# A Study on Consumers' Price Sensitivity and Price Thresholds: Effect of Purchase Frequency, Period of Use and Perceived Risk to a Product

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## Abstract

The objective of this study is to classify products in several categories and compare price thresholds among product categories. A 2 by 2 matrix model was built for cross analysis with two crucial factors affecting price thresholds, which are period/interval of product use and consumer's perceived risk. Consumer's perceived reference price, and upper and lower prices for total 12 items were surveyed for this paper and a difference in mean of the prices among 4 categories was analyzed for its significance. The results imply that the longer the period of use, the higher the upper price limit (threshold) for the low perceived risk products, and consumer's purchase experience within a year positively affects the upper price limit for the products on which consumer's perceived risk is high. The results further suggest that non-purchasers are more likely to be sensitive to prices of the products on which consumer's perceived risk is high, but it is implied that through repeat purchase of the products, they could turn into less price sensitive consumers. This paper has limitations in terms of item selection and base prices, therefore, follow-up studies to strengthen or re-verify the hypotheses which are formulated in this paper need to be considered.

## 1. Introduction

Consumer's price sensitivity and price threshold are critical to predict consumer's purchase behavior in marketing industry. There have been many attempts to define factors affecting price sensitivity and price thresholds.

Previous studies have shown that there exists a latitude of acceptance or zone of indifference around the reference price formed and stored in a consumer's memory, such that minor changes in price do not have any significant impact on consumer choice (Kahneman & Tversky 1979; Mayhew & Winer 1992; Han et al. 2001) and it was implied that the zone of price

indifference is asymmetric around the reference price. A reference price is an internal standard against observed prices to compare, and it is the perceived price or the price that the consumer expects to pay for a brand or product (Kalyanaram & Winer 1995). The upper price limit is defined as the highest price a consumer is willing to pay for a product and the lower price limit is defined as the lowest price a consumer would be willing to pay for a product. Therefore, consumers should have a range of prices that they are willing to pay for a product bounded by a lower and upper price limit (Kosenko & Rahtz 1988).

With reference to the linkage between a reference price and price threshold, several studies found that consumers tend to be less sensitive to the higher price above its perceived price, as the reference price is higher (Zarrel 1978). In other words, the absolute size of price thresholds on a product with high reference prices is larger than that of price thresholds on a product with low reference prices.

It has also been shown in previous studies that perceived essentiality of a product has influence on price sensitivity. In general, consumers have relatively larger price thresholds for those products which they perceive as essential with few or no substitutes (Sirvanci 1993).

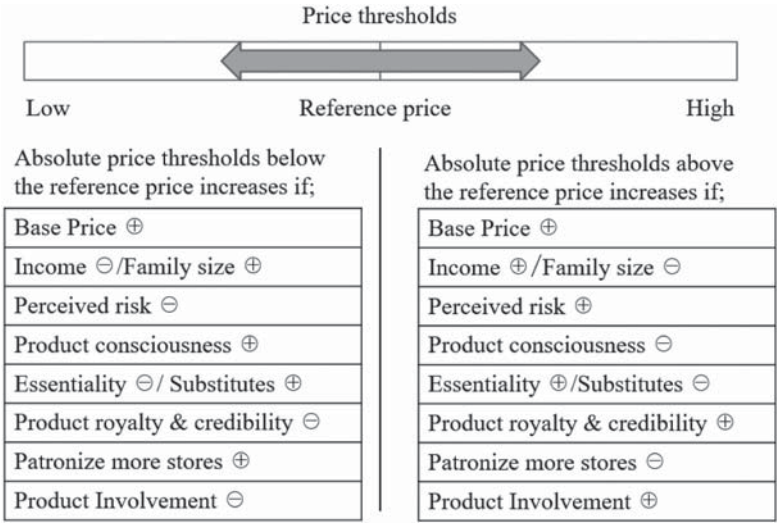
Several studies have also shown that brand credibility may decrease sensitivity to price by decreasing uncertainty and associated perceived risks (Tellis & Gaeth 1990; Tulin et al. 2002) and the impact of credibility appears to be larger the longer it takes to evaluate the product and the less one is able to depend on search in that category to eliminate uncertainly about product attributes (Gupta & Cooper 1992; Kalyanaram & Little 1994; Helson 1964; Kalwani & Yim 1992). Price consciousness and product involvement are also correlated to price acceptability level. In previous studies, it was implied that product consciousness is negatively related to price acceptability level while product involvement is positively correlated to price acceptability level (Donald et al. 1988).

