Some parallels and propositions from consumer behavior applied to the stock market

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ABSTRACT

The multiattribute model of consumer decision making and prospect theory have been used in studies of consumer behavior to explain buyer behavior, using reference prices. Extending some of these concepts to decisions in the stock market is possible. This is complicated however, since, stock buyers are investors not 'users', and buyers are also sellers in the stock market. This paper extends some of the concepts and ideas, from the area of pricing in consumer behavior to the field of behavioral finance. Variables that the article focuses on are stock price uncertainty, differences in investor behavior dependent on differing price review practices, and differences in investor behavior depending on the importance that investors place on recent price changes.

Keywords: Prospect theory, pricing, stock market, behavioral finance

INTRODUCTION

Kahneman and Tversky's (1979) prospect theory, proposes that people are impacted differently by gains and losses, dollar losses having a greater mental impact than equivalent dollar gains. Further, Kahneman and Tversky find that people under-weight outcomes that are merely probable in comparison with outcomes that are certain. Loss and risk aversion are examined in prospect theory, and Kahneman and Tversky (1979) suggest that people are risk averse in the context or 'domain' of gains but are comparatively risk seeking in the domain of losses. The S shaped value function used in prospect theory, describes value as a perception, defined in relation to perceived gains and losses relative to some natural reference point, reflecting the proposition that people respond to perceived rather than real changes (J.Kim, R.Rao, A.Rao, K.Kim 2011). The theory is used in describing and predicting behavior, rather than characterizing optimal behavior (Thaler, 1985). The loss domain has a steeper incline compared to the gains domain, reflective of individuals being more sensitive to losses than gains, and the shape conforms to the principal that successive gains and losses have diminishing impacts. A further implication of the S shaped value function is the proposition that segregated gains and losses have a greater impact (Mazumdar and Jun 1992; 1993) than integrated gains and losses; thus three gains or losses, of $10 each, have a greater impact than a single gain or loss of $ 30. As a consequence we tend to prefer segregated gains such as multiple discounts (to make them appear more) and integrate losses to make them appear less (eg. debt consolidation).

Framing is the way in which a problem is presented to an individual or is categorized and classified by the individual, and this influences decisions (Novemsky and Kahneman 2005). Decision makers often limit their approach to their individualized framing schema, and the answer to the problem is determined through this particular schema.

Every individual responds to problems differently because their emotions or experiences contribute to their framing process. For instance, if a price is considered too high by an individual, as compared to a personal standard of comparison a transaction will be framed as a 'loss,' on the other hand another individual, whose comparison price is much higher may frame the same transaction as a 'gain.'

Barberis and Huang (2001) focus on narrowly defined gains and losses in the stock market, using the term 'narrow framing' for investors who are loss averse over the fluctuations to individual stock that they own, as contrasted to those investors who are loss averse over the fluctuations to their entire stock portfolio. Barberis and Huang find the individual stock accounting framing perspective, rather than the portfolio accounting perspective, more effective in explaining empirical phenomena. Risk, in the stock market, is the chance that an investment's actual return will be different than expected. Probabilities of previous experiences will affect how the investor will respond to later events, since the impact of present gains or losses may be influenced by prior gains or losses. Tversky and Kahneman (1981) observe that their 1979 version of prospect theory was for 'one shot gambles' and further research is required to study sequences of gains and losses. Examining intertemporal gains and losses, if an individual has had many gains then a sudden loss may not be so detrimental since the prior gain has cushioned the one loss, but if there have already been prior losses the impact may be greater, as the buyer, is possibly, more sensitive to that particular loss. Thaler and Johnson (1990) found empirical evidence that after a gain on a prior gamble, people are more risk seeking than usual, while after a prior loss, they become more risk averse.

In this research the following sections develop a series of propositions based on the theoretical approach and inferences of prospect theory (Kahneman and Tversky, 1979).

COMPARISONS

The section: Compares a single stock price change to a dollar equivalent, multiple price change. Companies 'strategize' around the concepts of single and multiple impacts on the stock market. Should there be a 'single' major press conference announcing multiple achievements or should there be a sequence of positive press releases? Should the many elements of 'bad news' be released, once and for all, or should they be more subtly released in small bits to perhaps draw lesser attention? Such strategizing tends to have single or multiple stock price consequences.

