Gelfand and Smith (1990) for details.

Results

To explore the fit of our proposed model, we estimate three benchmark models. The first model is a logit model, in which the utility function is a linear function of the category constants, price of the product, promotion, price of ESC, and coverage length of ESC. This is our proposed model without perceived failure rate, expected replacement cost, uncertainty, hedonic value, the three interaction terms with uncertainty, and heterogeneity. The second model matches our proposed model but without hedonic value, interaction terms, and heterogeneity. Finally, in the third model, we exclude just heterogeneity from our proposed model. In table 3, we provide the log-likelihood and Akaike information criterion (AIC) model comparison results. As the results show, our proposed model fits the data better. By taking into account consumers' perceived failure rate, the modifying effects of product characteristics, advertising, promotion, and consumer characteristics, our model explains the observed data better than the benchmark models.

In table 4, we compare the predicted ESC purchase probabilities with those from the sample for each product category. Given the discrete nature of the dependent variable, our estimated consumer model approximates the data reasonably well. To further establish model validity, we obtain the available breakdown rates published by *Consumer Reports* and *PC Magazine* in the same period and compare them with the perceived probabilities of breakdown inferred from the model. Holding the camera category's failure rate to be fixed at 12% (reported by *Consumer Reports*), our model predicts consumers' perceived rates of product failure for video, games, and phone equipment to be 12%, 14%, and 22%, respectively. The rank order is quite consistent with the actual breakdown rates of 9%, 18%, and 26%, respectively, for the three categories.

In table 5, we report the parameter estimates in the perceived probability function. As expected, the results suggest that consumers tend to associate higher prices with a lower probability of product failure. We thus confirm the conventional wisdom that product price plays a significant role in signaling product reliability and reduces consumer concerns about product failure. However, the length of the manufacturer's warranty has no significant impact on the perceived probability of failure. This result is inconsistent with prior experimental findings (Boulding and Kirmani 1993) and hypothesis 2. Unlike experimental research where the manufacturer's warranty length is manipulated, our data contain manufacturers' warranties that are similar in length for most electronic categories. We do not believe that these results contradict existing theory; rather, the data may lack effective within-category variation to provide results consistent with experimental research.

In the purchase utility equation, the coefficient of the

TABLE 3

MODEL COMPARISON

	Benchmark model 1	Benchmark model 2	Benchmark model 3	Proposed model
Log-likelihood	−963.79	−943.80	−937.19	−869.15
AIC	974.79	958.80	956.19	929.15

NOTE.—Benchmark model 1: Proposed model without perceived probability of failure, expected replacement cost, uncertainty, hedonic value, three interaction terms with uncertainty, and heterogeneity. Benchmark model 2: Proposed model without hedonic value, three interactions terms, and heterogeneity. Benchmark model 3: Proposed model without heterogeneity. AIC = Akaike information criterion model.

TABLE 4

COMPARISON WITH SAMPLE STATISTICS

	Sample	Model
Predicted purchase probability:		
Audio	.38	.34
Video	.24	.28
Phone	.31	.31
Camera	.45	.47
Computer	.34	.26
Game	.30	.39
Mobile audio	.52	.44
Hit rate		.77
Efron's R^2		.23
McFadden's R^2		.18

NOTE.—Hit rate = percentage of observations correctly predicted.

$$\text{Efron's } R^2 = 1 - \frac{\sum_{i=1}^{N}(y_i - \hat{\pi}_i)^2}{\sum_{i=1}^{N}(y_i - \bar{y})^2},$$

where $\hat{\pi}_i$ = purchase probability predicted by the model.

$$\text{McFadden's } R^2 = 1 - \frac{\text{Log-likelihood(Model)Proposed}}{\text{Log-likelihood}(\text{Model}_{\text{intercept}})}.$$