There have been attempts to identify price sensitive consumers and it was found and demonstrated that income and education appear to be negatively related to overall price sensitivity (Kim et al. 1999) and a price sensitive group consisted of shoppers who patronize more stores, consider themselves aware of price changes, who are in fact more aware of the prices they pay, and who have lower income but larger families (Sirvanci 1993).

To summarize previous researches, price sensitivity depends both on product features and consumer characteristics. As shown in the figure 1, absolute price thresholds below the reference price is in inverse proportion to consumer's income, consumer's perceived essentiality, perceived risk, product involvement and loyalty/credibility of the product, and is proportional to consumer's perceived reference price, consumer's family size, product

consciousness, number of substitutes of the product and consumer's shopping frequency.
On the contrary, absolute price thresholds above the reference price is in inverse proportion to consumer's family size, product consciousness, number of substitutes of the product and consumer's shopping frequency, and is proportional to consumer's perceived reference price, consumer's income, consumer's perceived essentiality, perceived risk, product involvement and loyalty/credibility of the product.

Figure 1. Factors affecting price thresholds




(Source: Author's own figure)

However, one major problem with previous studies is that since most studies were conducted item by item (e.g. shampoo, soap, hair dryer), it is hard to generalize that their theory applies all kinds of products. In other words, most studies did not take detailed product features into consideration, therefore, it needs to be elaborated what type of products does a factor effect.
Moreover, most studies did not crossly analyze factors affecting price sensitivity. For example, it was revealed in previous studies that product sensitivity decreases as consumer's perceived risk on a product increases and as consumer's evaluation period of a product is longer (Gupta & Cooper 1992; Kalyanaram & Little 1994; Helson 1964; Kalwani & Yim 1992). But there is no study analyzing product sensitivity using both factors of consumer's perceived risk and consumer's evaluation period of use. In other words, there is few attempts to expand previous studies on price sensitivity and price threshold into cross factor analysis with several combinations of settings with factors.

Thus, the primary objective of this study is to classify products in several categories and compare price thresholds among product categories. A second objective of this study is to analyze how consumer's purchase experience influence price thresholds. The terminology of "latitude of price acceptance above consumer's perceived reference price" used in this paper, means the difference between a consumer's perceived reference price and an upper price limit, and the terminology of "latitude of price acceptance below consumer's perceived reference price" means the difference between a consumer's perceived reference price and a lower price limit of a product.

## 2. Conceptual model

We start with a brief description of the conceptual model of this study. A cross factor analysis with several combinations of setting with factors is the core of this study. Although factors affecting price threshold have been revealed by previous studies, the effect by a certain factor may be alleviated by another factor or is active only in a specific product group. For example, even though a consumer has low perceived risk to both product A and product B, the consumer may have a high upper price limit for product A but not for product B, because there is another factor differently affecting price threshold of product A and product B. A between or among product group analysis is an effectual means of elaborating the effect of the factors.

Since it is hard to classify products using all proven factors affecting price sensitivity, this study focused on two crucial factors, period/interval of use and consumer's perceived risk to understand and generalize customer's price sensitivity and price thresholds through cross analysis.

### Period and interval of use

In previous studies, it was revealed that the longer the use of a product, the higher the price acceptability of a consumer. Firstly, we narrowed subjects down to relatively frequently purchased products considering importance of consumers' repeat purchase and excluded dispensable products to control one of the affecting factors, essentiality of a product. Secondly, to eliminate influence by a substitute factor, only those items which contain more than 5 available brands were selected (e.g. There are more than a dozen shampoo brands on market). According to period and interval of use, products are classified into two groups, one is a long-term/continuous use product group and the other is short-term/temporary use prod-

uct group.

### Perceived risk

There are several types of perceived risk; financial risk, performance risk, social risk, physical risk, time risk, and psychological risk (Garner 1986; Stone and Gronhaug 1993).

In order to define an applicable type of perceived risk for this study and control other proven factors affecting price sensitivity, the following criteria are applied.