In this article, the price increases or decreases are considered in (a) near contemporaneous contexts, for example, multiple price changes within a trading day (b) changes that take place over a longer period of time (say, three weeks). Further, it examines some factors that can impact the formation of the expected price of buyers: in terms of an application of prospect theory principles (Thaler 1985; Janiszewski and Cunha 2004) , this expected price may be regarded as a buyer's reference price, the neutral point around which the buyer assesses the potential purchase price of a stock as a 'gain' or a 'loss.' The concept of the value function is used here, where value represents the impact of a gain or loss, not its dollar amount. We assume the S shaped value function proposed by Kahneman and Tversky (1979), where the loss domain is steeper than the gains domain (as losses have a greater impact), and successive gains and losses have diminishing impacts.

DEVELOPMENT OF PROPOSITIONS AND HYPOTHESES

To compare the perceptual impact of a single stock price decrease to a 'near contemporaneous', dollar equivalent, multiple price decrease, consider a scenario where stock price falls by a dollar amount D (this is analogous to the product price research of Mazumdar and Jun, 1993). In terms of the market participant's value function (V_i) the decrease could be framed by the stock market participant in either of two distinct ways:

> Frame A: Under this psycho-schema or decision framing schema, the participant may view the price decrease as a gain of D. This assumption would be proximately valid for investors who view the stock price decreases as temporary, perceiving the stock price behavior as recursive, that is, the investor anticipates a price reversal in the long run.

> Frame B: Under this psycho-schema, the participant may view a price decrease as a loss. Where the market participant does not perceive a possibility of recursive behavior, falling prices will not be perceived as a 'merit of the deal,' (Thaler 1980), rather, they will be seen as indicative of future losses that may result, if the stock is purchased. The difference between prevailing price and prior price will be perceived as a loss. Of course the prior price may not be the 'exact' expected or reference price that would be viewed as the fulcrum or neutral point around which gains and losses are assessed; however this could be a close approximation.

We start by using the Frame A schema. Suppose there is a price decrease of $D.
The impact of the decrease in terms of the value function is denoted by:

$$V_1 = V(D)$$

The equivalent dollar decrease, D, could take place through a near contemporaneous, multiple decrease price movement involving decreases d_1, d_2, and d_3. The 'near contemporaneous' price decreases may take place over a very short period. Here, let us say, the decreases in terms of absolute dollar amounts, are:

$$d_1 + d_2 + d_3 = D$$

In the triple decrease structure there are three segregated gains d_1, d_2, and d_3. Now, in terms of the value function:

$$V_2 = V (d_1) + V (d_2) + V (d_3)$$
and,
$$V_2 > V_1$$

The equations apply since segregated gains are perceived as greater than, dollar equivalent, single gains. Prices could also decrease over a longer period of time, from the current price, P_0, over a period of, say, three weeks. The period of time implies that the market participant is 'getting used to and familiar with' the price changes and is adapting expectations to them. Let us assume the stock price decreases in dollar amounts equal to the decreases in the 'near contemporaneous' decrease scenario:

Now, if the initial price is P_0,
Price at the end of week 1 is $P_1 = P_0 - d_1$
Price at the end of week 2 is $P_2 = P_1 - d_2$
Price at the end of week 3 is $P_3 = P_2 - d_3$
And consequently, $P_3 < P_2 < P_1 < P_0$,

If the consumer experiences a downward trend in prices, then in keeping with the reasoning of adaptation level theory (Helson, 1964), reference prices will decrease in every period, as long as the consumer perceives the monotonically decreasing trend and adapts to it, or incorporates the price changes into the moving reference or 'neutral' prices. If R refers to reference price, then:

$$R_3 < R_2 < R_1 < P_0.$$

In the case of price decreases over time, the value from segregated gains is:

$$V_3 = V(R_1 - P_1) + V(R_2 - P_2) + V(R_3 - P_3)$$

In the contemporaneous triple discount structure, there were three segregated gains: d_1, d_2, and d_3. If we postulate that reference prices are positively related to prices, then for a monotonic decrease in prices, reference prices shall decrease monotonically. In the case of the price decreases considered:

$$R_1 - P_1 < d_1$$

This is so, as R_1 is $< P_0$ since the reference price R_1 has adapted over time in the downward direction; also, d_1 is only the difference between P_0 and P_1 since the comparison is of a situation where the price changes over time are equal to the near contemporaneous decreases.
Similarly, as subsequent reference prices adapt in the downward direction:

$$R_2 - P_2 < d_2 \ \ (as \ R_2 < R_1)$$
$$R_3 - P_3 < d_3 \ \ (as \ R_3 < R_2)$$

And hence we state:

(I) $\qquad$ $V (d_1) + V (d_2) + V (d_3) > V (R_1 - P_1) + V (R_2 - P_2) + V (R_3 - P_3)$

Comparing the multiple contemporaneous discounts to a single dollar equivalent discount, based on the prospect theory principle that multiple gains have greater value than dollar equivalent single gains, we state:

(II) $\qquad V(d_1) + V(d_2) + V(d_3) > V(D)$

The first equation (I) implies that if stock price successively decreases by amounts equal to the three near contemporaneous decreases we have considered, but these decreases are over time, say three months, then this time factor permits adaptation. Now, a new set of reference prices R1, R2, R3 are formed. In this scenario, the segregated 'near contemporaneous' Value is greater than the Value that obtains over the three month period.

