

An experiment gauging affective responses to hypothetical price changes – extending ‘Prospect Theory’.

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Abstract

This study sought to extend the generalisability of ‘prospect theory’ to encompass affective response by consumers to price changes. The study examined buyer reaction to hypothetical price changes that occurred to a good after it was purchased. Reactions were recorded using ‘satisfaction with price paid’ scores on a 1 to 10 scale. The study found positive evidence for reference dependence and loss aversion; and limited evidence for diminishing sensitivity to larger losses or gains.

Introduction

It is widely accepted that consumers have reference prices for goods – an internal notion of price against which they compare current prices. The notion that judgement is anchored to a reference point is consistent with assimilation - contrast theory (Sherif and Hovland 1961). One of its substantive implications is that past prices may influence current decisions. Evidence for the reference price effect is summarized in Lowengart (2002).

The reference price concept implies that when consumers evaluate prices, they do so not in isolation but in terms of perceived changes to their internal reference point. This implies that the same absolute dollar change is seen differently, depending on the initial reference level. Furthermore, prices higher than expected are seen as ‘losses’ while prices lower than expected are seen as ‘gains’. When faced with a purchase decision, there is evidence that losses have greater impact on choice than gains (e.g. Novemsky and Kahneman 2005a; Novemsky and Kahneman 2005b; Thaler et al. 1997; Tversky and Kahneman 1991). The concepts of reference dependence and loss aversion are two tenets of Kahneman & Tversky’s ‘prospect theory’ (1979). The third tenet of prospect theory is diminishing incremental sensitivity to larger losses or gains. For example, the incremental impact of a loss of \$20 is apparently not double the impact of a loss of \$10.

The three tenets of prospect theory are important empirical generalisations. They have been validated in multiple studies. They also have normative implications. For example, based on loss aversion, Thaler recommends that losses be aggregated and gains be split out (1985). The posited consumer resistance to purchase resulting from offering temporary price reductions and then retracting them is also consistent with prospect theory (Kahn and Louie 1990).

Studies using the concepts of reference dependence and loss aversion as part of the prospect theory framework have examined situations such as differential willingness to pay for an item compared to willingness to sell it – the ‘endowment effect’ (Tversky and Kahneman 1991); myopic investment decisions (Thaler et al. 1997) and the altering of decisions based on whether a certain outcome is framed as a loss or a gain (Tversky and Kahneman 1986). Extensions into pricing included the modeling of consumer panel data that showed purchase behaviour consistent with loss aversion (Hardie et al. 1993). More recently Bell & Lattin (2000) questioned whether price response heterogeneity could exaggerate the loss aversion effect. This concern was confirmed by Klapper, Ebling and Temme (Klapper et al. 2005) who showed loss aversion in purchasing of grocery goods is small, after accounting for price response heterogeneity. So while prospect theory seems eminently supported in general, its relevance to consumer packaged goods may be limited, perhaps because the absolute dollar amount per item is small, or from limited consumer recollection of past prices. Therefore, perhaps further advances in knowledge in this area may be generated by:

“... the design of controlled experiments similar to that of Kalwani & Yim (1993) that can experimentally induce the reference points, verify their existence and assess whether people exhibit loss aversion in their choice decisions” - Mazumdar, Raj and Sinha (2005) p. 98.

It may also be the case that the design of such experiments might encompass phenomena wider than *choice*. Price changes may not only influence choice, they may also have some impact on consumer satisfaction with prices already paid. For example a consumer might purchase a good and later see that good at a different price. They might be in the store again or see price-related advertising. This post-purchase price change might induce an *affective* response – in other words, induce an impact on consumer feelings. No prior work was found that addresses this issue. Given the ubiquity of retail ‘sales’ and the likelihood that consumers revisit stores from which they have bought items on sale, this seems to be a fruitful topic for research.

In the situation described, lower prices than previously paid are not a gain, they represent a loss because the consumer paid more than they had to. Likewise, in this situation higher prices are not a loss, they represent a gain because the consumer paid less than they would have to if they bought later. In situations like this, the price change is not a potential influencer of choice. It may however be an important driver of positive or negative affect. Affect in turn might influence subsequent choice decisions, but this study first focuses on just affect. The study of affective response to price changes offers an opportunity to extend prospect theory from studies of choice or preference. In this case, the measure of affect is satisfaction with price paid (hereafter SWPP). Therefore the motivation for this study is to examine how information about how prices have changed post-purchase might differentially affect consumer satisfaction with price paid, according to (a) the reference level; (b) the sign and (c) magnitude of the price change post-purchase. Each of these corresponds to a tenet of prospect theory.

The three research questions are therefore:

Reference dependence: does the referent point influence the SWPP response to a loss or gain ? This is tested by comparing the same *absolute* level of loss or gain against two reference points. I compare the reaction to a \$20 loss or gain across two situations: one where the reference point is a \$100 purchase and one where the reference point is a \$200 purchase.

