6  PRICE CHANGE AND ASYMMETRIC EFFECTS ON PERCEPTION OR PRICE UNFAIRNESS

When compared to the reference price, actual price can have a negative or positive implication for consumers; i.e. it can be coded as a gain or a loss. Prospect theory suggests that losses are experienced more intensely than gains of equal magnitude. That is losses loom larger than gains (Kahneman and Tversky, 1979; Einhorn and Hogarth, 1981). Therefore, the impact of price change on PPU will be asymmetric. Consider a unit decrease in price leading to a unit increase in PPF. This increase in PPF will be lower in absolute magnitude than the decrease in PPF when the price is increased by a unit. In short, loss in PPF due to a quantum price increase cannot be reversed by the same quantum of price decrease. If PPF, (Re)Purchase Intention and Demand are highly correlated then the primary implication of the finding of this short study to marketers is that price increases and decreases may have asymmetric impact on demand. We investigate this asymmetric effect of price change on PPU/F in this short chapter.

6.1 Conceptual Framework

Prospect Theory (Kahneman and Tversky, 1979) is a descriptive theory of an individual’s subjective evaluation of all alternatives faced by him/her. The evaluations are with respect to a neutral reference point. Some alternatives may mean disutility and other utility to the individual. Such evaluations result in an S-shaped value function (see Figure 11 in page 125).

As depicted in Figure 11 page 125, the theory posits that an individual’s judgment is (1) reference dependent, (2) subject to loss aversion and (3) subject to diminishing sensitivity with increasing values of objective gains or losses. Reference dependence indicates that valuation of an alternative is subject to a neutral reference point. In the study’s context, a reference point may be an IRP. Loss aversion implies that a unit loss is weighted more than a unit gain. Diminishing sensitivity implies that marginal values of both gains and losses decrease with their size.
Loss aversion is of particular interest to us in this study and hence requires more elucidation. Loss aversion indicates that the loss curve is steeper, i.e. has a larger slope, at the origin than the gain curve. That is, losses are more intensely felt than gains of equal magnitude. To explain, in absolute terms, a unit gain (say Rs. 100) may result in lower units of pleasure (say 25 units) as opposed to a unit (say Rs. 100) loss’s pain (say 50 units); that is a Rs. 100 loss is felt more intensely than a Rs. 100 gain; that is a unit loss is weighted more than a unit gain (in this case, twice).

Perception of price (un)fairness is fuelled by the difference between fair price and actual price, i.e. the transaction (dis)utility (Thaler, 1985). Transaction utility is when the fair price higher than the actual price and it is transaction disutility when the actual price is greater than the fair price. The higher is the transaction utility, the higher is the perception of price fairness; and the higher is the transaction disutility, the higher is the perception of price unfairness.

Consider a reference (fair) price of Rs. 100 for a product. If the actual price were Rs. 90, (in absolute terms) the increase in the fairness perception may be lower than the decrease in fairness perception if the actual price were Rs. 110. Fall in fairness perception for a given (negative) change of Rs. 10 is much more in absolute terms.
than the rise in fairness perception for the same given (positive) change of Rs. 10. That is, the effect of a positive or a negative change of price on PPU/F is asymmetric.

**H1:**  *The impact of objective price difference on perception of price (un)fairness is asymmetric.*

In the Prospects Theory, the main indicator of the concept of Loss Aversion (which indicates the asymmetric effects of gain/loss on utility/disutility) is the slope of the ‘loss function’ being steeper than the slope of the ‘gain function’. We extend this to the relationship between price difference / change and perception of price (un)fairness.

There can be essentially two groups of consumers possible at any given time. The first group comprises the advantaged consumers, whose difference between fair price and actual price is positive and therefore consider the price as fair. The second group comprises the disadvantaged consumers, whose difference between fair price and actual price is negative and therefore consider the price as unfair.

In line with Prospects Theory, the slope of the line representing the disadvantaged consumers will be more than the slope of the line representing the advantaged consumers.

The need for testing this hypothesis may rest in its marketing implications and the fact that no prior research exploring the relationship between price difference / price change and perception of price (un)fairness. While we discuss the marketing implications in detail later, briefly, the implications are that a unit increase in actual price and its consequent loss of utility may not be possibly recouped by a unit decrease in actual price’s consequent gain in utility.