TABLE 5

MODEL ESTIMATES

Parameter	Symbol	Estimate	Standard deviation
Perceived probability:			
Constant term:	β_{0j}		
Audio		−1.21*	.33
Video		−2.46*	.35
Phone		−.65+	.37
Camera		Fixed	
Computer		−3.34*	.30
Game		−1.5*	.35
Mobile audio		−.26	.41
(Relative) price of the product	β_{1i}	−.77*	.24
Coverage of manufacturer warranty	β_{2i}	.04	.34
Utility function:			
Constant term	α_{0i}	−4.75*	1.23
Hedonic product	α_1	.38*	.19
Expected replacement cost	α_{2i}	16.97*	3.99
Variance of expected replacement cost (uncertainty)	α_{3i}	11.79*	3.55
Promotion	α_{4i}	1.31*	.51
Price of ESC	α_{5i}	−19.11*	6.07
Coverage length of ESC—coverage length of manufacturer's warranty	α_{6i}	.61	.97
Past purchases of ESC	α_{7i}	3.14*	.69
Hedonic × Uncertainty	α_{8i}	.88	.57
Unadvertised promotions × Uncertainty	α_{9i}	2.26*	.57
Advertised promotions × Uncertainty	α_{10i}	.97	.78

+Significant at the .10 level.
*Significant at the .05 level.

dummy variable Hedonic_j is positive and significant ($\alpha_1 = 0.38$). This result provides support of hypothesis 1, confirming that consumers are more likely to purchase ESCs for products with relatively higher hedonic value than for products with relatively higher utilitarian value. The α_{2i} parameter also is significant and positive, which implies that consumers are sensitive to the expected cost of replacement and increase their probability of purchasing ESCs when they estimate a higher replacement cost. This result is consistent with existing findings in the insurance literature that consumers are more likely to purchase insurance for products where the expected cost of replacement is high (Williamson, Ranyard, and Cuthbert 2000). The coefficient of the squared term of the expected replacement cost, α_{3i}, also is positive and significant, which suggests that consumers are risk averse and that greater uncertainty about the replacement cost increases their propensity to purchase ESCs. The coefficient of price promotion is positive and significant, indicating that, if consumers receive a price discount, they are more likely to purchase an ESC. We find support for hypothesis 3. As anticipated, consumers also are sensitive to the price (insurance premium) of the ESCs ($\alpha_{5i} = -19.11$), though we find no impact of the length of the ESC. This absence of effects may result from the lack of effective within-category variation in the length of the ESC. Another reason might be that, in some categories, the length of the ESC offered is too long relative to the product life cycle. Finally, the coefficient for past purchase of ESC ($\alpha_{7i} = 3.14$) is significant, indicating that consumers who have purchased ESCs in the past are more likely to do so in the future.

The interaction of hedonic value and uncertainty is not significant ($\alpha_{8i} = 0.88$). Therefore, we must reject the explanation that guilt following the purchase of hedonic items increases risk aversion. Eliminating this explanation suggests that consumers may be more likely to buy ESCs because they value hedonic items more, which is consistent with the experimental results of Hsee and Kunreuther (2000).

In hypothesis 4, we predict that unadvertised promotions create a positive mood and increase risk aversion. The interaction between unadvertised promotion and uncertainty is positive and significant ($\alpha_{9i} = 2.26$). Thus, when a retailer uses unadvertised promotions, consumers' risk aversion increases and this makes them more likely to buy ESCs. This supports hypothesis 4. The interaction between advertised promotions and uncertainty is not significant ($\alpha_{10i} = 0.97$), which confirms that only unadvertised promotions alter risk aversion levels.