The second equation (II) implies that if we compare a set of near contemporaneous segregated price decreases d1, d2, d3, to a single decrease of the same dollar amount, D, then according to prospect theory's postulates, the decision maker will perceive the segregated decreases as greater than the single decrease of the same dollar amount.

However, even if we integrate (I) and (II), it is only possible to infer that perceived gains through the successive price decreases over a substantial period of time, <u>may or may not</u>, carry a greater value, than a single price decrease.

From (I) it can be seen, that, for the intertemporal three week price decrease situation considered, the lower the reference prices over time, the lower the value (along the value function) from segregated gains. Analogously, if we consider price increases, then, the higher the reference prices over time, the lower the absolute value of segregated losses. In other words, for monotonic price increases and decreases, the closer the adaptation of reference prices, to the most recent price change, the lower the impact of segregation or multiple price changes compared to a single price change.

If we make a similar analysis using Frame B, i.e. the schema where a market participant perceives price decreases as 'losses,' then, since the participant does not foresee any recursive price behavior, the conclusions will again be similar. If the decrease is near contemporaneous, and hence reference prices have a lesser possibility of adapting, (or since they adapt inadequately), then, the impact (Value) of the three price decreases shall be greater than if the decreases were spread over time (three months in the example.) Of course here the impact on the mind is the perceptual impact of loss/es as they 'loom' in the mind of the market participant. Further, as before, the impact of the single price decrease will be less than that of three decreases.

In the case of multiple price changes, the closer the adaptation of reference prices to the most recent price change the lesser the impact of the multiple price changes. Whether this impact shall be negative or positive in terms of demand for the stock shall depend on the Frame or psycho –schema or decision schema of the individual market participant.

We postulate, that, the greater the number of price reviews by a market participant the closer is reference price adaptation to price changes (by price reviews we are referring to information searches and reviews by a market participant where the participant sights or observes the price of a stock). This follows from adaptation level theory where the subject adapts the standard of reference based on previous experiences. It is not necessary for the consumer to make a purchase on each occasion, as the consumer may make a decision to not buy. Even if the consumer ultimately decides to not purchase the product/stock, the process of review and

consideration implies a certain elaboration, and depth of processing. This is supported by Craik and Lockhart's (1972) depth of processing theory which holds that memory improves if processing takes place at a deeper level. The actual process of purchase decision making would appear to be a deeper level of processing than, say, mere observation of price histories, yet both involve retention and processing.

The reference price employed by a decision maker is an outcome of both conscious and unconscious factors. For instance, the consumer may consciously like to give a certain amount of importance to the last price paid, or the last few purchase choices he has made. On the other hand, part of the reference price formation process is *unconscious*, particularly as it is dependent on what is retained in memory. Hence forgetting becomes a factor in reference price formation. Two basic hypotheses regarding forgetting are the decay and interference hypotheses. The decay hypothesis asserts that memories weaken with time and are therefore harder to retrieve. The interference hypothesis claims that competition from other memories blocks retrieval of a target memory (Anderson, 1994). External cues and related memory formation may be viewed as interference to the formation of internal reference prices, and would influence what is available in working memory for the formation of these reference prices. In this article the proposed focus is on internal processes. This can be effectively done by using the concept of 'number of price reviews' as a variable, rather than time.

To summarize, on the basis of adaptation level theory, we postulate:

1. The greater the number of price reviews at a particular price, the closer reference price adaptation is to that price.
2. The closer the adaptation of reference price to the most recent price change, the lower the impact of segregation, or multiple price changes, when compared to a single price change.

On the basis of the foregoing arguments the following hypothesis is proposed:

Hypothesis 1

The greater the number of price reviews by a market participant between successive price changes, the smaller the changes in demand for the stock, for scenarios where prices change through multiple price changes, compared to a dollar equivalent single price change.