The hypothesis is validated through two datasets. The first dataset (study – 1) is from a survey of airfare and PPU/F, among other data, in revenue managed markets (a previous study in this thesis). The second dataset (study – 2) is collected specially for this study via an experiment that varies prices to assess PPU/F in a consumer apparel setting.
In both the data sets, the fair price and the actual price were/are collected. The resultant gain/loss (in transaction utility) is expected to impact the perception of price (un)fairness in the predicted asymmetric way. The core of the hypothesis is that the line representing the disadvantaged or the PPU or the case of transaction disutility has greater slope than the line representing the advantaged or the PPF or the case of transaction utility. The difference in the slope, especially the increased or higher slope for the disadvantaged consumer’s PPU is due to the loss aversion.

6.2 Study – 1

Recall, in Chapter 4 we analyzed the impact of different prices in a revenue managed market (the case of airlines) on PPU/F along with other variables such as perceived quality, perceived price, perceived value etc. We had in that study elicited the fair price or fair airfare for an intended flight and also elicited the actual fare paid along with perceptions of price (un)fairness. We take these three actual data points as reported by the subjects for the current study.

The difference between reported fair price and actual price can be construed as a gain or loss, i.e. transaction utility or disutility, as the case may be, for each consumer.

The PPU was measured using a two-item scale with a reliability of $\alpha = 0.89$. For current purposes, we sum the two items of the scale and average it. We also reverse the averaged scale; the scale now is for PPF and not unfairness.

6.2.1 Analysis and Findings

The prepared data variables ‘gain / loss’ representing the difference between fair price and actual price was set as the independent variable with ‘ppf’ representing dependent variable and the PPF. Various curves were fitted, such as linear, quadratic, cubic, exponential, growth and compound. The results are in Table 4 below (please see next page):
We can infer from Table 4 in page 128 that the relationship between Gain / Loss, i.e. Price Difference between Fair price and Actual price on the one hand and PPF on the other is Cubic in nature, the model is significant (F=497.87; p < 0.000) and with the highest r-square of 0.857. The relationship is shown in Figure 12. The fitted-curve is indeed an S-shaped curve as expected in line with Prospect Theory.

![Figure 12: Relationship between Gain / Loss in Rs., i.e. price difference, and PPF](image-url)
While it is impossible to prove that a relationship between two variables is cubic in nature, we present other circumstantial evidences that allude to the possibility that the relationship is indeed cubic.

The error terms after fitting the above cubic curve is normal.

![Histogram of Error Terms](image)

**Figure 13: Plot of Error Terms of the Cubic Function**

The KS Test for normality of error reveals that the mean is indeed 0.000 with KS Z statistic being = 0.568 with p > 0.903. The error terms are indeed normal.

Recall the objective is to prove that the slope of the line representing the disadvantaged consumers is greater than the slope of the line representing the advantaged.

The Equation for the line representing relationship between price difference and PPF is:

$$PPF = 4.09 + 0.002X - 0.0000001X^2 - 0.0000000001X^3$$  \hspace{1cm} \text{Equation 9}

Where, PPF is Perception of Price Fairness and X is Gain / Loss (or the price difference between fair price and actual price).

The first order derivative is the slope of the equation (9) and is:
\[
\frac{dPPF}{dX} = 0.002 - 0.00000002X - 0.0000000003X^2
\]

Equation 10

The second order derivative of equation (9), when set zero provides the inflection point that separates the group into two: one disadvantaged and the other disadvantaged. The second order derivative is:

\[
\frac{ddPPF}{dX} = -0.00000002 - 0.0000000006X
\]

Equation 11

Setting the second order derivative (i.e. equation (11)) to zero and solving for X, the inflection point is Rs. -333.33 or say Rs. -333. That is, any respondent whose difference between fair price and actual price is less than Rs. -333 would be categorized as the disadvantaged group and the rest would be categorized as advantaged.

Recall the objective of the hypothesis testing is to prove that the slope of the ‘loss function’ is greater than the slope of the ‘gain function’. For a cubic function, the slope at any given point in the curve is its first order derivative. If the average of the slopes of the ‘loss function’ is greater than the average of the slope of the ‘gain function’, then the inference about the implications due to ‘loss aversion’ may be appropriate.