We next examine the coefficients in the heterogeneity equations reported in table 6. These estimates describe how consumers with different characteristics respond differently to our focal variables in the perceived product failure and utility equations. We discuss only the significant estimates. Please note that the estimates in the heterogeneity equations are interpreted as interactions between consumer characteristics (income, gender, and prior usage) and the explanatory variables in the probability and utility equations. In other words, the estimates indicate how the explanatory variables, such as the impact of product price on the perceived probability of failure, are moderated by consumer characteristics. For example, the coefficient of men (0.75) in the heterogeneity equation for β_{1i} indicates that, relative to women, men are less likely to associate higher product price with lower probabilities of failure. Said differently, women are

TABLE 6

HETEROGENEITY ESTIMATES

Parameter	Symbol	Estimate		
		Income	Men	Prior usage
Perceived probability:				
Constant term	β_{0i}	−.04	−1.06⁺	1.18*
		(.08)	(.58)	(.41)
(Relative) price of the product	β_{1i}	.31*	.75*	.04
		(.13)	(.23)	(.21)
Coverage of manufacturer	β_{2i}	−.01	−.40	−.41
		(.11)	(.55)	(.47)
Utility function:				
Constant term	α_{0i}	−.10	3.7*	−1.35
		(.34)	(1.01)	(1.93)
Expected replacement cost	α_{2i}	−1.50⁺	14.64*	1.82
		(.84)	(4.77)	(7.07)
Uncertainty	α_{3i}	−1.05	−7.52*	5.82
		(.98)	(2.84)	(4.05)
Promotion	α_{4i}	−.53*	−.62	.27
		(.16)	(.54)	(.99)
Price of ESC	α_{5i}	.65	6.28	7.28
		(1.21)	(3.94)	(4.99)
Coverage length of ESC—coverage length of manufacturer's warranty	α_{6i}	−.08	−2.57*	−1.40
		(.24)	(.79)	(.97)
Past purchases of ESC	α_{7i}	.01	−2.33*	.97
		(.16)	(.49)	(.74)

NOTE.—Standard deviations are in parentheses.
⁺Significant at the .10 level.
*Significant at the .05 level.

more likely to believe that high-priced products are more reliable.

As indicated by the positive coefficient of income in the heterogeneity equation for β_{1i} (0.31), relative to high-income consumers, low-income consumers are more likely to infer product reliability from product price. Low-income consumers are also more sensitive to the expected cost of replacement (−1.50) relative to high-income consumers. When the product is on promotion, as compared to the high-income consumers, the low-income consumers are also more sensitive to promotions (−0.53) and more likely to purchase ESCs.

The overall effect implies that, given everything else equal, lower-income consumers are more prone to buying ESCs. Two explanations account for this finding: first, lower-income consumers are more sensitive to the replacement cost, which is not very surprising since the more limited disposable income makes it much harder for them to repurchase the product in event of product failure. Second, and more interesting, the impact of price promotions on the purchase of ESCs is greater for low-income consumers. The conjecture that low-income consumers are more prone to ESC purchases is inconsistent with the findings of Padmanabhan (1995) and Padmanabhan and Rao (1993). These results can be accounted for by the differences in the automobile category examined in the earlier studies and the cheaper electronic product categories. In the relatively cheaper electronic categories, higher-income consumers have the ability to self-insure their purchases, but lower-income consumers do not. Another possibility is that the insurance objective for automobiles and electronics products differs. In automobiles, the goal of purchasing the ESC is primarily repair and maintenance, while for electronic products, it is replacement. Since higher-income consumers have higher time costs, they may be more willing to purchase ESCs for automobiles rather than for electronic products, where product replacement is the primary goal.

Gender also entails several differences. Compared with women consumers, men are less likely to perceive that products will fail (−1.06) and less likely to rely on price to infer product reliability (0.75). Everything else being equal, men are more likely to purchase ESCs than women (3.70). Men are more sensitive to expected replacement costs (14.64). This is a puzzling result that suggests that there may be some veracity to the stereotype of men being more responsible for electronic and appliance product repairs and upkeep. Consistent with prior findings, men appear to be less risk averse than women (−7.52). Men are less likely to be influenced by the length of the longer coverage (−2.57) and are less influenced by past purchases of ESCs (−2.33). However, it remains difficult to predict whether ESC purchases relate to gender overall. Although women are inherently more risk averse and perceive higher probabilities of product failure, this is offset by men's lower price sensitivity to the price of the ESCs as well as higher sensitivity to the replacement costs. Interestingly, women are more likely to rely on product price to infer product reliability. These results are consistent with He, Inman, and Mittal (2008), who propose that the relationship between gender and buying insurance can be moderated by beliefs of own-self capa-