WEIGHT ASSIGNED TO PAST PURCHASE EXPERIENCES

Adaptation level theory (Helson, 1964) views the concept of adaptation level as a moving point that continually adjusts in order to integrate newly acquired stimulus information, as a result of previous exposures to a class of stimulants. Reference prices have been treated as adaptation levels, and extensively viewed as weighted averages of previous price exposures. For instance, Winer's (1986) extrapolative model derives reference price as a weighted average of the previous two period's price, Raman and Bass (1987) use a time series model of past prices, Gurumurthy and Little's (1987) adaptive expectations approach treats reference price as an exponentially decaying weighted average of all past prices. The next factor our hypotheses focus on is 'weight assigned to past price reviews.' The weight assigned to different purchase experiences and to more recent price histories can also depend on the type of consumer; price

knowledgeable and price conscious market participants may give greater weight to more recent price reviews, compared to other cues.

Assigning a greater weight to more recent price reviews or recent price histories implies that such a consumer adapts faster to the most recent price changes. Integrating this with the principal developed earlier, that is, 'the closer the adaptation of reference price to the most recent price change, the lower the impact of segregation, or multiple price changes, when compared to a single price change,' the following hypothesis is proposed:

Hypothesis 2

The greater the weight given to more recent price reviews by the market participant, in reference price formation, compared to the price reviews of earlier periods, the lesser the change in demand from a scenario of multiple price increases, compared to a single equivalent increase.

STOCK PRICE UNCERTAINTY

Research (Lichtenstein et al, 1988; Mazumdar and Jun, 1993) indicates that higher price uncertainty is associated with wider, as well as, higher levels of latitudes of acceptance in the minds of consumers. When consumers are uncertain of prices the latitudes of acceptance are wider (Sorce and Widrick, 1991; Rao and Sieben, 1992), and this uncertainty can be caused by reasons such as infrequent price reviews by a market participant, limited media publicity regarding price movements for a particular stock, insufficient pre purchase information search, insufficient processing of price information, high variability in market prices (Winer, 1986) etc. Further, the level of the central tendency of the range of price acceptability has been found to be higher as well (Urbany and Dickson, 1991; Mazumdar and Jun, 1992; 1993). Mazumdar and Jun find that the widening of the range of price acceptability, because of price uncertainty, is caused primarily by the upward displacement of the upper limit of acceptable prices, rather than a shift in the lower limit of acceptable prices. The overall effect is a rise in the central tendency of the range of acceptable prices.

Price uncertainty is thus associated with higher levels in the central tendency of latitudes of acceptance, and it may be assumed that this implies a rise in reference prices. Reference prices are frequently computed as an average of the upper and lower limits of the latitudes of acceptance.

Frame A market participants: Higher reference prices, in a high price uncertainty situation, would mean that in the context of multiple price increases, the impact of perceived losses from multiple price increases would be less than in the greater price certainty situation. Hence for Frame A market participants, in the high uncertainty context, the market mood shall be less negative which may also be referred to as more positive than in the certain scenario. In multiple price decrease situations, the high uncertainty-high reference price scenario, would mean higher perceived gains, and therefore a greater positive impact on market sentiment and stock demand, compared to the price certain scenario.

Frame B market participants: Higher reference prices, in a high price uncertainty situation, would mean that in the context of multiple price increases, the impact of

perceived gains from multiple price increases would be less than in the price certain situation. Hence for Frame B market participants in the high uncertainty context, the market mood or sentiment shall be more negative than in the certain scenario. In multiple price decrease situations, the high uncertainty-high reference price scenario, would mean higher perceived losses, and therefore a more negative market sentiment, compared to the price certain scenario.

Hypothesis 3

(a) For buyers who frame price increases as possible losses [Frame A], compared to a price certain situation, in a situation of high price uncertainty, multiple small price increases shall lead to more positive market sentiments
(b) For buyers who frame price increases as possible gains [Frame B], the price uncertain situation will be associated with more negative market sentiments than the price certain scenario.

Hypothesis 4

(a) For market participants who frame price decreases as possible gains [Frame A]: compared to a price certain situation, in a situation of high price uncertainty, multiple small price decreases in stock price shall lead to more positive market sentiments.(b) For buyers who frame price decreases as possible losses [Frame B], the price uncertain situation will be associated with more negative market sentiments than the price certain scenario.

Further Research

This research leads us towards interdisciplinary integration of research in behavioral finance, buyer behavior modeling, the multiattribute-prospect theory approach, reference pricing and framing and decision schema analysis. It opens up parallels in marketing and finance between internal and external cues, extrinsic reference prices and market signals in the stock market. While this research requires a stock market simulation for empirical validation, it provides a starting point for interdisciplinary approaches.

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