Firstly, the items used in this study are limited to those items which can be easily purchased and used by any grown up regardless of sex and age. Hence, time risk, social risk and psychological risk are alleviated. Secondly, to eliminate influence by each item's base price and reduce financial risk, items of which base prices are below 2,000 JPY are selected. Thirdly, to segment a high perceived risk product group and a low perceived risk product group, we narrowed subjects for this study into household products and medicines. Hence, physical risk is weighted more than other types of perceived risk.

### 2 by 2 matrix model and selected items

In this study, we used two crucial factors, consumers' perceived risk and period/interval of use. As a concept for a 2 by 2 model, we categorized horizon axis by period and interval of use, and vertical axis by consumer's perceived risk.

Products, on which consumer's perceived risk is low and which are used temporary, are classified in category 1. Thus, household products used aperiodically or seasonally fall into this category. Products, on which consumer's perceived risk is high and which are used temporary, are classified in category 2. Therefore, medicines used temporary or seasonally belong to this category. Products, on which consumer's perceived risk is low and which are used continuously, are classified in category 3. Thus, daily-used household products are categorized in this category. Products, on which consumer's perceived risk is high and which are used continuously, are classified in category 4. Therefore, medicines used for long-term period belong to this category.

Prior to a main survey, a preliminary survey was conducted to pick out appropriate items to be used for the main survey, corresponding to the concept of each category. 10 people who range in ages from the 20s to the 50s were interviewed to classify 30 household and medicine items into 4 categories specified above. The items which are categorized in the same group by majority of the respondents and which are easily purchasable and frequently used were finally selected. The 12 items selected for our main survey are presented in the Figure

2; mask, deodorant, and bandage for category 1; cold remedy, pain reliever and antiallergic agent for category 2; toothpaste, shampoo and hand soap for category 3; and vitamin, eye drops and stomach medicine for category 4.

Figure 2. 2 by 2 matrix model and selected items

| | Temporary but frequent /Seasonal use | Continuous/ Long-term use |
|---|---|---|
| Low Perceived Risk (household products) | **Category 1**<br>Mask<br>Deodorant<br>Bandage | **Category 3**<br>Toothpaste<br>Shampoo<br>Hand soap |
| High Perceived Risk (medicines) | **Category 2**<br>Pain reliever<br>Cold remedy<br>Antiallergic agent | **Category 4**<br>Vitamins<br>Stomach medicine<br>Eye drops |

(Source: Author's own figure)

## Hypothesis

We hypothesize that;

> ***H1****: The latitude of price acceptance above consumer's perceived reference price, for the products on which consumer's perceived risk is high, is larger than that of the products on which consumer's perceived risk is low.*

Perceived risk has a powerful effect on both evaluation of the deal and purchase intention (Wood & Scheer 1996). Consumers usually seek to alleviate greater perceived risk by purchasing a higher-priced product (Shapiro 1968; Lambert 1972; Peterson & Wilson 1985). H1 is aligned with the results of previous studies. But in this study, using a 2 by 2 matrix model each high and low perceived risk product group will be subdivided into 2 groups by period/ interval of use. And then statistical difference in the mean of upper price limit between category 1 and 2, and category 3 and 4 will be analyzed.

> ***H2****: The latitude of price acceptance above consumer's perceived reference price, for long term/ continuous use products, is larger than that of short-term temporary/seasonal use products.*

Prior knowledge of price and quality ranges will affect the width of the acceptable price range, and the upper limit of consumers' acceptable price range will increase with increasing prior knowledge until it reaches a point at which it corresponds to the high end of the pre-

vailing market price (Rao & Sieben 1992). If period of use is longer or interval of the product purchase is short, consumers knowledge on the product will increase based on the purchase and use experience. Moreover, product involvement which positively affects price acceptability (Donald et al. 1988) will also increase. H2 is aligned with the results of previous studies. But in this study, using a 2 by 2 matrix model each long term/continuous use product group and short-term temporary/seasonal use product group will be subdivided into 2 groups by consumer's perceived risk. And then statistical difference in the mean of upper price limit between category1 and 3, and category 2 and 4 will be analyzed.