Slopes for each of the sections of the curve, viz. gain and loss (i.e. price difference between fair price and actual price) is computed which is applying the first order derivative or equation (2) to the data set or each case or gain / loss. The mean slope of the ‘Disadvantaged’ is significantly different from the mean slope of the ‘Advantaged’ (F(1,251)=12.742; p < 0.000). The mean slope of the disadvantaged is 0.00186 and the advantaged is 0.00166. This means, with respect to a neutral reference point, when the transaction disutility increases the PPF falls 1.12 times faster than the rate of increase in PPF when the transaction utility increases. This proves H1.

It is of interest to note that even if the inflection point was considered to be zero, and not Rs. -333, the result is the same. The mean slope of the ‘Disadvantaged’ is
significantly different from the mean slope of the ‘Advantaged’ (F(1,251)=49.82; p < 0.000). The mean slope for the disadvantaged is 0.001913 and the advantaged is 0.001561.

A question may arise whether the results, that is the slope of the ‘disadvantaged’ value function is greater than that of the ‘advantaged’ because of the choice of the functional form (i.e. cubic or quadratic etc.) or the data itself. The results hold good regardless of the functional form. For instance, the slope is similarly different even if the functional form were quadratic (F(1,251) = 362.013; p < 0.000), etc. Indeed, in some sense, the functional forms do not matter. However, it is common to assume a parametric form (e.g. a power utility function) even though this may seem to confound the general test of the theory with that of the specific parametric form (Tversky and Kahneman, 1979).

6.3 Study – 2

Study – 2 is an experiment rather than a survey data as in study -1. In this experiment, subjects respond to a hypothetical scenario of a purchase of a suit (clothes / apparel). The fair price is exogenously provided and the actual price is manipulated over nine different scenarios.

Three hundred and ninety six students of both full-time and executive programs of a large South Indian business-school were approached to participate in providing responses to the experiment. Responses of thirty three students were discarded since they failed to follow procedure or their responses were incomplete.

6.3.1 Stimuli

The stimuli consisted of scenarios describing a purchase of apparels category by the respondents. Several issues were resolved using pre-tests (n=32). They revealed that price fluctuations are not unusual in this category and students often purchase apparels (e.g. garments, suits etc.). For the focal product in this study – purchasing a tailored suit - (1) was relevant to the set of respondents, (2) the mean price of Rs. 7,200 for a tailored suit with price range from Rs. 5,000 – Rs. 9,600 (after removing outliers). Care was taken not to include the pretest respondents in the main study.

44 The responses were collected in early Jun 2008.
The base price for the tailored suit was set at Rs. 7,000/- considering the pre-tests and investigations in the market. A set of price discounts and increases were developed to be applied on the base (control) price of Rs. 7,000/- The set of discounts was 5%, 20%, 35% and 50%. Similarly, a set of price increase with same percentage as in the discount condition was also applied. Care was taken in line with studies in the past (e.g. Chen, Monroe and Lou, 1998) to include both percentage based price-change and final (revised) price, considering the base price and product.

Nine scenarios were developed as in Annexure 6. All participants were instructed as follows: “Imagine that you have been selected to interview for a great job that you would really like to get and you have decided to get a new two-piece suit stitched / tailored for the interview. You prefer suits stitched because they fit you the best. After shopping around, you found material (i.e. fabric) that you like with an in-store tailor in a decent store. After measurements and other processes, the tailored suit you liked is estimated to cost you Rs. 7,000/- in all.” Under the discount condition, when they return to the store the next week, they find that the composite price for making the suit, for the same material that they chose last week, has been decreased. At this moment, they learn the discount percent and the final price (e.g. “has been decreased by 20% to Rs. 5,600”). The discounts are 5%, 20%, 35% and 50% with the final price being Rs. 6,650/-, 5,600/-, 4,550/- and 3,500/- respectively. Under the price increase condition, when they return to the store next week, they find that the composite price for making the suit, for the same material that they chose last week, has been increased. At this moment, they learn the price increase percent and the final price (e.g. “has been increased by 20% to Rs. 8,400”). The price increases are 5%, 20%, 35% and 50% with the final price being Rs. 7,350/-, 8,400/-, 9,450/- 10,500/- respectively. In both the discount and the price increase conditions, the respondents learn that the reason for price is change is implementation of a new pricing plan.