bility. He and colleagues find that, in loss avoidance situations such as buying insurance, women are less likely to buy insurance if their belief of own-self capability is high but that issue capability has no impact on men. In the purchase of ESCs, high-priced products may increase women's perceptions of self-efficacy. The raw data show that, across the purchase occasions, 33.46% of men and 32.23% of women purchase ESCs. Thus, we cannot confirm hypothesis 5.

Finally, and interestingly, examining the column in table 6 for prior usage, we see that, if consumers have previously exercised a service contract, they perceive a greater probability of product failure, regardless of the product category (1.18). This could be due to the availability bias (Tversky and Kahneman 1974), or perhaps past failures make consumers less confident about the way they handle products. This result confirms hypothesis 6 that past product failure increases perceptions of future product failure and consequently has an impact on subsequent purchase of ESCs.

DISCUSSION

In this article, we use consumers' purchase decisions of extended service contracts to understand their decision making under uncertainty. The decision to purchase insurance requires consumers to assess the probability of loss and the magnitude of loss and make a decision on the basis of their perceptions of risk and the premium charged. Our results suggest that this decision is context specific and that it can be influenced by marketing actions.

We conceptualize and demonstrate that the purchase of ESCs is influenced by three major factors: hedonic/utilitarian value of products, price promotions and advertising, and consumer characteristics. We develop hypotheses about the impact of these three factors on consumers' perceptions of product failure probability and their likelihood of purchasing an ESC. To test the predictions, we apply a consumer choice model to panel data containing consumer purchase histories of service contracts from the electronics department of a retail store.

We hypothesize that consumers are more likely to purchase insurance provided by ESCs for products that have relatively higher hedonic value than utilitarian value for two reasons. First, given equal prices, consumers' valuation of hedonic products is higher, which increases the pain of loss. Second, the purchases of hedonic products also elicit feelings of guilt and heighten risk aversion. The results confirm that the probability of purchasing ESCs is greater for products with high hedonic value, although this is not necessarily so because consumers feel guiltier about such purchases. The results reinforce the findings of Dhar and Wertenbroch (2000) that suggest that valuation of hedonic products is more than that for utilitarian products. The results also suggest that consumers are willing to pay a premium to protect the additional valuation.

Our results on the impact of retail environment demonstrate that retailer actions can influence ESC sales. Promotions increase the likelihood of purchasing ESCs because there may be a psychological increased income effect realized from savings due to the price promotion. We also predict and find support that unadvertised promotions augment the effects of promotions. The unexpected gains from unadvertised promotions evoke positive moods in consumers (Heilman, Nakamoto, and Rao 2002). The positive mood, in turn, increases their risk aversion and consequently the purchase of ESCs.

We confirm earlier empirical findings that product price serves as a cue of quality (Erdem et al. 2008). Consumers use high price as an indicator of product quality and assign a lower chance of the product failure if it has a higher price. The results do not confirm that the length of the basic manufacturer's warranty is an indicator of quality. We suspect, however, that this is an artifact of the real world data where there is little variation in the length of warranty offered across brands. The results also suggest the state dependence in the purchase of ESCs. Consumers who have purchased service contracts in the past are likely to do so again in other product categories in the future.