> ***H3**: The consumers who purchased a product within a year have larger latitude of price acceptance above consumer's perceived reference price for the product, than the consumers who have not purchased the product within a year.*

It is suggested in the previous study that if consumption outcomes are uncertain, consumers should be more price sensitive (Tellis & Gaeth 1990), and subjects who are uninformed about price have lower acceptable price limits than subjects who are informed about price (Fouilhe 1970; Kosenko & Rahtz 1988). Non-purchasers have uncertainty about the product and are uninformed about the product price than purchasers. H3 is aligned with the results of previous studies but using a 2 by 2 matrix model, it will also be analyzed which category is more affected by consumers' purchase experience. Thereby, a specific product group to be affected by consumers' purchase experience will be defined in this study.

> ***H4**: The width of latitude of price acceptance above consumer's perceived reference price is greater than the width of latitude of price acceptance below consumer's perceived reference price, for the products on which consumer's perceived risk is high.*

The acceptable price range incorporates two dimensions, a width dimension and a level dimension, therefore individuals may differ not only in how wide a range of prices but also in whether this range is centered (Lichtenstein et al. 1988; Rao & Sieben 1992). In a certain category, consumers have wide price threshold both above and below reference price, therefore, both high and low prices are acceptable for them. But in another category, consumers have a wide price threshold above reference price but have narrow price threshold below reference price, therefore, a high price is more acceptable for them than a low price.

H4 is built to analyze whether the price threshold of the high perceived risk group (category 2 and category 4) is weighted toward higher prices. In addition, by subdividing each category into two groups using purchase experience within a year, it will also be analyzed in this

study whether there is a difference in the price threshold type (skewed towards higher prices or lower prices, or equal) between a purchaser group and a non-purchaser group in the same category.

## 3. Research method

### Sample

The purpose of this study is to define differences in price thresholds among categories.

The survey was conducted during 2 months in different time and areas (Tokyo and Fukushima) and total 90 people over the age of 20 participated in the survey. Questionnaires were distributed to the respondents and the task was administered in their homes or offices and took about 10 min. Since several respondents' responses were incomplete or inconsistent, only 80 respondents' responses were adopted for analysis. Respondent sex and age were variously distributed, and there were 16 in their 20s (male: 9, female: 7); 20 in their 30s (male: 8, female: 12); 18 in their 40s (male: 12, female: 6); 17 in their 50s (male: 7, female: 10); and 9 in their 60s (male: 8, female: 1).

### Measure

The questionnaire contained demographic questions asking respondents to report their sex, age, the number of their household and annual household income. 12 items, 3 items corresponding to each category, selected in the preliminary survey were listed in the questionnaire in a random order and no category information was given in the questionnaire.

The most commonly used quantity or volume, and package of each item were given with an image in the questionnaire (each page describes each different item), and respondents were asked to respond to the following questions listed in the same page on the basis of the given information on each item (ex. a carton/pack of cold medicine in a tablet/capsule form for 3 days including 18-27 pills). For each item, respondents were asked to answer yes or no to their purchase experience of the item within a year, and to write a numeric value of their perceived reference price (ex. "The average price of a cold medicine I think is (  ) JPY"), upper price limits (ex. "I can/will do pay maximum (  ) JPY to buy a cold medicine") and lower price limits (ex. "I do/will not buy a cold medicine of which price is lower than (  ) JPY", with the comment of "This question is to explore consumers' resistance to a lower price product") of the item.

In order to compare mean of the latitude of price acceptance above consumer's perceived

reference price, and the latitude of price acceptance below consumer's perceived reference price among 4 categories, each numeric value for upper and lower prices acceptable for individual customers was converted into a percentage based on the mean of consumer's perceived reference prices for each item.

# 4. Results

## Gender difference

It is widely regarded that women are more involved in the purchasing activity and more aware of actual market price than men in terms of household items including medicine. To examine the mean differences between men and women with reference to the perceived reference price, upper price limit (threshold) and lower price limit (threshold) for each item, several *t*-tests were conducted. There was no statistically significant difference in mean between men and women for the perceived reference prices except pain reliever ($M_{m=}$988 vs $M_w$=1,199, $t$(59)=-2.252, $p$<0.05) and shampoo ($M_{m=}$722 vs $M_w$=1,082, $t$(42.8)=-2.509, $p$<0.05), and for the upper price limits except shampoo ($M_{m=}$1,205 vs $M_w$=1,945, $t$(45.1)=-2.723, $p$<0.01) while 5 out of 12 items showed statistically significant differences in means between men and women for the lower price limits; vitamin ($M_{m=}$665 vs $M_w$=491, $t$(67.6)=2.193, $p$<0.05), deodorant ($M_{m=}$495 vs $M_w$=325, $t$(66.7)=3.131, $p$<0.01), hand soap ($M_{m=}$234 vs $M_w$=135, $t$(58.4)=3.771, $p$<0.001), stomach medicine ($M_{m=}$633 vs $M_w$=458, $t$(56.1)=2.741, $p$<0.01), and bandage ($M_{m=}$200 vs $M_w$=113, $t$(67.1)=3.363, $p$<0.01). The descriptive statistics on each item are shown in the Table 1.