Loss aversion: Will perceived losses from seeing lower prices than what was paid have more effect on SWPP than perceived gains from seeing higher prices than what was paid ?

Diminishing sensitivity: Will there be diminishing incremental sensitivity to larger losses and larger gains compared to smaller losses and smaller gains, as per prospect theory ? This is tested by examining the change in SWPP from the control to the small loss or gain, compared to the change in SWPP from the small loss or gain to the larger loss or gain.

The Study

An experiment was conducted using consumers as respondents. Respondents were selected randomly from the telephone directory. This sampling scheme addresses a potential criticism of many prior studies in this area, namely the reliance on college students as respondents (Johnson et al. 2006). Interviews were conducted via telephone, by a team of professional market research interviewers. An across-subjects design was used. In other words, the effect of price changes relative to a reference level was conducted across subjects (one group was administered a particular price change treatment, another group received a different price change, etc) rather than within-subjects (respondents get a price change treatment, then another one, and another). The design used here also minimized demand effects, which are claimed by some to be a cause for observed loss aversion (Johnson et al. 2006). In other words, this study compares the results across groups who received different loss – gain treatments, not across respondents who received multiple loss-gain stimuli.

Respondents were all given an initial description of a shopping trip whereby they purchased a pair of shoes. They were read out a statement explaining that a week after their purchase they were in the same store and noticed the price of the shoes had changed. The scenario was manipulated across subjects who were randomly allocated to one of five treatment groups. For each group, the price of the shoes changed by a different amount: either going down 10%; down 20%; up 10%; or up 20%. There was also a control group that was administered a ‘no change’ treatment.

To examine the effect of a reference point, the initial price paid for the shoes was also manipulated across respondents, at either \$100 or \$200. If a respondent claimed they would never pay \$200 for a pair of shoes, the interviewers were instructed to transfer them to the \$100 scenario. No respondent did. The use of hundred-dollar increments as the two baseline conditions allows us to examine reference dependence that is not confounded with passing a specific dollar-based reference point – ie, passing \$100 or passing \$200. In total there were ten experimental groups in the study as shown in Table 1.

Table 1 Experimental Groups

<i>group</i>	Initially paid ..	Then saw item selling for ...	<i>group</i>	Initially paid ..	Then saw item selling for ...
1	\$100	\$80	6	\$200	\$160
2	\$100	\$90	7	\$200	\$180
3	\$100	\$100 (control group)	8	\$200	\$200 (control group)
4	\$100	\$110	9	\$200	\$220
5	\$100	\$120	10	\$200	\$240

Respondents were asked to rate their satisfaction and happiness with the price they paid for the shoes using a two-item 10 point scale (1=very dissatisfied 10=very satisfied; 1=very unhappy 10=very happy). Many other studies have used a single item scale. I used two items to reduce the random error from a single item, although it was probably not really necessary.

Prices that declined after purchase represent a loss to the consumer: they paid more than the subsequent price. Prices that increased after purchase represent a gain for the consumer, they paid less for the good than it was subsequently. Of course it is arguable that price reduction after purchase could represent the foregoing of a gain, and a price increase after purchase could represent the foregoing of a loss. However, the precedent in the literature is that facing a price higher than last experienced is a loss. All respondents were asked to rate their satisfaction with the price they paid after being told that they had seen this subsequent price.

Analysis

The dependent variable in this experiment is a mean score (average of happiness & satisfaction score) from each respondent. The correlation between the two scale items was $r=0.88$ so they can be justifiably averaged for analysis as one variable. The independent variables are the initial treatment level (\$100, \$200) and the price change (-20%, -10%, no change, +10%, +20%), which are coded as categorical variables. For some analyses the price changes are aggregated into coarser factors such as 'gain' v 'loss'. The analysis method used is one-way ANOVA.

Question 1. The impact of reference dependence

To test the impact of reference dependence I examine the impact of the \$20 loss when it is from a reference point of a \$100 purchase, compared to a reference point of a \$200 purchase. Gains are analysed in the same way. The control group mean is pooled across the \$100 and \$200 treatments. A one-way ANOVA with a Sidak post-hoc test showed that the mean SWPP for the \$20 loss was statistically significant from the mean SWPP for the control group when it was from a \$100 base, but not from a \$200 base. The same absolute dollar loss evoked more response depending on the reference level. Therefore these data are consistent with reference dependence - but only for losses, not gains.

Table 1.

Losses	Mean SWPP paid score /7	Gains	Mean SWPP paid score /7
\$20 loss from <u>\$200 reference level</u>	5.8	\$20 gain from <u>\$200 reference level</u>	8.0
Control group – no loss or gain	7.6	Control group – no loss or gain	7.6
\$20 loss from <u>\$100 reference level</u>	5.0*	\$20 gain from <u>\$100 reference level</u>	8.0
ANOVA: * SS from control group at $p<0.05$		Neither gain or loss statistically significant to control group	

Question 2. Losses hurt more than gains ?