6.3.2 Dependent Measures

The price change is expected to impact PPU and Purchase Intentions. Therefore, next, the participants rated Perceived Price Fairness of the final price to the respondent on a 7-point, 3-item scale, on fairness, unfairness (R), and reasonableness all anchored 1= “extremely” and 7= “not at all”; the Cronbach’s Alpha for PPF Scale is 0.893. The scale for PPF is mostly in line with several past studies (e.g. Lee-Wingate and
Corfman, 2006; Campbell, 2007). We slightly depart from a convention in literature; we name the scale as “Fairness” instead of ‘Unfairness’. The departure is no more than a matter of naming and has no other implication, especially of construct validity. The same scale measures ‘Unfairness’ if the values are reversed. We include both fairness and unfairness in the same scale, even though some may consider the two to be opposites.45

Lastly, the participants indicated their willingness to buy on a 7-point, 1-item scale anchored 1= “extremely unlikely” and 7= “extremely likely”.

6.3.3 Check Measures

Next, the participants rated the perceived typicality of the scenarios on a 7-point, 2-item scale anchored by “usual / unusual” and “typical / novel”. The scale has a reliability Cronbach’s Alpha = .7944 and the values are significantly less than the mid-point of the scale (t= -3.663, df 362, p < 0.000 and t= -4.229, df 362, p <0.000 respectively). Next, the participants were asked for their (1) age, and (2) gender. The data is homogenous in variance (Levene’s Test Static for df (8,354) = 0.952; p > 0.474).

6.3.4 Analysis and Results

The scales were summed and averaged to produce a single composite measure of PPF and Perceived Typicality.

ANOVA considering 9 levels of price changes and PPF is significant (F(8,354) = 126.881; p< 0.000). The means and standard deviations are shown in Table 5 (please see next page).

45 For more information on the debate see page 14.
<table>
<thead>
<tr>
<th>Price Change</th>
<th>N</th>
<th>Mean PPF</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50%</td>
<td>39</td>
<td>5.84</td>
<td>0.7680</td>
</tr>
<tr>
<td>-35%</td>
<td>42</td>
<td>5.87</td>
<td>0.9282</td>
</tr>
<tr>
<td>-20%</td>
<td>38</td>
<td>5.93</td>
<td>0.9142</td>
</tr>
<tr>
<td>-5%</td>
<td>41</td>
<td>4.96</td>
<td>0.9580</td>
</tr>
<tr>
<td>0</td>
<td>37</td>
<td>4.94</td>
<td>0.9224</td>
</tr>
<tr>
<td>5%</td>
<td>42</td>
<td>5.02</td>
<td>0.9353</td>
</tr>
<tr>
<td>20%</td>
<td>39</td>
<td>3.03</td>
<td>0.8944</td>
</tr>
<tr>
<td>35%</td>
<td>41</td>
<td>2.47</td>
<td>0.9916</td>
</tr>
<tr>
<td>50%</td>
<td>44</td>
<td>1.83</td>
<td>0.7384</td>
</tr>
<tr>
<td>Total</td>
<td>363</td>
<td>4.40</td>
<td>1.7450</td>
</tr>
</tbody>
</table>

Table 5: Means and Standard Deviations

Post-hoc tests reveal that means of PPF for a discount of 50%, 35% and 20% is similar; PPF for a price discount of -5%, no price change and a price increase of 5% are similar; and PPF for price increase of 20%, 35% and 50% are different. Thus one may note that for varying levels of positive equity, the PPF is stable; however, for any drop in equity in the negative side, the PPF falls significantly.

The means of PPF plot for different levels of discounts and price increases are shown in Figure 14 in page 134.
The hypothesis is that the slope of the line for positive inequity and PPF is lower than the slope of the line for negative inequity and PPF. The actual percentages of discounts and price increases were tested for relationship with PPF. The curve estimation reveals that the best fit is cubic. A look at Table 6 reveals that the best fit is cubic and is significant.