## Price thresholds comparison

The hypothesis 1 and 2 hold that the means of the latitude of price acceptance above consumer's perceived reference price ("upper price limit (threshold)") will vary depending on period/interval of the use and level of perceived risk on a product.

There was no significant difference in the means of upper price limits (thresholds) between the high perceived risk product group (category 2 & 4) and low perceived risk product group (category 1 and 3): $M_{category2\&4}$=1.42 and $M_{category1\&3}$=1.54, and between long term/continuous use product group (category 3 & 4) and short-term temporary/seasonal use product group (category 1 & 2): $M_{category3\&4}$=1.52 and $M_{category1\&2}$=1.44.

The means of upper price limits (thresholds) across the categories which were classified by period/interval of the use and level of perceived risk, were as follows: $M_{category1}$=1.41, $M_{cate-}$

$_{gory2}$=1.46, $M_{category3}$=1.67 and $M_{category4}$=1.36. And the means of 4 categories were significantly different (F(3,514)=3.392 P<0.05).

Table 1. Statistics

| | | | reference price | upper price | lower price |
|---|---|---|---|---|---|
| Category 1 | Mask | *M* | 364.86 | 512.03 | 141.27 |
| | | *SD* | 239.35 | 357.72 | 99.43 |
| | Deodorant | *M* | 745.95 | 1,075.95 | 417.81 |
| | | *SD* | 340.27 | 650.88 | 265.17 |
| | Bandage | *M* | 415.38 | 575.00 | 161.15 |
| | | *SD* | 229.95 | 323.31 | 128.04 |
| Category 2 | Pain reliever | *M* | 1,085.64 | 1,469.23 | 515.38 |
| | | *SD* | 412.06 | 708.81 | 218.66 |
| | Cold remedy | *M* | 1,103.59 | 1,891.03 | 573.08 |
| | | *SD* | 375.37 | 989.19 | 237.78 |
| | Antiallergic agent | *M* | 1,335.44 | 1,773.42 | 641.77 |
| | | *SD* | 617.70 | 937.50 | 430.22 |
| Category 3 | Toothpaste | *M* | 399.24 | 732.89 | 199.74 |
| | | *SD* | 227.79 | 517.66 | 131.84 |
| | Shampoo | *M* | 880.13 | 1,530.67 | 429.33 |
| | | *SD* | 594.51 | 1,143.49 | 287.83 |
| | Hand soap | *M* | 432.10 | 626.50 | 194.48 |
| | | *SD* | 223.15 | 373.73 | 146.98 |
| Category 4 | Vitamins | *M* | 1,478.21 | 2,032.05 | 589.10 |
| | | *SD* | 928.54 | 1,868.29 | 381.10 |
| | Stomach Medicine | *M* | 1,164.56 | 1,511.39 | 553.16 |
| | | *SD* | 576.69 | 1,164.65 | 311.26 |
| | Eye drops | *M* | 698.75 | 998.75 | 346.25 |
| | | *SD* | 318.02 | 500.69 | 222.87 |

As shown in the Table 2, it was revealed with Games-Howell post hoc test that there was a statistically significant difference in the means of upper price limit between category 1 (low perceived risk & short-term/temporary use products) and category 3 (low perceived risk & long-term/continuous use products), and between category 3 (low perceived risk & long-term/continuous use products) and category 4 (high perceived risk & long-term/continuous use products).

Regarding hypothesis 1, although there was a difference in the means of upper price limit between category 3 and category 4, the mean upper price limit of category 3 was greater than that of category 4 which is opposite to hypothesis 1 (the higher the perceived risk, the higher the upper price limit). Hence, hypothesis 1 was not supported.