The results from the heterogeneity analysis are intriguing. In contrast to prior empirical findings (Padmanabhan 1995; Padmanabhan and Rao 1993), we find that, as compared to high-income consumers, low-income consumers are more likely to purchase ESCs. The analysis reveals that they are likely to do so because they are more sensitive to the replacement costs in the event of product failure. Unlike in the case of automobiles, where high-income consumers buy ESCs to avoid maintenance because they have higher time costs, in the electronics product category, low-income consumers buy insurance to hedge against the out-of-pocket costs of replacing the product. Additionally, lower-income consumers are also more predisposed to exercise the savings obtained from promotions to purchase ESCs.

If the ESCs do, in fact, offer little value, the results imply a perverse impact on consumer welfare. The lack of financial ability of low-income consumers to replace products induces them to pay a potentially unnecessary and overpriced insurance premium. High-income consumers, for whom product replacement is not a cause for anxiety, incur a lower total cost of product acquisition. These findings are somewhat ironic in light of observations that poor sick patients who are unable to afford health insurance pay the highest prices for drugs (e.g., Frank 2001). In the health domain, poor patients are unable to afford insurance in a category where it is salubrious to buy it, but they opt for insurance in an area where the investment is inexpedient.

Although women are risk averse and perceive higher probability of product failure, men's inherent propensity to buy insurance is higher, and they are more sensitive to the expected replacement costs. We find confirmatory evidence that women are more risk averse than men. However, the higher aversion does not necessarily translate into an increased likelihood of buying ESCs. According to the raw statistics, the proportion of men and women who purchase ESCs is approximately the same.

Finally, the analysis confirms that consumers who have encountered product failure and have utilized an ESC for that product in the past increase their estimates of subsequent

product failures and are also less sensitive to the prices charged for ESCs. We conjecture that perceptions of risk are higher for these consumers due to the availability bias.

With data based on revealed choices in a store environment, we focus primarily on examining outcomes of the decision process. Unlike experimental research, which can pinpoint the processes by controlling all other factors, empirical research is more exploratory. The main advantage of conducting empirical research is that we have revealed preference data collected in a real setting. Thus, we can investigate the simultaneous impact of many factors on the purchase decision. More important, it allows us to establish the external validity of the key effects. Finally, empirical research captures effects that may be difficult to replicate using hypothetical experimental scenarios. For example, it may be hard to simulate the positive mood evoked by an unexpected price promotion.

Consistent with the nature of our data, though, we cannot test for all underlying processes, which is an endemic limitation of empirical research. Although our primary objective has been predicting outcomes based on theoretical reasoning, when the data allow, we make the best possible attempt to gain an understanding of the processes. It is important that experimental research be conducted to confirm the underlying mechanisms.

The mechanisms that influence perceptions of value, perceived probability of failure, and risk aversion require more in-depth analysis, including through experimentation. For example, we find that consumers are more likely to purchase ESCs in response to unadvertised promotions, but we cannot determine post hoc whether consumers actually were unaware of these promotions, so research in an experimental setting should confirm this effect. In addition, our data indicate that guilt following purchase of hedonic items does not account for ESC purchases. Future research should examine our proposed explanation that high hedonic valuation prompts insurance purchase.

A key difference between ESCs and other insurance is that the purchase process for the latter is more deliberate. For most ESC purchases, decision making likely takes place quickly and with less deliberation. These differences suggest potential avenues for exploration. Such exploration also might consider the different ESC offers among retailers: some of them offer a single ESC option where the only decision a consumer faces is whether to buy or not buy. Other retailers offer menus of ESC contracts. An interesting issue for future research is to investigate how consumers choose among a menu of ESC plans. We find evidence that unadvertised promotions increase risk aversion. Other factors that prime risk (e.g., Mandel 2003) in retail environments are useful avenues for further investigation.

We adopted a static approach for our analysis, but further research might model consumer dynamics explicitly in the choice of service contracts. Structural models in which consumers learn the benefits of ESCs, incorporate prior information to form their expectations of product reliability, develop expectations about future replacement costs, and are forward looking about risk might help investigate the dynamic nature of consumer decision processes. Finally, additional consumer decisions, such as product returns, could be studied in conjunction with the ESC purchase decision.

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