<table>
<thead>
<tr>
<th>Method</th>
<th>Rsq</th>
<th>d.f.</th>
<th>F</th>
<th>Sigf</th>
<th>b0</th>
<th>b1</th>
<th>b2</th>
<th>b3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear</td>
<td>0.6470</td>
<td>361</td>
<td>660.51</td>
<td>0.000</td>
<td>4.4287</td>
<td>-0.0457</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadratic</td>
<td>0.7030</td>
<td>360</td>
<td>425.88</td>
<td>0.000</td>
<td>4.8353</td>
<td>-0.0452</td>
<td>-0.0004</td>
<td></td>
</tr>
<tr>
<td>Cubic</td>
<td>0.7200</td>
<td>359</td>
<td>307.85</td>
<td>0.000</td>
<td>4.8389</td>
<td>-0.0640</td>
<td>-0.0004</td>
<td>9.80E-06</td>
</tr>
<tr>
<td>Compound</td>
<td>0.6190</td>
<td>361</td>
<td>587.01</td>
<td>0.000</td>
<td>3.9795</td>
<td>0.9869</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>0.6190</td>
<td>361</td>
<td>587.01</td>
<td>0.000</td>
<td>1.3811</td>
<td>-0.0132</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exponential</td>
<td>0.6190</td>
<td>361</td>
<td>587.01</td>
<td>0.000</td>
<td>3.9795</td>
<td>-0.0132</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Relationship between Price Change and PPF

The equation is

\[ PPF = 4.8389 - 0.064X - 0.0004X^2 + 0.0000098X^3 \]

Equation 12

In equation (12), PPF is Perception of Price Fairness and X is the level of price change. The first order derivative is its slope:

\[ \frac{dPPF}{dX} = -0.064 - 0.0008X + 0.0000294X^2 \]

Equation 13

The second order derivative of equation (12), when set zero provides the inflection point that separates the group into two: one disadvantaged and the other disadvantaged. The second order derivative is:

\[ \frac{d^2PPF}{dX^2} = -0.0008 + 0.0000588X \]

Equation 14

When equation (14) is set to zero and solved for X, X=13.6; i.e. all consumers who receive a price increase of 13.6% or above is disadvantaged and a price increase of less than 13.6% or discounts is advantaged. The slope, as per equation (13) was
computed for each case. The mean slope of the disadvantaged is significantly different from the advantaged (F(1,361) = 29.289; p < 0.000). The slope change for the disadvantaged is -0.050796 and for the advantaged is -0.029577 and the ‘steepness’ of the slope for the disadvantaged is 1.72 times more than that of the advantaged. Thus H1 is proved again.

We explored relationship between PPF and PI. A regression analysis reveals that the model is significant (F(1,361) = 1110.611; p < 0.000) with a high r-square = 0.755.

6.4 Limitations
As in the other studies of the thesis, this study too suffers the limitation of use of student sample.

6.5 Conclusions and Discussions
We demonstrated through two studies that the price change has an asymmetric impact on PPU or PPF. The core issue is the proof akin to proving ‘loss aversion’ in the prospects theory; that is the slope of the ‘transaction disutility to PPU curve’ is greater than ‘transaction utility to PPF’ curve.

In the first study we took the data-set of a previous study that explored the relationship between transaction (dis)utility (signified by the difference between the fair price and the actual price) on the one hand and the perception of price (un)fairness on the other. A unit increase in ‘gain’ begets an increase in PPF at a lower rate than a unit increase in ‘loss’ impacts PPU. In the second study, we directly manipulated prices in an experiment to establish a relationship between price change and PPU/F. When the consumers were in an advantageous situation, a price change that improves the advantage begets an increase in PPF at a lower rate than when the consumers in the disadvantageous situation, a price change that deteriorates the disadvantage begets an increase in PPU. In the second study we also explored the relationship between PPF and Purchase intention; they were highly correlated.

That the impact of transaction (dis)utility on PPU/F is asymmetric has important implications to marketers. A unit fall in PPF may be more damaging to the consequences such as purchase intentions etc. than a unit gain in PPF. That is, in line
with Prospect Theory (Kahneman and Tversky, 1979), buyers under a loss condition show greater responsiveness than buyers under a gain condition. Firms practicing flexible pricing may have to consider the disadvantages that they may create when the prices are continuously moved up. Consequences of consumers’ stronger negative reaction may be difficult redeem.