Regarding hypothesis 2, although there was no difference in the means of upper price limit between category 2 (high perceived risk & short-term/temporary use products) and category

4 (high perceived risk & long-term/continuous use products), a statistically significant difference in the means of upper price limit between category 1 (low perceived risk & short-term/temporary use products) and category 3 (low perceived risk & long-term/continuous use products) was observed. Therefore, hypothesis 2 was partially supported and it is implied that the longer the period of use, the higher the upper price limit for the low perceived risk products.

For reference, there was no statistically significant difference in the means of lower price limit (threshold) among 4 categories.

Table 2. post hoc test (*Games-Howell*) for multiple comparisons

| Dependent Variable | Category | Category | Mean Difference | *SE* |
|---|---|---|---|---|
| upper price limit | 1 | 2 | -0.05 | 0.08 |
| | | 3 | -0.26 * | 0.10 |
| | | 4 | 0.04 | 0.09 |
| | 2 | 1 | 0.05 | 0.08 |
| | | 3 | -0.21 | 0.09 |
| | | 4 | 0.10 | 0.08 |
| | 3 | 1 | 0.26 * | 0.10 |
| | | 2 | 0.21 | 0.09 |
| | | 4 | 0.30 * | 0.10 |
| | 4 | 1 | -0.04 | 0.09 |
| | | 2 | -0.10 | 0.08 |
| | | 3 | -0.30 * | 0.10 |

Note: * $p<0.05$

To analyze differences in the means of upper price limit (threshold) between two consumer groups classified by purchase experience of a relevant item within a year, we conducted *t*-tests. As shown in the Table 3, no significant difference in means of upper price limit (thresholds) between the purchaser group and the non-purchaser group was observed in the low perceived risk product group (category 1 and category 3).

On the contrary, there was statistically significant difference in means of upper price limit (threshold) between the purchaser group and non-purchaser group in the high perceived risk product group; category 2, high perceived risk & short-term/temporary use products ($M_{\text{purchaser}}$=1.77 vs $M_{\text{non-purchaser}}$=1.28, $t(118)=3.874$, $p<0.001$), and category 4, high perceived risk & long-term/continuous use products ($M_{\text{purchaser}}$=1.73 vs $M_{\text{non-purchaser}}$=1.15, $t(135)=4.465$, $p<0.001$). Hence H3 was partially supported in the categories of the products on which consumers' perceived risk is high and it suggests that the purchase experience of a high perceived risk product within a year positively affects the upper price limit for the product.

**Table 3. Results of *t*-tests for comparison of upper price limit**

| | Upper price limit | | | | |
|---|---|---|---|---|---|
| | Purchaser | | Non-Purchaser | | |
| | *M* | *SD* | *M* | *SD* | *t* |
| Category 1 (low perceived risk/short-term use) | 1.48 | 0.99 | 1.34 | 0.75 | 1.261 |
| Category 3 (low perceived risk/long-term use) | 1.70 | 1.24 | 1.54 | 0.85 | 0.804 |
| Category 2 (high perceived risk/short-term use) | 1.77 | 0.90 | 1.28 | 0.62 | 4.465 *** |
| Category 4 (high perceived risk/long-term use) | 1.73 | 1.32 | 1.15 | 0.68 | 3.874 *** |

Note: *** $p<0.001$

To analyze differences in the means of width between the latitude of price acceptance above consumer's perceived reference price, and the latitude of price acceptance below consumer's perceived reference price, several *t*-tests were conducted.

**Table 4. Results of *t*-tests for comparison of latitude of price acceptance**

| | Purchaser | | | | | Non-Purchaser | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | above | | below | | | above | | below | | |
| | *M* | *SD* | *M* | *SD* | *t* | *M* | *SD* | *M* | *SD* | *t* |
| High perceived risk (2&4) | 0.74 | 1.13 | 0.48 | 0.25 | 3.055 ** | 0.22 | 0.66 | 0.55 | 0.28 | -8.047 *** |
| Category 2 | 0.76 | 0.90 | 0.46 | 0.20 | 2.933 ** | 0.29 | 0.63 | 0.54 | 0.27 | -4.292 *** |
| Category 4 | 0.73 | 1.32 | 0.49 | 0.29 | 1.633 † | 0.15 | 0.68 | 0.58 | 0.28 | -7.055 *** |
| Low perceived risk (1&3) | 0.62 | 1.15 | 0.56 | 0.31 | 0.835 | 0.39 | 0.78 | 0.50 | 0.36 | -1.538 |
| Category 1 | 0.48 | 0.99 | 0.59 | 0.31 | -1.06 | 0.34 | 0.75 | 0.53 | 0.34 | -2.472 * |
| Category 3 | 0.70 | 1.23 | 0.54 | 0.31 | 1.672 † | 0.55 | 0.86 | 0.42 | 0.40 | 0.867 |