Question 2 relating to loss aversion would be supported by the mean scores for losses exhibiting a larger difference to the control group satisfaction score, than the difference between the control group and the mean score for gains. I collapsed the smaller and larger losses together; and the smaller and larger gains together. The analysis compares pooled losses to pooled gains. The specific test was to examine the gap between the baseline and Loss SWPP; compared to the baseline and Gain SWPP. Results are shown in Table 2. The data are consistent with loss aversion.

Table 2. Losses Hurt More than Gains ?

Gains v Losses	Mean SWPP paid score /7	95% C.I.	Difference to control group mean
Gains from reference level	8.3	7.8 – 8.7	0.7
Control group	7.6	7.2 – 8.0	n/a
Losses from reference level	5.0*	4.2 – 5.7	2.6

ANOVA F=39; df 2,221, p=0.0001. * = statistically significant to control group at p<0.05

Question 3. Diminishing sensitivity

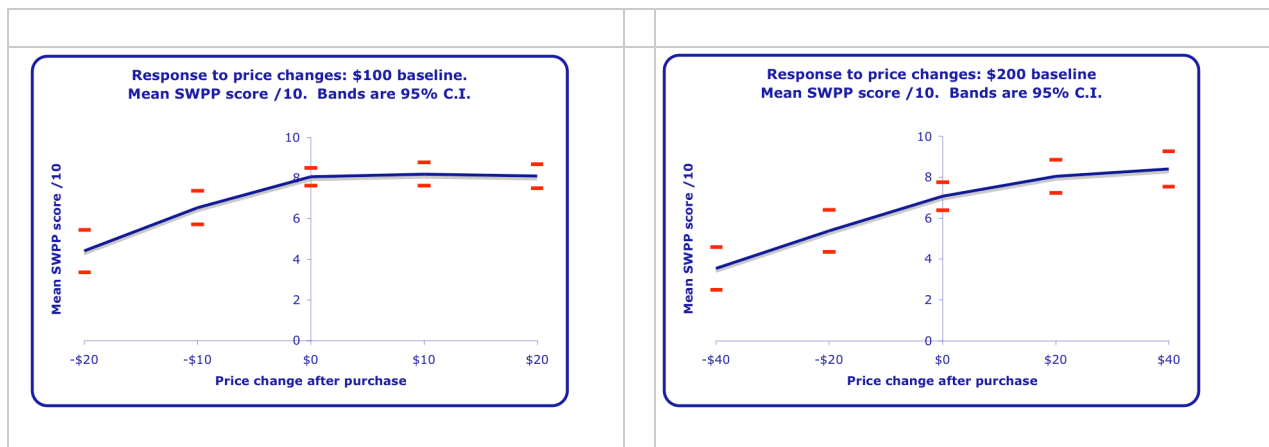
Consider the difference between the SWPP score for the control group and the score for small losses. Let this be D1. Let D2 be the difference between the score for small losses and the score for large losses. Diminishing sensitivity says that $D1 > D2$. The same should hold for comparing the effect of small gains and larger gains. I tested this by simply tabulating & graphing the means as well as running a one-way ANOVA to test for significant differences between the price change treatments. Diminishing sensitivity should show as a ‘kink’ in the lines at D1 where the slope would flatten. Results are shown in Table 3 and the graphs.

Table 3. Diminishing Sensitivity

Gains & Losses	\$100 baseline	differences	\$200 baseline	differences
Large loss from reference level	4.4	$D2=2.1$	3.5	$D2=1.9$
Small loss from reference level	6.5	$D1=1.6$	5.4	$D1=1.7$
Control (\$0 price change)	8.1		7.1	
Small gain from reference level (D1)	8.2	$D1=0.1$	8.0	$D1=0.9$
Large gain from reference level (D2)	8.1	$D2=-0.1$	8.4	$D2=0.4$

ANOVA F=23; df 4,164, p<0.001 ANOVA F=19; df 4,165, p<0.001

The results are graphed with associated 95% confidence intervals below for easier interpretation.



There is no evidence for diminishing sensitivity in the \$100 baseline treatment. There is for the \$200 treatment, but only for gains. Specifically, the difference between the score for the control to small gain score is 0.9 points, compared to a 0.4 point difference between small gain and large gain.

Summary and Conclusions

This study tested whether affective responses to hypothetical price changes would be consistent with the three tenets of 'prospect theory'. It found positive evidence for reference dependence, but only for losses. Positive evidence was found for loss aversion. There was also partial evidence of diminishing sensitivity for gains, but not losses. The results suggest that the absolute dollar losses or gains need to be more substantial than say, \$20 or \$40 for diminishing sensitivity to occur in affective responses. Prior work has found that estimates of loss aversion may be confounded with heterogeneity in price sensitivity. Further work of the type reported here could examine if respondents with different levels of price sensitivity respond differently to price change scenarios.

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