Note: † $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

As shown in the Table 4, statistical difference in means of width between the latitude of price acceptance above consumer's perceived reference price, and below consumer's perceived reference price, was found in the non-purchaser group of category 1 ($M_{above}$=0.34 vs $M_{below}$=0.53, $t(238)$=-2.472, $p<0.05$). However, there was no significant difference in means of width between the latitude of price acceptance above consumer's perceived reference price and below consumer's perceived reference price, in both purchaser and non-purchaser groups of the low perceived risk product group (category 1 and category 3).

On the contrary, there was statistically significant difference in means of width between the latitude of price acceptance above consumer's perceived reference price, and below consumer's perceived reference price in the purchaser group ($M_{above}$=0.74 vs $M_{below}$=0.48, $t(350)$=3.055, $p<0.01$) as well as non-purchaser group ($M_{above}$=0.22 vs $M_{below}$=0.55, $t(590)$=-8.047, $p<0.001$) of the high perceived risk product group (category 2 and category 4). And corresponding results were obtained in category 2 and category 4 respectively.

The interesting result obtained from this study is that in the purchaser group of the high perceived risk product group, the width of latitude of price acceptance above consumer's perceived reference price was greater than the width of latitude of price acceptance below consumer's perceived reference price. But the opposite results, width of latitude of price acceptance below consumer's perceived reference price was greater than the width of latitude of price acceptance above consumer's perceived reference price, was shown in the non-purchaser group of the high perceived risk product group. And the corresponding results were shown in the individual result of category 2 and category 4 respectively.

Regarding hypothesis 4, price threshold on the high perceived products is skewed toward higher price only in a purchaser group, therefore, hypothesis 4 was partially supported. And it is implied that for high perceived products, purchasers have a wider price threshold above reference price than below reference price, while non-purchasers have a wider price threshold below reference price than above reference price. In other words, higher prices above reference price are more likely to be acceptable for purchasers than lower prices, while lower prices are more likely to be acceptable for non-purchasers than higher prices.

## 5. Discussion and Managerial Implications

It was revealed in previous studies that product sensitivity decreases as consumer's perceived risk on a product increases and as consumer's evaluation period of a product is longer. (Gupta & Cooper 1992; Kalyanaram & Little 1994; Helson 1964; Kalwani & Yim 1992). However, with the results of our study, there was no significant difference in the mean of upper price limits (threshold) between a low perceived risk product group (category 1 & 3) and a high perceived risk product group (category 2 & 4), and between a long term/continuous use product group (category 3 & 4) and a short-term temporary/seasonal use product group (category 1 & 2) .

On the other hand, in the subdivided results, it is revealed that in case of a low perceived product group (category 1 & 3), there was a statistically significant difference in the mean of upper price limits (threshold) between a long term/continuous use product group (category 3) and a short-term temporary/seasonal use product group (category 1). With this result, it is suggested that period/interval of product use positively affects upper price limit (threshold) of the products on which consumer's perceived risk is low.

In the same manner, a significant difference in the mean of upper price limits (threshold) between a purchaser group and a non-purchaser group was shown only in a high perceived

product group.

In previous studies, it was revealed that if a consumer has uncertainty on a product and are uninformed about the price of the product, the consumer tends to be price sensitive. (Tellis & Gaeth 1990; Fouilhe 1970; Kosenko & Rahtz 1988). Therefore, we expect that the purchaser group has higher upper price threshold than that of the non-purchaser group. However, the previous theory was applied only in the high perceived product group. Therefore, with these subdivided results, it is clearly implied that a between or among product analysis needs to be conducted to clearly determine what combination of factors have what kind of influence on consumers' purchase behavior and price threshold.

In our study, the mean of upper price limit (threshold) of category 4 was the lowest among 4 categories in spite of its categorization as a high perceived risk products, therefore, it could be argued that the items selected for category 4 were appropriate for this study in terms of the level of perceived risk, in other words, whether there is an enough difference in means of consumer's perceived risk between category 2 and category 4.

On the other hand, several interesting results were obtained from this study.

Firstly, it was revealed that, those who have purchased a high perceived risk product within a year are less sensitive to a high price of the product, while those who have not purchased the product within a year are sensitive to a high price. In previous studies, it has been shown that consumers purchase a higher-priced product to reduce perceived risk (Shapiro 1968; Lambert 1972; Peterson & Wilson 1985). In other words, consumer's perceived risk positively affects price threshold above a reference price. However, the previous theory was applied only in the purchaser group, therefore, with the results of our study, it is suggested that consumer's perceived risk positively affects price threshold above a reference price for only the consumers who have purchased the relevant product within a year. It is also interpreted that the tendency (consumer's perceived risk positively affects price threshold above a reference price) revealed in previous studies may be increased and reinforced, if consumers have an experience in buying the relevant product within a year.

Secondly, it was found in this study that, regarding the products on which consumer's perceived risk is high, the range from consumer's average perceived reference price to upper price threshold is greater than the range from consumer's average perceived reference price to lower price threshold, in the consumer group who have purchased a product within a year. On the other hand, in the consumer group who have not purchased a product within a year, the range from consumer's average perceived reference price to lower price threshold is greater than the range from consumer's average perceived reference price to upper price

threshold.

Given the findings that the price threshold of purchasers is skewed towards higher prices and that of non-purchasers is skewed towards lower prices, it is implied that non-purchasers are more likely to be sensitive to a high-price of the products on which consumer's perceived risk is high.

And from a managerial implication point of view, it is also implied that through repeat purchase of the products, consumers could turn into less high-price sensitive consumers, and the results presented in this study suggest that marketers should pay more attention to repeat purchase when they consider raising a price of the products on which consumer's perceived risk is high considering our findings; the more the repeat purchase, the less the price sensitivity when it comes to the products with high perceived risk.

In this study, most findings are related to the high perceived risk product group, therefore, it is also suggested that price thresholds of high perceived risk products are more likely to be affected by the factors than that of low perceived risk products.

Lastly, although the hypotheses in this study are partially supported, this does still have significant implication to have shown the need of a supplementary/additional study of the previous findings using a between/among product category analysis.

## 6. Limitations and Future Research

This study has several limitations.

Firstly, as previously stated, representative items for category 4 (long-term/continuous use & high perceived risk) may not be adequate for this study in terms of the level of perceived risk.

Since most candidates for category 4 on which consumer's perceived risk is quite high, are the medicines for the treatment of chronic diseases such as high blood pressure, high cholesterol or urinary incontinence, we had to eliminate the items considering that less people use those items.

For this reason, the selected items for category 4 (vitamin, stomach medicines and eye drops) may not meet the condition, high-level perceived risk, representing the product features of category 4. The mean of upper price limit (threshold) of category 4 was lowest among 4 categories and it resulted the rejection of hypothesis 1 and 2. In this regard, to verify hypothesis 1 and 2, additional studies with different items need to be conducted in the future.

Secondly, although 12 items were selected and categorized with the results of a preliminary study, the categorization may not be incongruent to a certain respondent. For example, a mask was categorized in this study as category 1 but a certain respondent may use masks continuously.

Thirdly, the difference in base prices may affect the results of this study. Notwithstanding our efforts to eliminate the base price factor, the average consumer's perceived reference prices vary among 12 items with the range of 395 to 1,478. Therefore, we had to convert prices to percentages based on the average consumer's perceived reference price of each category to compare the means of upper price limit (threshold) among 4 categories. Therefore, in a future study, base prices need to be well controlled by selecting items of which base prices are similar.

Fourthly, our study model was not subject to regression analysis, in other words, we did not investigate the relationships among variables. Therefore, our study implies necessity of regression analysis with the factors used for this study and previous studies.

Lastly, this study was conducted on a small scale in terms of number of respondents, therefore, verification of the hypotheses in a larger scale or with a different research method need to be considered in a future study.

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